SUPPLY AND DEMAND SIDE ANALYSES OF STAGNANT FEMALE LABOR FORCE PARTICIPATION: EVIDENCE FROM INDONESIA

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1. Abstract

In this thesis, we investigate the seemingly stagnating female labor force participation rate of Indonesia from 1995 to 2007. Specifically, we estimate own-wage elasticity and cross-wage elasticities of female labor supply and find a sharp decrease in their absolute magnitudes over time. The results of an Oaxaca-Blinder decomposition also reveal a marked decline in the responsiveness of females' labor supply to own wage and spousal wage. Our results imply that women's attitude toward work or intra-household bargaining power or both changed significantly during our sample period even though the overall female labor force participation rate for Indonesia is stagnant.

We also examine the impact of trade liberalization on demand for female workers, using firm-level data for Indonesia for the period 1993-1999. To separately examine the impact of increased domestic competition and import of foreign technology driven by trade liberalization, we employ unique output and input tariff data, calculated at the five-digit industry level. Our results show that imported technology decreases demand for female workers, while increased competition has a limited impact on it. The impact of reduction in input tariff on demand for female workers is salient among production workers in heavy industry, implying that imported technology is more complementary to male workers with relatively higher skill level.

2. Summary

Despite Indonesia's rapid economic growth and various social changes there, such as skill upgrading and fertility decline, the female labor force participation rate has been stagnant at 35 percent for two decades. In this thesis, we examine two large micro-data sets to identify long-term trends in female labor force participation and to acquire an understanding of the relationship between female employment and trade openness.

We investigate the seemingly stagnant female labor force participation rate from 1995 to 2007 using data from the National Labor Force Survey, which is conducted annually by the Indonesian Statistics Bureau. Two main drivers of female labor force participation in textbook models are the income effect and the substitution effect. U-shape theory literature holds that the magnitude of both effects changes as women's attitude toward work changes. When women are secondary earners, female labor supply is negatively associated with spouse's wages and positively with own offered wage. However, as women become more career-oriented, the magnitude of both effects diminishes (Blau and Kahn, 2007).

We employ the methodology of Blau and Kahn (2007) to examine the evolution of women's own wage and cross-wage elasticities in Indonesia. We find a decrease in the magnitude of both elasticities for married women. Those findings are confirmed by decomposition results. Using the technique developed by Blinder and Oxaca (1973), we

decompose the change in female labor force participation by change in average characteristics and change in sensitivity. The decrease in sensitivity to own offered wage and spouse's wage canceled each other, resulting in stagnation of female labor force participation.

We also investigate the impact of trade liberalization on relative demand for female workers, using firm-level data and tariff reduction in the 1990s as a natural experiment setting. Following Amiti and Konings (2007), we focus on two channels of the impact: domestic competition and adoption of technology.

The overall effect of trade liberalization on demand for female labor is uniformly obscure in the literature. Becker (1957) suggests that an increase in domestic market competition force employers to abandon discrimination against of minority workers. Thus, an increase in domestic competition would increase demand for female workers, who are included in minority workers. Galor and Weil (1996) claim new technology is complementary with female blue-collar workers. In contrast, Lee and Wie (2015) empirically illustrate that technology embedded imported material increases demand for skilled workers in Indonesia. If unskilled workers are composed of more female than male, trade liberalization would decrease demand for female workers.

We find that increased demand for female workers through domestic competition is limited, while decreased demand through technology adoption is significant. The decrease in

demand is observed especially in heavy industry and among production workers. This implies that heavy industry, which tends to hire skilled workers, reduces female production workers as the firms import more technology embedded intermediate materials as the input tariff decreases.

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Chapter 1. Introduction

Gender equality and economic development are closely connected. Duflo (2012), for example, posits that development can play a major role in improving equality between men and women, while empowering women tends to benefit development as well. Goldin (1995) states that when they work outside of home women can acquire economic power, freedom from their own households, and political power. Despite the conjectured important relationship between female mainstreaming and economic development, studies of gender issues related to the supply side of the labor market in developing countries are relatively few.

This thesis examines the supply and demand sides of the female labor market in Indonesia using both a long-term labor force survey and a firm-level survey and provide an explanation for the apparent stagnation of female labor force participation. Indonesia's GDP per capita doubled from 1990 to 2010 in tandem with a rapid extension of education level and technological change involved in international trade. (Lee and Wie, 2015). Indonesia also experienced a significant decline in fertility rate (Priebe 2010), and a decreased gender gap in education and wages in the labor market (Wie and Ngyuen, 2015). In spite of the efforts made by the Indonesian government since 1978 to eliminate discrimination against women and the favorable change in socio-economic indices,

overall female labor force participation in Indonesia remained rather consistent at around 35 percent from 1995 to 2007. Considering Indonesia's large labor-intensive industries and its world's fourth largest population, a study on its female labor force should provide valuable perspectives on the relationship between development and female labor market potentially applicable to other parts of the world. In addition, close investigation of the stagnant female labor force participation should have valuable implications for Indonesia's further implementation of national development policy focused on gender equality.

We examine the substitution effect and the income effect on married women's labor supply and the estimation indicates that large changes in these two main forces cancelled each other, resulting in stagnation of female labor supply in Indonesia. The substitution effect works through a women's relative wage and opportunity cost, while the income effect works through unearned income or earnings of husband. Blau and Kahn (2007) claim that the magnitude of these two effects decreases as women's attitude toward work changes. When women are secondary earners, their labor supply will be negatively associated with spouse's wages and positively associated with own offered market wages. However, as women become more career-oriented, the size of these two effects will be diminished.

In this thesis we employ the methodology of Blau and Kahn (2007) to examine the evolution of women's own wage elasticity and cross-wage elasticity. Using a large set of micro-data for the labor market in Indonesia, we find a reduction in magnitude of both own wage elasticity and cross-wage elasticity for married women from 1995 to 2007. Our estimation results are further supported by our decomposition results. We employ the decomposition technique developed by Blinder (1973) and Oxaca (1973) in our simultaneous analysis of the change in characteristics and the change in sensitivity for such characteristics. Even though the women's labor market qualification improved over time, its impact on female labor participation was cancelled by the decrease in women's sensitivity to wage levels and the female labor force participation stagnated during our sample period.

Among the various factors which influence demand side of female labor market, we examine an impact of trade liberalization. The rapid globalization over the last three decades motivated scholars to investigate both theoretically and empirically the impacts of international trade on the demand for female workers in various. However, theories related to trade liberalization predict different results depending on the channels of trade liberalization. For example, Becker (1957) argues that heightened competition increases the demand for female workers because it drives out costly discrimination towards

minority workers including females. From a different perspective, Standing (1999) claims that, through growing cost-cutting pressure resulting from increasing competition, globalization makes firms seek female workers who will accept low wages and irregular employment.

As another perspective, trade liberalization allows developing countries to adopt foreign technology in the form of imported materials. Galor and Weil (1996) argue that capital investments were more complementary to female labor. Juhn et al (2014) claim that trade liberalization induces more productive firms to adopt new technologies with more computerized processes. New technology will lower the need for human physical skills, thereby employment and the relative wage of women should improve. Empirical evidence found by Juhn et al (2013) employing tariff reduction in Mexico demonstrates that trade liberalization causes firms to update their technology and replace male blue-collar workers with female blue-collar workers. However, the literature on skill-biased technological change predicts that adoption of foreign technology, induced by trade liberalization, would favor more skilled workers.

Recent empirical studies on the impact of globalization on female workers have been inconclusive. Gaddis and Pieters (2012) examined regional variations of tariff reduction in Brazil and found that trade liberalization increased female employment in

the trade and service sectors. Cooray et al (2012) investigated the impact of foreign direct investments (FDI) and trade on female labor force participation in 80 developing countries. Their empirical results suggested that trade has a negative impact on female labor supply for young cohorts.

In the context of Indonesia, several studies have investigated an impact of trade liberalization. For example, Lee and Wie (2015) show empirical evidence that technology embedded imported material increased demand for skilled workers in the 2000s and Amiti and Cameron (2012) find that reducing import tariffs increased the use of foreign intermediate goods and decreased the skill premium during the 1990s. However, the impact of trade liberalization on the Indonesian female labor market has not been studied yet. We examine this impact in this thesis using Indonesia's tariff reduction in the 1990s as a natural experiment. According to the literature, the reduction of output tariffs increases domestic competition while reduction of input tariffs encourages firms to employ imported intermediate goods. To examine the effect of competition and foreign technology separately, we use both the input and output tariffs calculated by Amiti and Konnings (2007) at the five-digit industry level and Indonesian manufacturing census data from 1993 to 1999. We examine the impact of trade liberalization on female employment share at the firm level. We find that increased competition driven by reduced

output tariffs has a limited impact on the relative demand for female workers. On the other hand, the impact of input tariff reduction on importing firms is statistically significant; a 10-percentage point decrease in input tariffs increases the share of female employment by around 1.1 percentage points. We also find that the impact of input tariff reduction is mainly driven by the heavy industry rather than light industry. And the impact is salient among production workers than non-production workers. Our results imply that heavy industry, which tends to hire more skilled production workers, reduced the relative number of female workers as they employed more imported materials in response to decreased input tariffs. Our findings are robust to Asian financial crisis, attrition of sample firms, and non-tariff barriers.

This thesis contributes to the literature with its examination of the own and cross wage elasticities of Indonesia's female labor supply and its female labor demand analysis focusing on the impact of input and output tariff reduction using disaggregated level of tariff data. On the supply side, our findings reveal decreasing female labor supply elasticities both to own and spouse's wages. On the demand side, our findings provide fresh evidence that trade liberalization may harm female job prospects, at least in the short run, because it only slightly increases female labor share through reduction in output

tariffs while it significantly decreases female employment by reducing input tariffs, especially among production workers in heavy industry.

The thesis is organized as follows. In Chapter 2, we summarize the literature on gender equality, female labor supply, and the effect of trade liberalization on female labor market outcomes. Chapter 3 describes our micro-data sets and presents an overview of our findings on recent trends in female labor supply, gender wage differential, and wage structure. In Chapter 4, we employ data from Indonesia's labor force survey to estimate changes in the elasticity of female labor supply in terms of their own wages and spouses' wages. We also present a decomposition analysis of the evolution of labor participation into the two effects: change in characteristics and change in sensitivities to those characteristics. Chapter 5 uses data from a firm level survey of Indonesia to examine the relationship between demand for female workers and trade liberalization. Concluding remarks follow in Chapter 6.

Chapter 2. Literature Review

2.1. Economic Development and Female Labor Force Participation

A seminally paper, Goldin (1995), suggested a U-shaped theory explaining the relationship between economic development and female labor force participation. According to that theory, before industrialization, women's labor market participation is high, driven by poor income: women work as unpaid family workers or casual workers in agricultural or livestock industry to support the family. Industrialization and economic development lead to a decrease in women's labor market participation, since household-produced goods become unprofitable when factory-produced goods dominate the market. At the same time, economic development also creates paid blue-collar jobs, but work by women in such manual labor would be stigmatized by society. Society stigmatizes men if their wives work in such manual labor outside the home. This perception is also prevalent in both male-intensive industry (e.g., mining, steel) and female-intensive industries (e.g., textile, clothing). Moreover, an increase in men's labor income further lead to a decrease in women's labor market participation through the income effect.

Further industrialization and economic development creates white-collar jobs and lead to a decrease in women's education level. Therefore, at a certain point in economic development, that increase in the number of white-collar jobs encourages

women's participation in the labor market through the substitution effect, which masks the income effect. Additionally, an increase in the education level of women also tends to change their attitude toward work, thereby decreasing the strength of the income effect (Blau and Kahn, 2007).

The U-shaped trend has been discussed much in the literature. Çağatay and Ozler (1995) found the U-shaped relationship between a women's share in the labor force and a long-term economic development in their analysis of cross-country data for 1985 and 1990. They also found a positive relationship between structural adjustment such as trade reform and female labor force participation.

Mammen and Paxson (2000) supplemented cross-country evidence for the U-shape theory with microdata from Thailand and India. Analyzing Thai household surveys conducted from 1981 to 1996 and an Indian labor force survey (1993-1994), they found supporting evidence for the U-shape theory. In rural India, the share of women among labor decreased as household per capita expenditure increased. In contrast, they found that in urban India and Thailand, the share of working women increased as per capita expenditure increased. However, interpretation of their findings should be made with caution because the two countries have different gender attitudes, cultural and legal

restrictions on women's social activity, and economic conditions. These differences make it difficult to accept the findings as supporting evidence for the general U-shape theory.

Tam (2011) analyzed panel data for 130 countries from 1950 to 1980 to compensate for the shortcomings of cross-country comparisons. Their dynamic panel data estimation identified a U-shaped association between female labor force participation and real GDP per capita. Lechman and Kaur (2015) employed data from 162 countries over the period 1990-2012 and also found a U-shaped relationship between per capita income and female labor force participation across various empirical specifications including GMM and IV estimation.

On the other hand, Gaddis and Klasen (2014) claimed that empirical evidences for the U-shape trend was weak and depending on the data sources based on their careful investigation of the U-shape trend using different cross-country data and various approaches. They also investigated the mechanism of the U-shape theory. Specifically, they examined the relationship between feminization of the labor force and sector-specific growth. Their results suggest that both growth in agricultural sector and manufacturing sector have a positive relationships with share of the female workforce. This implies that reduction in the size of agricultural sector at the beginning of economic development and later growth in the manufacturing sector may drive the U-shaped trends

of women's labor force participation. However, the estimated impact of the sector-specific change is very small, and the authors suggest that historical contingencies play a more important role in the change of female labor force participation than developmental phases.

Many scholars posited that historical context, gender attitude in culture, and religion might contribute to the explanation of cross-country differences in female labor force participation. Psacharopoulos and Tzannatos (1989) found a broad pattern of age-specific female participation in Western countries and suggested that the family cycle had an influence on female labor supply. They also identified a relationship between low female labor force participation rates and strong religious views about the role of women role in society.

Besamusca et al. (2015) examined the factors affecting female labor force participation using data from 117 countries from 1990 to 2010. They found only a U-shaped relationship between young and old women only. Their analyses also showed that gender parity in primary education, length of maternity leave, and women's political representation contributed to increased female labor force participation.

As mentioned above, empirical literature on female labor force participation in development country was limited because of challenges related to data availability and

demographic characteristics, especially concerning low labor force participation rate of females and the huge informal sector. Therefore, our contribution is an analysis dealing with such difficulties.

2.1. Trade Liberalization and Gender Implications

Trade liberalization has many important implications for gender issues. According to the textbook Heckscher-Ohlin model, openness to international trade reallocates input factors towards those sectors that use a country's abundant factor most intensively. If a country has abundant unskilled labor consisting mostly of women, then trade facilitation will expand labor-intensive industries and thereby increase employment of female unskilled workers.

Several studies report a positive relationships between trade and women's employment and women's relative wages. Ozler (2000) found that female share of employment increases as the export to total output ratio of its sector increases, based on plant-level data in Turkey during 1983 to 1985. Baslevent and Onaran (2004) analyzed household labor force survey and find the similar effect of export-orientation on non-married women in Turkey.

Goldberg and Pavcnik (2003) suggested the opposite effect of trade on female employment. They argued that firms faced with international competition tried to reduce labor costs by replacing permanent workers with part-time workers or laying off workers who were willing to accept jobs in the informal sector. This increase employment of female workers in the informal sector while decreasing the number of regular female workers in the formal sector.

