Does Offshoring Raise Female Employment in a Developing Country?

Hyejoon Im* **& Hisamitsu Saito†**

May 11, 2021

Abstract

We investigate the effects of offshoring on female employment in a developing country as the recipient. We use unique information on outsourcing revenues from the establishment-level dataset of Indonesia. After correcting for endogeneity of offshoring, we find large positive effects on female employment: a 10% increase in offshoring revenues in a plant raises its share of female employment by 0.8–0.9 percentage points. These positive effects occur in production occupations, but not in non-production ones. Further, these effects are more pronounced in industries with a large unskilled workforce, low-technology industries, or light industries.

Keywords: offshoring, gender, employment, globalization, FDI

JEL codes: F14, F16, J16

* Yeungnam University. Email: hi6w@yu.ac.kr

† Hokkaido University. Email: saitoh@econ.hokudai.ac.jp

1. Introduction

Female participation in the labor market is important in both developed and developing countries, especially in the latter. It affects not only macroeconomic performances, such as economic growth and poverty rate of a country, but also microeconomic decisions of individuals or households, such as education, marriage, fertility, and child development. Globalization, such as trade liberalization and offshoring, greatly influences female labor participation in developing countries. This study considers the linkage between the two. Specifically, we investigate the effects of offshoring on female employment in a developing country as the recipient. We refer to offshoring as international outsourcing where a firm hires another firm in a foreign country, whether the latter is an inside or outside firm, to perform a manufacturing task.

There are a few theoretical ideas on the relationship between offshoring and gender outcome in employment. Routine tasks are easier to automate and more easily offshored to be performed by unskilled labor with low wages in developing countries (Autor et al., 2003; Ebenstein et al., 2014). Some examples of such routine tasks include assembling parts in TVs and printers, attaching pieces to metal or wooden articles, and sewing buttons and decorative trimmings to clothing.[1] It is often argued that women have a higher tolerance for repetitive tasks, greater agility, and lower skill and wages (Standing, 1999; Fontana, 2003; Atkin, 2009). Thus, as developed countries offshore routine tasks, the demand for female workers relative to male workers should rise in the host countries.

The next idea is related to the brain vs. brawn hypothesis that women have a lower level of

[1] Refer to Autor et al. (2003) for a formal definition of routine tasks.

physical skill relative to men.[2] Offshoring often entails the adoption of new technology in the host firms, such as automated or computerized production processes, at the request of firms in the source countries that provide offshoring tasks. The new technology lowers the need for physical skill at which men have an advantage and leads to an increase in female employment. In other words, the new technology brought in by offshoring is complementary to female labor.

An opposing but related theory is also possible. Offshoring in the host firms involves imported intermediated inputs embodying high-level technology or the transfer of such technology, which requires skilled workers to operate. In this case, offshoring results in so called skill-biased technological change in the host firms.[3] Given that men are more educated than women in developing countries, including Indonesia, offshoring is likely to increase male employment but decrease female employment.

In summary, the above theories suggest that the effects of offshoring on female employment in the host firms are ambiguous. The current study provides an empirical investigation regarding this issue. We use the establishment-level dataset of Indonesia, which is novel in that it records outsourcing revenues of plants. After correcting for endogeneity of offshoring with an instrument based on an external demand shock, we find large positive effects of offshoring on female employment: a 10% increase in offshoring revenues of a plant raises its female employment share by 0.8–0.9 percentage points. The positive effects occur in production occupations, but not in non-production ones. Furthermore, these effects are more pronounced in industries with a large unskilled (or low-educated) workforce, low-technology industries, or

[2] Juhn et al. (2014) originally proposed this idea in the context of trade and gender composition.

[3] This idea is related to Acemoglu (2003), who argues that increased trade induces skill-biased technological change in both developed and developing countries, causing the skill premium to increase in both groups.

light industries.

Some authors examine the gender component in response to trade liberalization or offshoring.[4] Black and Brainerd (2004) and Ederington et al. (2010) test Becker's (1957) famous hypothesis that employers who discriminate against a particular group (e.g., female or black workers) are disadvantaged and driven out of business when competition increases. They consider an increase in foreign competition after trade liberalization and examine its effect on the gender wage gap or female employment.

Juhn et al. (2014) test the brain vs. brawn hypothesis in the context of trade liberalization. Using Mexican establishment-level data, they show that an increase in export opportunities due to the North American Free Trade Agreement leads to new technology (e.g., a computerized production system), which complements female labor by reducing the need for physical skill. Gaddis and Pieters (2017) investigate the effect of Brazil's trade liberalization on gender differences in local labor markets. They find no evidence that female employment and labor participation increase relative to men in response to trade liberalization. Oishi and Wei (2018) use the same dataset as ours and find that tariff cuts are associated with a reduction in the share of female employment in Indonesia.

