Institute for Economic Studies, Keio University

Keio-IES Discussion Paper Series

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20 November, 2017
DP2017-027
https://ies.keio.ac.jp/en/publications/8630/

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On the Demand for Female Workers in Japan: The Role of ICT and Offshoring*

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Abstract

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*We thank Shigeyuki Abe, Sarra Ben Yahmed, Yukiko Ito, Naoto Jinji, Sung-Chun Jung, Ayako Obashi, Fumio Ohtake, Tsunehiko Otsuki, seminar participants at Kobe University and Osaka University, and participants of Asian Economic Panel Keio Meeting, EHESS–Keio conference on globalization and labor market outcomes, the JAE Meeting and the JSIE Meeting for their helpful comments. We are grateful to Tatsuji Makino for providing us with the disaggregated JIP labor data and to Taiji Hagiwara and Kozo Miyagawa for providing us with dataset of the Japanese input-output tables. Kiyota gratefully acknowledges financial support received from the MEXT-Supported Program for the Strategic Research Foundation at Private Universities. Kiyota gratefully acknowledges financial support received from the JSPS Grant-in-Aid (JP16H02018, JP26285058). The usual disclaimers apply.

1 Introduction

Sustaining labor force is one of the main concerns for many developed countries. Accordingly, raising female labor participation is becoming an issue for policy makers because it can help avoid looming labor supply shortages. In Japan, the focus of this study, the female labor participation is a key policy agenda of the current administration. In 2014, the female labor participation rate, at 71.8 percent for age 25–54, is 20 percentage points below that of men and is ranked 24 out of 33 OECD countries (OECD, 2015a, Table B).[1] According to the OECD (2015b) estimates, "if the female participation rate were to converge to those of men by 2030, the labour supply would decline by only 5%, increasing GDP by almost 20% compared with unchanged participation rate" (p.15). Indeed, Japanese Prime Minister Shinzo Abe put his priority on the female labor participation as an important policy agenda, which was called Abe's Womenomics.[2]

Several studies have addressed the issue of the female labor participation in Japan. Our study closely relates to the following strands of studies. The first strand focuses on the supply side, asking what factors prevent the female labor participation. For example, Akabayashi (2006) examined the determinants of labor supply of married women, focusing on the effects of the spousal deductions. In Japan, the deductible amount from the income of the primary earner (married men in most households) decreases, as the income of spouse (usually married women in most households) increases. It thus is widely believed that this tax system makes married women work for limited days in order to reduce their partner's income tax. Using household-level data for 1995, his study found that the spousal deductions had significantly larger effects on the supply of married women than those from their own income tax. The results suggest that the tax system affects the supply of married women. In contrast, Sasaki (2002) focused on the family structure. Using individual-level data (a sample of 1,500 women aged between 23 and 34 years old) in 1993, his study found that the co-residence with one's own parents or parent in-laws had a positive effect on the labor force participation of married women. The result suggests that the decrease in the burden of household work from living with their parents or parent in-laws helps increase the probability of labor force participation of married women.

The second strand of the literature asks why there exists a large wage gap between female and male workers in Japan. For example, Miyoshi (2008) examined the gender wage gap, using individual-level panel data in Japan. Estimating wage functions for female and male workers, his study found that the difference in the experiences as a full-time worker between female and male workers was one of the most important

[1] Data for Czech Republic in 2014 are not available in OECD (2015a).

[2] "Mr. Abe has made "womenomics" a core part of his "Abenomics" policies, in the hope that bringing more women into the workforce will raise Japan's growth potential" the *Financial Times* on December 7th, 2015.

factors in explaining the gender wage gap in Japan. Kawaguchi (2007) estimated the determinants of the firm growth, focusing on the gender composition of workers. Using firm-level data, his study found that, although hiring more female workers resulted in the higher profit of the firms, its effect was economically small. The result implies that the major determinant of gender wage is attributed to the gender productivity gap, rather than gender discrimination.

These strands of studies have made significant contributions to the literature. However, none of these studies focused on the effects of skill-biased technological change in discussing the female labor participation. Skill-biased technological change, due to the use of the information and communication technology (ICT) such as computers and other high-tech equipment, can increase the demand for female workers. For example, skill-biased technology may change physically demanding tasks to less physically demanding tasks. This implies that the demand for female workers relative to male workers would increase as a result of technological change. Indeed, using the data from the Current Population Survey in the United States, Weinberg (2000) found that increases in computer use accounted for more than half of the growth in demand for female workers.[3]

Note also that globalization could narrow the gender wage gap, which is pointed out by the third strand of the studies. For example, increased product market competition will drive out costly discrimination (Becker, 1957). Increasing competition from foreign countries thus will force firms to reduce their market power in an industry, which results in the reduction of discrimination and the increase in the relative wages and employment of female workers in that industry. Indeed, several empirical studies found that international trade helped in narrowing the gender wage gap.[4] However, these studies focused on neither the effects of offshoring nor those of ICT, even though both offshoring and ICT have been expanding during the last three decades.[5]

The fourth strand of the literature examines the effects of ICT and offshoring on skill demand. As is well known, offshoring has qualitatively the same effect as the skill-biased technological change.[6] The increase in

[3]Similarly, using the data from West Germany, Black and Spitz-Oener (2010) found that the technological change contributed to the women's task change: from routine to non-routine tasks. The change explains a large fraction of the closing of the gender wage gap.

[4]See, for example, Black and Brainerd (2004) for the case of the United States; Chen et al. (2013) for the case of China; Juhn et al. (2014) for the case of Mexico. In this connection, Sauré and Zoabi (2014) and Gaddis and Pieters (2017) examined the effects of trade on the female labor participation in the United States and in Brazil respectively, while Do et al. (2016) analyzed the effects of trade on fertility for 146 countries.

[5]The trends of offshoring and ICT will be discussed in Section 3.2.

[6]For the detailed explanations about the relationship between offshoring and skill-biased technological change, see Feenstra (2010).

the demand for female workers can be attributable to either skill-biased technological change or offshoring (or both). Determining which of these explanations accounts for the changes is an empirical question. Therefore, a number of studies such as Hijzen et al. (2005) and Kiyota and Maruyama (2017) examined the effects of ICT and offshoring on the skill demand in the trade literature. Interestingly, however, none of the studies on ICT and offshoring has taken into account the difference between female and male workers.

Building upon these strands of literature, this paper studies the effects of ICT and offshoring on female labor demand for manufacturing industries in Japan.[7] One of the contributions of this paper is to shed light on the role of ICT and offshoring as determinants of female labor demand. This paper thus reveals new aspects of the female labor participation. To address this issue, we estimate a system of labor demands, controlling for the effects of skill-biased technological change and offshoring simultaneously. This framework was first proposed by Hijzen et al. (2005) who examined skill demand in the United Kingdom. Following the methodology by Hijzen et al. (2005), our companion paper, Kiyota and Maruyama (2017), examined the skill demand in Japan. However, the difference between female and male workers was unexplored by Kiyota and Maruyama (2017). This paper extends these studies to examine the demand for female workers.

Why is it important to examine the determinants of skill demands by gender? It is because the distribution of skill type of workers is different between male and female workers. For example, the share of female workers in part-time workers was 73% in 1988 at its peak, and 57% in 2011 which is our latest figure (see Figure 2 below). These figures are much higher than the share in other workers types. Moreover, industries with higher share of part-time workers tend to indicate higher share of female workers. Figure 1 shows the relationship between the share of female workers and the share of part-time workers by industry in 2011. The correlation coefficient of these two variables was 0.687, which suggests that labor demands on part-time workers may reflect labor demands on female workers. Therefore, we need to separate effects on labor demand by gender as well as by skill.[8]

=== Figure 1 ===

The rest of the paper is organized as follows. Section 2 describes the empirical framework. Section 3

[7]We focus on manufacturing in this paper due to the following two reasons, even though we recognize the importance of services offshoring (Amiti and Wei, 2005). First, offshoring in the manufacturing sector has developed widely and already been observed in the 1980s, while offshoring in services is rather a new phenomenon which started to develop with ICT technology in the 1990s (UNCTAD, 2011, p.137). Second, the JIP Database is not fine enough to zoom in on those services that are heavily offshored, such as consultancy and accounting services. We also recognize the importance of analyzing services for gender issue. Analyzing services is a key question for future research.

[8]In Kiyota and Maruyama (2017), ICT capital stock affected the demand for part-time workers positively, whereas the effect of offshoring was insignificant.

explains the data used in this paper. Section 4 presents the estimation results. A summary and concluding remarks are presented in Section 5.

2 Econometric Methodology

2.1 Model

Let i be the index of industry $(i = 1, ..., N)$; j be the index of factor $(j = 1, ..., J)$; k be the index of fixed input or output $(k = 1, ..., K)$; and r be the index of the proxy for technological change $(r = 1, ..., R)$. For the ease of presentation, we omit time subscript t, unless otherwise noted. As in Berndt (1991), assume that the industry cost function can be represented by a translog form, which is twice differentiable, linearly homogenous, and concave in factor prices. The cost function of industry i, C_i, can be represented as follows:

$$\begin{aligned}
\ln C_i(w,x,z) &= \alpha_0 + \sum_{j=1}^{J} \alpha_j \ln w_{ij} + \sum_{k=1}^{K} \beta_k \ln x_{ik} + \sum_{r=1}^{R} \gamma_r z_{ir} \\
&+ \frac{1}{2}\sum_{j=1}^{J}\sum_{s=1}^{J} \alpha_{ij} \ln w_{ij} \ln w_{is} + \frac{1}{2}\sum_{k=1}^{K}\sum_{l=1}^{K} \beta_{kl} \ln x_{ik} \ln x_{il} + \frac{1}{2}\sum_{r=1}^{R}\sum_{q=1}^{R} \gamma_{rq} z_{ir} z_{iq} \\
&+ \frac{1}{2}\sum_{j=1}^{J}\sum_{k=1}^{K} \delta_{jk} \ln w_{ij} \ln x_{ik} + \frac{1}{2}\sum_{j=1}^{J}\sum_{r=1}^{R} \delta_{jr} \ln w_{ij} z_{ir} + \frac{1}{2}\sum_{k=1}^{K}\sum_{r=1}^{R} \delta_{kr} \ln x_{ik} z_{ir},
\end{aligned} \tag{1}$$

where w_{ij} is factor price for factor j in industry i; x_{ik} is fixed input or output k in industry i; z_{ir} is exogenous factor r such as technological change.

For a cost function to be well behaved, assume further that the cost function is homogeneous of degree one in prices for a given output. This implies the following restrictions:

$$\sum_{j=1}^{J} \alpha_j = 1 \text{ and } \sum_{j=1}^{J} \alpha_{js} = \sum_{s=1}^{J} \alpha_{sj} = \sum_{j=1}^{J} \delta_{jk} = \sum_{j=1}^{J} \delta_{jr} = 0. \tag{2}$$

Without loss of generality, symmetry implies $\alpha_{js} = \alpha_{sj}$. Let v_{ij} be the variable input j in industry i. Differentiating the translog cost function with respect to factor prices, we have the cost share of factor j in total variable costs:

$$S_{ij} = \alpha_j + \sum_{s=1}^{J} \alpha_{js} \ln w_{ij} + \sum_{k=1}^{K} \delta_{jk} \ln x_{ik} + \sum_{r=1}^{R} \delta_{jr} z_{ir}, \tag{3}$$

where $S_{ij} = \partial \ln C_i / \partial \ln w_{ij} = (w_{ij}/C_i)(\partial C_i / \partial w_{ij}) = w_{ij} v_{ij} / C_i$ and $\sum_{j=1}^{J} S_{ij} = 1$.