Trade also affects labor market through technological changes. Wood (1995) argued that trade has a significant impact on unskilled workers in developed countries as a result of giving firms incentive to adopt new technologies. Berman et al. (1998) showed that technological change was pervasive in developed countries because of international trade. They provided empirical evidence that technological development and demand for skilled workers were concentrated in the same industries in each country. Acemoglu (2003) also claimed that the opening of trade can encourage skill-biased technological change in both developed and developing countries, and that international trade increases the relative price of skill-intensive goods in developed countries and raises demand for skilled workers. At the same time, trade induces technological change in developing countries through the import of technology-embedded goods such as machinery from advanced countries.

Technological change through trade has important implications for gender issues in the labor market as well. Galor and Weil (1996) argue that physical capital is more complementary to female workers than male, based on a model in which female and male workers are equally endowed with mental labor, but male workers have more physical labor than female. Juhn et al. (2014) argued that trade liberalization stimulates firms modernize their technology. New technologies embedded in physical capital involve computerized production processes and thus reduce the relative advantage of male workers. Therefore, trade liberalization and involved technological advancement of firms may increase employment of blue-collar female workers but not white-collar.

International trade can affect labor market by increasing domestic competition. The discrimination model of Becker (1957) predicts that increased competition would benefit women by decreasing discrimination against them, because reducing the discrimination enables firms reduce costs. Black and Brainerd (2004) empirically examined the hypothesis that increased competition by international trade drives out discriminating plants and improves gender wage gap in the United States. They found that the decrease in gender wage gap occurred in the competitive manufacturing sector, which experienced more import penetration. Ederington et al. (2009) used Colombian firm-level data to investigate the claim that increasing competition by tariff reduction

decreases discrimination against female worker. They found that exporting firms are more likely to hire female worker, but they could not confirm that this tendency was driven by the exit of discriminating firms.

Standing (1999) suggests concerns about increased female employment driven by industrialization and trade liberalization. Since tougher competition driven by globalization would lead firms to seek workers who willing to take low-wage jobs. Firms facing globalization also turn to more flexible forms of labor such as outsourcing, subcontracting, and contract labor. Increased employment of female workers resulting from globalization is also more likely to result in the development of female workers in the more vulnerable informal sector.

Gaddis and Pieters (2012) examined the effect of Brazil's 1987-1994 trade liberalization on female labor force participation. They found that increased female employment involved a large shift from the agricultural sector, and that it was not driven by unemployment of their male spouses.

As mentioned above, the impact of trade liberalization on female employment has been widely studied both theoretically and empirically. However, the theoretical literature has yielded differing predictions of that impact on the issue, and no strong conclusions have emerged from the empirical literature yet. In addition, previous studies

were conducted at a highly aggregated level due to limited data availability. However, tariff level varies considerably within that aggregated level. Given the uniqueness of the Indonesian dataset, our contribution to the literature is finding of limited impact of reduction in output tariffs and the significant effect of input tariff reductions.

Chapter 3. Data and Overview of Indonesia's Labor Market

3.1. Labor Force Survey (SAKERNAS)

We took data form the National Labor Force Survey (SAKERNAS) provided by the Indonesian Statistics Bureau. SAKERNAS is a nationally representative repeated large cross-section data set collected annually using with two-stage clustered sampling. Each survey except for 1995 contains around 250,000 observations. The sample size in 1995 was larger since the survey was conducted as a submodule of a broader survey, Intercensal Population Survey (SUPAS). We take into account survey settings in our estimates and analyses in this thesis.

Figure 8.1 shows employment rate of urban females from 1990 to 2007, calculated from the data. The urban female employment rate remains unchanged for almost two decades. However, educational attainments of working women changed markedly. In 1990, more than half of working women had obtained primary school education or less while less than 30 percent of working women had such a low level of education in 2007.

A similar trend was found when we restricted our sample to married women, as can be seen in Figure 8.2. In spite of increased educational attainment, female

employment rates in Indonesia stagnated from 1995 to 2007.[1] In Figure 8.3 it can be seen that there was no marked change in male labor force participation rate during the same period, suggesting that macroeconomic shocks and structural changes in the economy had no significant impact on employment trends in Indonesia during our sample period.

Figure 8.4 shows the female labor force participation rate across age for four periods, 1990-1993, 1994-1997, 1998-2002 and 2003-2007. Before the Asian Financial Crisis occurred in 1997, there was a steadily increase in labor force participation rate for women up to age 45 and steep decline after age 50. After the Crisis, moderate M-shaped trend was observed. The employment rate of female increased in the twenties and declined slightly from age 24 to 25 and rebounded around age 40. The above suggests that the negative effect of having children on prime-aged (25-54) women's labor force participation.

For our analyses in this thesis, we employ labor force survey data for the period of 1995 to 2007 where the household ID and spouse relationship variables are available. To examine the change in own wage and spouse wage elasticities of labor supply of married women, we choose the period 1995-1996 and period 2006-2007. We combine

[1] Variable indicates married status is available from 1995 to 2007 in our sample.

two consecutive data in 1995-1996 and 2006-2007 to alleviate the effect of year specific economic incidents.

Figure 8.5 shows the evolution of gender wage gap between 2000 and 2007. In urban Indonesia, gender wage gap for the lowest wage percentile group was greater than 0.7, which suggests that women's wage is less than 30 percent of men in the same wage percentile. That gap decreased to 0.4 in 2007 which implies that women in the lowest percentile now makes 60 percent of men's wage in the same percentile. The decrease in gender wage gap is most dramatic among a low-wage group but also happened across all wage percentiles in both urban and rural Indonesia.

Table 7.1 also shows that average log real wage of female increased much more than that of male workers. The ratio of average real wages between male and female also increased from 0.63 to 0.78 implying that the stagnation of female labor force participation is not driven by gender wage differential.

Table 7.2 provides a summary statistic of women and men ages between 18 and 60 and living in urban area, whose main activities are not attending school. The table shows a socioeconomic profile of our sample and also, the important changes over time especially in educational attainment. As for the educational attainment during the sample period, the gap in average years of schooling between women and men was more than

one year in the 1995-1996 period, but it narrowed down to 0.71 years in the 2006-2007 period. We find that the increase was not a phenomenon that happens intensively in a specific grade, but advancement occurs among whole educational levels. For the family structure, household size decreased from 5.06 to 4.53 between two periods.

Table 7.2 also shows summary statistics of labor supply and wage of our sample and their spouses. We employ annual working hours as our measure of labor supply. For the female, annual hours of working increased by 60.6 hours (6.1 percent) during sample period from 1995-1996 to 2006-2007. The measure includes zero working hours of those who does not work. Annual working hours of working population also increased from 2,204 to 2,293 showing that increase in working hour is driven by both higher labor force participation and longer working hours of those who already in the labor force. Labor supply of men during the sample period does not show much change during the sample period.

To understand women's labor supply, it is essential to have an offered wage of those who are not in the labor force. Therefore, we imputed offered wages of non-working women using methodology suggested in the literature. Log hourly wage of working women improved compared to that of working men, however, log hourly wage of all

sample women shows almost no change during the same period. It suggests these possibility of stronger positive selection of women into the labor force.

Table 7.2 shows summary statistics of a primary sample of supply side analysis, married people between ages 18 and 60 who are currently living in urban area. Couples are identified within the family as a head of the household and his or her spouse. The sample of both married female and male show a shorter year of schooling compared to the averages of the whole sample. The education level of married people also improved over time. Household size and number of children younger than ten are slightly decreased for the married people throughout the sample period.

Annual working hours of married working women show very limited change from 2,079 to 2,200. However, annual working hours including non-working people show a significant increase from 729.3 to 832.4 (14.1 percent) implying an increase in participation margin of married women. At the same time, the annual working hour of men remains stable.

3.1. Firm Level Data: Annual Survey of Manufactures

For the demand side analysis on the female employment, we use detailed information from the firm-level survey, The Indonesian Manufacturing Survey (Statistik Industri, SI).

It contains employment information of gender by production workers and non-production workers in all firms with twenty or more employees. The survey also contains information on its wage bills for production workers and non-production worker, trade status, main output, amount of fixed capital, and information about imported and domestic input materials. Each survey contains around 20,000 observations. The analysis in this dissertation uses data from 1993 to 1999, because a firm identification number and information about the number of female employees are available during this period.

The summary statistics for the 1993 and 1999 are provided in Table 7.3. The share of female workers is 38.8 percent on average in 1993 and 38.5 percent in 1999, basically unchanged. Its variance also remains almost unchanged. The dissimilarity index slightly increases from 1993 to 1999 showing the female and male workers were more segregated in the workplace in 1999. The skill level of a firm is often approximated by the ratio of the number of non-production workers to the total workers. While the relative wage bill on non-production workers to total wage bill slightly decreased during the sample period, but the share of non-production workers is stable. The average total number of workers at a firm in the sample was 196.82 in 1993 and 191.71 in 1999, indicating that the average firm size with respect to the number of workers did not decline much even after the Asian Crisis. While the firms' performances and worker characteristic

did not change during the sample period, the real fixed capital per worker materially changed. The average real fixed capital per worker declined from 2,033 rupiah to 691 rupiah, or 34 percent, although the variation in both year 1993 and 1999 are high. This reduction may be the impact of the Asian crisis or change in reporting criteria of fixed capitals in 1999. Therefore, for the robustness check against the effect of the crisis, we define the post-crisis period not only the 1997 but also 1999.

A firm is categorized as an importing firm if imports more than 10 percent of its intermediate goods and categorized as an exporting firm if it exports any of its output. While the share of importing firms was stable at around 25 percent of the whole firms, the share of exporting firms decreased from 17.72 percent in 1993 to 13.58 percent. This can be interpreted as another possibility that the effect of the Asian crisis remained in 1999.[2]

[2] For more general overview of the Indonesian labor supply and demand analysis, please refer Lee and Wie (2015).

Chapter 4. Supply side: Analysis using Labor Force Survey[3]

4.1. Specification and Empirical Issues

Cogan (1980) provided a theoretical background of the traditional static labor supply model whose left-hand side is yearly hours of working and right-hand side is the natural logarithm of a woman's hourly wage and her husband's yearly income. Ashenfelter and Heckman (1974) extended the traditional model, adding the logarithm of husband's hourly wage on the right-hand side. This model enables us to examine whether married couple's leisure is substitutable or complementary. Following the conventions established in literature, we estimate the following regression model:

$$H_i = \propto + \beta^O Log\left(W_i^O\right) + \beta^S Log\left(W_i^S\right) + \gamma D_i + \delta F_i + \varepsilon_i \quad (1)$$

where the dependent variable H_i is annual working hours calculated using reported working hours of previous week.[4] The coefficient β^O on the log of own wage captures own-wage elasticity, while the coefficient β^S on spouse wage captures cross wage elasticity. We also control a set of demographic variables D_i such as age, years of

[3] This chapter is based on a joint work with Dainn Wie.

[4] Annual working hours are calculated with reported working hours of previous week times 52.14228. This enables us to compare our results with other literatures.

schooling, spouse's years of schooling, province fixed effects and year dummy. According to Mincer (1962) and Cain (1996), the number of children should be included to control increased opportunity value for married women of staying at home relative to working. The set of family characteristics F_i includes number of household members and number of children age less than ten.

4.1.A. Wage Imputation

The estimation of elasticity of labor supply has a fundamental issue that it is not possible to observe offered wages of non-working women. Therefore, we impute offered wages for non-working women. Alternatively, Heckman's two-stage selection model (Heckman, 1979) is widely used to assign wages to non-workers. However, as the literature suggests, that method is sometimes not applicable due to difficulty in finding variables which affect only on the selection rule and not the labor supply function (Wooldridge, 2002; Fitzgerald, Gottschalk and Moffit, 1998). Our data set has this limitation as it lacks a variable for a selection rule. Thus, we employ the imputation approach used in Juhn (1992), Juhn and Murphy (1997) and Blau and Khan (2007).

The imputation method follows Blau and Kahn (2007), which is widely accepted in the literature. That method estimates wage regression for each sex using data of

individuals whose working hours are few. The assumption is that workers with few working hours and non-working individuals share common characteristics. For our analysis, we introduce a threshold of 27 hours and use data from workers who work less than 27 hours a week and are not self-employed. Limiting the sample with this condition makes the demographic characteristics of the non-employed and this subsample rather similar. Table 7.10 shows the comparison of the characteristics of the selected sample and those of non-workers. Most of the characteristics show small magnitude or insignificant difference suggesting that the two groups are plausibly similar. In addition to the wage of non-workers, we assign imputed wages for missing wages of working women. Wage is also not reported for working women who are in unpaid jobs or are self-employed. We exclude self-employed and unpaid workers from our primary analyses, and add them later for the robustness checks, as the proportion of self-employed is not negligible in Indonesia.

For the imputation, we include years of schooling, equation level dummies, experience, square of experience, and province dummies as explanatory variables in the wage equation. To properly assign imputed wage we estimate wage regression for each sex separately, as follows, for each period T =1995-1996, 2001-2002, or 2006-2007:

$$\text{Log}(W_{iT})^{offer} = \beta_{0T} + \beta_{1T}S_{iT} + \beta_{2T}E_{iT} + \beta_{3T}E_{iT}^2 + \gamma D_{iT} + \eta_{iT} \qquad (2)$$

where $\text{Log}(W_{iT})$ is log of hourly wage, S_{iT} is years of schooling, and E_{iT} is years of experience.[5] We also control the set of individual and regional characteristics D_{iT}, dummy for different type of attained education and province fixed effects.

4.1.B. Possible Endogeneity Issues

Another estimation issue arises from division bias, as reported by Borjas (1980). Division bias is caused by the definition of hourly wage variable, as most survey data, including ours, do not provide an hourly wage measured independently from hours of work. Therefore we constructed hourly wage by dividing monthly wage by hours of work. If the hours of work variable contains a measurement error, estimated own-wage elasticity suffers from attenuation bias. Borjas (1980) claims that the negative coefficients for hourly wage in much of the literature have been affected by division bias. To alleviate that issue, we estimate equation (1) using predicted log hourly wage as our instrumental variable by applying the grouped-data estimation introduced by Anglist (1991). To obtain

[5] Years of experience is calculated by deducting schooling year + six from age.

predicted wages for each sex and period, we employ the same wage regression specification as in equation (2) but regress without restriction of hours of working.

$$\text{Log}(W_{iT})^{Est} = \beta_{0T} + \beta_{1T}S_{iT} + \beta_{2T}E_{iT} + \beta_{3T}E_{iT}^2 + \gamma D_{iT} + \xi_{iT}. \qquad (3)$$

Employment of this instrumental variable allows us to obtain β^o and β^s without suffering attenuation bias, since $\widehat{\text{Log}(W_{iT})}^{Est}$ no longer contains hours of work directly. $\widehat{\text{Log}(W_{iT})}^{Est}$ should be independent of measurement errors contained in ε_i, the error term in equation (1). These instrumental variables are serviceable, because they correlate with $Log(W_i^O)$ and $Log(W_i^S)$ conditioned on other explanatory variables. While this instrumental variable method addresses attenuation bias, it does not fully alleviate omitted variable bias since the instrument variables are based only on observable variables employed in labor supply equation, Eq. 1.

4.2. Results of Estimation of Labor Supply Elasticities

Table 7.4 shows estimated results of Eq. 1 for three periods 1995-1996; 2001-2002; and 2006-2007. For each period, we estimate two different specifications using a different set of control variables. The specifications differ as to whether or not the model includes the

number of children below age ten or not. Unfortunately, SAKERNAS does not provide information to link each child and mother in the household. However, the data provides the number of children below age ten in the family. Therefore, we employ number of children in each household as a proxy variable to control for number of children of each married woman, as suggested in the literature. For both specifications, we find that estimated elasticity declines rapidly. Estimation with a full set of control variables shows that a one percent increase in own hourly wage increases annual working hours by 9.67 hours in 1995-1996, while it increases annual working hours by 5.23 hours in 2006-2007. We also calculate elasticity by dividing estimated coefficients by mean hours of working. The own-wage elasticity of married women declines from 1.40 in 1996 to 0.61 in 2007, 56.6 percent decline in wage elasticity.