Although many studies examine the effects of offshoring, they usually focus on the effects from the perspective of the source country, not the host country.[5] Further, they seldom consider gender outcomes in conjunction with offshoring. One notable exception is Peri and Poole

[4] Fontana (2003) provides a comprehensive review of early studies on the gender effects of trade liberalization.

[5] For instance, Ebenstein et al. (2014) consider the wage effects of offshoring in the U.S., and Hummels et al. (2014) examine those in Denmark.

(2012), who examine the effect of a firm's exports (a proxy for offshoring) on its female employment and relative demand for productive tasks (e.g., cognitive tasks) in the host country, Brazil.

Foreign direct investment (FDI), particularly vertical FDI, is a kind of offshoring activity in that it is international outsourcing, where tasks are performed by a foreign-affiliated subsidiary.[6] Ouedraogo and Marlet (2018) review the literature on the relationship between FDI and gender outcomes and report that the effects of FDI on the gender wage gap are unclear. Instead, the authors use two composite gender indices for a panel of 95 developing countries and find that FDI inflows are positively associated with gender development (i.e., women are better off) and negatively associated with gender inequality (i.e., decreasing gender gaps). Helble and Takeda (2020) consider the effects of FDI on the Cambodian labor market and find no evidence that FDI reduces the gender wage gap or increases the probability of women working in the formal sector.

In light of the aforementioned studies, our main contribution to the literature is that we examine the effects of offshoring on female employment from the perspective of the host country. In doing so, we use a more direct measure of offshoring activities of the host plants. Many studies employ a rather indirect measure of offshoring. For instance, Feenstra and Hansen (1996a, b) measure offshoring using the share of imported materials in total non-energy input purchases. Ebenstein et al. (2014) use employment of foreign affiliates of U.S. multinational enterprises (MNEs) as a measure of offshoring.

[6] Since we can identify whether a plant is a foreign affiliate of multinational enterprises in the data, we also examine the effects of FDI on female employment. See subsection 4.3.

The rest of this paper is organized as follows. Section 2 describes the data and variables. Section 3 explains empirical methodology, and section 4 discusses results and provides robustness checks. Finally, concluding remarks are presented in section 5.

2. Data

The primary data source is the *Annual Survey of Medium and Large Manufacturing Establishment* published by Statistics Indonesia (Badan Pusat Statistik or BPS) for 2001 to 2012. Its microdata are available for plants with 20 or more employees. This dataset contains production and cost information at the plant level, including the total value of production, the revenue from manufacturing services, the number of workers in production and non-production occupations by gender, and the book values of fixed capital assets, materials, electricity, and energy inputs. The dataset also reports the plant's industry classification for its main product, export and import status, and the share of foreign capital. The industry is defined based on the three-digit International Standard Industrial Classification (ISIC) Revision 3.

The revenue from manufacturing services measures that from performing tasks outsourced by other firms, which is our main area of interest. According to the survey, "manufacturing services are industrial activities that serve others. In these activities, the materials are supplied by others while the processor is processing and receiving payments for these activities as compensation." However, the revenue from manufacturing services in the survey includes that from activities outsourced by both domestic and foreign firms.

To disentangle offshoring activities, international outsourcing, we use an interaction term

between the plant's revenue from manufacturing services and a dummy variable indicating the plant's involvement in international trade. When Indonesian plants perform tasks outsourced by their partner firms in foreign countries, they often import some inputs from their foreign partners and/or export the finished products to them. To reflect this, we consider two types of dummy variables. The first takes the value of one if the plant imports materials and exports its products, while the second takes the value of one if the plant exports its products whether it imports materials or not. The interaction term with the former (the latter) is supposed to measure the revenue from narrowly (broadly) defined offshored activities.[7] Of the total observations in the sample, plants that engage in outsourcing activities account for 17.6%, among which those engaging in the narrowly (broadly) defined offshoring hold 6.2% (19.3%). The most and the least offshoring industries based on the broad definition of offshoring and the share of female workers therein are presented in Table 1. A casual inspection suggests that industries with the highest intensity of offshoring have a higher female share compared to those with the lowest intensity of offshoring. Note that the four industries with the least offshoring have zero revenues from outsourcing.