Adding time subscript t and error term μ_{ijt} and taking into account the industry-factor specific fixed effects α_{ij}, the regression equation is written as:[9]

$$S_{ijt} = \alpha_{ij} + \sum_{j=1}^{J} \alpha_{js} \ln w_{ijt} + \sum_{k=1}^{K} \delta_{jk} \ln x_{ikt} + \sum_{r=1}^{R} \delta_{jr} z_{irt} + d_{jt} + T_{jt} + \mu_{ijt}. \tag{4}$$

Following Hijzen et al. (2005) and Kiyota and Maruyama (2017), we use labor inputs as well as intermediate inputs as variable factors. The detailed classification of labor inputs is defined in the next section. For fixed inputs x_{ikt}, we use the non-ICT capital stock. For z_{irt}, we utilize offshoring and the ICT capital stock. One way to control for the supply side effects such as the declining supply of junior-high school graduates is using instrumental variable methods, however, it is difficult to employ such a method in the seemingly unrelated regressions (SUR) model which we use in this analysis. We, therefore, include time dummies and factor-specific time trends. A full set of time dummies d_{jt} is included to capture the economy-wide technological change over time. Factor-specific time trend T_{jt} is also included to control for some of the effects of factor j involving supply side effects.[10]

2.2 Elasticities

Without loss of generality, we remove industry subscript i and time subscript t for the ease of exposition. The cost share of factor j is written as S_j. The elasticity of factor demand j with respect to a change in factor prices is:

$$\varepsilon_{js} = \frac{\partial \ln v_j}{\partial \ln w_s} = \frac{\hat{\alpha}_{js}}{S_j} + S_s - \phi_{js}, \tag{5}$$

where $\phi_{js} = 1$ if $j = s$ and $\phi_{js} = 0$ if $j \neq s$, $\sum_{j=1}^{J} \varepsilon_{js} = 0$, and $\hat{\alpha}_{js}$ is an estimated parameter value in equation (4). The elasticity of factor demand j with respect to a change in non-ICT capital stock or output is:

$$\varepsilon_{jk} = \frac{\partial \ln v_j}{\partial \ln x_{sk}} = \frac{\hat{\delta}_{jk}}{S_j}, \tag{6}$$

9 We assume that the industry-factor specific fixed effects are time-invariant. Industry characteristics can be time-variant, however, we cannot introduce time-variant industry effects in our estimation because it corresponds with residuals. To apply time variance, variables which indicate industrial characteristics need to be identified. We leave it in our future study.

10 We also assume that these variables explain the shift of the demand curve: the shift of the intercept can be controlled for by year dummies and/or trend variables.

where $\sum_{j=1}^{J} \varepsilon_{jk} = 1$ and $\hat{\delta}_{jk}$ is an estimated parameter value in equation (4). The elasticity of factor demand with respect to skill-biased technological change due to offshoring is:[11]

$$\varepsilon_{jr} = \frac{\partial \ln v_j}{\partial z_r} = \frac{\hat{\delta}_{jr}}{S_j}, \tag{7}$$

where $\sum_{j=1}^{J} \varepsilon_{jr} = 1$ and $\hat{\delta}_{jr}$ is an estimated parameter value in equation (4).

3 Trends in the Labor Market, ICT, and Offshoring in Japan

3.1 Data

Outputs and inputs

Data on outputs, inputs, and their prices are obtained from the Japan Industrial Productivity Database 2014 (JIP Database 2014), which was compiled as part of a research project at the Research Institute of Economy, Trade and Industry (RIETI). The database is constructed to estimate total factor productivity (TFP). It includes detailed information on sectoral outputs, inputs, and their prices. The database runs annually from 1970 to 2011, consisting of 52 manufacturing and 56 nonmanufacturing industries.[12]

From the JIP Database 2014, we use gross outputs, ICT capital stock, non-ICT capital stock, intermediate inputs, labor inputs, and labor costs.[13] In the JIP Database, the ICT capital stock is estimated following the guidelines of the OECD. The ICT capital stock consists of 39 assets such as electric computing equipment, wired and radio communication equipment, and applied electronic equipment.[14] Other assets are classified as non-ICT capital stock. All of these variables are valued at constant prices (year 2000). We

[11] Following Hijzen et al. (2005), we call ε_{jk} and ε_{jr} as elasticity.

[12] The database is downloadable from `http://www.rieti.go.jp/en/database/JIP2014/index.html`. For more details about the JIP Database see Fukao et al. (2007).

[13] ICT capital stock and non-ICT capital stock are used as fixed inputs because the user cost of capital is not available by the type of capital. Besides, it is common to assume that capital is a (quasi-)fixed input in estimating a production function. See, for example, Kiyota et al. (2009) and Dobbelaere et al. (2015) for the case of Japanese firms. We checked the correlation between ICT capital stock and non-ICT capital stock and found that it was 0.6878. The positive coefficient suggests that there is no substitutive relationship between ICT and non-ICT capital stock.

[14] Because the JIP Database follows the coverage of the System of National Accounts 1993, own-account software and prepackaged software are not included in ICT capital stock.

also obtain nominal intermediate inputs from the database to compute the cost shares.

The labor inputs consist of the following six categories: 1) university graduates or higher; 2) college graduates; 3) high school graduates; 4) junior high school graduates; 5) part-time workers; and 6) self-employed workers. The educational level of the last two categories is not available. We exclude self-employed workers from the analysis. The reason is that self-employed workers are employers rather than employees. It is not clear whether the demand for employers can be estimated in the same framework as the demand for employees. In the JIP Database, the part-time workers are defined as the workers whose average number of hours worked in a week is less than 35 hours.[15] The labor costs are the sum of monthly wages plus bonuses. The average wages are obtained from the labor costs divided by the product of the number of workers and hours worked.[16]

Figure 2a and 2b present the shift in average wages of five worker categories for female workers and for male workers, respectively. From these figures, it is obvious that wages tend to be higher for workers with higher educational background. At the same time, these figures indicate that wages for part-time workers are lowest for both genders. In addition, some differing trends are observed between male and female workers. Among female workers, there are clear wage gaps between worker categories. Meanwhile, wages of male college, high school, and junior high school graduates stay at the same level in the long term, although the wages of male junior high school graduates begin to decline in the 2000s. On the ground of these findings, we employ different classification of labor input by gender.

=== Figure 2a ===

=== Figure 2b ===

Labor inputs of both male and female workers are classified into the following four skill groups: 1) High skilled workers; 2) Middle-high skilled workers; 3) Middle-low skilled workers; and 4) Low skilled workers. Our classification is based on the wage level. We assume that workers with higher skills can obtain higher wages. Concerning 3) and 4), the same definitions are applied for both genders: middle-low skilled workers are defined as junior high school graduates, and low skilled workers are defined as part-time workers.[17]

[15]The coverage of the non-regular workers is wider than that of the part-time workers because some of the non-regular workers works more than 35 hours per week.

[16]In the JIP Database, the wage of male part-time workers is computed from that of the female part-time workers. This in turn implies that there is basically no wage difference between female and male part-time workers in the JIP Database.

[17]In general, firms assign jobs that require less skills to part-time workers than full-time workers. For more detail, see Kiyota and Maruyama (2017). One may argue that we exclude part-time workers because they

Different categories are applied for 1) and 2) by gender. For male workers, university graduates are classified into high skilled workers, whereas college and high school graduates are classified into middle-high skilled workers. This classification is based the on wage differences shown in Figure 2b.

For female workers, university and college graduates are classified into high skilled workers, whereas high school graduates are classified into middle-high skill workers. The reason of uniting female university and college graduates is twofold. First, the share of female university graduates is fairly small to form one group; it accounts for 0.9 percent of total female workers in 1980, and for 6.8 percent even in 2011. Second, we emphasize an involvement in different job assignments by educational background. According to the School Basic Survey conducted by the Ministry of Education, Culture, Sports, Science and Technology in 1980 for all industries, 12.9 percent of female high school graduates were involved in the manufacturing process when they found work after finishing school, whereas 0.4 percent of college graduates and 0.6 percent of university graduates were involved in the same process.[18] This structure stays unchanged in 2011; the share of female workers involved in the manufacturing process is 22.7 percent of high school graduates, 0.8 percent of college graduates, and 0.2 percent of university graduates. The fact that high school graduates tend to be involved more in the manufacturing process than university or college graduates indicates that there is a qualitative difference between high school graduates and college/university graduates. Indeed, compared with our companion study (Kiyota and Maruyama, 2017), this paper can take into account the relationship between skill and education level in a more precise way in distinguishing the gender difference.

Figure 3 presents the share of female workers by skill group.[19] Three findings stand out from this figure. First, the share of female workers in total workers does not necessarily increase over the period. It was 33 percent in 1970 and increased to 36 percent in 1990. It then gradually decreased to 29 percent in 2011. Second, the share of low skilled female workers increased until early 1990s and then declined afterwards with some fluctuations.[20] The share of female workers was 65 percent in 1970, 71 percent in 1990, and 57 percent in 2011. Finally, the share of high skilled female workers increased steadily although it showed a slight decline in the late 2000s. The share of female high skilled workers increased from 10 percent in 1970 to 24 percent in 2004 of its peak and then slightly declined to 21 percent in 2011.

=== Figure 3 ===

consist of workers who have different educational backgrounds. As we will see below, the share of part-time workers in total female workers is non-negligibly high. Therefore, we keep this category in our baseline analysis. We, however, exclude this category as a robustness check in Section 4.2.

[18] Data for manufacturing is not available.

[19] Table A1 presents the share of female workers between 1980 and 2011 by industry.

[20] Table A2 presents the share of part-time workers between 1980 and 2011 by industry.

Figure 4 indicates the average female wages relative to average male wages by skill group. This ratio equals to unity when there is no gender wage gap. Major findings are twofold. First, the gender wage gap of high skilled workers declined steadily from 0.47 in 1970 to 0.60 in 2011. Second, the gender wage gaps of middle-high and middle-low skilled workers were almost constant. In 1970, it was 0.53 and 0.50 for middle-high and middle-low skilled workers respectively, and remained almost the same level until 1990. Then the gaps improved to 0.59 and 0.55, respectively, in 2011.

=== Figure 4 ===

Figures 3 and 4 indicate that the changes in the share of female workers and the gender wage gaps were modest. However, the skill structure of female workers changed significantly over the period. Figure 5a indicates the disparities in average female wages per hour across skill groups in 1980 and 2011. The share of each group in the female labor force is represented by a length of the horizontal line segment. The average hourly wage is indicated in a vertical position.

=== Figure 5a ===

We highlight two results from Figure 5a. First, the shares and the increases for high and low skilled female workers are remarkably large. The share of high skilled workers grew from 3.9 percent to 16.0 percent between 1980 and 2011, while that of low skilled workers grew from 17.5 percent to 36.5 percent. Moreover, in 2011, the share of low skilled workers was more than twice as much as that of high skilled workers. This suggests that the size of low skilled part-time workers is not negligible in the employment of female workers in Japanese manufacturing. Excluding this group makes it difficult for us to describe the overall picture of manufacturing. Second, the wage level of low skilled workers is low. Although part-time workers have different educational backgrounds, the wage level is the lowest among these four categories.

Figure 5b presents the same figure as Figure 5a for male workers. We find a similar tendency to those of female workers presented in Figure 5a. That is, overall shares and the increases in shares over time for high and low skilled workers are remarkably high, although the share of low skilled workers is much smaller in male workers than female workers.