Similar trends can be found in the estimates of cross-wage elasticity. In full specification, a one percent increase in spouse hourly wage decreases labor supply of married women by 5.36 hours in 1995-1996; however, the same increase in spouse hourly wage has no significant effect on married women's labor supply in 2006-2007. The cross-wage elasticity evaluated at mean decreased in absolute value from -0.78 to 0.001 during the same period.

The noticeable reduction in married women's own-wage elasticity and cross-wage elasticity are consistent with Blau and Kahn's findings for the United Status. Thus, we can apply the same interpretation: the role of women who used to work as a second earner has changed. In 2006-2007, married women chose to work regardless of their husband's income and were less responsive to wages. At the same time, married women in 2006-2007 were more career-oriented and less responsive to economic incentives compared to married women in 1995-1996. In indonesian context, Beegle et. al. (2001) claimed power between spouses are multi dimentional such as share of household assets, couple's each education level, social status of parents, and education level of their farthers. From a perspective of bargaining power between spouses, our findings are consistent under another scenario: a decreased bargaining power within the family. When husbands share less of their earnings with their wives, it leads to a decrease in the size of the income effect. Also, if husbands ask their wives to hand over some share of their earnings, that has an influence like income tax, reducing women's sensitivity of labor supply to their nominal offered wages.

Coefficients on other control variables also had expected signs. Household size and age have negative and significant impacts on the labor supply of married women. The negative effect of household size attenuated when we further control for number of

children under age ten, which implies that childcare is a major factor driving negative impact on married women's labor supply. Years of schooling had a negative impact reflecting a large number of female non-workers who attain relatively high education levels. This possibly captures the impact of income effect caused by positive assortative mating.

Negative coefficients on years of schooling are counter conventional, but this is affected by a large portion of non-workers who has high educational attainment. This can be explained by the point that females in less-wealthy family usually have lower educational attainment and tend to have a lower offered wage, are more likely to work for a living. Alternatively, the negative coefficient for education variable could attributed to the assortative mating, if significant income effect were observed. Smits and Park (2009) claimed that educational assortative mating was relatively high in Indonesia among other South-East Asian countries. However, our findings does not fully explained by the assortative mating since we observed the decreases in own-wage elasticity and spouse-wage elasticity in absolute values simultaneously. To describe negative coefficient for education variable in depth, it requires further research using additional observations. However, this relationship invites the awareness of policymakers that there is a possibility

to exist some obstacles which prohibits high educated females from contributing to the formal labor market.

In Table 7.5 we include self-employed women in our sample to test the robustness of our results. Self-employed earnings are reported from 2001, so we employ the data for the latter two sample periods; the results are shown in column (1) and (2). That information is slightly different from the data for wage workers. The wages of the self-employed are calculated as monthly earnings divided by monthly working hours. All our findings from basic specification can be confirmed in Table 7.5 again. The estimation results shown in column (1) and (2) are similar to those shown in column (4) and (6) in Table 7.4. Also, we observe a rapid decline in own-wage elasticity and cross-wage elasticity. The elasticities evaluated at mean hours of working also confirm previous findings.

4.3. Alternative Specifications and Robustness Tests

4.3.A. Intensive and Extensive Margin

In the previous section, unconditional working hours was employed as the dependent variable regardless the person's working status. That unconditional hours incorporates two different decisions of working women: the decision to participate in the labor market,

i.e. extensive margin, and the decision to increase working hours conditional on working, i.e. intensive margin. Since as posited by Heckman (1993) these two decisions are distinct, we separately estimated effects of own-wage and cross-wage in this subsection.

Table 7.6 presents the results of estimation of basic specification of labor supply model in Eq. 1 using intensive and extensive margin as dependent variables. As can be seen in Table 7.6, extensive margin drives most of the reduction in own-wage elasticity. A one percent increase in own hourly wage increases labor market participation by 0.53 percent in 1995-1996. The size of that increase declined to 0.33 percent and 0.26 percent in 2001-2002 and 2006-2007 respectively, showing reduced effect of own wage on extensive margin. On the other hand, intensive margin had no significant impact on reduction in own-wage elasticity. In 1995-1996, the coefficient is negative and significant, becoming non-significant in the latter two periods. This is consistent with the hypothesis that in the period 1995-1996, the female was working to earn income to increase family earnings. Therefore, female who is employed does not increase hours of working even their wage increases once they attained enough earnings to support the household. However, it is not the case in the periods 2001-2002 and 2006-2007. This can be seen as one of evidences that female's decision making changes over time.

Change in spouse-wage elasticity is also driven by extensive margin. A one percent increase in spouse hourly wage decreases married women's labor force participation by 0.28 percent in 1995-1996 but has no effect in 2001-2002 and 2006-2007. The effect of spouse hourly wage on married women's intensive margin is statistically insignificant for all periods.

As can be seen in Table 7.7, to examine the robustness of our results we include self-employed in our sample for the period 2001-2002. The results are consistent with previous findings when we add self-employed to our sample, confirming that most of the reduction of own-wage elasticity and cross-wage elasticity results from extensive margin.

4.3.A. Including All Household Earnings

In Indonesia, many families are extended families i.e., more than two generations live together as one household. Therefore, women's labor supply is not only affected by spouse income but also by the income earned by all other household members. In this subsection, we include both married women and single women in our analysis sample and examine the elasticity of their own offered wages and the elasticity of other family member's average earning.

Table 7.8 shows that one finding, the decline in own wage elasticity on female labor force participation from the basic specification is confirmed. In this analysis, instead of spouse offered wage, we examine the elasticity of average earnings of other family members to capture the income effect of other family member's earnings. The coefficient for .other family member's average hourly earnings are negative and significant for extensive margin in all the periods. Also the size of the coefficient decreases greatly from 1995-1996 to 2001-2002 and moderately from 2001-2002 to 2006-2007. The results show that in 1995-1996, a one percent increase in own wage increased annual working hours of women by 11.78 hours while the same magnitude of increase in own wage increases annual working hour by 6.64 hours in 2006-2007. A similar reduction can be found in the extensive margin of own wage. A one percent increase in own hourly wage increased the probability of being in the labor market by 0.56 percent in 1995-1996, while a one percent increase in own hourly wage increased labor market participation by 0.29 percent point in 2006-2007. These results confirm that own wage elasticity decreased from 1995-1996 to 2006-2007 even single women are increased in the sample.

The effect of other family member's average hourly earnings is not significant in the basic regression as shown in column (1), (3) and (5). While coefficients for other family member's average hourly earnings is extensive margin analysis are negative and

significant in all periods. The previous analysis that conducted on spouse wage and this analysis on other member's earning are not comparable because we employed husband's "offered wage" in the previous analysis, while there we examines effect of "average of reported wage". However, this analysis suggests that in contrast with disappearing effect from husband's offered wage over time, though the magnitude is small and decreasing, the other member's average earnings were considered throughout the whole sample periods, in female's decision making for labor market entry.

We also use a dummy variable for marital status, which is one if the women is currently married. The coefficients for marriage dummy are negative and significant in all specifications, implying that married females have lower average working hours and participation probability than unmarried females. The magnitudes are not negligible but a size of the coefficients are decrease over time in absolute terms, suggesting that the difference in labor participation between married and not married women was shrinking. In Table 7.9 we included self-employed in our sample. Unfortunately, the monthly earnings for self-employed are only available after 2001. When self-employed is included, the coefficients for average earnings of other family member become negative and significant. However, the results show that our elasticity estimations are not affected much by including self-employed, at least after 2001.

4.3.A. Analyses on Male Population

We analyze the own and cross-wage elasticities for male as robustness checks and find that own wage and spouse wage elasticities are stable for males. In Table 7.11, own wage elasticity for a male was 0.62 in the period 1995-1996 and 0.69 in 2006-2007, though it jumped to 1.54 in 2001-2002. This fluctuation in 2001-2002 may have been influenced by the Asian crisis. Own wage elasticity for females decreased to 0.61 in 2006-2007, as shown in Table 7.4, suggesting that female own wage elasticity declined to the level of males' elasticity. Spouse wage elasticities were stable at 0.18 over the sample period, although the magnitude was moderate compared with the elasticities for own wage. The stable own and spouse wage elasticities for male contrasts sharply with the decline of female elasticities. While coefficients for the number of children were negative and significant for females, they are not significant for married males. Table 7.12 corresponds to Table 7.5 for females, suggesting that inclusion of self-employed mitigates the fluctuation in 2001-2002. We cannot compare the periods 1995-1996 and 2001-2002 because the wage data of self-employed are not available for the former period. However, the comparison of the 2001-2002 and the 2006-2007 implies that spouse elasticities were stable in the latter two periods and the coefficient for own and spouse wages were much smaller than the estimation without self-employed for married males.

4.4. Blinder-Oaxaca Decomposition

4.4.A. Methodology

We further explore female labor participation during this stagnant period by exploiting the intuitive decomposition method developed by Blinder and Oaxaca. Our motivation is to take the change in education level and change in mean offered wages into account for the argument of the change in elasticities. The method decomposes the difference in labor force participation during the two periods into two parts: change caused by the evolution of essential qualities and change caused by the change in particular sensitivity to each characteristic. We hereby call these two effects by characteristic effect and sensitivity effect.

We focus on the mean difference in labor participation between 1995-1996 and 2006-2007. Recall that in Eq. 1, the estimation results allow us to express predicted weighted mean labor participation of each period as follows:

$$H_t = \widehat{\propto}_t + \hat{\beta}_t^{\,o}\overline{Log(W_t^o)} + \hat{\beta}_t^{\,s}\overline{Log(W_t^s)} + \widehat{\theta}_t\bar{X}_t + \varepsilon_t \qquad (4)$$

where a bar indicates mean and a hat indicates estimation, both for period *t*. Here the control variables F and D in Eq. 1 are contained in the vectors X and θ is a vector of its coefficients. The difference in labor participation between these periods is expressed as follows:

$$\widehat{\Delta H} = \hat{H}_{06-07} - \hat{H}_{95-96} \qquad (5)$$

and using Eqs. 4 and 5 above, ΔH is decomposed as follows:

$$\begin{aligned}\widehat{\Delta H} = {} & \hat{\beta}_{06-07}\left(\overline{W}_{06-07} - \overline{W}_{95-96}\right) + \hat{\theta}_{06-07}\left(\overline{X}_{06-07} - \overline{X}_{95-96}\right) \\ & + \left(\hat{\propto}_{06-07} - \hat{\propto}_{95-96}\right) + \left(\hat{\beta}_{06-07} - \hat{\beta}_{95-96}\right)\overline{W}_{06-07} \\ & + \left(\hat{\theta}_{06-07} - \hat{\theta}_{95-96}\right)\overline{X}_{06-07} \qquad (6)\end{aligned}$$

where $\overline{W}$ stands for the means of female and spouse offered wage vector including both reported and imputed wages and $\hat{\beta}$ contains the two stage least square estimates of the regression coefficients. The first and second terms reveal the characteristic effect and the latter three terms show the sensitivity effect.

4.4.B. Decomposition Results for Female

Table 7.13 summarizes the decomposition result. The total difference in predicted labor participation is 69.21 hours a year. The characteristic effect is not significant, and the sensitivity effect is 65.10 and significant. Even comparison between the aggregated levels suggests that sensitivity effect generates the largest part of the total difference. However, a much larger change occurs for sensitivity effect. The detailed decomposition provides insightful support for our analyses. As for sensitivity effect, the impact of sensitivity towards spouse hourly wage was 2151.18 hours a year, more than 33 times greater impact

than total sensitivity effect. It is mostly canceled out by the change in sensitivity to own hourly wage. That cancels out 75.2 percent of the effect of spouse hourly wage. Therefore, this decomposition strongly supports the interpretation that behind stagnated labor participation, the most remarkable change is occurring through the change in sensitivity.

Of course, the evolution of the characteristic causes difference as well. However, the size of the characteristic effect is remarkably smaller than that of sensitivity effect. If we closely look at the details of the characteristic effect, change in mean hourly wage increases labor participation by 41.57 hours a year, and change in mean spouse hourly wage decreases it by 72.63 hours a year. These results are significant at one percent level, but the impacts are much smaller than that of the sensitivity effect.

Another noteworthy finding is the effect of child-care. The component for number of children suggests that change in sensitivity is bigger than the decrease in number of children. Since the mean number of children decreases, it increases labor participation by 11.93. However, the women become more sensitive to the number of children, resulting in a 27.48 decrease, which is 2.3 times greater than the impact from the decrease in average number of children.

Decomposition supports our observation of a significant change in women's sensitivity towards own wage and spouse wage. In other words, even if the mean

characteristic evolves, drastic change occurs with the change of the sensitivities. In spite of the seemingly small total participation change, the material sizes of positive and negative sensitivity changes cancel each other. As a result, the total change in labor force participation seems small regardless of significant change in attitude.

4.4.C. Decomposition Result for Male

Table 7.14 shows the Oaxaca decomposition for a male. The difference in annual working hours is negative and significant. The characteristic and sensitivity effects contribute to total change from the same direction, and both effects are significant. The size of the characteristic effect is -65.34, and that of its sensitivity effect is -54.153.

If we focus on the characteristic effect, we observe that the positive impact of hourly wage is partially canceled out by the negative impact of spouse hourly wage. Though the aggregated characteristic effect is negative, change in the mean of hourly wage generates a major impact. In contrast, sensitivity effect is mainly caused by a change in premiums for spouse skill and province. The size of wage components are much smaller than that observed in female decomposition, and is not significant. We conclude that change in male participation mostly comes from change in mean characteristic rather

than change in sensitivity. This also implies that a large change in sensitivity in both own and spouse wage is not part of the prevalent trend, but occurs solely for females.

Chapter 5. Demand side: Analysis using Firm Level Survey[6]

5.1. Trade Policy in Indonesia

Thanks to an increase in the international price of oil during the 1970s, the Indonesian government was able to implement an import substitution strategy to support domestic industries. A number of protectionist measures were in place until the mid-1980s (Soesastro and Basri 2005). In the early 1980s, the price of oil started to fall, and the government initiated comprehensive trade liberalization to improve the competitiveness of domestic firms and marketability of their exports. However, that effort to promote trade liberalization slowed in the late 1980s as a result of political resistance from the agriculture, motor vehicles, plastic, and cement sectors (Feridhanusetyawan and Pangestu, 2003).

In the 1990s, the trade liberalization gained momentum under pressures from foreign countries. In January 1992, Association of Southeast Asian Nations (ASEAN) members agreed on the establishment of the ASEAN Free Trade Area (AFTA) and 15 commodities were chosen for fast track tariff reduction.[7] Indonesia also hosted the 1994

[6] This chapter is based on a joint work with Dainn Wie.

[7] If fast track product tariffs are higher than 20 percent, the tariff on the commodities should be immediately reduced to 20 percent and further to below 5 percent within ten years. For commodities with tariff rates of 20 percent or less, tariffs should be reduced to 0-5 percent within seven years.

APEC (Asia Pacific Economic Cooperation) summit, the first meeting since they announced their intentions regarding free trade and investment at the previous year's meeting. In 1995, Indonesia joined WTO. And in that year, the government announced a comprehensive tariff reduction except for tariffs on motor vehicles and their components targeting 10 percent by 2003.