A plant's value-added is obtained by subtracting intermediate consumption, such as materials, electricity, and energy inputs, from its total revenue. The value-added obtained and the revenue from manufacturing services are deflated by the wholesale price index (2000 = 100). Non-production workers are those engaged in non-manual work, such as factory supervision, administration, logistics, and research and development. The initial capital stock is proxied by fixed tangible assets deflated by the price index for gross fixed capital formation in Indonesia's

[7] It should be noted that we cannot rule out cases where the plant imports materials that are not used for the offshored activities or where it exports goods that are unrelated with the offshored activities.

System of National Accounts. Capital stock in the following periods is constructed using the perpetual inventory method, assuming a depreciation rate of 9% (Brandt et al., 2012). We define MNEs or FDI as firms whose foreign capital share is greater than 20%.[8] We construct instrument variables (IVs) based on world import demand, the data of which are obtained from the United Nations Comtrade Database.[9]

To determine whether the effect of offshoring on female employment differs between industries, we classify them in a couple of dimensions. First, the survey in 2006 provides detailed data on workers' educational attainment, allowing us to compute the share of skilled workers in the total employment, including both male and female workers, for each plant. Since the share of workers with a college degree is very small (only 4%) in the Indonesian manufacturing workforce, we define skilled (educated) workers as high-school graduates or above (see Table 2). We obtain the average share of skilled workers across plants for each industry. Using the median value, industries are classified into those employing skilled workers intensively and those not. Second, we classify industries as high- and low-technology according to the classification of the OECD (2003). However, because this classification is based on R&D intensities of industries in OECD countries, it does not necessarily reflect the technology level of Indonesian manufacturing. Third, following Oishi and Wie (2018), we classify industries into light and heavy.[10]

[8] According to Blalock and Gertler (2009), the samples of foreign-affiliated firms obtained under this definition are mostly equivalent to those doing business under the foreign capital investment licenses in Indonesia.

[9] We use the concordance table between Harmonized System (HS) codes and Indonesian product codes provided by BPS to construct the instrument variables.

[10] Light industries include food and beverages, textiles, wooden commodities, paper and printing, furniture, and recycling. Heavy industries include chemicals, petroleum and rubber, metal products, machinery, and transportation.

Table 3 shows summary statistics. Female workers account for 41% of total employment or production occupation in average Indonesian plants. By contrast, the share of female workers in non-production occupations is six percentage points smaller than the former two types of shares. As for the export and import status of plants, about 20% of plants export products while only 5% engage in both exporting products and importing materials.

Figure 1 shows the average share of female workers along with the logarithm values of the outsourcing revenues of plants in the narrowly and broadly defined offshoring over the sample period. The average share of female workers increased before the global financial crisis in 2008–2009 and recovered to the pre-crisis level in 2011. The outsourcing revenues of narrowly defined offshored plants are smaller than those of broadly defined ones, but both series exhibit similar fluctuations. The figure shows that, except for 2005–2008, the female share and the outsourcing revenues tend to move in a similar fashion. We investigate the relationship between them more formally in the following section.

3. Empirical Strategy

We consider the following econometric model.

$$fem\_emp_{ijt} = \alpha + \beta_1 lnouts_{it} + \beta_2 d\_trade_{it} + \beta_3 lnouts_{it} \times d\_trade_{it} + \boldsymbol{X}'_{it}\boldsymbol{\beta} + \theta_{jt} + \varepsilon_{ijt} \quad (1)$$

where *i* is an index for a plant, *j* is an index for an industry, and *t* is an index for time or year.[11] The dependent variable is the share of female employment of plant *i* at time *t*. $lnouts_{it}$ is the logarithm of outsourcing revenues of plant *i* at time *t*. d_trade_{it} is a dummy variable of plants that engage in international trade, for which we consider two types: plants that import materials and export products at the same time (d_trade1_{it}) and those that export products (d_trade2_{it}). $lnouts_{it} \times d\_trade_{it}$ is the interaction term between outsourcing revenues and one of the two dummy variables. $\boldsymbol{X}_{it}^{'}$ is a row vector of control variables for plant characteristics such as value-added, the ratio of capital to value-added, and a dummy variable for MNEs or FDI. θ_{jt} is the fixed effects for an industry-time pair and controls for any industry-time specific shocks, such as industry-wide technology shocks for a given year. Note that the industry fixed effects θ_j and the time fixed effects θ_t are subsumed into θ_{jt}. ε_{ijt} is a random variable.