=== Figure 5b ===

Offshoring

The offshoring is computed using import-use matrices of input–output tables for manufacturing industries between 1980 and 2011.[21] The input–output table is available every five years between 1980 and 2005, and 2011. Unlike Michaels et al. (2014) who applied the US import-use matrix in 1987 to other countries in other years, we allow the import-use matrix to change over the period.[22]

There are two types of offshoring in the literature. One is the narrow offshoring $S^N_{O,it}$ and the other is the broad offshoring $S^B_{O,it}$. The narrow offshoring is defined as the imported intermediate inputs in an industry i from the same industry (which corresponds to diagonal terms of the import-use matrix) divided by the industry i's tradable intermediate inputs M_{ijt}:

$$S^N_{O,it} = \frac{O_{ii,t}}{\sum_{j=\text{tradables}} M_{ijt}}, \tag{8}$$

where $O_{ii,t}$ stands for imported intermediate inputs in industry i in year t only; and M_{ijt} is intermediate inputs from industry j to industry i in year t.[23] Tradable intermediate inputs mean both domestic and imported intermediate inputs from agricultural and manufacturing industries.[24] Feenstra and Hanson (1999) referred to this measure of offshoring as the narrow measure of offshoring.[25]

[21] The construction of the import-use matrices is explained in the Appendix of Kiyota and Maruyama (2016). We focus on the imports of intermediate goods in order to capture trade flows in global value chains. Feenstra (2010) defines that offshoring consists of two types of foreign production which shapes a part of global value chains: in-house foreign production by multinationals and foreign outsourcing. Imports of intermediate goods are accompanied with these foreign productions. Note that the imports of final goods are not included because it is difficult to distinguish imports due to offshoring from imports due to other reasons such as direct consumption by household sector. Note also that exports of intermediate goods from Japan are excluded, although they constitute a part of offshoring. Since information of exports of intermediate goods is not available from input–output tables, we leave it to our future study.

[22] Note that the import-use matrix is not available in every year in many countries. Some studies such as Hijzen et al. (2005) and Ahn et al. (2008) employed linear extrapolation (or interpolation) for the missing years to fill the gaps. In this paper, however, we do not employ the linear extrapolation (or interpolation). The changes in imports seemed to be non-linear because the missing years include such years as the Asian financial crisis in 1997 and the global financial crisis in 2008–09.

[23] Note that there is a slight abuse of notation where both i and j stand for industries. To maintain the consistency, M_{ijt} stands for the imported intermediate inputs from industry j to industry i, which is opposite from the standard notation in the input–output analysis.

[24] For some industries such as Seafood products and Livestock products, inputs mainly come from agricultural industries. If we focus on manufacturing intermediate inputs for M_{ijt}, these industries tend to show high offshoring index because their manufacturing inputs are low. In the baseline model, therefore, we take into account agricultural intermediate inputs. To check the robustness of our results, Section 4.2 utilizes different measures in the denominator.

[25] Strictly speaking, Feenstra and Hanson (1999) utilized non-energy intermediate inputs for the denominator.

The broad measure is defined as all the imported intermediate inputs in an industry i divided by the industry i's total tradable intermediate inputs:

$$S^B_{O,it} = \frac{\sum_{j=1}^{J} O_{ijt}}{\sum_{j=\text{tradables}} M_{ijt}}. \tag{9}$$

Feenstra and Hanson (1999) prefer the narrow measure to the broad measure because the essence of fragmentation, which necessarily takes place within the industry, is closer to the narrow measure than to the broad measure. In the baseline model of our analysis, we utilize the narrow definition of offshoring. In Section 4.2, we also use the broad measure to check the robustness of our results.

3.2 Descriptive statistics

Tables 1 and 2 report some summary statistics for the labor market and production data for 1980–2011. Table 1 presents the difference of cost shares between female and male workers by skills, and intermediate inputs at the level of the industry (52 manufacturing industries from 1980 to 2011). The major findings are threefold. First, on average, intermediate inputs indicate the largest cost shares (S_M), accounting for 77.3 percent of total variable costs. Second, the cost share of the labor inputs varies across groups, ranging from 0.3 percent for low skilled male workers (Male S_L) to 9.1 percent for middle-high skilled male workers (Male S_{MH}). Third, the cost share of female workers is smaller than that of male workers in each skill type, except for low skilled workers.

=== Tables 1 & 2 ===

Table 2 presents average annual changes for the quantities and prices of inputs and output between 1980 and 2011. Two messages stand out from this table. First, the cost shares are fairly stable over the sample period. The annual average change was less than 0.5 percent point for all the cost shares. This result is similar to that in the United Kingdom reported in Hijzen et al. (2005). Second, however, some of the input quantities and flexible factor prices indicate large change. For example, the demand for high skilled female workers grew at 3.2 percent per year whereas the demand for middle-low skilled female workers declined at 8.5 percent per year. The average wage grew at around 2.4 percent for high skilled female workers whereas it grew at 1.7 percent for high skilled male workers. As a result, as we confirmed in Figure 2, the gender wage gap of high skilled workers decreased from 1980 to 2011.

Table 3 presents descriptive statistics for narrow and broad offshoring, and the share of the ICT capital stock.[26] ICT capital share is the share of ICT capital stock to total capital stock. Table 3 also reports the difference between the narrow and broad measures, which is called "differential." The differential presents the intermediate inputs from other industries in foreign countries. We highlight three findings. First, the narrow offshoring increased steadily from 2.1 percent in 1980 to 5.7 percent in 2005, although it declined slightly to 5.3 percent in 2011. This result implies the increasing importance of offshoring from the mid-1980s. Second, differential and broad offshoring shows a slightly different trend from narrow offshoring. Both measures increased steadily throughout the period. These results suggest that the measurement of offshoring may affect the estimation results. In Section 4.2, we examine how the results are sensitive to the measurement of the offshoring.

=== Table 3 ===

Finally, the share of the ICT capital stock to total capital stock increased remarkably. The ICT capital share increased from 2.4 percent in 1980 to 15.0 percent in 2011. Because the ICT capital stock and offshoring as a whole increased over the period, the increase in the demand for high skilled female workers can be explained by offshoring or skill-biased technological change (or both). At the same time, the correlation coefficient between ICT capital stock and offshoring is 0.176. This suggests that the correlation between two variables is low, and it is unlikely that there is a problem caused by multicollinearity. We now turn to the econometric analysis.

4 Results

4.1 Baseline model

This section investigates how ICT and offshoring affect female labor demand. To begin with, we estimate equation (4) as a baseline model. Equation (4) is estimated by each skill type. Therefore, there are eight equations to be estimated (for high, middle-high, middle-low, and low skilled workers for each gender). Note that the demand for each type of workers could be determined simultaneously. Indeed, the Breusch–Pagan test rejects the null hypothesis that the error terms across equations are contemporaneously uncorrelated. Because the error terms across equations are correlated with each other, the system of equations should be

[26] Table A3 presents narrow offshoring between 1980 and 2011 by industry. Table A4 presents the share of ICT capital stock to total capital stock between 1980 and 2011 by industry.

estimated by the seemingly unrelated regressions (SUR) model. We also test the null hypothesis that the industry-factor fixed effects equal zero, which is rejected at the 1 percent level in all equations. It thus is important to control for the unobserved industry heterogeneity.

Table 4 shows the estimation results. Note that the coefficients of wages facing across the diagonal are the same due to the symmetry constraints. Table 5 reports the own price elasticities, elasticities for ICT capital, and those for offshoring.[27] Examining Table 5, we highlight three results. First, own price elasticities are negative or insignificant in general. This means that a necessary (but not sufficient) condition for concavity in factor prices is satisfied.

=== Tables 4 and 5 ===

Second, the effects of the ICT capital vary across the skill groups of workers. On the one hand, the ICT capital stock has significantly positive effects on the demand for low skilled female and male workers, middle-high skilled female and male workers, and high skilled female workers. On the other hand, it has significantly negative effects on the demand for middle-low skilled female and male workers.[28] On the whole, the elasticities for ICT capital stock indicate the same sign between male and female workers of middle-high, middle-low, and low skill groups. The absolute values of those elasticities are larger for female workers in comparison with male workers at the same skill level. This suggests that demand for female workers is more susceptible to the increase in ICT capital stock than that for male workers, although more detailed analysis is needed to clarify the reasons of susceptibility.

Finally, offshoring has significantly positive effects on the demand for high skilled male workers and low skilled female workers. No significant effects are confirmed in other groups of workers. The results without negative and significant effects suggest that offshoring is at least neutral for the demand for any skill groups of workers.

In sum, major findings of the baseline results on the demand for female workers are twofold. The effects of the ICT capital on the demand for female worker vary across the skill groups of workers. While the ICT capital stock has significantly positive effects on the demand for low, middle-high, and high skilled female workers, it has significantly negative effects on the demand for middle-low skilled female workers. Second,

[27]See Table A5 for other elasticities of the baseline model.

[28]The positive effects of ICT on middle-high and low skilled workers and the negative effects on middle-low skilled workers may imply the ICT–based "job polarization" in which "automation and new technology were going to wipe out large numbers of middle class jobs" (Autor, 2015, p.3). Although our analysis excludes services, our result might suggest a common feature of tasks assigned to low skilled workers in the manufacturing sector which are "challenging to automate" and "infeasible to offshore." (Acemoglu and Autor, 2011, p.1077)

the effects of offshoring on the demand for female workers are significantly positive for low skilled female workers, and insignificant for other female workers. The results suggest that offshoring is at least neutral for the demand for female workers.

4.2 Robustness Check

One may be concerned that our results are sensitive to an additional control variable, the measurement of offshoring, the categories of workers, or the choice of exogenous variables. To address this concern, this section examines the robustness of our results in the following four ways. First, we add R&D intensity as an additional control variable. Second, we employ the different measures of offshoring. Third, we focus on full-time workers, excluding part-time workers from the sample. Finally, we exclude either of ICT and offshoring in view of the potential endogeneity.

4.2.1 Adding R&D intensity

R&D is often used as a proxy for the technological change. Indeed, previous studies such as Michaels et al. (2014) and Ahn et al. (2008) utilized R&D intensity or expenditure to control for the effects of technological change. We add R&D intensity as an additional control variable to check the robustness of our results. Following Michaels et al. (2014), R&D intensity is measured by the R&D investment relative to value added.[29] R&D investment is obtained from the Research and Development, Innovation and Productivity (RDIP) Database developed by the National Institute of Science and Technology Policy. In the RDIP Database, both nominal and real R&D investment is available for 1973–2008, by the same industry classification as the JIP Database. The real R&D investment is valued at 2000 constant prices. We calculate R&D intensity for each industry-year, which is defined as the real R&D investment divided by the real value added. Because the RDIP Database is not available after 2008, we focus on the period between 1980 and 2008.[30]

The results of the robustness check are reported in Tables 6 and 7 for ICT capital stock and for offshoring, respectively. The first rows in Tables 6 and 7 indicate the baseline results in Table 5 while the second rows show the elasticities of ICT and offshoring when R&D intensity is added. The results are qualitatively similar to those of the baseline model although the significance of some elasticities is missing. As for ICT, the effects

[29]It is desirable to use R&D stock rather than investment data but R&D stock data are difficult to obtain.

[30]Michaels et al. (2014) found that the effects of offshoring became insignificant once the initial R&D intensity. However, because the RDIP Database is not available after 2008 and the (time invariant) initial R&D intensity can be controlled for by the fixed effects, we did not include initial R&D intensity in the baseline model.

on the demand for high skilled female workers and low skilled male workers turn out to be insignificant, whereas the effect on the demand for low skilled female workers is insignificant as for offshoring. To confirm the robustness of our results, we need to examine our model further in three other ways.