Different factors led to tariff reductions in politically sensitive sectors. After the 1997 Asian crisis, Indonesia agreed to the IMF's structural adjustment program. The January 1998 reform package included a gradual 5-10 percent reduction of import tariffs on chemical, iron, steel, and fishery products (Soesastro and Basri, 1998). In addition to that structural reform program, in July 1999 the government also announced a reduction of tariffs on motor vehicles and their components (Feridhanusetyawan and Pangestu 2003). Indonesia also removed other trade barriers such as non-tariff barriers (NTBs). In 1995, the Indonesian government committed to removing non-tariff barriers on 12 commodities[8] within ten years (Republic of Indonesia Ministry of Trade, 1995).

5.2. Specification and Empirical issues

[8] These commodities include flat-rolled iron and steel; iron and steel tubes and pipes; engine and engine parts; forklift trucks; bulldozers; tractors; electronic musical instruments, sugar substitutes, certain hand tools, disposable gas-filled cigarette lighters, locomotive engines and certain lubricants.

5.2.A. Calculation of Output and Input Tariff

To estimate the effect of input tariff and output tariff separately, Amiti and Konnings (2007) calculated two different tariffs at five-digit industry level in the 1990s using Annual Survey of Manufacturers data. For output tariff, they assigned tariff schedule to each firm by matching the firm's main product and nine-digit Harmonized System (HS) code using an unpublished concordance.

For input tariff, they used data from the Annual Survey of Manufacturers conducted in 1998 which has unique information about the inputs employed to each firm's produce products. They calculated aggregated inputs at the five-digit industry level and calculated input tariffs as a weighted average of output tariffs on inputs employed each industry. For example, if an industry's aggregated expenditure for intermediate goods consists of 70 percent steel, and 30 percent glass, the input tariff is calculated as 0.7 times the output tariff on steel plus 0.3 times the output tariff on glass. The underlying assumption of this calculation is that the composition of the inputs is constant at the five-digit industry code level over the sample period.

Table 7.15 shows the evolution of output and input tariffs aggregated at two-digit industry level. There exists significant variation of both output and input tariffs across industry, and input tariff is generally higher than output tariff. Also, both input and output

tariffs show a substantial and gradual decrease over the sample period. For example, the output tariff on the basic metal industry fell from 26.32 percent in 1993 to 6.98 percent in 1999.

5.2.B. Empirical Strategy

We analyze the impact of trade liberalization on firm level female employment share using the following specification. For firm *i* in industry *k* in year *t,* the female employment share F_{ikt} is estimated as follows:

$$F_{it}^{k} = \beta_1 OT_t^k + \beta_3 OTex_{it}^k + \beta_2 IT_t^k + \beta_3 ITim_{it}^k + \delta_1 im_{it} + \delta_2 ex_{it} + \xi controls_{it} + \alpha + \theta_i + \theta_k + \theta_t + \varepsilon_{ikt} \quad (7)$$

where the independent variables include output tariff OT_t^k, input tariff IT_t^k, and their interaction terms with the import status dummy im_{it}, which is one if the firm imports more than 10 percent of its input material. We also control for the dummy variable for export status ex_{it}, which is one if the firm exports any positive amount of its output in year *t*. The control variables include the total number of workers, real fixed capital per worker, the real value added per worker, and the relative wage of production and non-production workers within each industry deflated by the consumer price index.

The literature suggests that reduction in output tariff reductions increases domestic competition by promoting the import of final goods from other countries. Therefore, we expect the coefficient of output tariff to be negative, as increased competition eliminatse "costly discrimination" (Becker, 1957) against female workers. The coefficient of the interaction term between output tariff and export dummy variable would capture the different effect of domestic competition on exporting firms who have an overseas market as well.

The interaction term between input tariff and dummy variable for import status provides an estimation of estimate the effect of increased imported materials on demand for female workers. Roughly 80 percent of Indonesia's imported intermediate goods are from industrialized countries (Amiti and Cameron, 2012), so a tariff reduction would stimulate the import of foreign technology embedded in imported materials. The coefficient is expected to be negative if foreign technology complements female workers, according to Juhn et al (2012). On the other hand, if foreign technology favors more skilled workers, the coefficient of the interaction term would be positive as the average skill level of female workers is lower than that of male workers. The coefficient of input tariff itself would capture the spill-over effect of foreign technology on other firms who do not utilize foreign inputs.

5.2.C. Possible Endogeneity Issues

To estimate the unbiased effect of trade liberalization on demand for female workers, it is important to ensure erogeneity of output tariff and input tariff employed in our empirical specification. Grossman and Helpman (1994) theoretically argue that certain industries are more powerful in demanding government protection and that governments have incentive to provide political favors by in the form of trade policy to maximize their own welfare. However, Mobarak and Purbasri (2005) claim that in Indonesia, an industry's political connections do not affect tariff rates in Indonesia; rather, that firms with strong political connections benefit in informal ways include licensing.[9] They also claim that close monitoring of international organizations and the International Monetary Fund (IMF) make it difficult for the government to give explicit benefits to certain industries in the form of higher tariffs.

The scatter plots in Figure 9.1 and Figure 9.2 show the relationship between initial tariff levels in 1993 and changes in output and input tariffs from 1993 to 1999. They show that industries with high initial tariffs experienced larger tariff reductions, which suggests the possibility that tariff reductions were focused on certain industries.

[9] We conjecture that the licensing has limited impact on our results. Fewer than one percent of all firms are licensed. Also, licenses were issued to firms who import raw materials rather than advanced machinery or intermediate goods with embedded technology.

Figures 9.3 and 9.4 show the relationship between the change in tariffs and average female rate in 1993. No clear relationship between the two variables is visible, implying that work the share of female workers did not affect the change in output and input tariffs.

Another area of concern regarding possible endogeneity is the sample selection. Response to the survey is mandatory for firms with twenty or more employees in Indonesia. However, the Annual Survey of Manufacturers data contains a significant amount of data on firms' new entry and exit. In Figure 9.5 shows there were 18,163 firms in the sample in 1993 and 35 percent of those firms exited by 1999. This significant level of attrition should be considered carefully. In a later section, we confirm that our key results are robust to attrition caused by firm exit.

In addition, deliberate interpretation is required as in the medium to the long run, human capital or skill level could be endogenous. Current and potential workers including students who intend to work in the future may choose to enroll in higher educational institutions in respond to increased demand for skilled labor. However, the specification does not allow us to distinguish long run effect from short run effect.

5.3. Estimation Results of Impact of Trade Liberalization

5.3.A. Share of Female Employment and Tariffs

We first analyze the impact of tariff change on the share of female employment it importing and exporting companies. Table 7.17 shows the estimation results for Eq. 7, which suggest that input tariff reduction decreased female employment share, especially for firms who import intermediate goods. While output tariff reduction increases female share, the effect is limited. In column (1), the coefficient for input tariff is positive but not significant. However, the coefficient for the interaction term of input tariff and import status is 0.109 and statistically significant, which implies that a 10 percentage point fall in input tariffs decreases female share by 1.1 percentage points for firms that use imported intermediate goods. The coefficient for input tariff itself is positive but not significant. This confirms that a reduction in input tariff has a stronger effect on importing firms which import a meaningful amount of intermediate foods than those which do not. Generally speaking, importing firms have a 1.3 percentage point lower female share. This lower female ratio could be interpreted as evidence that importing firms require more highly skilled workers if we take the fact into account that 80 percent of intermediate goods are imported from high-income countries (Amiti and Cameron, 2012), in which relatively high technology is embedded. Also, the foreign technology embedded in those

intermediate goods needs to be handled by highly skilled workers.[10] On the other hand, exporting firms have 0.78 percentage points higher female employment share on average. This higher female ratio for exporting firms is consistent with the results of earlier studies (Cagatay and Berik, 1991, Kasnakoglu and Dikbayir, 1997, and Ozler, 2000). In their report of a study conducted in Turkey, Cogaty and Berik (1991) claim that the positive relationship between female share and export orientation is the result of the fact that females have a comparative advantage in export-oriented industries and firms in export-processing zones. Since these firms, especially those with labor-intensive production, require little or no formal training for their employees. Another explanation is offered by Ozler, who posits that female labor forces who are willing to take low-wage jobs meet the demand of employers who are expanding their trade, and facing global competition need workers who will accept low wages (2000). The coefficient for output tariff is negative, though the magnitude is small and not significant.

In light of column (2) we can exclude the possibility of inconsistent estimates caused by potential endogeneity of firm-specific control variables and industry fixed effects, and the result implies there is no serious endogeneity. Column (3) include an

[10] As for the threshold of import firms, we estimated the equation with thresholds of 20 percent and 30 percent. The definitions of the different import dummies do not result in any significant difference.

interaction term of input tariffs and import and export status to examine the specific effects for processing firms, import intermediate goods and export outputs. The result shows that there is no evidence for distinct effects for processing firms. We further controlled for island specific trend and industry specific trend, but either trend does not influence the findings, as can be seen in column (4) and (5) respectively. In column (4) shows that the coefficient of input tariff is significant at the 10 percent level, though the magnitude is moderate.

In order to analyze the varying degrees of impact of the trade liberalization across different industries, we divide firms into light and heavy industry according to the amount of real fixed capital per worker.[11] The number of light industry firms changed little between 1993 (10,923) and 1999 (10,969), but Indonesia experienced growth in heavy industry and the number of heavy industry firms increased from 7,240 in 1993 to 11,085 in 1999.

The female employment share of light industry employment is higher than heavy industry than at around 47 percent and stable.[12] While the female employment share is

[11] Heavy industry includes, 33: Wooden commodities and furniture; 34: Paper, printing and publishing; 35: Chemicals; 37: Basic metals; 38: Metal products, Machinery and Equipment. Light industry includes 31: Food and beverages, tobacco; 32: Textile, clothes, and leather; 36: Non-metallic minerals; and 39: Other industry processing.

[12] It was 46.8 % and 46.7 % in 1993 and 1999 respectively.

lower in heavy industry, it increased slightly from 26.8 percent to 30.4 percent over the sample period. Output tariff decreased by approximately 16 percentage points for light industry and 12 percentage points for heavy industry. Input tariff reduction is about 8 and 6 percentage points in light and heavy industry respectively. The average number of workers per firm is moderately larger in light industry firms within the sample, 195.3 workers in 1993 and 206 workers in 1999, while heavy industries hired 199.1 workers in 1993 and 177.6 workers in 1999. A larger share of heavy industry firms, 23.51 percent in year 1993 and 20.05 in 1999, than light industry utilizes the material from abroad and is categorized as an importing firm. In comparison, a share of importing firms in light industry was 11.21 and 10.72 in 1993 and 1999, respectively.

We find industry characteristics impacts on relative female employment caused by the tariff reduction as follows. In the first two columns of Table 7.18 it can be seen that reduced input and output tariffs impact heavy industry more than light industry. In heavy industry, output and input tariffs decreased by 12 and 6 percentage points from 1993 to 1999, respectively. Therefore, it is estimated that the impact of the tariff reductions on the female employment share is 0.89 percentage points increase by output tariffs and 1.41 percentage points reduction by input tariffs. Though partially cancelled by the effect of output tariffs, the 1.41 percentage point decrease is noteworthy since the

average share of female employment in heavy industry is relatively low at 26.8 percent. The importing firms and the exporting firms show statistically different average female employment shares within heavy industry but this difference does not exist in light industry.

Additionally, we find that a reduction in tariff affects production workers more than non-production workers. In column (3) and (4) of Table 7.18 it can be seen that the tariff variables only affect female share within production workers. Within production workers, the coefficient on the interaction term of input tariff and importing status is 0.116. It is almost identical with the estimation of total female share employed the same set of variables, 0.113 as shown in column (2) in the Table 7.17. The result suggests that the female share change in the production workers drives the impact of input tariff reduction observed in Table 7.17.

5.3.B. Channels of Change in Female Share

We investigate two other channels, tariff reductions and relative female employment. To that end, we examine the effect of tariff reductions on firms in concentrated markets, and then consider the potential channels of trade liberalization, product switch and exit from the market, and ownership structure of firms. Finally, we examine technology adoption.

Analysis shows that in highly concentrated industries, the effect of input tariff reduction is smaller in other industries, while no significant difference of the two in terms of effect of output tariff reduction. In addition, we controlled for factors possibly related to response to trade liberalization, including: shift in main production, exit from the market, and change in ownership, and found that these factors are not primary channels of female share reduction. Also, in the context of Indonesia, where females and males have different skills, we investigate the impact of trade liberalization in firms with highly skilled workers, and the other firms separately. The results suggest that the impact of input tariff reduction is greater among firms with highly skilled workers.

We employ the Herfindahl-Hirschman Index (HHI)[13] to construct a dummy variable to denote higher concentration.[14] We assume that highly concentrated industries are less competitive within the domestic market. Amiti and Konings (2007) find that a decrease in output tariff increases competition, and it leads firms in concentrated industries decrease their mark-ups. If that is so, the firms have incentive to increase the share of female labor as a cost containment measure. The hypothesis is examined by adding the interaction terms of the tariff variables with a high concentration dummy. In

[13] The HHI is calculated as the sum of the squared market shares in each four-digit-level industry.
[14] The concentration dummy is one if the Herfindahl-Hirschman Index is in the seventy-fifth-percentile, which equal to or more than 0.25.

column (1) of Table 7.19 it can be seen that output tariff and its interaction term are not significant, suggesting that the markup reduction does not immediately lead to an increase in female share. In contrast, the negative and significant coefficient for interaction term with input tariff suggests that there is a difference in degree of technology adoption between concentrated and not concentrated markets. As the input tariff decreased, the female share of employment declines. Its magnitude is higher for the firms utilizing imported intermediate goods. The reduction effect is mitigated for firms in the concentrated market. One possible explanation for the difference is that firms in competitive industries have greater incentive to adopt advanced technologies for survival than firms in concentrated industries.

We examine the effect of product switching and exit from the market by interacting tariff variables with switching and exit dummies. The switching dummy is one if a firm reports a different main product from the previous year, measured by the five-digit-level industry category. Exit dummy is one if a firm exits from the sample two years later. The coefficients for interaction terms of switch or exit with tariff variables are not significant. In addition, coefficients for the dummy variables themselves are not significant, as can be seen in columns (2) and (3), respectively. These results suggest that

the switching of main product or exit from market do not drive change in female employment share.

We further examine the impact of reduction in tariffs by netting out the influence caused by public or foreign ownership. We exclude firms that are partially or fully owned by foreign capital or government. In column (4) it can be seen that the coefficients for output tariff, input tariff, and its interaction term with import status are almost identical to those in column (1) of Table 7.20, in which implies that the effect of reduction in output and input tariffs is not affected by the structure of ownership.

We investigate the intensity of effect on female share from the perspective of technology-skill complementarity. Thus we introduce a dummy variable to indicate firms with a large proportion of highly educated workers among total employees. The high-skilled dummy is set to one if a firm is in the highest quintile in terms of share of workers with high school or higher education in 1995.[15] This dummy is time invariant. In column (1) in Table 7.20 it can be seen that the coefficient for the interaction term of input tariff with import status is 0.107, with high-skill dummy is 0.103 and both coefficients are significant. This implies that firms with high-skilled worker decrease female share further.

[15] Educational background of the workers is available only for the year 1995 and 1997 in the sample period.