The interaction term is the variable of interest and indicates offshoring activities of plants. Depending on the trade status of plants, we have two definitions of offshoring. If plants that engage in outsourcing tasks conduct both importing and exporting, the interaction term ($lnouts_{it} \times d\_trade1_{it}$) indicates offshoring in a narrow sense. If plants that engage in outsourcing tasks conduct exporting, the interaction term ($lnouts_{it} \times d\_trade2_{it}$) indicates offshoring in a broad sense. If offshoring increases the demand for female labor, we should expect positive coefficients for β_3 in both cases. Note that, given that we use an industry-time fixed effect in equation (1), we are essentially comparing plants within a given industry-time pair to identify β_3. In other words, we identify the effects of offshoring through variations

[11] When a plant produces multiple products, the industry classification is based on its main product.

across plants for a given industry-time pair.[12]

Offshoring activities can be endogenous. Plants that employ many female workers may have more offshored tasks. It is also possible that unobserved technology change is correlated with both a plant's decision to upgrade technology for attracting offshoring and to change the demand for female labor. On the one hand, as noted in the introduction, plants that perform offshored tasks adopt a new automated production system that lowers the need for physical skill and increases female employment. On the other hand, the adoption of new technology may increase the demand for skilled workers to work with it. Given that skilled labor is disproportionately male in the Indonesian workforce,[13] the new technology is likely to increase the relative demand for male workers. To address the potential endogeneity of offshoring, we consider an instrumental variable strategy. A valid instrument should be correlated with offshoring activities of plants, but should not be directly associated with their technology shocks or female employment. As an instrument, we consider the weighted average of world import demand, with the weight being plant *j*'s initial production share of product *k*:

$$\boldsymbol{IV_{it}^{vol} \equiv \sum_{k} \omega_{ikt_0} WID_{kt}} \qquad (2)$$

where WID_{kt} is the value of world imports of product *k* at time *t*, less imports from Indonesia, and ω_{jkt_0} is the share of product *k* in the total production of plant *i* at the initial year t_0. We assume that the instrument is positively correlated with plant *i*'s revenue from outsourcing.[14]

[12] When we use the plant fixed effects instead of the industry-time fixed effects, the results are largely insignificant. This is due to the lack of variations within plants during the sample period.

[13] Male workers with a high school diploma or above comprised 29% of the Indonesian manufacturing workforce in 2006, while female counterparts made up 20%. See Table 2.

[14] Here, an implicit assumption is that all products manufactured by plant *j* are subject to outsourcing.

This instrument is a modification of Hummel et al.'s (2014) instruments. The idea is that the fluctuations in offshoring activities over the sample period are driven by external demand shocks to Indonesian manufacturing plants. Our instrument captures such shocks and, thus, helps identify the causal effects of offshoring. We use a plant's share of product *k* in the initial year to reduce simultaneity bias, because female employment and offshoring may be determined contemporaneously. The novelty of the instrument variable is that it varies in terms of plant *and* time. We instrument the interaction of plant *i*'s outsourcing revenue and its trade status with the interaction of the instrument and plant *i*'s trade status.

Alternatively, we use the share of world import demand for product *k* in world total import demand as an instrument:

$$\boldsymbol{IV_{it}^{sh} \equiv \sum_{k} \omega_{ikt_0} \frac{WID_{kt}}{WID_t}} \tag{3}$$

where WID_t is the total value of world imports at time *t*, less imports from Indonesia. We use each of these two instruments (equations (2) and (3)) in two-stage least squares (TSLS) estimations.

The effects of offshoring on female labor can differ depending on industries, because offshoring activities are likely to be concentrated in particular industries, as evidenced in Table 1. First, the effects are expected to be more prominent in industries with a large unskilled (low-educated) workforce, because tasks under offshoring are likely to be routine and unskilled production activities. Second, they are likely to be stronger in industries with low technology where production tasks are relatively simple and routine and, thus, are easy to be offshored. In the same vein, the effects of offshoring are expected to be more pronounced in light industries (e.g.,

food and beverages and textiles) than in heavy industries. In fact, the above discussions are largely consistent with traditional trade theory. Indonesia, developing countries in general, is abundantly endowed with unskilled workers and specializes in industries with unskilled workforce, low-technology industries, or light industries. Thus, the Heckscher–Ohlin theory implies that offshoring activities like international trade are likely to concentrate on such industries. Therefore, it is worthwhile examining if the effects of offshoring are particularly stronger for these industries.

4. Results

4.1. Effects on Female Employment

The estimation results of equation (1) are reported in Table 4. The first two columns show ordinary least squares (OLS) results. The coefficients of the interaction terms are positive and statistically significant (columns (1) and (2) in Table 4). Thus, whether offshoring is narrowly or broadly defined, as a plant performs more offshoring tasks, its share of female employment increases.