=== Tables 6 & 7 ===

4.2.2 Alternative measures of offshoring

As we have seen in Section 3.1, there are some alternative measures of offshoring. The measurement issue involves two aspects. One is concerning the scope of offshoring. In the baseline model, we utilized narrow offshoring. Noting that broad offshoring in Table 3 presents a slightly different trend from narrow offshoring, one may be concerned that the baseline results are sensitive to whether we use narrow or broad offshoring measures. The other aspect is how we measure the relative size of offshoring. Although the baseline model utilized the sum of tradable intermediate inputs for a denominator, some of the previous studies such as Ahn et al. (2008) utilized gross output for a denominator. The use of different denominators could also affect the results. As a robustness check, we employ three alternative measures: 1) broad offshoring, 2) offshoring relative to all intermediate inputs, and 3) offshoring relative to gross output.

The results of the alternative measures of offshoring are presented from the third to fifth rows in Tables 6 and 7. As for the results of ICT capital stock in Table 6, all the tests using three different measures present qualitatively the same results as those of the baseline model. ICT capital stock has significantly positive effects on the demand for high, middle-high, and low skilled female workers, whereas it has significantly negative effects on the demand for middle-low skilled female workers. The results of offshoring are presented in Table 7. Offshoring has again insignificant effects on the demand for low skilled female workers when we utilize the broad measure of offshoring or gross output for a denominator. Effects on the demand for high skilled male workers are also insignificant when we employ these two measures. Meanwhile, elasticity of middle-high skilled male workers turn to be negative and significant only with the case of the broad measure.

4.2.3 Excluding low skilled workers

One may argue that we exclude low skilled workers because low skilled workers (defined as part-time workers) consist of workers who have different educational backgrounds. To address this issue, we estimate equation (4) excluding low skilled workers from the sample.[31]

[31] The total cost and cost share of variable factors are recalculated accordingly.

The sixth rows in Tables 6 and 7 present the results of ICT capital and offshoring elasticities, respectively. The effect of ICT is significantly positive for high and middle-high skilled female workers while significantly negative for middle-low skilled female workers. The effect of offshoring is significantly positive only for high skilled male workers. These results are qualitatively the same as the baseline results. Note, however, that we confirmed significantly positive effects of ICT on part-time workers. Without including these workers, one will miss a part of positive effects of ICT. The result suggests the importance of including low-wage part-time workers in the sample in analyzing the effects of offshoring and ICT.

4.2.4 Excluding either of exogenous variables

Although the correlation coefficient between ICT capital stock and offshoring is low with the correlation coefficient of 0.176, there might be a potential endogeneity problem between these two exogenous variables. For example, the development of ICT might promote the use of offshoring. One way for eliminating this effect is to employ instrumental variable methods, however, it is difficult to employ such a method in the SUR. Thus, we check the robustness excluding either of ICT capital stock or offshoring.

The result for ICT capital stock with the exclusion of offshoring is reported in the seventh row in Table 6. The result is quite similar to that of baseline model; signs and significance of all elasticities are unchanged. The result for offshoring with the exclusion of ICT capital stock is provided in the seventh row in Table 7. Concerning the effects of offshoring, two of the elasticities for middle-high and middle-low skilled female groups turn to be significant, but the significance is low at 10 percent level. The significance of the rest of elasticities is unchanged, and signs of all elasticities remain the same. On the whole, ICT capital stock and offshoring hold the same effect as the baseline model.

In sum, we asked whether our results were sensitive to the inclusion of an additional control variable, the use of different measures of offshoring, the exclusion of low skilled workers, and the exclusion of either exogenous variables. The results suggest that the effects of ICT on the demand for female workers in the robustness checks are qualitatively similar to those in the baseline model. In contrast, the effects of offshoring may be sensitive to the different measures of offshoring. The significance level of the elasticities of low skilled female workers is low and the results are insignificant in some cases. This suggests that the positive effect of offshoring on female part-time workers is not necessarily robust. Nonetheless, our main messages hold: offshoring is at least neutral on the demand for female workers.

4.3 Discussion

As we have seen, the effects of offshoring on labor demands are neutral in general, and only two skill groups obtain positive results. Then, why does offshoring affect only the demand for two groups positively? One possible reason for high skilled male workers is that this group tends to be assigned managerial, professional and technical occupations which are classified into abstract, non-routine tasks. For example, the increase of offshoring raises relative demand for workers who coordinate transactions in global value chains or workers who can manage foreign operations. In addition, the increase of R&D or technical centers may accompany professional and technical occupations. In Japan, these tasks are concentrated on male workers with high education. For low skilled female workers, the reason behind this trend is not clear, because the educational background of part-time workers is diverse and tasks assigned to them are not obvious.

Similarly, difference between the effects of ICT and offshoring may be explained by the demand for tasks. Acemoglu and Autor (2011) explain that the distribution of tasks is different by gender and by skill level. For instance, the share of clerical/sales occupations is high among female workers, while the share of production/operative occupations is high among male workers. These middle skill routine tasks tend to be substituted by machines. Besides, tasks are different in offshorability. Acemoglu and Autor (2011) find that clerical/sales occupations and professional, managerial and technical occupations are much more offshorable than production/operative or service occupation. Differences in tasks between female and male workers result in the differences of the effects between ICT and offshoring.

With regard to Japanese manufacturing, Wakasugi et al. (2008) is an example of investigating types of task offshored, although their data was decomposed neither by skill group nor by gender. Employing a survey to Japanese manufacturing firms, they found that the most frequently offshored tasks were directly related to manufacturing activities such as the production of intermediate and final assembly. Meanwhile, Ikenaga (2009) investigated whether there existed job polarization in the Japanese labor market. She found that the ICT complemented workers with non-routine analytic tasks while substituting them with routine tasks. Her study included service sector, however, it did not take into account the effects of offshoring. To address this issue of tasks further, more detailed data and analysis are needed, which goes beyond the scope of this paper.[32]

Moreover, our estimation reveals that only the effects of ICT on labor demands for middle-low skilled male and female workers are negative. One may worry that ICT harms labor demands partly, but the effects

[32] We cannot obtain the wage information by occupations and by industry in JIP database, which prevents us from estimating labor demand function by occupation.

for middle-low skilled workers should not be overestimated. The share of this skill category, namely junior high school graduates, is shrinking in the long term; in 2011, it accounts for 5.1% of female workers and 5.7% of male workers. On the ground that ICT and offshoring affect labor demands positively or neutrally for other groups, governments should not hesitate to implement policies to encourage ICT and/or offshoring.

5 Concluding Remarks

Sustaining labor force is one of the main concerns for many developed countries. Accordingly, raising female labor participation is becoming an issue for policy makers because it can help avoid looming labor supply shortages. In light of the increasing importance of female labor participation in Japan, this paper examined the determinants of the demand for female workers. One of the contributions of this paper is that we shed light on the role of information and communication technology and offshoring as determinants of female labor demand. We estimate a system of variable factor demands for manufacturing industries between 1980 and 2011.

Our major findings are twofold. First, the effects of the ICT capital on the demand for female workers vary across the skill groups of workers. While the ICT capital stock has significantly positive effects on the demand for low, middle-high, and high skilled female workers, it has significantly negative effects on the demand for middle-low skilled female workers. Second, the effects of offshoring on the demand for female workers are generally insignificant. The results suggest that offshoring is at least neutral on the demand for female workers. A part of the increasing demand for female workers can be attributable to ICT, which contributes to narrow the gender wage gap in Japan.

In conclusion, there are several research issues for the future that are worth mentioning. First, it is important to examine the relationship between tasks and gender. As mentioned above, tasks may be different between female and male workers, which may result in the difference of the effects between ICT and offshoring. The use of individual-level micro data may allow us to address such an issue.

Second, a more detailed analysis of the cost function within each industry is another important issue. Our analysis is based on industry-level data and thus estimates the system of cost functions for manufacturing as a whole. The industry differences are captured by the industry-fixed effects. The use of firm-level data enables us to estimate the cost function by industry. Such analysis allows us to estimate the elasticities in a more precise way.

Finally, offshoring of services is of interest, although we could not include it in this analysis due to the limitation of data. The inclusion of service offshoring is important because the share of female workers is generally higher in services than in the manufacturing sector. Besides, offshoring of service tasks in both manufacturing and services is increasing. Additional analysis of service offshoring may provide a comprehensive picture of offshoring in the global value chains.

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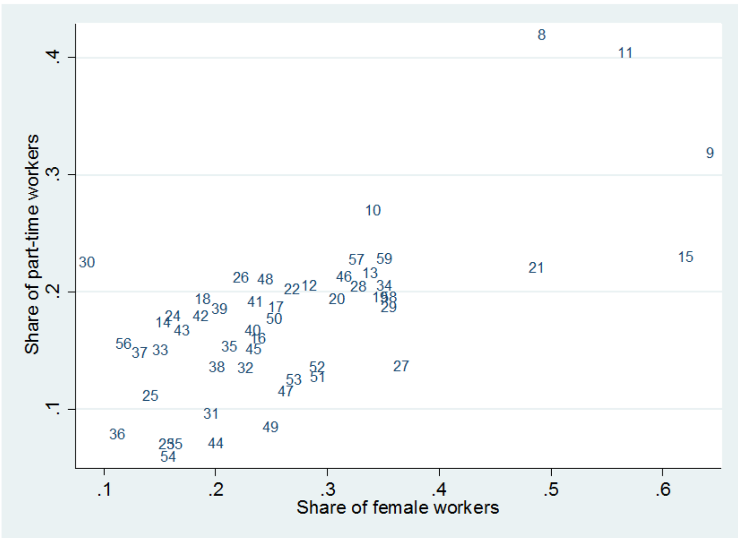
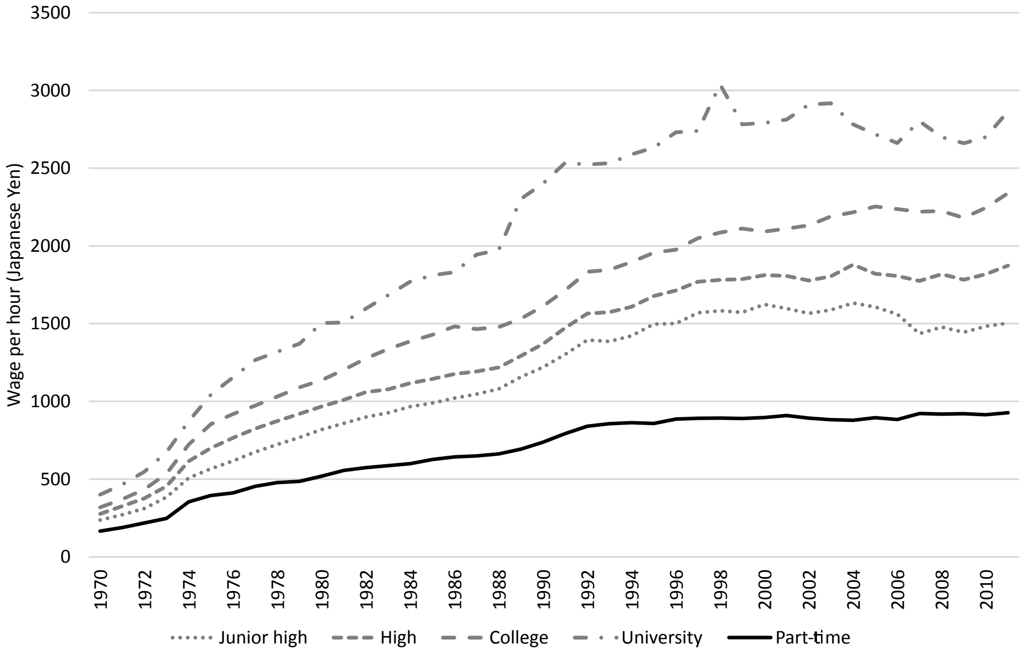
Figure 1: The Share of Female Workers and The Share of Part-time Workers, 2011