The impact of tariff reduction in heavy industry is distinctly different from that in light industry, as is shown in column (2) and (3). Similar to the results shown in column (1) in Table 7.18, the effect of tariff reduction on female employment is unclear for light industries. On the other hand, for heavy industries, the coefficient for output tariff is -0.094 and significant, which suggests that a reduction in output tariff increases the share of female employment, especially among firms whose average required skill is not high. The interaction term of input tariff and import status is 0.214, almost equivalent to the one in the model without skill-level dummy, 0.235. In addition, though the variance is large, the coefficient for the high-skill interaction term with input tariff is 0.112, larger than that for the whole sample 0.103. This implies that the possibility of reduction in input tariff reduces female ratio more among high-skill firms than the other firms.

We examine the link between technology adoption and change in share of non-production workers. Non-production workers have relatively high education level, so the observed impact from input tariffs can be through the change in non-production worker share. To examine that channel, the next model controls the share of non-production workers, which is calculated for each year for each firm. In column (4) it can be seen that the coefficient for the dummy, non-production worker share, is negative and significant. This implies that on average, firms with higher share of non-production workers have a

low share of female employment. However, more importantly, including share variable and its interaction terms hardly affects the coefficients for the interaction terms of input tariff and import status. Therefore, the impact of reduction of input tariff for importing firm is not affected by share of non-production workers. Together with the result for production worker analysis shown in Table 7.18 column (4), the result implies that a reduction in input tariff affects female ratio, mainly regarding production workers, regardless of the production-non-production worker composition.

5.3.C. Robustness check

The study period includes the Asian crisis that began in August 1997. In order to verify that the key findings are not affected by the crisis, we add the interaction term of crisis dummy and tariff variables. The crisis dummy is set to one for the post-Asian crisis period. In column (1) in Table 7.21 it can be seen that our key findings are robust. The coefficients on interaction terms with the post-crisis dummy are not significant and the values are small in absolute value. Moreover, the coefficients for tariff variables are almost identical to the ones without post-crisis dummies, as per Table 7.17 column (1). The results for industry-wise analysis is also robust, as per columns (2) and (3).

We examine the effect of attrition, together with the change in industry structure, possibly caused by the Asian crisis. We restrict the sample to firms with all sample periods and analyze using the post-crisis dummy. The results, shown in column (4), unchanged magnitude of the coefficients confirms the robustness toward attrition.

The Indonesian trade liberalization policy announced in 1995 included removal of Non-Tariff Benefits (NTBs). Another robustness check assures that the findings are not driven by the trade liberalization on NTBs. The robustness check is conducted by excluding the industries which committed to remove NTBs at the four-digit industry level, identified according to a government report.[16] Those industries fell in 24 categories of five-digit industry code. Table 7.22 shows that the exclusion of these industries does not significantly affect the key findings.

5.4. Appendix: Testing the Identification Assumption

The identification assumption for fixed effect models requires strict exogeneity. This strict exogeneity for tariff variables is tested by including future variables, as demonstrated by Wooldridge (2010). Thus, we include lead variables for both input and

[16] This identification is based on the Republic of Indonesia Ministry of Trade (1995). All 12 categories mentioned in it are identified except for the category, “Certain hand tools”.

output tariffs and for their interaction terms. As can be seen in Table 7.23, the lead variables have small and insignificant coefficients, which suggests that the test results do not show evidence of violation of the strict exogeneity assumption. Column (1) shows the regression on female share of employees in each firm, and column (2) shows the regression on female share of production workers for each firm.

Chapter 6. Conclusion and Policy Implication

Indonesia is the world's fourth most populous country, with labor-intensive industries and huge regional socio-economic variations. Therefore, the results of our study of the Indonesian case of stagnating female labor force participation should be valuable for other developing countries seeking implications for policy to increase female participation in the labor market. Our analyses should also provide valuable implications for policy makers in Indonesia. Indonesia established its National Machinery for the Advancement of Women with the 1978 presidential decree and initiated implementation of its commitment to eliminate all forms of discrimination against women by legislation since 1984. However, the female employment rate was rather stable from 1990 to 2000 even though several indices that are commonly considered closely connected to female labor participation changed in favorable directions. In 2000, the State Ministry of Women Empowerment initiated 38 national development programs focusing on gender mainstreaming. Thus, the findings of the supply and demand side analyses in this thesis should provide insights for a wide range of efforts by the Indonesian government, both in the past and the future.

It is puzzling that, in Indonesia, despite favorable external changes in factors encouraging female entry into the labor market, (e.g., rapid economic growth; increasing

education level of females; decreasing fertility rate; and narrowing gender wage gap) the female labor force participation rate remained unchanged for two decades after 1990. That counterintuitive association of stable female labor force participation and encouraging social indices confounded policymakers. If the analysts focused exclusively on the relationship between those factors and female labor force participation analyses might well conclude that the policy had no effect on female labor force participation in Indonesia. The study reported here investigated Indonesian female labor force participation from both supply and demand perspectives and revealed overshadowing factors such as the decline in own wage and spouse wage elasticities and the impact of trade liberalization. Those analyses revealed that complex changes in supply side decision making and the impact of trade liberalization were masked by stagnant female labor force participation.

Chapter 4 described how female decision making responsiveness to own and spouse wage changed over time. Females showed a large income effect from husband's wages and substitution effect from own wages in the initial period, 1995-1996. However, the magnitude of both effects decreased in 2001-2002 and 2006-2007. One possible interpretation of these decreases is that female decision behavior became more similar to that of males. Decomposition analysis supports this conjecture: sensitivity to both own

and spouse's wage have decreased substantially but those changes canceled each other, resulting in a limited increase in hours worked by female.

The analyses presented in Chapter 5 suggest that trade liberalization hardly increased relative to demand for female employees resulting from increased domestic competition as output tariff was reduced. On the other hand, trade liberalization decreased relative to female demand due to technology adoption as input tariffs were reduced. A significant impact of input tariff reduction was observed in heavy industry more than in light industry, and more among production workers than non-production workers. Moreover, reduction of input tariffs further reduced female share of employment for firms with a higher proportion of skilled workers than unskilled.

One contribution of this thesis to the literature is estimation of own and cross-wage elasticities of Indonesia's female labor force for the first time and the depiction of the evolution of those elasticities. Due to the large informal business sector and the large number of non-workers, no detailed study had been conducted in this area. Compensate for the large number of non-wage workers by employing a careful imputation method utilizing the similar characteristics of workers who work few hours. Though our study has limitations arising from wage imputations, this analysis has important policy implications because many policy elements, such as paid maternity leave and childcare

subsidy, work through either substitution effect or income effect. This thesis also contributes to the literature on trade liberalization and female employment, which until now had been discussed mainly using aggregated level tariff data. This thesis examines two different effects of trade liberalization using detailed input and output tariffs calculated at the five-digit industry level and thus provides unconventional evidence that the increased demand for female employment resulting from reduction of output tariffs is limited while reduction in input tariffs has a negative impact on female job prospects as production workers especially in heavy industry.

Two policy implications of the study are as follows. First, a matching service for female job seekers, which focuses on work hour flexibility may create broader opportunities for potential female workers. In Chapter 3, we observe late entry to the labor market and moderate M-shaped employment rate in Indonesia. Chapter 4 demonstrates that hesitance to enter the labor market due to having one additional child increased over time. Also, estimated value of own wage elasticity was smaller when the self-employed were included in the data. These factors suggest that female job seekers require flexibility regarding working hours when they enter the labor market. Even when aspiring female workers increased in number, as observed in declines in own and spouse wage elasticities, potential female workers may well not succeed in finding jobs that meet their work style

preferences. Berman et.al. (2013) suggest that young females, especially those with scarce role models or a limited number of connections to experienced female workers, are disadvantaged with regard to job searching. Therefore, a job matching service which considers female preferences could increase female labor participation.

The other implication is around vocational training for women. Though this analysis did not identify a direct causal effect of skillset on employment, it does suggest that further research be conducted around skillset and employment in the context of gender differences. The finding reported in Chapter 5 suggests that input tariff reduction may harm female job prospects for production work in heavy industry, at least in the short run. However, the result is not fully explained by the skill-biased technological change hypothesis: while a change in relative female demand in Indonesia is observed among production workers, the literature on skill-biased technological change suggests that technological change increases the relative number of female non-production workers. Considering the narrowing educational gender gap in terms of years of schooling, the gender differences in labor demand may be the result of gender differences in skill sets. Newhouse and Suryadarma (2009) reported that in Indonesia in 2007, 63.8 percent of male students majored in technical or industrial subjects but less than 5 percent of female did so. 56.0 percent of females majored in business management and 28.9 percent in

tourism. Due to unavailability of data, one limitation of our analysis is that we had to use years of schooling as a proxy for skill level and as a result may not have captured the change in demand attributable to the gender specific skill gap. To determine the impact of trade liberalization in more detail, we plan to exploit data sets including educational attainment and areas of major or certification.

The Indonesian government adopted a policy of increasing the secondary level vocational school enrolment in response to meet the increasing demand for skilled workers. According to the Ministry of National Education Strategic Planning (2005), the government targeted a 50:50 enrolment ratio between vocational and general secondary schools by 2015, aiming for a ratio of 70:30 by 2025. Thus, further examination of gender skill set difference and labor demand is essential for practical assessment of related government efforts[17] and formulation of policy recommendations such as designing training programs to equip current and future female workers with sector specific skills such as engineering and technology skills.

[17] For example, analysis of United States training programs suggests that female participants benefit from such programs more than males but that estimated female benefits vary significantly (Lalonde, 2003).

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Chapter 7. Tables

7.1. Tables for Supply-side Analysis

Table 7.1 Overview of Real Wage Trends: Indonesia, 1990-2007

	1990	2000	2007
Log male real wage	8.5127	8.7698	8.9704
	(0.0040)	(0.0063)	(0.0050)
Log female real wage	7.9620	8.4067	8.7255
	(0.0077)	(0.0114)	(0.0078)
Differential	0.5507	0.3630	0.2449
	(0.0080)	(0.0122)	(0.0091)
Ratio of average real wages between male and female	0.63	0.75	0.78

Table 7.2 Summary Statistics of Women and Men

	1995-1996		2006-2007	
	Women	Men	Women	Men
Sample: All				
Age	33.95	35.10	35.33	36.02
	(11.00)	(11.06)	(10.90)	(11.15)
Education level				
Year of schooling	8.18	9.26	9.01	9.72
	(3.81)	(3.68)	(3.76)	(3.53)
Primary school or below	45.6%	34.0%	37.6%	29.1%
Junior high school	17.7%	18.1%	20.6%	20.6%
Senior high school	30.1%	38.0%	31.4%	38.9%
College or above	6.6%	9.9%	10.5%	11.4%
Married	71.6%	70.4%	74.4%	69.5%
Household size	5.06	5.10	4.53	4.59
	(2.14)	(2.15)	(1.77)	(1.75)
Annual working hours*	929.9	2,111	990.5	2,046
	(1231.22)	(1069.19)	(1284.72)	(1164.62)
Log hourly wage **	3.40	3.67	3.40	3.70
(including imputed wage)	(0.59)	(0.65)	(0.59)	(0.73)
Observation	117,611	116,118	60,808	58,931
Sample: Working population				
Annual working hours	2,204	2,444	2,293	2,473
	(885.65)	(714.59)	(912.91)	(763.05)
Observation	47,758	99,570	27,000	48,929
Sample: Employed regular workers				
Log hourly wage	3.280	3.62	3.44	3.70
	(0.83)	(0.69)	(0.81)	(0.73)
Observation	26,352	61,205	12,738	24,484

Note. The reported numbers are estimated mean or the share of population in each category. The numbers in the parenthesis are standard deviations. *We treated working hours of non-working population as zero. **It includes imputed wage of non-working population.

Table 7.3 Summary Statistics of Married People

	1995-1996		2006-2007	
	Women	Men	Women	Men
Sample: All married people				
Age	35.56	39.21	36.85	40.31
	(9.98)	(9.70)	(9.9)	(9.53)
Spouse age	41.51	35.32	42.97	37.11
	(10.95)	(9.09)	(10.61)	(8.87)
Year of schooling	7.860	8.96	8.76	9.51
	(3.68)	(3.78)	(3.68)	(3.65)
Primary school or below	49.5%	38.1%	40.1%	32.4%
Junior high school	18.8%	18.0%	21.6%	19.9%
Senior high school	26.2%	33.5%	28.9%	35.6%
College or above	5.5%	10.3%	9.5%	12.1%
Household size	4.95	4.93	4.47	4.46
	(2.00)	(2.00)	(1.65)	(1.64)
Number of children< age 10	1.03	1.05	0.90	0.92
	(1.01)	(1.01)	(0.88)	(0.88)
Annual hours worked	729.3	2,298	832.4	2,239
	(1124.3)	(920.02)	(1211.4)	(1035.1)
Log hourly wage	3.44	3.76	3.41	3.88
(including imputed wage)	(0.56)	(0.68)	(0.57)	(0.69)
Spouse log hourly wage	3.76	3.44	3.82	3.41
	(0.67)	(0.56)	(0.73)	(0.57)
Observation : all	83,278	80,826	45,261	42,180
Observation: *	49,881	44,357	17,856	16,654
Sample: Working population				
Annual working hours >0	2,079	2,459	2,200	2,482
	(893.44)	(713.24)	(933.11)	(764.68)
Log hourly wage	3.490	3.725	3.607	3.818
(employed regular workers)	(0.83)	(0.68)	(0.84)	(0.73)
Observation	27,602	75,267	17,741	37,766
(employed regular workers)	(12,035)	(44,357)	(6,607)	22,245

Note. See note below Table 7.2. *Observation includes spouse whose wages are imputed.

Table 7.4 Elasticities of Labor Supply of Married Women

	1995-1996		2001-2002		2006-2007	
Dependent variable: Annual hours of working						
	(1)	(2)	(3)	(4)	(5)	(6)
Own log hourly wage	948.8***	966.6***	596.9***	608.4***	512.2***	522.8***
	(55.28)	(55.36)	(52.60)	(52.68)	(58.92)	(58.89)
Spouse log hourly wage	-563.5***	-536.3***	-114.3	-23.32	-53.08	0.767
	(102.3)	(101.5)	(229.8)	(226.1)	(136.8)	(135.3)
Age	-1.209	-5.098***	0.578	-4.503*	-0.356	-5.006**
	(1.835)	(1.881)	(2.447)	(2.440)	(2.263)	(2.280)
Year of schooling	-11.24	-13.90*	-28.50**	-32.34***	-19.01*	-19.00*
	(7.601)	(7.600)	(11.97)	(11.94)	(9.974)	(10.02)
Household size	-16.41***	8.453	-31.36***	6.093	-31.22***	6.595
	(4.662)	(5.394)	(6.679)	(8.146)	(5.743)	(6.825)
Number of children age < 10		-84.73***		-115.3***		-114.9***
		(8.285)		(12.50)		(11.91)
Elasticities（evaluated at mean hours of working）:						
Own log wage	1.375	1.401	0.770	0.785	0.595	0.607
Spouse log wage	-0.817	-0.777	-0.148	-0.030	-0.062	0.001
Observations	39,502	39,502	16,837	16,837	16,651	16,651

Note. Standard errors and coefficients are estimated using survey setting. Dependent variable is annual working hours including zero for non-workers

Table 7.5 Elasticities of Labor Supply of Married Women Including Self-Employed

	2001-2002	2006-2007
Dependent variable: Annual hours of working		
	(1)	(2)
Own log hourly wage	666.5***	538.0***
	(55.29)	(67.83)
Spouse log hourly wage	-103.1	44.04
	(182.3)	(135.2)
Age	-1.796	-1.654
	(2.388)	(2.226)
Year of schooling	-20.53**	-14.81*
	(10.09)	(8.471)
Household size	1.875	1.990
	(8.858)	(6.762)
Number of children age < 10	-92.20***	-103.4***
	(12.92)	(11.42)
Elasticities (evaluated at mean hours of working):		
Own log wage	0.860	0.625
Spouse log wage	-0.133	0.051
Observations	27,377	28,323

Note. Standard errors and coefficients are estimated using survey setting. Dependent variable is annual working hours including zero for non-workers. Self-employed workers' wage rates are calculated as monthly earning divided by monthly working hours. We included self-employed women from year 2001.