As for control variables, when a plant's value-added or the ratio of capital to value-added increases, its share of female labor decreases. The share of female labor is higher for affiliates of MNEs. For plants that do not engage in international trade, an increase in outsourcing decreases the share of female workers. Among plants without outsourcing revenues, those that engage in both importing and exporting (d_trade1_{it}) and those that conduct exporting

(d_trade2_{it}) have higher shares of female workers.[15]

To address the endogeneity of offshoring, we consider instrument variables. Columns (3) to (6) in Table 4 show the instrument estimation results. The results stay the same whether we use world import demand for product *k* (columns (3) and (5)) or its share in world total import demand (columns (4) and (6)) as an instrument. In terms of the economic magnitude of the coefficients, a 10% increase in offshoring revenues raises the female employment share by 0.8–0.9 percentage points. Our findings contrast those of Peri and Poole (2012), who use a firm's intensity of exports as a proxy for offshoring and find that it has no statistical relationship with the share of female workers in Brazilian firms.

It is noteworthy that the coefficients of offshoring in TSLS are much larger than those in OLS. In other words, the effects of offshoring are underestimated in OLS, but, after correcting for endogeneity, the causal effects of offshoring on female employment are considerably large. Note that this result is not due to a weak instrument problem, as our instruments are relatively strong. Stock and Yogo (2002) suggest that to avoid a weak instrument problem, the first-stage *F* statistic should be above 10. The *F* statistics at the first stage are slightly less than 10 for the volume of world import demand (equation (2)) and are more than 10 for its share (equation (3)). In TSLS, the results for all control variables qualitatively stay the same as those in OLS, except for the dummy variables for the trade status of a plant, whose coefficients are negative in TSLS.

Because tasks that developed countries usually offshore are production ones rather than non-

[15] Oishi and Wie (2018) find similar results: The share of female labor is higher for exporting plants than for non-exporting plants.

production ones (Ebenstein et al., 2014), we expect that the previous positive effects occur in the former rather than in the latter. This prediction is tested in Table 5. In OLS, the coefficients of the interactions are indeed significantly positive only in production occupation (columns (1) to (4) in Table 5). When we use the share of world import demand as an instrument, the results remain the same (columns (5) to (8) in Table 5).[16] Again, the coefficients of the offshoring terms in TSLS are much larger than those in OLS. In summary, the affirmative effects of offshoring on female employment are concentrated in production occupation.

4.2. Heterogeneous Effects over Industries

We examine whether the effects of offshoring on female employment vary depending on industries. As previously discussed, jobs that are subject to offshoring are production-related, so we concentrate on the effects in production occupations in the following analyses.[17]

First, we classify industries based on education attainment of employees of plants into two subsamples: industries that employ unskilled (less than high-school diploma) workers intensively and industries that employ skilled workers intensively. We only report the results for the former group, as those for the latter group are insignificant in all estimations.[18] Table **6** and Table **7** show the results of OLS and TSLS, respectively. For comparison, columns (1) and (5) in these tables reproduce the results for the full sample in Table 5. In OLS, regardless

[16] Using the volume of world import demand as an instrument gives similar results, which are available upon request.

[17] As expected, we find that the heterogeneous effects of offshoring are all insignificant for non-production occupations. These results are available upon request.

[18] This is also true for the other cases: The results for high-technology or heavy industries are insignificant. These results are available upon request.

of which offshoring measures are used, the coefficients of the interaction terms for industries with many unskilled workers do not differ from those for the full sample (columns (2) and (6) in Table 6). In contrast, when using the instrument, the coefficients for industries with a large unskilled workforce are much bigger than those in the full sample (columns (2) and (6) in Table 7). This result suggests that the effects of offshoring on female production workers are more pronounced in unskilled-labor intensive industries.

Second, we use the OECD classification of the level of technology of industries. Columns (3) and (7) in Table **6** and Table **7** show the results for low-technology industries. Again, the coefficients of the interactions are similar between the full sample and the subsample of low-technology industries in OLS. However, in TSLS, they are substantially larger than in the full sample. Therefore, the effects of offshoring on female production workers are stronger for low-technology industries.

Lastly, the results for light industries are presented in columns (4) and (8) in Table **6** and Table **7**. In the instrument estimation, the coefficients of the interactions for light industries are much larger than those in the full sample, suggesting that the effects of offshoring on female production workers are more prominent for light industries.