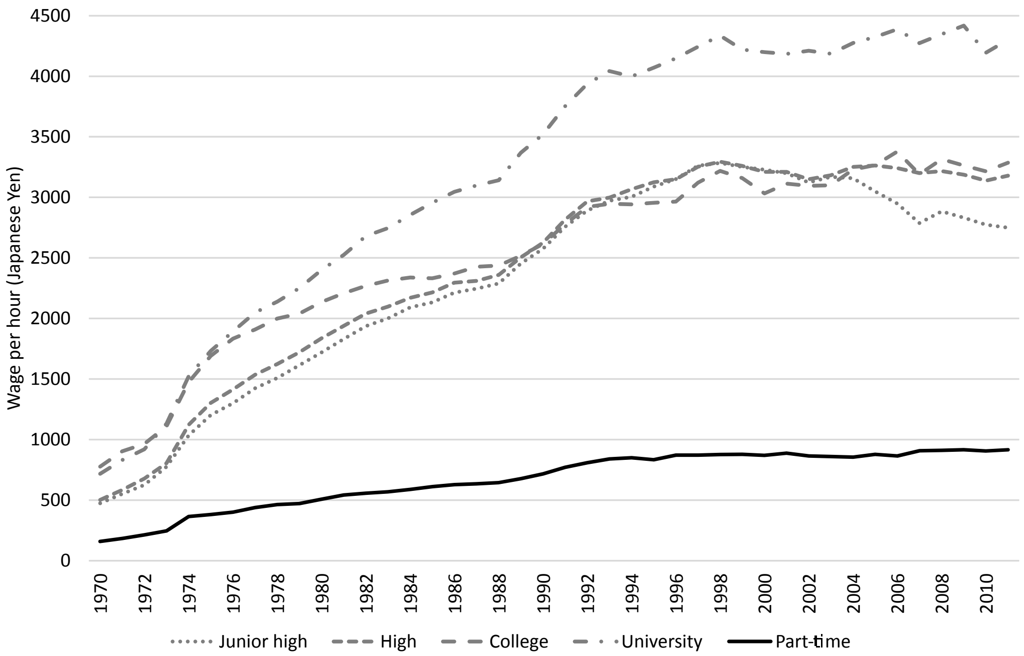
Note: Numbers in the graph area indicate industrial codes of each observation.
Source: JIP Database 2014.

Figure 2: Average Wages by Education in Japanese Labor Markets, 1970-2011

(a) Female Workers

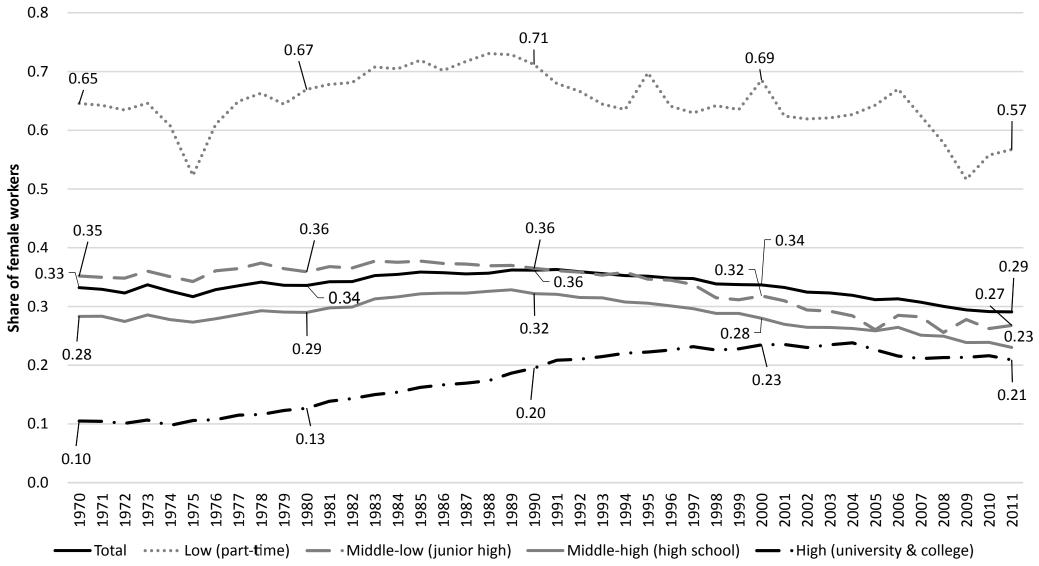


(b) Male Workers



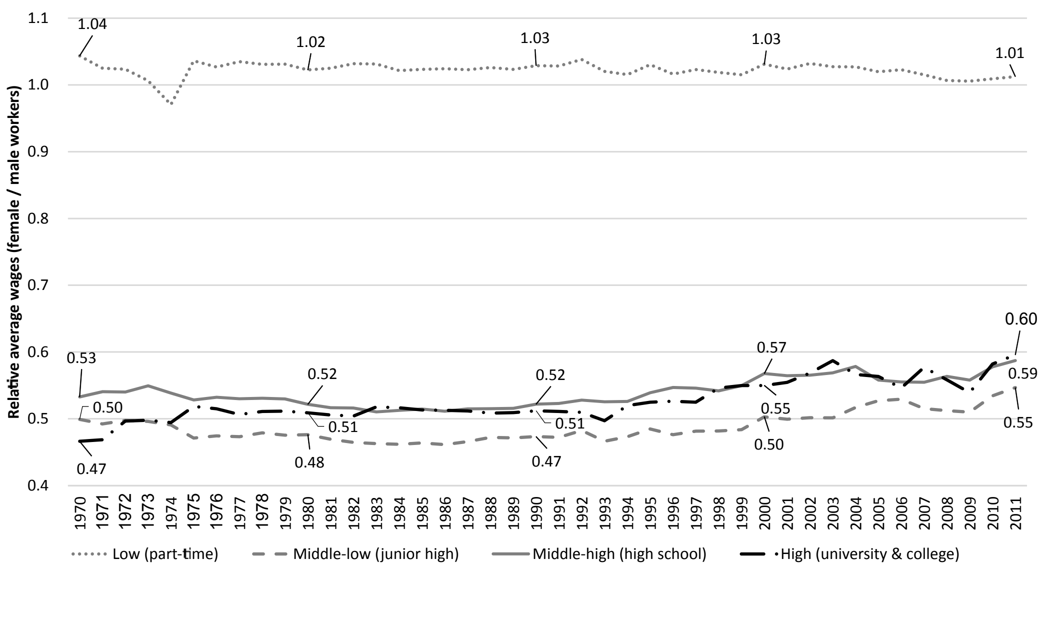
Source: JIP Database 2014.

Figure 3: Share of Female Workers, by Education and Type of Workers: Manufacturing in Japan, 1970-2011



Source: JIP Database 2014.

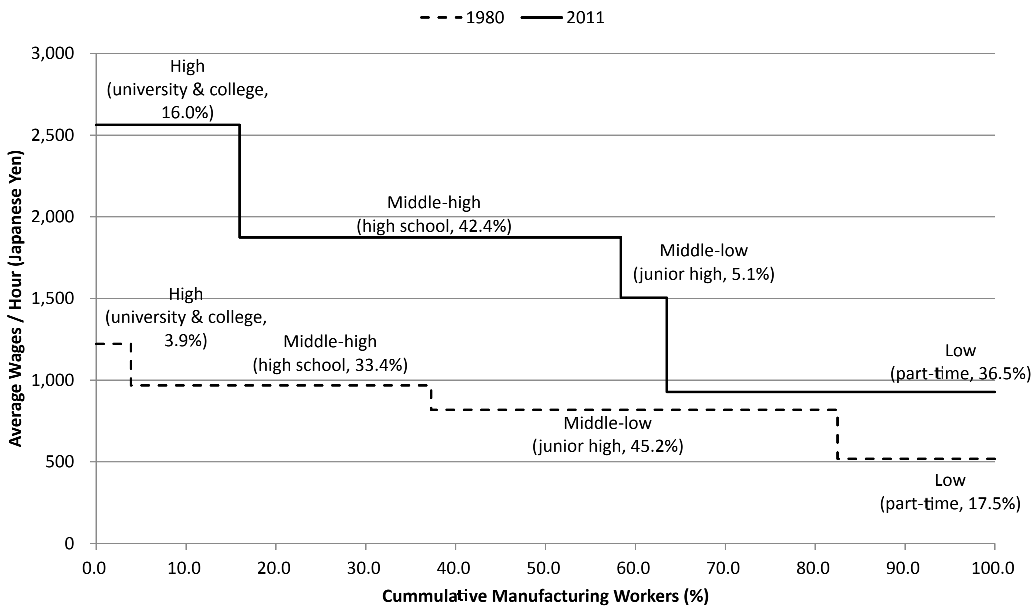
Figure 4: Female Average Wages Relative to Male Average Wages per Hour, by Education and Type of Workers: Manufacturing in Japan, 1970-2011



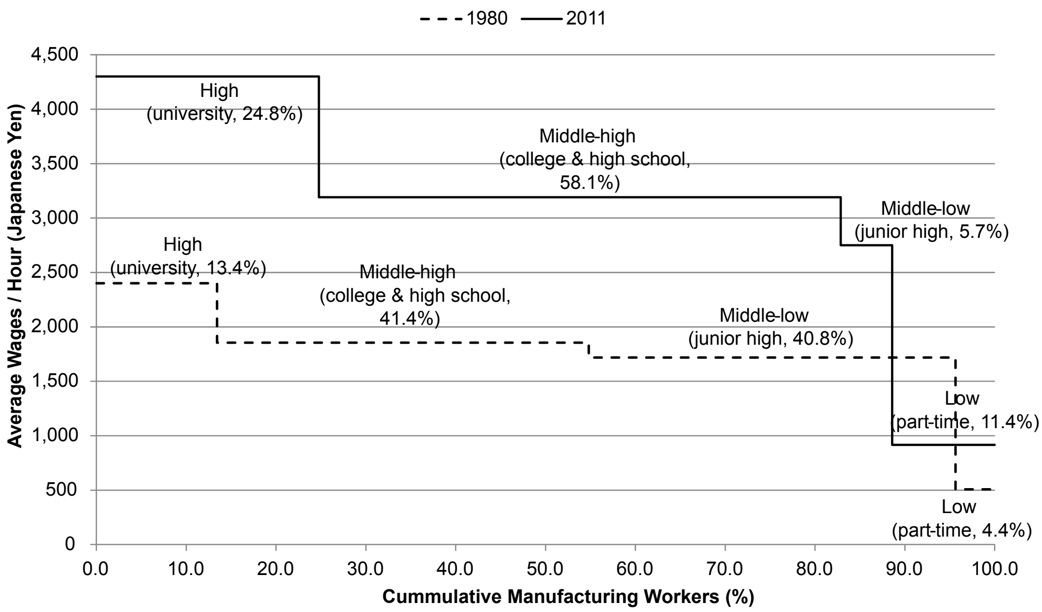
Source: JIP Database 2014.