Table 7.6 Labor Supply Estimates for Married Women: Internal and External Margins

	1995-1996		2001-2002		2006-2007	
	Intensive	Extensive	Intensive	Extensive	Intensive	Extensive
Own log hourly wage	-254.1**	0.533***	-260.3	0.327***	49.77	0.264***
	(111.8)	(0.0277)	(187.1)	(0.0230)	(229.7)	(0.0262)
Spouse log hourly wage	64.34	-0.279***	253.9	-0.00252	153.8	-0.010
	(161.9)	(0.0499)	(336.4)	(0.102)	(188.7)	(0.0603)
Year of schooling	40.21***	-0.0135***	5.459	-0.0195***	16.87	-0.012**
	-11.78	-0.00375	-21.21	-0.00539	-20.8	-0.005
Household size	4.701	0.00362	6.039	0.00159	-7.476	0.003
	(7.115)	(0.00265)	(13.54)	(0.00371)	(11.75)	(0.003)
Number of children age < 10	-68.03***	-0.0353***	-71.39***	-0.0461***	-57.84***	-0.0474***
	(11.14)	(0.00408)	(18.32)	(0.00567)	(19.52)	(0.00530)
Elasticities (evaluated at mean hours of working):						
Own log hourly wage	-0.122		-0.122		0.023	
Spouse log hourly wage	0.031		0.119		0.070	
Observations	9,665	39,502	4,103	16,837	4,448	16,651

Note: Standard errors and coefficients are estimated using survey setting. For intensive margin, we restricted our sample to married women with positive working hours. To analyze extensive margin, we employed linear probability estimation.

Table 7.7 Estimation of Internal and External Margins Including Self-Employed

	2001-2002		2006-2007	
	Intensive	Extensive	Intensive	Extensive
	(1)	(2)	(3)	(4)
Own log hourly wage	-280.5	0.342***	-108.3	0.252***
	(187.5)	(0.0226)	(219.9)	(0.0278)
Spouse log hourly wage	269.9	-0.0972	-30.27	0.0219
	(258.3)	(0.0768)	(172.5)	(0.0552)
Year of schooling	32.82**	-0.0232***	16.59	-0.00867**
	(13.95)	(0.00449)	(12.81)	(0.00353)
Household size	7.420	0.000318	3.614	0.000730
	(12.31)	(0.00376)	(10.45)	(0.00281)
Number of children age < 10	-31.37	-0.0399***	-50.73***	-0.0417***
	(19.44)	(0.00538)	(18.98)	(0.00467)
Elasticities (evaluated at mean)				
Own log hourly wage	-0.131		-0.050	
Spouse log hourly wage	0.126		-0.014	
Observations	7,694	27,377	8,955	28,323

Note. Standard errors and coefficients are estimated using survey setting. For intensive margin, we restricted our sample to married women with positive working hours. To analyze extensive margin, we employed linear probability model. We included self-employed women from year 2001.

Table 7.8 Elasticities of Labor Supply of Women: Elasticity and External Margins

	1995-1996		2001-2002		2006-2007	
Dependent variable: Annual hours of working						
		Extensive		Extensive		Extensive
	(1)	(2)	(3)	(4)	(5)	(6)
Own log hourly wage	1,178***	0.558***	685.5***	0.318***	663.5***	0.287***
	(57.42)	(0.0245)	(43.35)	(0.0182)	(53.44)	(0.0216)
Other family members'	-12.12	-0.0430***	2.541	-0.0271***	9.397	-0.0218***
average log hourly earning	(11.83)	(0.00467)	(11.48)	(0.00462)	(9.853)	(0.00374)
Married	-1,042***	-0.389***	-789.8***	-0.285***	-760.6***	-0.256***
	(26.19)	(0.0104)	(24.50)	(0.00941)	(22.99)	(0.00846)
Year of schooling	-46.66***	-0.0279***	-22.40***	-	-24.57***	-0.00879***
	(7.254)	(0.00303)	(1.010)	(0.000435)	(1.193)	(0.000492)
Household size	11.48***	-0.00146	-41.17***	-0.0218***	-30.28***	-0.0155***
	(3.975)	(0.00160)	(7.101)	(0.00296)	(6.929)	(0.00279)
Number of children age < 10	-97.84***	-0.0330***	33.18***	0.0101***	33.95***	0.0107***
	(7.789)	(0.00326)	(4.575)	(0.00190)	(3.993)	(0.00156)
Elasticities (evaluated at mean hours of working):						
Own log hourly wage	1.267		0.718		0.670	
Spouse log hourly wage	-0.013		0.003		0.009	
Observations	67,455	67,455	38,545	38,545	39,544	39,544

Note. Standard errors and coefficients are estimated using survey setting. Dependent variable working hour includes zero for non-workers. To analyze extensive margin, we employed linear probability model.

Table 7.9 Elasticities of Labor Supply of Women: Elasticity and External Margins including Self-Employed

	2001-2002		2006-2007	
Dependent variable: Annual hours of working				
	(1)	(2)	(3)	(4)
		Extensive		Extensive
Own log hourly wage	776.3***	0.343***	829.0***	0.287***
	(50.07)	(0.0205)	(64.23)	(0.0216)
Other family members'	-72.91***	-0.0601***	-55.78***	-0.0218***
average log hourly earning	(12.42)	(0.00489)	(11.35)	(0.00374)
Married	-754.8***	-0.277***	-743.3***	-0.256***
	(24.19)	(0.00924)	(23.16)	(0.00846)
Year of schooling	-18.20***	-0.00654***	-21.11***	-0.00879***
	(1.155)	(0.000481)	(1.395)	(0.000492)
Household size	-46.38***	-0.0258***	-39.70***	-0.0155***
	(7.449)	(0.00303)	(7.663)	(0.00279)
Number of children age < 10	17.54***	0.00323	20.78***	0.0107***
	(4.887)	(0.00197)	(4.367)	(0.00156)
Elasticities (evaluated at mean hours of working):				
Own log hourly wage	0.813		0.837	
Spouse log hourly wage	-0.076		-0.056	
Observations	42,034	42,034	43,663	43,663

Note. Standard errors and coefficients are estimated using survey setting. To analyze extensive margin, we employed linear probability model. We included self-employed women from year 2001.

Table 7.10 Comparison of Non-Workers and Imputation Sample

	1995-1996			2001-2002			2006-2007		
	Non-workers	Imputation sample	Difference	Non-workers	Imputation sample	Difference	Non-workers	Imputation sample	Difference
Years of schooling	7.71	8.75	1.04**	8.15	8.25	0.09	8.65	8.87	0.22
	(0.38)	(0.20)	(0.19)	(0.07)	(0.23)	(0.12)	(0.04)	(0.18)	(0.18)
Years of schooling of Spouse	8.84	8.93	0.09	9.04	8.24	-0.80**	9.34	8.84	-0.50**
	(0.04)	(0.20)	(0.20)	(0.09)	(0.23)	(0.22)	(0.05)	(0.18)	(0.18)
Number of Children <10	1.07	1.08	0.01	1.00	0.86	-0.13**	0.99	0.91	-0.08*
	(0.01)	(0.06)	(0.06)	(0.01)	(0.03)	(0,03)	(0.01)	(0.03)	(0.03)
Household size	4.97	4.95	-0.02	4.48	4.43	-0.04	4.50	4.46	-0.05
	(0.02)	(0.07)	(0.07)	(0.02)	(0.09)	(0.08)	(0.02)	(0.06)	(0.06)
Age	34.11	35.33	1.21**	34.62	36.54	1.93**	35.28	36.47	1.20**
	(0.06)	(0.30)	(0.30)	(0.12)	(0.34)	(0.37)	(0.08)	(0.32)	(0.32)
Age of Spouse	40.23	40.90	0.68	40.42	43.02	2.60**	41.51	42.10	0.56
	(0.08)	(0.38)	(0.38)	(0.13)	(0.46)	(0.50)	(0.09)	(0.38)	(0.39)
Observation	58,189	1,372		26,157	728		28,233	998	

Note. **statistically significant at 1%, *statistically significant at 5% Sample for imputation is restricted to married female workers in paid job who work less than 27 hours in the previous week. Non-workers: non-workers with positive wages are excluded.

Table 7.11 Elasticities of Labor Supply of Married Men

	1995-1996		2001-2002		2006-2007	
Dependent variable: Annual hours of working						
	(1)	(2)	(3)	(4)	(5)	(6)
Own log hourly wage	1,425***	1,426***	3,503***	3,470***	1,545***	1,542***
	(144.0)	(143.3)	(644.9)	(632.9)	(230.7)	(228.6)
Spouse log hourly wage	404.9***	405.4***	417.6***	413.4***	411.0***	410.4***
	(77.78)	(78.14)	(144.9)	(144.3)	(101.6)	(101.7)
Age	-47.08***	-47.14***	-83.18***	-81.89***	-46.74***	-46.55***
	(3.446)	(3.412)	(12.85)	(12.52)	(5.115)	(5.057)
Year of schooling	-36.21**	-36.30**	11.64	12.84	-14.11	-13.94
	(14.95)	-14.92	(35.91)	(35.60)	(25.11)	(25.05)
Household size	-12.06*	-11.33	-22.20	-35.90	8.162	5.677
	(6.832)	(7.960)	(18.68)	(22.93)	(10.76)	(13.10)
Number of children age < 10		-2.490		42.17		7.575
		(11.76)		(33.04)		(20.32)
Elasticities（evaluated at mean hours of working）:						
Own log wage	0.620	0.621	1.552	1.537	0.690	0.689
Spouse log wage	0.176	0.176	0.185	0.183	0.184	0.183
Observations	39,497	39,497	16,836	16,836	16,650	16,650

Note. Standard errors and coefficients are estimated using survey setting. Dependent variable is annual working hours including zero for non-workers.

Table 7.12 Elasticities of Labor Supply of Married Men including Self-Employed

	2001-2002	2006-2007
Dependent variable: Annual hours of working		
	(1)	(2)
Own log hourly wage	1,645***	956.8***
	(283.3)	(164.4)
Spouse log hourly wage	307.1***	309.4***
	(85.26)	(84.29)
Age	-37.56***	-30.63***
	(4.727)	(3.272)
Year of schooling	11.50	-6.450
	(15.42)	(12.56)
Household size	-41.87***	-1.127
	(13.86)	(8.918)
Number of children age < 10	57.55***	27.37*
	(19.18)	(14.05)
Elasticities (evaluated at mean hours of working):		
Own log wage	0.729	0.427
Spouse log wage	0.136	0.138
Observations	27,374	28,320

Note. Standard errors and coefficients are estimated using survey setting. Dependent variable is annual working hours including zero for non-workers. Self-employed workers' wage rates are calculated as monthly earning divided by monthly working hours. We included self-employed women from year 2001.

Table 7.13 Oaxaca Decomposition of Women's Labor Participation Gap

	Participation Difference	Characteristic Effect	Sensitivity Effect
Total	69.211***	4.108	65.103***
Hourly wage		41.574***	-1617.546***
Spouse hourly wage		-72.633***	2151.175***
Age		-10.616***	9.396
Spouse age		-14.220***	-208.090
Years of schooling		-14.273*	-44.376
Spouse years of schooling		-11.782*	204.743
Household members		-3.828	-9.126
Number of children age < 10		11.927***	-27.480**
Skill		10.272	8.514
Spouse skill		19.117***	292.533***
Year		-1.492	3.073
Province		50.061***	-201.108***
Constant			-496.604**

Table 7.14 Oaxaca Decomposition of Men's Labor Participation Gap

	Participation Difference	Characteristic Effect	Sensitivity Effect
Total	-119.497***	-65.344***	-54.153**
Hourly wage		193.001***	455.230
Spouse hourly wage		-17.403***	19.179
Age		-79.576***	24.694
Spouse age		-40.488***	-275.795
Years of schooling		-21.968**	242.551
Spouse years of schooling		-52.072***	327.738
Household members		5.141	72.750
Number of children age < 10		0.351	9.487
Skill		-39.311***	215.758
Spouse skill		-38.233***	334.932***
Year		-20.163	79.483***
Province		10.564	-820.337**
Constant			-739.823

7.2. Tables for Demand-side Analysis

Table 7.15 Output tariff and input tariff

Industry	1993		1995		1997		1999	
	Output tariffs	Input tariffs	Output tariffs	Input tariffs	Output tariffs	Input tariffs	Output tariffs	Input tariffs
Food	25.29	15.49	16.57	11.69	11.93	8.97	8.61	6.97
Textile clothing	28.45	18.64	20.01	14.41	20.62	17.41	13.44	9.94
Wood	27.17	10.36	20.68	6.01	13.06	3.49	10.09	2.96
Paper	18.48	16.91	8.47	8.90	5.87	6.83	3.79	4.49
Chemicals	14.88	10.61	11.92	8.76	10.32	7.33	8.15	6.01
Minerals	18.09	10.69	7.70	5.54	6.63	6.63	4.10	5.86
Basic Metals	10.02	9.06	8.12	7.84	6.88	6.91	7.55	6.38
Equipment and Metal products	31.52	14.30	33.74	11.20	16.06	8.70	10.73	7.59
Other Industry Process	34.65	19.08	22.96	13.46	19.44	11.38	15.67	9.63

Note. The reported numbers are average of output tariff and input tariff within two-digit industry weighted by output of each firm.

Table 7.16 Summary Statistics: Annual Survey of Manufacturers

Variable	1993	1999
The share of female workers	0.388	0.385
	(0.292)	(0.288)
Dissimilarity Index	37.118	41.549
	(9.509)	(11.755)
Output tariff	24.508	10.257
	(10.426)	(8.622)
Input tariff	14.704	7.490
	(6.559)	(4.757)
Relative wage bill of non-production workers	0.226	0.204
	(0.201)	(0.201)
The share of non-production workers (%)	14.791	14.009
	(15.401)	(15.446)
The number of workers	196.82	191.71
	(658.86)	(644.78)
Real value added per worker (in 1,000Rp)	0.698	0.769
	(5.713)	(5.227)
Real fixed capital per worker (in 1,000Rp)	2.033	0.691
	(36.404)	(11.656)
Real output per worker (in 1,000Rp)	0.002	0.002
	(0.011)	(0.018)
Domestic material per worker (in 1,000Rp)	0.893	0.906
	(5.604)	(14.427)
Imported material per worker (in 1,000Rp)	0.226	0.263
	(1.534)	(2.855)
The share of importing firms (%)	16.11	15.41
The share of exporting firms (%)	17.72	13.58
Observation	18,163	22,054

Note. The reported numbers are mean. The number in parenthesis are standard deviation. The dissimilarity index is defined as $\text{DI} = \frac{1}{2}\sum |f_i - m_i| \times 100$, where f_i is the ratio of females in each firm i to the total female employment in five-digit industry. m_i is defined similarly for males.