In summary, the effects of offshoring on female production workers are more pronounced in industries with large unskilled workforce, low-technology industries, or light industries. One may wonder if these results are really caused by offshoring or simply driven by the fact that the majority of Indonesian plants belong to these industries[19] and that they tend to employ

[19] In the sample, 86% of plants belong to industries employing unskilled workers intensively, 92% belong to low-technology industries, and 73% belong to light industries.

many female workers *and* have offshoring activities. This is essentially an endogeneity concern, which we address using the instrumental variable strategy. We reiterate that our instrument is based on a demand-driven shock, which is external to the Indonesian economic or industrial environment. Thus, the instrument allows us to identify the causal effects of offshoring. In fact, this issue can be understood by comparing the OLS and TSLS results. As previously noted, the OLS estimates of the coefficients of the interaction terms are quite similar between the full sample and the three industry subsamples, whereas the IV estimates differ greatly between them. In other words, after correcting for endogeneity with an instrument, we can identify the industry heterogeneities in the effects of offshoring on female workers.

4.3. Robustness Checks

In this study, offshoring covers international outsourcing, regardless of whether outsourced tasked are performed by an outside firm or affiliated firm in foreign countries. The latter is international production by MNEs or FDI. Since we can identify plants that are owned by foreign firms in the data, we consider FDI as an alternative measure of offshoring and investigate its effects on female employment. FDI is categorized as either horizontal or vertical investment. Vertical FDI involves a fragmentation of production tasks across countries, while horizontal FDI is mainly motivated by serving a foreign market. Thus, the former is more relevant to offshoring activities than the latter. Since FDI in our data includes both types of FDI, we distinguish vertical type by creating the interaction term between FDI and the dummy variable for the trade status of a plant in analogy to our offshoring measures.

The results for all occupations and production and non-production occupations are reported in

Table 8. The effects of FDI on female workers are not significant for FDI plants engaging in both importing and exporting (the first three columns in Table 8). However, the effects are significant for FDI plants engaging in exporting (the last three columns in Table 8). As in the previous findings based on our offshoring measures, the effects are significant in production occupations, but not in non-production ones (columns (5) and (6) in Table 8). Remarkably, the comparison of the coefficients of *FDI* and those of *FDI*×*d_trade2* in columns (5) and (6) in

Table 8 reveals that we have different female employment effects over the types of FDI. The former indicates the effects for horizontal FDI because this type does not involve any exports, while the latter indicates the effects for vertical FDI. Horizontal FDI increases female employment in non-production occupations, such as supervision and administration, whereas vertical FDI raises that in production occupations. Overall, when we constrain offshoring activities to vertical international production by MNEs, the results are similar to those when using our offshoring measures.

As another robustness check, we use relative employment of women to men as a dependent variable. Table 9 shows the TSLS results with the world import share as an instrument variable, which are qualitatively similar to those when using the female employment share. We find that both the narrowly and broadly defined offshoring raise the ratio of female to male workers, although the level of significance is marginal for the narrowly defined offshoring. Again, these effects prevail only in production occupations. In terms of magnitudes, a 1% increase in offshoring revenues for the broadly defined offshoring plants raises their ratio of female to male labor by 0.8 percentage points in all occupations and 1.9 percentage points in production occupations, respectively.

Offshoring may increase productivity of a plant, which, in turn, affects a plant's size, such as value-added and the ratio of capital to value-added (Hummels et al., 2014). Thus, these variables can be outcome variables. As a robustness check, we run regressions excluding them. We find that the results are very robust to this exclusion (see Table 10). It is noteworthy that the first-stage F statistics in TSLS estimations are larger than before, suggesting that our instrument variables become stronger when excluding these potentially endogenous variables (columns (3)–(6) in Table 10).

5. Conclusions

We empirically investigate the effects of international outsourcing or offshoring on female employment in a developing country as the recipient. We use the plant-level panel data of Indonesia, which is novel in that they include the information on outsourcing revenues of plants. We use an instrumental variable, which is based on an external demand shock, to address the endogeneity of offshoring and find that offshoring considerably increases the female employment: a 10% increase in the offshoring revenues of a plant raises its share of female employment by 0.8–0.9 percentage points. These effects occur primarily in production occupations, but not in non-production jobs. When we constrain offshoring activities to vertical production of foreign affiliates of MNEs, the results are qualitatively similar. Furthermore, we find that the positive effects of offshoring are more prominent in industries with a large unskilled workforce, low-technology industries, or light industries. Our findings suggest that when developed countries offshore routine tasks to developing countries, more women in the

recipient country join in the labor force because they have a comparative advantage in such tasks relative to men. Furthermore, the findings suggest that the new technology introduced by offshoring tends to complement rather than substitute female labor.