Figure 5: Average Wages in Japanese Labor Markets, 1980 and 2011

(a) Female Workers



(b) Male Workers



Source: JIP Database 2014.

Table 1: Average Cost Shares, 1980-2011

	N	Mean	Std. Dev.	Min	Max
Female					
s_H	364	0.007	0.006	0.000	0.047
s_{MH}	364	0.021	0.015	0.000	0.085
s_{ML}	364	0.009	0.011	0.000	0.070
s_L	364	0.005	0.005	0.000	0.025
Male					
s_H	364	0.047	0.027	0.003	0.150
s_{MH}	364	0.099	0.046	0.006	0.253
s_{ML}	364	0.037	0.030	0.001	0.133
s_L	364	0.003	0.002	0.000	0.011
s_M	364	0.773	0.098	0.509	0.988

Source: JIP Database 2014.

Table 2: Annual Percentage Change, 1980-2011

	N	Mean	Std. Dev.	Min	Max
Cost shares					
Female					
s_H	52	0.000	0.000	0.000	0.001
s_{MH}	52	0.000	0.000	0.000	0.002
s_{ML}	52	-0.001	0.000	-0.002	0.000
s_L	52	0.000	0.000	0.000	0.001
Male					
s_H	52	0.001	0.001	0.000	0.003
s_{MH}	52	0.001	0.001	-0.001	0.004
s_{ML}	52	-0.002	0.001	-0.004	0.000
s_L	52	0.000	0.000	0.000	0.000
s_M	52	-0.001	0.001	-0.004	0.003
Input quantities					
Female					
L_H	52	0.032	0.023	-0.052	0.090
L_{MH}	52	-0.008	0.021	-0.089	0.041
L_{ML}	52	-0.085	0.022	-0.177	-0.044
L_L	52	0.008	0.020	-0.042	0.052
Male					
L_H	52	0.010	0.021	-0.044	0.075
L_{MH}	52	0.001	0.021	-0.052	0.062
L_{ML}	52	-0.073	0.022	-0.127	-0.011
L_L	52	0.025	0.026	-0.046	0.112
M	52	0.004	0.025	-0.040	0.077
Flexible factor prices					
Female					
w_H	52	0.024	0.008	-0.012	0.046
w_{MH}	52	0.022	0.008	-0.011	0.049
w_{ML}	52	0.020	0.008	-0.014	0.054
w_L	52	0.018	0.008	-0.009	0.042
Male					
w_H	52	0.018	0.007	-0.013	0.038
w_{MH}	52	0.017	0.007	-0.018	0.035
w_{ML}	52	0.013	0.009	-0.026	0.032
w_L	52	0.019	0.008	-0.010	0.046
p_M	52	-0.001	0.012	-0.041	0.028
Fixed input and output quantities					
ICT capital stock	52	0.088	0.025	0.011	0.143
Non-ICT capital stock	52	0.022	0.019	-0.022	0.094
Output	52	0.021	0.065	-0.093	0.282

Source: JIP Database 2014.

Table 3: Offshoring and ICT, 1980-2011

	Offshoring			ICT capital share
	Narrow	Differential	Broad	
1980	0.021	0.053	0.074	0.024
1985	0.024	0.055	0.079	0.050
1990	0.030	0.061	0.091	0.071
1995	0.042	0.061	0.103	0.082
2000	0.047	0.078	0.124	0.104
2005	0.057	0.097	0.154	0.127
2011	0.053	0.110	0.163	0.150

Note: "Differential" is defined as the difference between the broad and narrow definition.
Sources: JIP Database 2014 and Ministry of Internal Affairs and Communications (various years).

Table 4: Baseline Results: Coefficients

Fixed effects	Female workers				Male workers			
SUR	L_H	L_{MH}	L_{ML}	L_L	L_H	L_{MH}	L_{ML}	L_L
Female								
w_H	*0.014******	0.010*	-0.009**	0.001	0.014***	-0.041***	0.016***	-0.003**
	(0.005)	(0.005)	(0.004)	(0.002)	(0.005)	(0.007)	(0.006)	(0.001)
w_{MH}	0.010*	*-0.007*	0.004	-0.008***	0.002	0.005	-0.010	0.000
	(0.005)	*(0.010)*	(0.005)	(0.003)	(0.006)	(0.009)	(0.006)	(0.002)
w_{ML}	-0.009**	0.004	*-0.001*	0.002	-0.012**	0.011	0.002	-0.001
	(0.004)	(0.005)	*(0.005)*	(0.002)	(0.005)	(0.007)	(0.006)	(0.001)
w_L	0.001	-0.008***	0.002	*0.005***	0.008***	-0.002	-0.003	-0.004**
	(0.002)	(0.003)	(0.002)	*(0.002)*	(0.002)	(0.004)	(0.003)	(0.002)
Male								
w_H	0.014***	0.002	-0.012**	0.008***	*0.059****	-0.034***	-0.014	0.005***
	(0.005)	(0.006)	(0.005)	(0.002)	*(0.010)*	(0.011)	(0.009)	(0.002)
w_{MH}	-0.041***	0.005	0.011	-0.002	-0.034***	*0.077****	0.021	-0.002
	(0.007)	(0.009)	(0.007)	(0.004)	(0.011)	*(0.020)*	(0.014)	(0.003)
w_{ML}	0.016***	-0.010	0.002	-0.003	-0.014	0.021	*-0.001*	0.001
	(0.006)	(0.006)	(0.006)	(0.003)	(0.009)	(0.014)	*(0.016)*	(0.002)
w_L	-0.003**	0.000	-0.001	-0.004**	0.005***	-0.002	0.001	*0.005****
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	*(0.002)*
ICT capital	0.001*	0.005***	-0.006***	0.001***	-0.002	0.009***	-0.006***	0.000**
	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.003)	(0.002)	(0.000)
Non-ICT capital	-0.001	-0.004**	0.007***	-0.000	-0.000	-0.025***	0.010***	-0.001*
	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)	(0.004)	(0.003)	(0.000)
Offshoring	0.012	0.014	-0.012	0.006*	0.034**	0.016	-0.000	0.000
	(0.008)	(0.010)	(0.010)	(0.003)	(0.017)	(0.028)	(0.021)	(0.002)
Output	-0.001	-0.004***	-0.002**	-0.001***	0.004**	-0.004	-0.002	-0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.000)
R-squared	0.915	0.975	0.908	0.959	0.981	0.985	0.956	0.939
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Factor-specific time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Figures in parentheses are standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively. The null hypothesis that the fixed effects equal zero is rejected at 1% level in all equations. Shaded coefficients are constrained by symmetry constraints. Offshoring is measured by narrow measure. The own price elasticities are reported in italics.

Sources: JIP Database 2014 and Ministry of Internal Affairs and Communications (various years).

Table 5: Baseline Results: Elasticities

	Female workers				Male workers			
	L_H	L_{MH}	L_{ML}	L_L	L_H	L_{MH}	L_{ML}	L_L
Own price	1.112	-1.312***	-1.069**	0.062	0.291	-0.122	-0.992**	1.059
elasticities	(0.749)	(0.470)	(0.527)	(0.423)	(0.203)	(0.197)	(0.449)	(0.679)
ICT capital	0.192*	0.223***	-0.640***	0.248***	-0.052	0.088***	-0.153***	0.178**
	(0.106)	(0.043)	(0.095)	(0.066)	(0.032)	(0.026)	(0.052)	(0.086)
Offshoring	1.743	0.648	-1.302	1.185*	0.723**	0.161	-0.012	0.139
	(1.165)	(0.467)	(1.048)	(0.714)	(0.357)	(0.283)	(0.579)	(0.931)

Notes: For offshoring and ICT capital, estimated elasticities are reported. For other notes and sources, see Table 4.

Table 6: Robustness Check: ICT Elasticities

	Female workers				Male workers			
	L_H	L_{MH}	L_{ML}	L_L	L_H	L_{MH}	L_{ML}	L_L
Baseline	0.192*	0.223***	-0.640***	0.248***	-0.052	0.088***	-0.153***	0.178**
	(0.106)	(0.043)	(0.095)	(0.066)	(0.032)	(0.026)	(0.052)	(0.086)
Adding R&D as	0.148	0.239***	-0.628***	0.261***	-0.052*	0.083***	-0.220***	0.121
a control variable	(0.103)	(0.044)	(0.098)	(0.072)	(0.029)	(0.026)	(0.050)	(0.082)
Broad measure	0.204*	0.230***	-0.655***	0.260***	-0.050	0.091***	-0.158***	0.184**
	(0.105)	(0.043)	(0.095)	(0.065)	(0.032)	(0.026)	(0.052)	(0.085)
Relative to all	0.194*	0.224***	-0.641***	0.249***	-0.051	0.088***	-0.154***	0.178**
intermediate inputs	(0.106)	(0.043)	(0.095)	(0.066)	(0.032)	(0.026)	(0.052)	(0.086)
Relative to	0.248**	0.224***	-0.648***	0.267***	-0.018	0.083***	-0.156***	0.193**
gross output	(0.106)	(0.043)	(0.095)	(0.065)	(0.032)	(0.026)	(0.052)	(0.085)
Excluding low	0.188*	0.219***	-0.634***		-0.045	0.090***	-0.154***	
skilled workers	(0.106)	(0.044)	(0.095)		(0.032)	(0.026)	(0.052)	
Excluding offshoring	0.200*	0.227***	-0.647***	0.256***	-0.047	0.088***	-0.153***	0.176**
	(0.106)	(0.043)	(0.095)	(0.066)	(0.032)	(0.026)	(0.052)	(0.085)

Note: For notes and sources, see Table 4.

Table 7: Robustness Check: Robustness Check: Offshoring Elasticities

	Female workers				Male workers			
	L_H	L_{MH}	L_{ML}	L_L	L_H	L_{MH}	L_{ML}	L_L
Baseline	1.743	0.648	-1.302	1.185*	0.723**	0.161	-0.012	0.139
	(1.165)	(0.467)	(1.048)	(0.714)	(0.357)	(0.283)	(0.579)	(0.931)
Adding R&D as	1.108	0.121	-1.299	0.782	0.588*	-0.071	0.265	-0.084
a control variable	(1.114)	(0.484)	(1.075)	(0.780)	(0.315)	(0.288)	(0.552)	(0.879)
Broad measure	1.143	-0.452	-0.509	0.072	0.362	-0.531***	0.576	-0.408
	(0.796)	(0.321)	(0.725)	(0.493)	(0.245)	(0.193)	(0.398)	(0.636)
Relative to all	2.509	0.908	-2.086	1.954*	1.006*	0.171	0.063	0.308
intermediate inputs	(1.856)	(0.746)	(1.674)	(1.140)	(0.570)	(0.451)	(0.925)	(1.488)
Relative to	1.526	0.416	-3.447	1.245	0.396	-0.674	-0.628	-2.132
gross output	(2.823)	(1.133)	(2.534)	(1.729)	(0.868)	(0.686)	(1.400)	(2.237)
Excluding low	1.817	0.666	-1.289		0.733**	0.161	-0.016	
skilled workers	(1.164)	(0.477)	(1.048)		(0.359)	(0.289)	(0.579)	
Excluding ICT	1.890	0.846*	-1.830*	1.370*	0.666*	0.248	-0.167	0.244
	(1.165)	(0.485)	(1.106)	(0.717)	(0.359)	(0.286)	(0.581)	(0.944)

Note: For notes and sources, see Table 4.