Table 7.17 Effect of Trade Liberalization on Female Employment

Dependent variable: The share of female employment (%)					
	(1)	(2)	(3)	(4)	(5)
Output tariff	-0.019	-0.016	-0.020	-0.020	-0.010
	(0.013)	(0.012)	(0.013)	(0.013)	(0.019)
Output tariff	-0.014	-0.012	-0.010	-0.011	-0.008
× Export	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)
Input tariff	0.038	0.038	0.038	0.041*	-0.001
	(0.025)	(0.024)	(0.024)	(0.024)	(0.037)
Input tariff	0.113**	0.111**	0.132***	0.104**	0.084*
×Import	(0.046)	(0.045)	(0.048)	(0.046)	(0.050)
Input tariff			-0.049		
× Import × Export			(0.039)		
Import	-1.217**	-1.259*	-1.304**	-1.121*	-0.954
	(0.587)	(0.585)	(0.588)	(0.587)	(0.621)
Export	0.787**	0.775**	0.869**	0.739**	0.707*
	(0.369)	(0.367)	(0.373)	(0.369)	(0.375)
Firm-specific control variables	Yes	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Island-specific time trend	No	No	No	Yes	No
Industry time trend	No	No	No	No	Yes
Observations	80,795	80,795	80,795	80,795	80,795
R-squared	0.929	0.929	0.929	0.929	0.930

Note. The dependent variable and tariffs are in percentage term. Export is defined as a binary variable indicating firms with positive amount of export. Import is a binary variable indicating firms whose imported material is more than 10% of total inputs. Output tariff and import tariffs are calculated as explained in Chapter 5.2.A. The set of firm-specific control variables include number of workers, wage of production workers relative to industry average, wage of non-production workers relative to industry average, real fixed capital per worker, real value added per workers, and real output per worker. Errors are clustered within the firm level. Standard errors are reported in parenthesis. (* Significant at 10%,** significant at 5%, *** significant at 1%)

Table 7.18 The Effect of Trade Liberalization by Industry and Worker

Dependent variable: The share of female employment (%)				
Sample selection	Industry		Type of workers	
	Light Industry	Heavy Industry	Non-production worker	Production worker
	(1)	(2)	(3)	(4)
Output tariff	-0.006	-0.075***	0.000	-0.018
	(0.015)	(0.024)	(0.000)	(0.014)
Input tariff	0.029	0.050	0.001	0.048*
	(0.027)	(0.072)	(0.001)	(0.028)
Input tariff × Import	0.037	0.235***	0.001	0.116**
	(0.062)	(0.066)	(0.001)	(0.049)
Import	0.009	-2.453***	-0.008	-1.324**
	(0.945)	(0.744)	(0.010)	(0.651)
Export	0.418	0.693**	0.001	0.585**
	(0.346)	(0.302)	(0.004)	(0.258)
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	47,571	33,224	65,447	80,772
R-squared	0.922	0.920	0.757	0.929

Note: See the note for Table 7.17. The dependent variable and tariffs are in percentage term. In regression (1) and (2) samples are restricted to firms in light industry and heavy industry separately. In regression (3) and (4), dependent variable is the share of female employment among non-production workers and those among production workers separately.

Table 7.19 The Trade Liberalization and Channels

Dependent variable: The share of female employment (%)				
Sample of firms	All firms	All firms	All firms	Domestic private firms
	(1)	(2)	(3)	(4)
Output tariff	-0.023	-0.021*	-0.022*	-0.023*
	(0.017)	(0.013)	(0.013)	(0.014)
Output tariff × High concentration	0.007			
	(0.017)			
Output tariff × Product shift		0.016		
		(0.044)		
Output tariff × Exit			0.009	
			(0.024)	
Input tariff	0.124***	0.039	0.040	0.047*
	(0.044)	(0.024)	(0.025)	(0.026)
Input tariff × Import	0.115**	0.110**	0.110**	0.112**
	(0.045)	(0.045)	(0.045)	(0.051)
Input tariff × High concentration	-0.100**			
	(0.044)			
Input tariff × Product shift		-0.050		
		(0.089)		
Input tariff × Exit			0.033	
			(0.059)	
High concentration	-1.764			
	(1.169)			
Product shift		0.051		
		(0.935)		
Exit			-0.552	
			(0.511)	
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	80,795	80,795	80,795	73,530
R-squared	0.929	0.929	0.929	0.930

Note. See the note for Table 7.17. High concentration is binary variable indicating that Herfindahl index is less than 0.25 in 5-digi industry where firm belongs to. Product shift indicates if firm changes its main product is changed in next period. Exit is defined as indicator variable for firms who exit the market in next period.

Table 7.20 The Trade Liberalization and Skilled Workers

Dependent variable: The share of female employment (%)				
Sample of firms	All firms	Light Industry	Heavy Industry	All firms
	(1)	(2)	(3)	(4)
Output tariff	-0.021	-0.008	-0.094***	-0.014
	(0.014)	(0.016)	(0.036)	(0.016)
Output tariff × High skilled	0.003	0.017	0.041	
	(0.027)	(0.041)	(0.046)	
Output tariff × Share of non-production workers				-0.059
				(0.057)
Input tariff	0.030	0.031	-0.015	0.039
	(0.027)	(0.029)	(0.088)	(0.033)
Input tariff × Import	0.107**	0.042	0.214***	0.109**
	(0.045)	(0.060)	(0.066)	(0.045)
Input tariff × High skilled	0.103**	0.050	0.112	
	(0.056)	(0.079)	(0.101)	
Input tariff × Share of non-production workers				0.004
				(0.112)
Share of non-production Workers				-2.285**
				(1.108)
Import	-1.102*	0.080	-2.269***	-1.138*
	(0.567)	(0.896)	(0.730)	(0.581)
Export	0.470**	0.376	0.592*	0.561**
	(0.230)	(0.343)	(0.305)	(0.229)
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	70,065	41,383	28,682	80,794
R-squared	0.926	0.917	0.917	0.929

See the note for Table 7.17. We define high skilled firms as firms in highest quantile in terms of share of workers with high school or higher education.

Table 7.21 Asian Financial Crisis and Robustness of Results

Dependent variable: The share of female employment (%)				
Sample of firms	All firms	Light industry	Heavy industry	Firms in all periods
	(1)	(2)	(3)	(4)
Output tariff	-0.017	-0.007	-0.071***	-0.017
	(0.014)	(0.018)	(0.024)	(0.014)
Output tariff × Post-crisis	0.007	0.017	-0.036*	-0.007
	(0.012)	(0.017)	(0.020)	(0.013)
Input tariff	0.047*	0.043	0.034	0.039
	(0.027)	(0.031)	(0.073)	(0.028)
Input tariff × Import	0.104**	0.031	0.225***	0.125***
	(0.046)	(0.063)	(0.067)	(0.045)
Input tariff × Post-crisis	-0.042	-0.051	-0.057	0.006
	(0.026)	(0.031)	(0.062)	(0.027)
Import	-1.111*	0.089	-2.380***	-1.430**
	(0.587)	(0.954)	(0.745)	(0.567)
Export	0.555**	0.411	0.686**	0.412*
	(0.229)	(0.346)	(0.303)	(0.236)
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	80,795	47,571	33,224	47,477
R-squared	0.929	0.922	0.920	0.924

See the note for Table 7.17. Post crisis is defined as year 1997 and thereafter.

Table 7.22 The Effect of Trade Liberalization Exclude Industry with Removed NTBs

Dependent variable: The share of female employment (%)					
Sample of firms: Industries without NTB reduction commitment					
Sample selection		Industry		Type of workers	
	All firms	Light Industry	Heavy Industry	Non-production worker	Production worker
	(1)	(2)	(3)	(4)	(5)
Output tariff	-0.020	-0.006	-0.099***	0.000	-0.018
	(0.014)	(0.015)	(0.033)	(0.000)	(0.016)
Output tariff × Export	-0.018				
	(0.020)				
Input tariff	0.040*	0.030	0.081	0.001	0.050*
	(0.025)	(0.027)	(0.078)	(0.001)	(0.028)
Input tariff × Import	0.124***	0.042	0.261***	0.001	0.127**
	(0.048)	(0.063)	(0.075)	(0.001)	(0.052)
Import	-1.509**	-0.212	-2.888***	-0.008	-1.665**
	(0.623)	(0.941)	(0.822)	(0.010)	(0.691)
Export	0.839**	0.376	0.723**	0.001	0.562**
	(0.385)	(0.347)	(0.318)	(0.004)	(0.265)
Firm-specific variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	77,790	47,039	30,751	62,649	77,768
R-squared	0.927	0.921	0.917	0.754	0.927

See the note for Table 7.17. The industries committed to reduce non-tariff barrier are excluded. The excluded industries are as follows: includes flat-rolled iron and steel, iron and steel tubes and pipes, engine and engine parts, forklift trucks, bulldozers, tractors, electronic musical instruments, sugar substitutes, certain hand tools, disposable gas-filled cigarette lighters, locomotive engines and certain lubricants.

Table 7.23 Future Tariff Reduction and Robustness

Dependent variable: The share of female employment (%)				
Sample of firms	All firms	Light industry	Heavy industry	Production worker
	(1)	(2)	(3)	(4)
Output tariff	-0.057***	-0.040	-0.110***	-0.060***
	(0.020)	(0.025)	(0.036)	(0.022)
Output tariff × Export	-0.008	-0.017	0.037	0.003
	(0.038)	(0.053)	(0.053)	(0.045)
Output tariff $(t+2)$	0.036	0.051	0.012	0.041
	(0.023)	(0.032)	(0.027)	(0.026)
Output tariff × Export $(t+2)$	0.012	0.016	-0.028	-0.006
	(0.041)	(0.053)	(0.061)	(0.050)
Input tariff	0.050	0.079	0.042	0.016
	(0.058)	(0.078)	(0.117)	(0.065)
Input tariff × Import	0.180*	0.291	0.055	0.241**
	(0.110)	(0.181)	(0.147)	(0.122)
Input tariff $(t+2)$	-0.016	-0.039	0.128	0.001
	(0.037)	(0.046)	(0.185)	(0.043)
Input tariff × Import $(t+2)$	-0.0344	-0.214	0.234	-0.097
	(0.161)	(0.240)	(0.262)	(0.177)
Import	-1.673*	-1.105	-2.656**	-1.953*
	(0.898)	(1.420)	(1.279)	(1.005)
Export	0.323	0.582	-0.010	0.452
	(0.544)	(0.903)	(0.686)	(0.624)
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	52,393	30,809	21,584	52,385
R-squared	0.945	0.939	0.940	0.945

See the note for Table 7.17.

Table 7.24 Future Tariff Reduction and Robustness

Dependent variable: Share of unpaid worker (%)				
Sample of firms	All firms	Light industry	Heavy industry	All firms
	(1)	(2)	(3)	(4)
Output tariff	0.012*	0.012**	0.012	0.020*
	(0.007)	(0.005)	(0.0194)	(0.012)
Output tariff × Export	0.016*	0.0236	0.0105	0.013
	(0.009)	(0.015)	(0.0109)	(0.008)
Output tariff × Post-crisis				-0.007
				(0.006)
Input tariff	-0.029**	-0.032***	-0.017	-0.023**
	(0.012)	(0.010)	(0.062)	(0.011)
Input tariff × Import	-0.002	-0.0223	0.033	-0.005
	(0.015)	(0.015)	(0.057)	(0.014)
Input tariff × Post-crisis				-0.021
				(0.017)
Import	0.017	0.263	-0.289	0.060
	(0.169)	(0.221)	(0.495)	(0.152)
Export	-0.361**	-0.516*	-0.258*	-0.322**
	(0.151)	(0.305)	(0.135)	(0.147)
Post-crisis				0.385
				(0.469)
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	80,794	47,571	33,223	80,794
R-squared	0.417	0.677	0.309	0.417

See the note for Table 7.17

Table 7.25 Future Tariff Reduction and Robustness

Dependent variable: Male share of unpaid worker (%)				
Sample of firms	All firms	Light industry	Heavy industry	All firms
	(1)	(2)	(3)	(4)
Output tariff	0.014	0.018*	-0.006	0.025*
	(0.011)	(0.011)	(0.021)	(0.014)
Output tariff × Export	-0.003	0.002	0.005	-0.006
	(0.010)	(0.017)	(0.012)	(0.010)
Output tariff × Post-crisis				-0.005
				(0.009)
Input tariff	-0.019	-0.027	-0.006	-0.006
	(0.019)	(0.021)	(0.07)	(0.020)
Input tariff × Import	-0.036	-0.072*	0.014	-0.044*
	(0.028)	(0.041)	(0.060)	(0.027)
Input tariff × Post-crisis				-0.051**
				(0.023)
Import	0.368	0.929	-0.176	0.455
	(0.336)	(0.745)	(0.519)	(0.329)
Export	-0.105	-0.270	-0.116	-0.050
	(0.179)	(0.363)	(0.159)	(0.177)
Post-crisis				0.322
				(0.515)
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	79,961	46,770	33,191	79,961
R-squared	0.629	0.743	0.372	0.629

See the note for Table 7.17.

Table 7.26 Future Tariff Reduction and Robustness

Dependent variable: Female share of unpaid worker (%)				
Sample of firms	All firms	Light industry	Heavy industry	All firms
	(1)	(2)	(3)	(4)
Output tariff	-0.002	-0.010	0.038	-0.005
	(0.013)	(0.016)	(0.029)	(0.015)
Output tariff × Export	0.018	0.023	-0.007	0.020
	(0.014)	(0.022)	(0.021)	(0.014)
Output tariff × Post-crisis				0.011
				(0.013)
Input tariff	-0.032	-0.022	-0.053	-0.029
	(0.040)	(0.044)	(0.066)	(0.038)
Input tariff × Import	-0.021	-0.029	-0.028	-0.022
	(0.025)	(0.035)	(0.048)	(0.025)
Input tariff × Post-crisis				-0.017
				(0.034)
Import	0.307	0.453	0.258	0.321
	(0.341)	(0.557)	(0.493)	(0.344)
Export	-0.637**	-0.511	-0.500	-0.658**
	(0.276)	(0.453)	(0.349)	(0.272)
Post-crisis				-0.719*
				(0.398)
Firm-specific control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	73,823	44,133	29,690	73,823
R-squared	0.718	0.719	0.716	0.718

See the note for Table 7.17.