It is certainly good news that offshoring enhances female labor participation and, perhaps, their welfare in a developing country. However, to fully appraise the effects of offshoring on female workers, we have to consider what type of jobs it offers to female workers. Jobs brought by foreign investment or offshoring could be low-paying, irregular, or informal jobs (Standing, 1999; Fontana, 2003). We leave the investigation of the quality of offshoring jobs that female labor takes up for future research.

References

Acemoglu, D. (2003). Patterns of skill premia. *The Review of Economic Studies*, *70*(2): 199-230.

Atkin, D. (2009). Working for the Future: Female Factory Work and Child Health in Mexico. Mimeo.

Autor, D., F. Levy, and R. Murnane (2003). The Skill Content of Recent Technological Change: An Empirical Exploration. *The Quarterly Journal of Economics*, 118(4): 1279–1333.

Badan Pusat Statistik (Statistics Indonesia), various years, *the Annual Survey of Medium and Large Manufacturing Establishment*.

Becker, G. (1957). *The Economics of Discrimination*, Second Edition. Chicago: University of Chicago Press.

Black S. and E. Brainerd (2004). Importing Equality? The Impact of Globalization on Gender Discrimination. *ILR Review*, 57(4): 540-559.

Blalock, G. and P. Gertler (2009). How Firm Capabilities Affect Who Benefits from Foreign Technology. *Journal of Development Economics*, 90: 192–199.

Brandt, L., J. Biesebroeck, and Y. Zhang (2012). Creative Accounting or Creative Destruction? Firm-Level Productivity Growth in Chinese Manufacturing. *Journal of Development Economics*, 97: 339–351.

Ebenstein, A., A. Harrison, M. McMillan, and S. Phillips (2014). Estimating the Impact of Trade and Offshoring on American Workers Using the Current Population Surveys. *Review of Economics and Statistics*, 96(4): 581–595.

Ederington, J., J. Minier, and K. Troske (2009). Where the Girls are: Trade and Labor Market Segregation in Colombia. IZA Discussion Paper No. 4131.

Feenstra, R. and G. Hanson (1996a). Foreign Investment, Outsourcing and Relative Wages. *Political Economy of Trade Policy: Papers in Honor of Jagdish Bhagwati*, Edited by R. Feenstra, G. Grossman, and D. Irwin.

Feenstra, R. and G. Hanson (1996b). Globalization, Outsourcing, and Wage Inequality. *American Economic Review*, 240-245.

Fontana, M. (2003). The Gender Effects of Trade Liberalisation in Developing Countries: a Review of the Literature. Discussion Papers 101. University of Sussex.

Gaddis, I. and J. Pieters (2017). The Gendered Labor Market Impacts of Trade Liberalization: Evidence from Brazil. *Journal of Human Resources*, 52(2): 457-490.

Helble, M. and A. Takeda (2020). Do Women Benefit from FDI? FDI and Labor Market Outcomes in Cambodia. Working paper No. 1093. Asian Development Bank Institute.

Hummels, D., R. Jørgensen, J. Munch, and C. Xiang (2014). The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data. *American Economic Review*, 104: 1597–1629.

Juhn, C., G. Ujhelyi, and C. Villegas-Sanchez (2014). Men, Women, and Machines: How Trade Impacts Gender Inequality. *Journal of Development Economics*, 106: 179-193

Kasahara, H., Y. Liang, and J. Rodrigue (2016). Does importing intermediates increase the demand for skilled workers? Plant-level evidence from Indonesia. *Journal of International Economics*, 102: 242-261

OECD (2003). *OECD Science, Technology and Industry Scoreboard*, Paris: OECD Publishing.

Oishi, Y. and D. Wie (2018). Importing Inequality: Trade Liberalization, Technology, and Women's Employment. GRIPS Discussion Paper 18-16. National Graduate Institute for Policy Studies.