Table A1. Share of Female Workers, 1980-2011, by Industry

Industry	1980	1985	1990	1995	2000	2005	2011
Seafood products	0.671	0.691	0.682	0.673	0.665	0.654	0.642
Textile products	0.655	0.679	0.683	0.689	0.668	0.638	0.620
Miscellaneous foods and related products	0.495	0.528	0.548	0.559	0.574	0.568	0.567
Livestock products	0.439	0.471	0.475	0.496	0.503	0.493	0.492
Leather and leather products	0.455	0.515	0.516	0.520	0.478	0.467	0.487
Chemical fibers	0.215	0.252	0.260	0.281	0.260	0.284	0.366
Plastic products	0.368	0.393	0.390	0.385	0.385	0.374	0.355
Pharmaceutical products	0.363	0.364	0.355	0.366	0.345	0.355	0.355
Pottery	0.503	0.491	0.466	0.426	0.410	0.367	0.351
Miscellaneous manufacturing industries	0.435	0.455	0.443	0.417	0.405	0.375	0.351
Paper products	0.375	0.385	0.391	0.387	0.375	0.352	0.347
Flour and grain mill products	0.294	0.309	0.357	0.378	0.419	0.361	0.341
Beverages	0.330	0.336	0.360	0.357	0.353	0.343	0.339
Miscellaneous chemical products	0.289	0.303	0.319	0.316	0.333	0.328	0.328
Precision machinery and equipment	0.419	0.429	0.398	0.365	0.360	0.338	0.326
Electrical generating, transmission, distribution and industrial apparatus	0.375	0.385	0.394	0.366	0.352	0.339	0.315
Printing, plate making for printing and bookbinding	0.291	0.325	0.336	0.341	0.324	0.309	0.309
Semiconductor devices and integrated circuits	0.469	0.487	0.439	0.392	0.362	0.335	00.292
Electronic parts	0.449	0.486	0.438	0.390	0.363	0.331	0.291
Prepared animal foods and organic fertilizers	0.239	0.248	0.279	0.344	0.344	0.297	0.284
Miscellaneous electrical machinery equipment	0.407	0.399	0.401	0.355	0.339	0.308	0.270
Rubber products	0.339	0.358	0.335	0.325	0.316	0.295	0.269
Household electric appliances	0.427	0.463	0.420	0.374	0.353	0.303	0.263
Furniture and fixtures	0.291	0.289	0.294	0.296	0.277	0.261	0.254
Electronic equipment and electric measuring instruments	0.413	0.437	0.395	0.359	0.339	0.287	0.253
Communication equipment	0.469	0.474	0.429	0.386	0.356	0.283	0.249
Electronic data processing machines, digital and analog computer equipment and accessories	0.464	0.477	0.431	0.380	0.354	0.277	0.244
Lumber and wood products	0.307	0.299	0.297	0.287	0.269	0.247	0.238
Miscellaneous fabricated metal products	0.242	0.261	0.263	0.260	0.259	0.247	0.235
Office and service industry machines	0.240	0.267	0.267	0.258	0.244	0.222	0.234
Fabricated constructional and architectural metal products	0.238	0.251	0.258	0.258	0.256	0.245	0.233
Glass and its products	0.228	0.233	0.263	0.258	0.254	0.241	0.226
Organic chemicals	0.216	0.215	0.263	0.239	0.230	0.221	0.222
Miscellaneous ceramic, stone and clay products	0.238	0.227	0.226	0.233	0.221	0.215	0.212
Non-ferrous metal products	0.224	0.232	0.236	0.242	0.234	0.223	0.203
Smelting and refining of non-ferrous metals	0.210	0.227	0.240	0.234	0.228	0.220	0.201
Miscellaneous machinery	0.236	0.257	0.260	0.254	0.244	0.227	0.200
Coal products	0.165	0.142	0.163	0.159	0.173	0.185	0.196
Pulp, paper, and coated and glazed paper	0.228	0.224	0.238	0.231	0.221	0.200	0.188
General industry machinery	0.158	0.169	0.184	0.184	0.178	0.181	0.186
Special industry machinery	0.162	0.174	0.188	0.188	0.185	0.181	0.170
Motor vehicle parts and accessories	0.191	0.196	0.207	0.199	0.193	0.178	0.163
Basic inorganic chemicals	0.178	0.187	0.186	0.173	0.173	0.166	0.161
Motor vehicles	0.182	0.182	0.199	0.190	0.186	0.170	0.157
Chemical fertilizers	0.168	0.165	0.175	0.174	0.170	0.169	0.156
Tobacco	0.432	0.377	0.340	0.305	0.273	0.246	0.153
Cement and its products	0.206	0.184	0.178	0.173	0.166	0.151	0.150
Basic organic chemicals	0.142	0.165	0.180	0.188	0.171	0.143	0.141
Miscellaneous iron and steel	0.128	0.135	0.141	0.142	0.149	0.143	0.132
Other transportation equipment	0.122	0.126	0.152	0.150	0.146	0.128	0.117
Pig iron and crude steel	0.097	0.099	0.113	0.113	0.121	0.115	0.112
Petroleum products	0.127	0.127	0.122	0.131	0.099	0.099	0.084

Note: Sorted by the descending order in 2011.

Source: JIP Database 2014.

Table A2. Share of Part-time Workers, 1980-2011, by Industry

Industry	1980	1985	1990	1995	2000	2005	2011
Livestock products	0.126	0.132	0.172	0.212	0.231	0.238	0.419
Miscellaneous foods and related products	0.179	0.193	0.249	0.287	0.307	0.321	0.404
Seafood products	0.140	0.148	0.179	0.224	0.271	0.279	0.318
Flour and grain mill products	0.075	0.081	0.125	0.166	0.209	0.203	0.270
Textile products	0.093	0.098	0.121	0.153	0.196	0.208	0.230
Miscellaneous manufacturing industries	0.118	0.125	0.147	0.162	0.198	0.200	0.228
Precision machinery and equipment	0.102	0.105	0.128	0.143	0.136	0.138	0.228
Petroleum products	0.049	0.048	0.048	0.068	0.110	0.104	0.225
Leather and leather products	0.109	0.119	0.142	0.177	0.217	0.225	0.221
Beverages	0.073	0.074	0.097	0.124	0.173	0.187	0.216
Electrical generating, transmission, distribution and industrial apparatus	0.093	0.103	0.128	0.130	0.108	0.085	0.213
Organic chemicals	0.148	0.142	0.163	0.156	0.162	0.165	0.212
Electronic data processing machines, digital and analog computer equipment and accessories	0.095	0.100	0.120	0.109	0.119	0.107	0.211
Pottery	0.088	0.090	0.118	0.133	0.162	0.180	0.206
Prepared animal foods and organic fertilizers	0.074	0.079	0.112	0.135	0.162	0.166	0.206
Miscellaneous chemical products	0.093	0.096	0.118	0.122	0.150	0.151	0.205
Rubber products	0.091	0.098	0.130	0.134	0.143	0.146	0.203
Paper products	0.130	0.135	0.157	0.166	0.172	0.182	0.196
Plastic products	0.126	0.133	0.153	0.162	0.177	0.190	0.196
Printing, plate making for printing and bookbinding	0.090	0.097	0.111	0.126	0.135	0.145	0.194
Pulp, paper, and coated and glazed paper	0.052	0.052	0.068	0.079	0.123	0.125	0.194
Miscellaneous fabricated metal products	0.086	0.092	0.118	0.125	0.124	0.148	0.192
Furniture and fixtures	0.086	0.088	0.101	0.110	0.128	0.148	0.187
Pharmaceutical products	0.063	0.065	0.089	0.106	0.104	0.111	0.187
Non-ferrous metal products	0.080	0.083	0.107	0.115	0.124	0.125	0.186
Basic inorganic chemicals	0.096	0.092	0.112	0.131	0.163	0.151	0.180
General industry machinery	0.065	0.067	0.094	0.095	0.096	0.094	0.179
Electronic equipment and electric measuring instruments	0.096	0.104	0.137	0.127	0.105	0.104	0.177
Tobacco	0.007	0.007	0.025	0.061	0.118	0.190	0.174
Fabricated constructional and architectural metal products	0.094	0.096	0.118	0.127	0.150	0.158	0.167
Special industry machinery	0.049	0.051	0.069	0.070	0.067	0.113	0.167
Lumber and wood products	0.069	0.068	0.084	0.107	0.131	0.153	0.160
Other transportation equipment	0.062	0.062	0.073	0.078	0.094	0.100	0.156
Miscellaneous ceramic, stone and clay products	0.070	0.068	0.087	0.105	0.120	0.132	0.153
Office and service industry machines	0.062	0.068	0.088	0.100	0.142	0.146	0.151
Cement and its products	0.046	0.044	0.052	0.058	0.077	0.102	0.151
Miscellaneous iron and steel	0.072	0.073	0.104	0.123	0.135	0.134	0.148
Chemical fibers	0.068	0.070	0.123	0.155	0.148	0.154	0.137
Electronic parts	0.096	0.102	0.120	0.123	0.186	0.118	0.136
Smelting and refining of non-ferrous metals	0.077	0.077	0.082	0.075	0.092	0.112	0.136
Glass and its products	0.088	0.089	0.115	0.105	0.124	0.131	0.135
Semiconductor devices and integrated circuits	0.078	0.081	0.095	0.098	0.068	0.180	0.127
Miscellaneous electrical machinery equipment	0.113	0.119	0.146	0.146	0.160	0.180	0.125
Household electric appliances	0.087	0.092	0.111	0.125	0.151	0.152	0.115
Basic organic chemicals	0.024	0.085	0.099	0.131	0.130	0.100	0.112
Coal products	0.062	0.061	0.070	0.095	0.102	0.110	0.096
Communication equipment	0.105	0.108	0.117	0.114	0.122	0.080	0.085
Pig iron and crude steel	0.033	0.031	0.054	0.051	0.044	0.064	0.079
Miscellaneous machinery	0.077	0.082	0.103	0.099	0.100	0.115	0.071
Chemical fertilizers	0.055	0.054	0.072	0.090	0.086	0.080	0.070
Motor vehicle parts and accessories	0.051	0.051	0.074	0.077	0.094	0.092	0.070
Motor vehicles	0.037	0.035	0.055	0.060	0.054	0.087	0.060

Note: Sorted by the descending order in 2011.

Source: JIP Database 2014.