Chapter 8. Figures

8.1. Figures for Supply-side Analysis

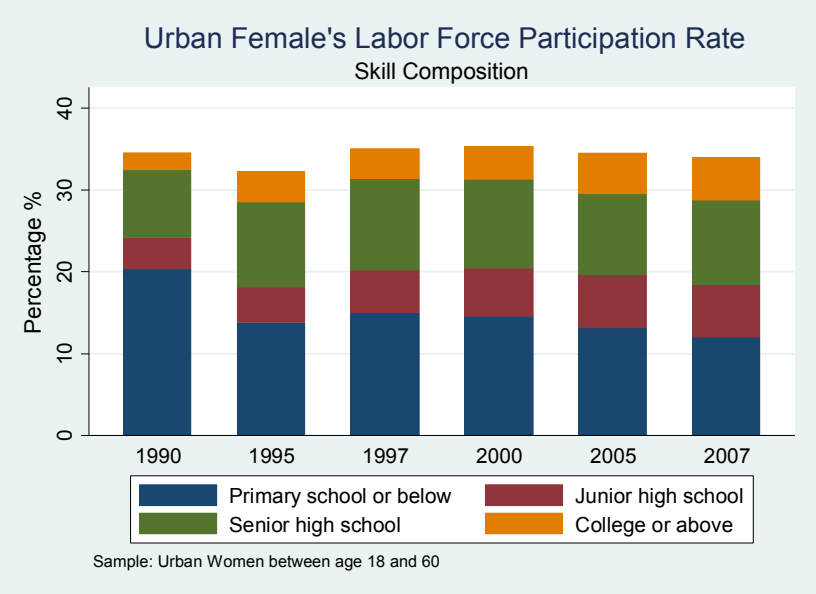

Figure 8.1 Urban Female's Employment Rate

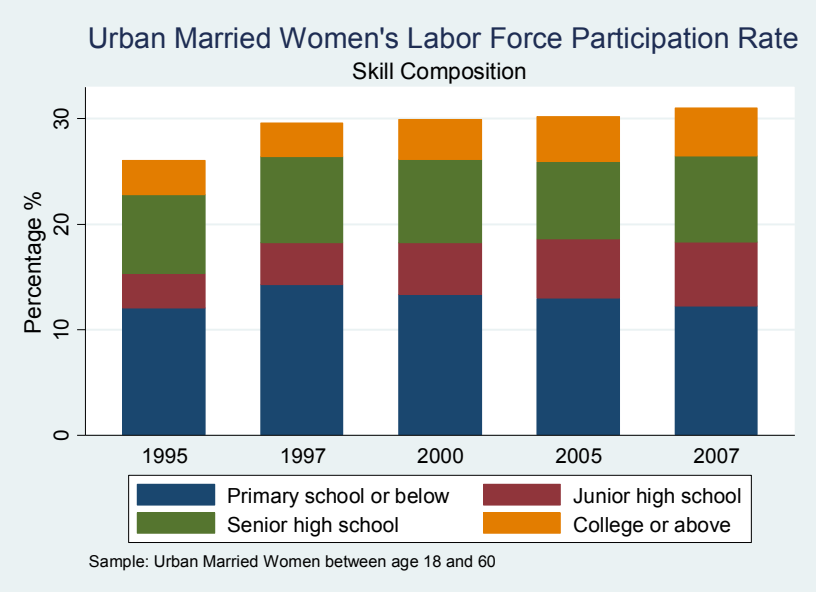

Figure 8.2 Urban Married Female's Employment Rate

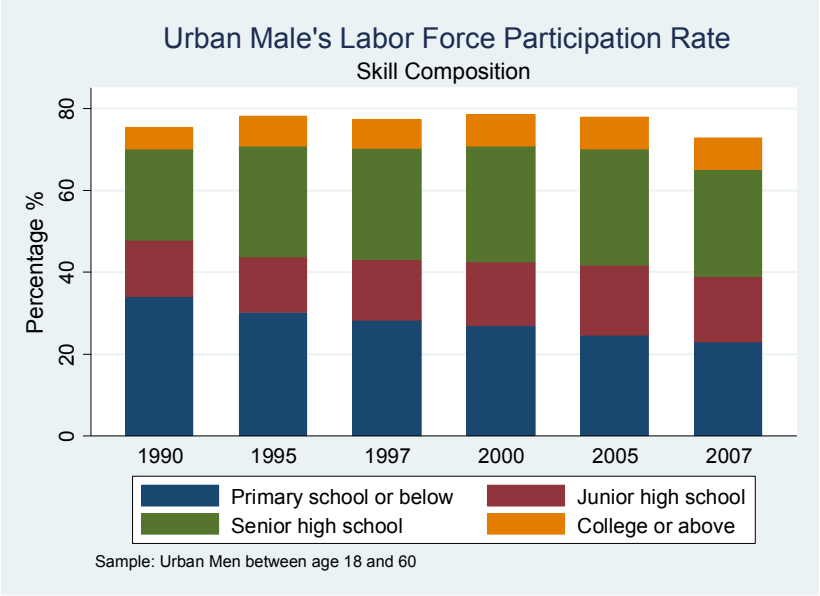

Figure 8.3 Urban Male's Employment Rate

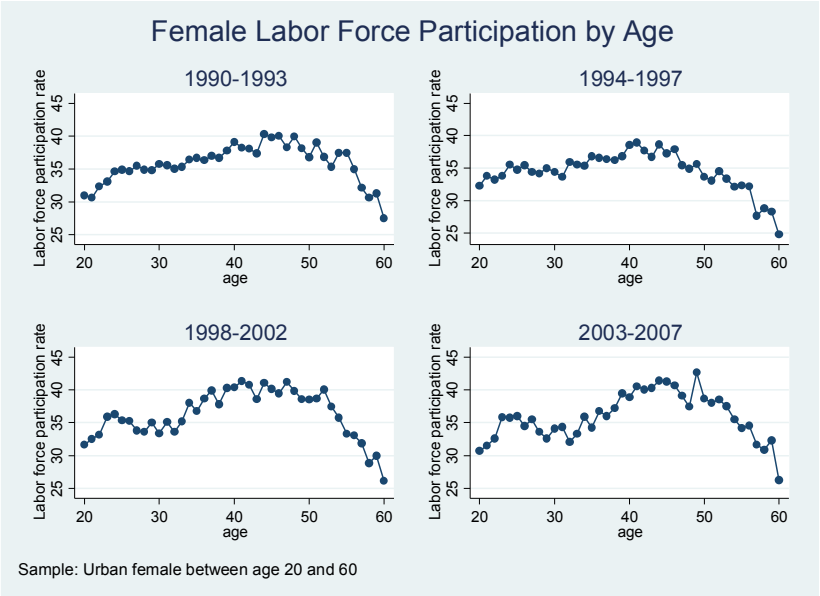

Figure 8.4 Female Employment Rate by Age

Figure 8.5 Urban Area's Change in Gender Wage Gap in by Wage Percentile

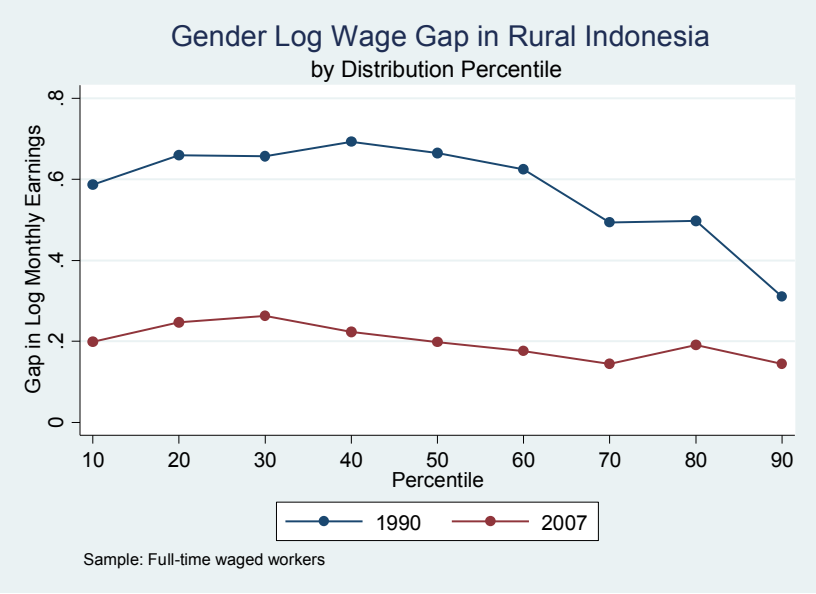

Figure 8.6 Rural Area's Change in Gender Wage Gap by Wage Percentile

8.2. Figures for Demand-side Analysis

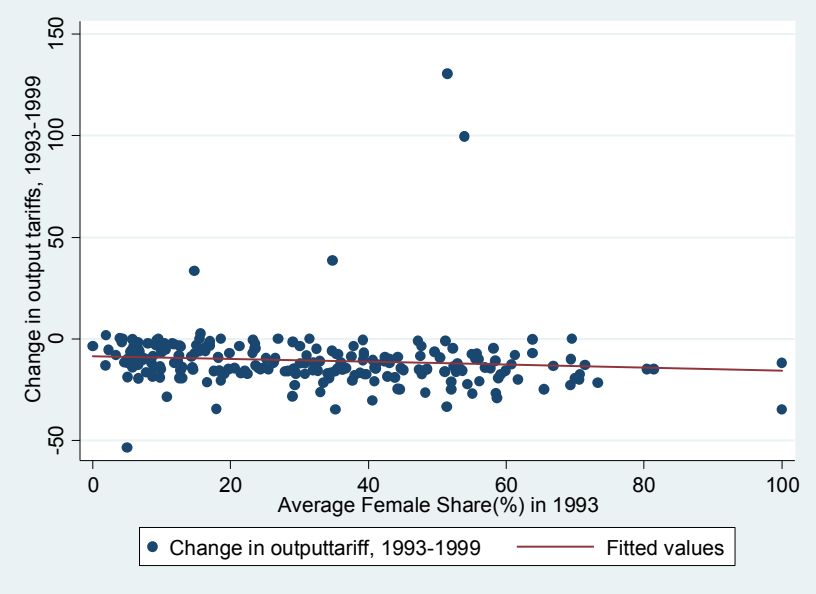

Figure 8.7 Change in Output Tariffs and Initial Female Rate

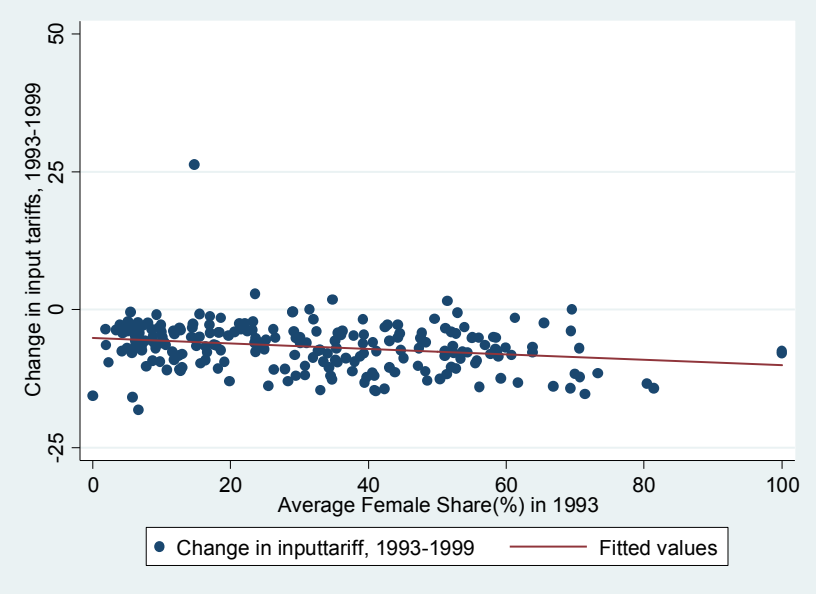

Figure 8.8 Change in Input Tariffs and Initial Tariff

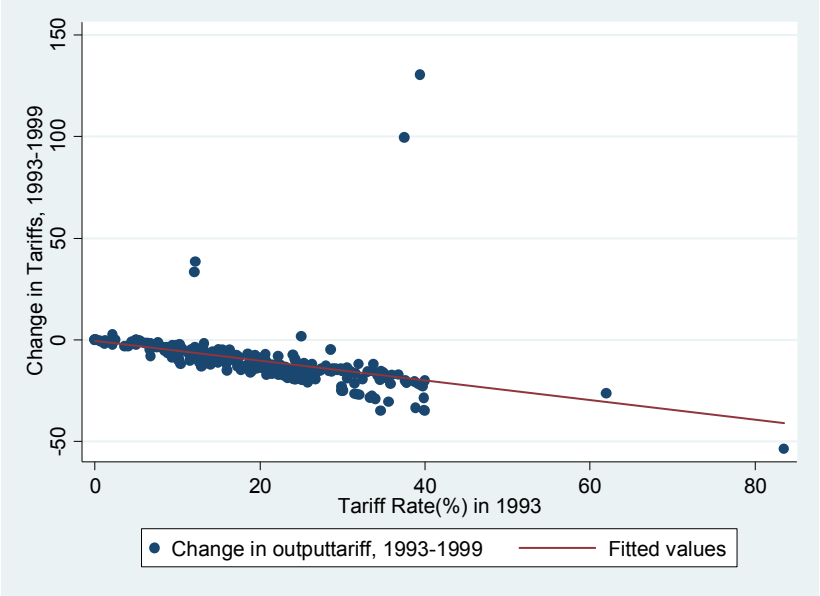

Figure 8.9 Change in Output Tariffs and Female Employment

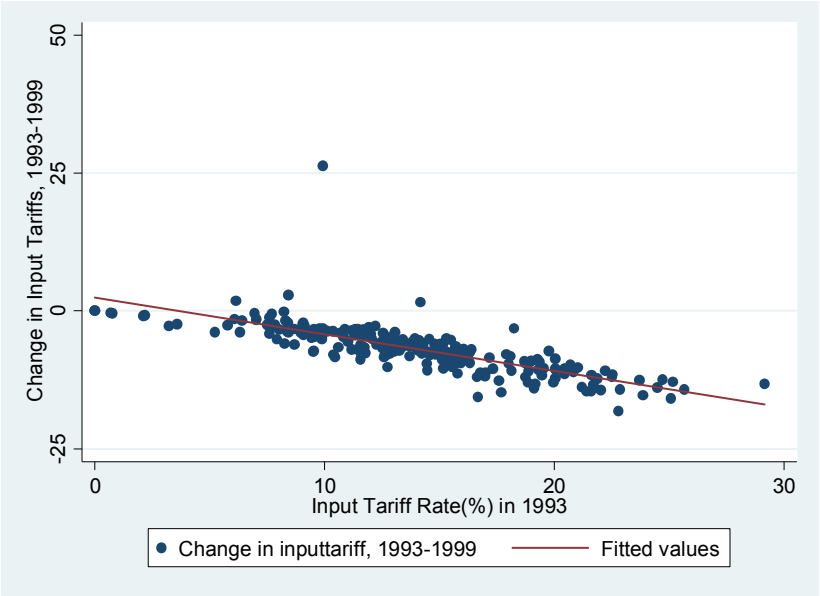

Figure 8.10 Change in Input Tariffs and Female Employment

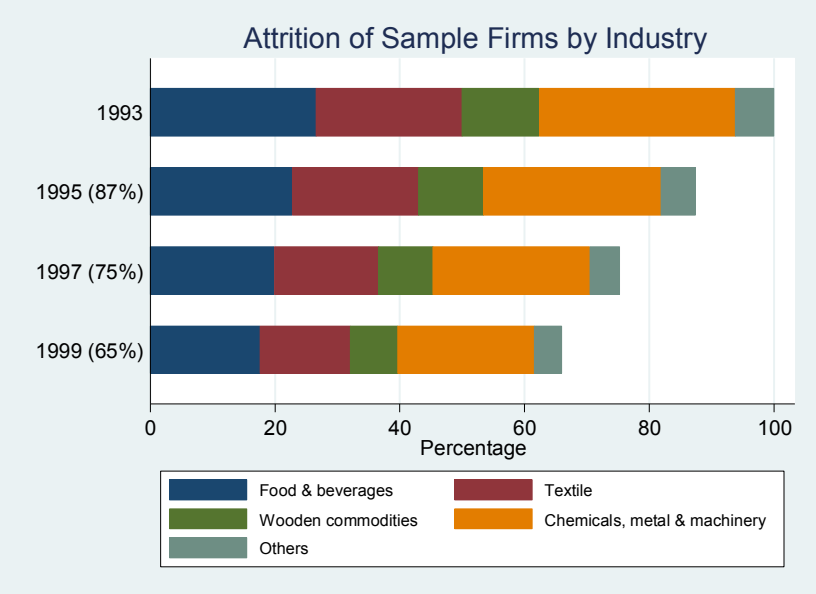

Figure 8.11 Attrition of Firms by Industry from 1993 to 1999