Table A3. Offshoring, 1980-2011, by Industry

Industry	1980	1985	1990	1995	2000	2005	2011
Chemical fertilizers	0.013	0.007	0.033	0.116	0.176	0.312	0.228
Basic inorganic chemicals	0.070	0.084	0.097	0.091	0.096	0.163	0.176
Textile products	0.048	0.067	0.086	0.095	0.105	0.139	0.175
Organic chemicals	0.051	0.077	0.085	0.100	0.113	0.131	0.152
Leather and leather products	0.044	0.045	0.079	0.106	0.145	0.164	0.138
Lumber and wood products	0.013	0.028	0.044	0.068	0.095	0.106	0.131
Smelting and refining of non-ferrous metals	0.086	0.086	0.147	0.160	0.081	0.107	0.123
Seafood products	0.003	0.053	0.089	0.151	0.127	0.139	0.112
Livestock products	0.027	0.069	0.061	0.087	0.094	0.106	0.107
Other transportation equipment	0.033	0.090	0.081	0.064	0.114	0.102	0.100
General industry machinery	0.010	0.013	0.016	0.020	0.052	0.067	0.088
Miscellaneous foods and related products	0.115	0.052	0.050	0.059	0.052	0.077	0.086
Semiconductor devices and integrated circuits	0.009	0.029	0.060	0.062	0.056	0.124	0.085
Miscellaneous chemical products	0.016	0.024	0.040	0.029	0.033	0.044	0.079
Plastic products	0.003	0.005	0.015	0.020	0.038	0.060	0.075
Electronic data processing machines, digital and analog computer equipment and accessories	0.060	0.094	0.070	0.114	0.053	0.047	0.070
Pulp, paper, and coated and glazed paper	0.077	0.080	0.116	0.122	0.102	0.081	0.069
Special industry machinery	0.011	0.007	0.022	0.029	0.063	0.069	0.066
Miscellaneous ceramic, stone and clay products	0.020	0.019	0.003	0.030	0.062	0.074	0.060
Electronic parts	0.011	0.009	0.005	0.028	0.072	0.121	0.058
Pharmaceutical products	0.119	0.019	0.021	0.099	0.022	0.028	0.053
Electrical generating, transmission, distribution and industrial apparatus	0.009	0.012	0.015	0.024	0.048	0.052	0.050
Miscellaneous manufacturing industries	0.036	0.018	0.022	0.023	0.017	0.056	0.044
Pig iron and crude steel	0.031	0.051	0.065	0.095	0.053	0.077	0.043
Beverages	0.003	0.006	0.012	0.008	0.012	0.021	0.040
Precision machinery and equipment	0.028	0.029	0.045	0.102	0.154	0.034	0.038
Non-ferrous metal products	0.000	0.002	0.007	0.005	0.013	0.030	0.036
Electronic equipment and electric measuring instruments	0.024	0.028	0.020	0.011	0.031	0.027	0.036
Furniture and fixtures	0.007	0.008	0.027	0.026	0.044	0.058	0.035
Miscellaneous electrical machinery equipment	0.036	0.016	0.020	0.048	0.060	0.077	0.034
Household electric appliances	0.004	0.004	0.011	0.028	0.051	0.033	0.029
Motor vehicle parts and accessories	0.000	0.001	0.002	0.004	0.007	0.019	0.026
Glass and its products	0.007	0.028	0.007	0.002	0.003	0.005	0.023
Miscellaneous fabricated metal products	0.003	0.002	0.006	0.009	0.009	0.020	0.020
Miscellaneous machinery	0.012	0.006	0.005	0.009	0.029	0.022	0.016
Miscellaneous iron and steel	0.003	0.012	0.021	0.018	0.013	0.013	0.015
Rubber products	0.006	0.007	0.009	0.014	0.013	0.017	0.014
Office and service industry machines	0.005	0.005	0.010	0.020	0.033	0.025	0.012
Petroleum products	0.010	0.024	0.016	0.031	0.003	0.007	0.007
Cement and its products	0.000	0.003	0.009	0.003	0.007	0.007	0.005
Communication equipment	0.000	0.000	0.000	0.002	0.003	0.002	0.004
Fabricated constructional and architectural metal products	0.000	0.000	0.000	0.000	0.000	0.003	0.003
Coal products	0.002	0.000	0.000	0.000	0.000	0.000	0.003
Printing, plate making for printing and bookbinding	0.000	0.001	0.002	0.002	0.001	0.002	0.003
Flour and grain mill products	0.000	0.000	0.000	0.000	0.000	0.001	0.002
Basic organic chemicals	0.000	0.002	0.002	0.001	0.001	0.001	0.002
Pottery	0.005	0.001	0.005	0.001	0.002	0.003	0.002
Prepared animal foods and organic fertilizers	0.000	0.008	0.018	0.035	0.056	0.066	0.001
Motor vehicles	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Paper products	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tobacco	0.002	0.023	0.007	0.002	0.010	0.000	0.000
Chemical fibers	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Offshoring is based on narrow definition. Sorted by the descending order in 2011.

Source: JIP Database 2014.

Table A4. ICT Capital Share, 1980-2011, by Industry

Industry	1980	1985	1990	1995	2000	2005	2011
Electronic equipment and electric measuring instruments	0.054	0.172	0.221	0.209	0.288	0.366	0.427
Electronic data processing machines, digital and analog computer equipment and accessories	0.042	0.153	0.203	0.217	0.314	0.358	0.383
Electronic parts	0.042	0.102	0.174	0.190	0.234	0.298	0.320
Communication equipment	0.048	0.117	0.126	0.132	0.206	0.253	0.297
Miscellaneous electrical machinery equipment	0.046	0.074	0.146	0.161	0.193	0.252	0.285
Household electric appliances	0.051	0.093	0.136	0.165	0.200	0.237	0.269
Electrical generating, transmission, distribution and industrial apparatus	0.045	0.130	0.187	0.182	0.213	0.232	0.248
Precision machinery and equipment	0.087	0.138	0.166	0.177	0.189	0.206	0.222
Office and service industry machines	0.025	0.133	0.150	0.145	0.174	0.198	0.216
Miscellaneous manufacturing industries	0.011	0.032	0.068	0.102	0.128	0.166	0.214
Printing, plate making for printing and bookbinding	0.013	0.033	0.060	0.083	0.107	0.161	0.206
Special industry machinery	0.025	0.072	0.082	0.095	0.125	0.146	0.199
Basic inorganic chemicals	0.025	0.043	0.068	0.098	0.130	0.169	0.196
Other transportation equipment	0.022	0.032	0.080	0.123	0.140	0.147	0.193
Miscellaneous machinery	0.028	0.112	0.128	0.114	0.129	0.146	0.179
Smelting and refining of non-ferrous metals	0.019	0.037	0.089	0.116	0.142	0.145	0.176
Chemical fertilizers	0.025	0.041	0.057	0.074	0.103	0.134	0.163
Leather and leather products	0.011	0.011	0.036	0.067	0.104	0.125	0.161
Flour and grain mill products	0.010	0.028	0.053	0.063	0.077	0.133	0.160
General industry machinery	0.024	0.070	0.105	0.120	0.139	0.137	0.153
Pottery	0.014	0.023	0.046	0.074	0.107	0.114	0.138
Miscellaneous fabricated metal products	0.015	0.022	0.059	0.069	0.084	0.107	0.134
Fabricated constructional and architectural metal products	0.014	0.030	0.049	0.066	0.089	0.108	0.132
Pharmaceutical products	0.040	0.071	0.084	0.079	0.095	0.119	0.129
Tobacco	0.011	0.014	0.022	0.044	0.054	0.080	0.129
Furniture and fixtures	0.007	0.017	0.047	0.064	0.092	0.102	0.128
Chemical fibers	0.026	0.033	0.038	0.052	0.071	0.098	0.124
Seafood products	0.010	0.018	0.042	0.052	0.061	0.093	0.123
Livestock products	0.011	0.019	0.038	0.048	0.059	0.087	0.119
Rubber products	0.021	0.025	0.042	0.054	0.069	0.096	0.119
Basic organic chemicals	0.028	0.038	0.047	0.055	0.083	0.117	0.118
Miscellaneous foods and related products	0.011	0.021	0.044	0.051	0.060	0.087	0.114
Miscellaneous chemical products	0.028	0.046	0.053	0.061	0.079	0.107	0.111
Textile products	0.007	0.012	0.032	0.049	0.064	0.085	0.109
Plastic products	0.011	0.012	0.019	0.031	0.045	0.075	0.103
Miscellaneous iron and steel	0.040	0.054	0.052	0.055	0.070	0.079	0.103
Organic chemicals	0.026	0.039	0.048	0.053	0.070	0.093	0.101
Petroleum products	0.011	0.024	0.044	0.058	0.062	0.080	0.094
Lumber and wood products	0.005	0.009	0.022	0.033	0.050	0.062	0.091
Miscellaneous ceramic, stone and clay products	0.013	0.017	0.025	0.038	0.063	0.076	0.091
Pulp, paper, and coated and glazed paper	0.014	0.027	0.042	0.052	0.077	0.082	0.084
Glass and its products	0.016	0.027	0.036	0.046	0.064	0.071	0.083
Beverages	0.010	0.015	0.027	0.032	0.040	0.061	0.082
Motor vehicles	0.024	0.028	0.031	0.035	0.053	0.071	0.081
Semiconductor devices and integrated circuits	0.048	0.180	0.161	0.128	0.101	0.085	0.076
Motor vehicle parts and accessories	0.024	0.031	0.037	0.040	0.049	0.060	0.073
Prepared animal foods and organic fertilizers	0.012	0.019	0.025	0.023	0.030	0.050	0.070
Cement and its products	0.013	0.017	0.033	0.050	0.071	0.071	0.067
Coal products	0.014	0.017	0.023	0.023	0.027	0.047	0.063
Pig iron and crude steel	0.023	0.024	0.024	0.029	0.039	0.044	0.060
Paper products	0.012	0.016	0.024	0.041	0.053	0.053	0.058
Non-ferrous metal products	0.020	0.025	0.033	0.033	0.043	0.048	0.052

Notes: ICT capital share is the share of ICT capital stock to total capital stock. Sorted by the descending order in 2011.

Source: JIP Database 2014.

Table A5. Factor Demand and Other Elasticities, 1980-2011: Baseline Results

Fixed effects	Female workers				Male workers				M
SUR	L_H	L_{MH}	L_{ML}	L_L	L_H	L_{MH}	L_{ML}	L_L	
Female									
w_H	1.112								
	(0.749)								
w_{MH}	0.462*	-1.312***							
	(0.247)	(0.470)							
w_{ML}	-0.932**	0.486	-1.069**						
	(0.392)	(0.552)	(0.527)						
w_L	0.282	-1.705***	0.509	0.062					
	(0.385)	(0.551)	(0.348)	(0.423)					
Male									
w_H	0.311***	0.069	-0.237**	0.166***	0.291				
	(0.104)	(0.129)	(0.104)	(0.050)	(0.203)				
w_{MH}	-0.408***	0.074	0.124*	-0.016	-0.292***	-0.122			
	(0.073)	(0.094)	(0.070)	(0.036)	(0.109)	(0.197)			
w_{ML}	0.454***	-0.258	0.051	-0.084	-0.336	0.671*	-0.992**		
	(0.155)	(0.173)	(0.171)	(0.070)	(0.252)	(0.376)	(0.449)		
w_L	-1.323**	0.059	-0.208	-1.438**	1.851***	-0.745	0.307	1.059	
	(0.546)	(0.864)	(0.501)	(0.684)	(0.663)	(1.034)	(0.704)	(0.679)	
p_M	0.332	0.965***	0.993***	0.941***	0.174**	0.410***	0.474***	0.438**	-0.134***
	(0.246)	(0.098)	(0.212)	(0.166)	(0.070)	(0.054)	(0.118)	(0.210)	(0.011)
ICT capital	0.192*	0.223***	-0.640***	0.248***	-0.052	0.088***	-0.153***	0.178**	-0.003
	(0.106)	(0.043)	(0.095)	(0.066)	(0.032)	(0.026)	(0.052)	(0.086)	(0.006)
Non-ICT capital	-0.163	-0.189**	0.776***	-0.064	-0.009	-0.248***	0.260***	-0.279*	0.019*
	(0.188)	(0.076)	(0.168)	(0.116)	(0.057)	(0.045)	(0.093)	(0.152)	(0.010)
Offshoring	1.743	0.648	-1.302	1.185*	0.723**	0.161	-0.012	0.139	-0.090
	(1.165)	(0.467)	(1.048)	(0.714)	(0.357)	(0.283)	(0.579)	(0.931)	(0.063)
Output	-0.132	-0.192***	-0.218**	-0.283***	0.077**	-0.038	-0.048	-0.093	0.014**
	(0.103)	(0.041)	(0.091)	(0.063)	(0.031)	(0.025)	(0.051)	(0.083)	(0.005)

Source: JIP Database 2014.