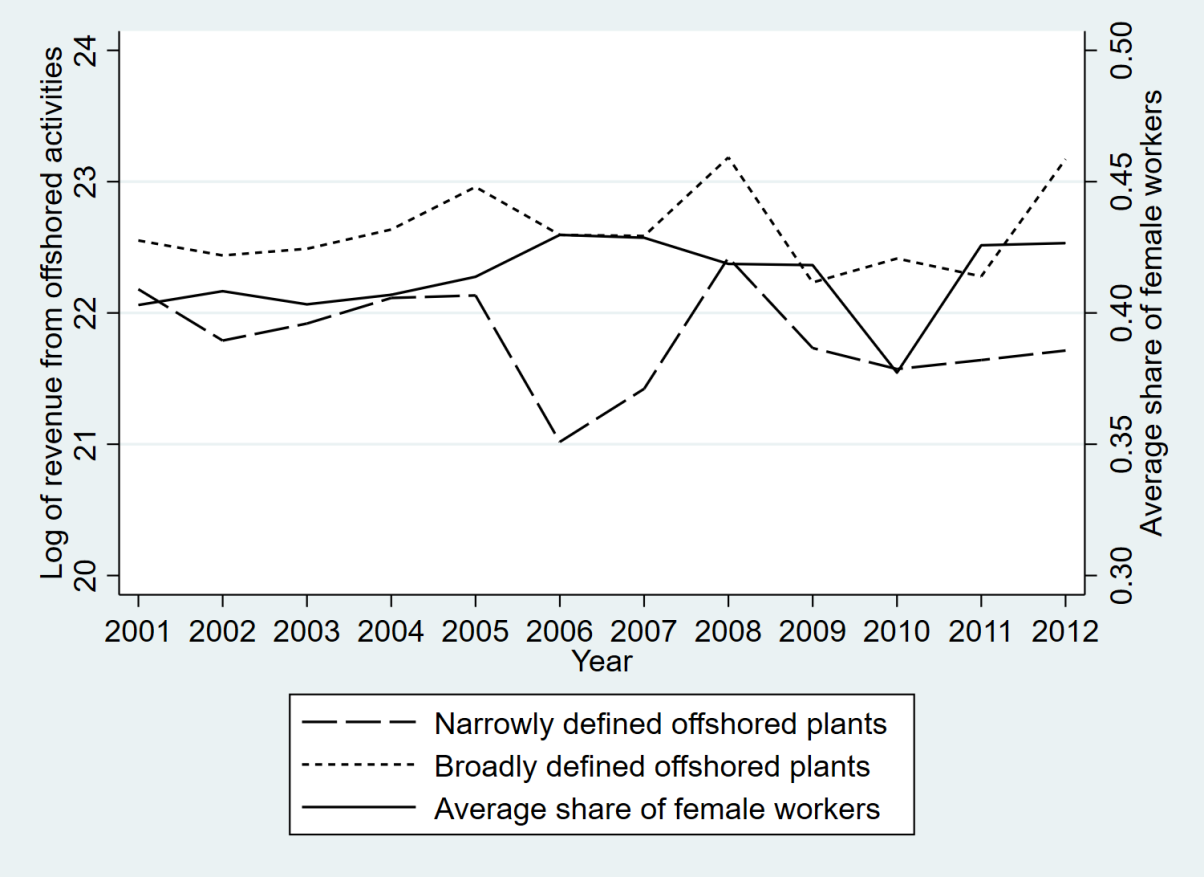
Ouedraogo, R. and E. Marlet (2018). Foreign Direct Investment and Women Empowerment: New Evidence on Developing Countries. IMF Working Papers 2018/025. International Monetary Fund.

Peri, G. and J. Poole (2012). Offshoring and Firm-Level Task Composition: Is There a Gender Component? Mimeo.

Standing, G. (1999). Global feminization through flexible labor: A theme revisited. *World Development*, 27(3): 583-602.

Stock, J. and M. Yogo (2002). Testing for Weak Instruments in Linear IV Regression, NBER Working Papers 284. National Bureau of Economic Research.

Figure 1. Offshoring Revenues and the Average Share of Female Workers for 2001–2012



Notes: Narrowly defined offshored plants are those that engage in outsourcing tasks and conduct both importing and exporting. Broadly defined offshored plants are those that engage in outsourcing tasks and conduct exporting.

Source: Authors' calculation based on BPS, *Annual Survey of Medium and Large Manufacturing Establishment*, various years.

Table 1. Most and Least Offshoring Industries

Panel A: Top 10 Most Offshoring Industries

Rank	Industries	Female share
1	Manufacture of electronic valves and tubes and other electronic components	0.59
2	Rubber and from rubber-product industry	0.24
3	Cement, lime and plaster, as well as cement and lime product industry	0.12
4	Manufacture of textile apparel (except fur apparel)	0.60
5	Manufacture of paper, paper goods, and the like	0.32
6	Manufacture of products of wood, rattan, bamboo and the like	0.33
7	Spinning, weaving, and end textile processing	0.48
8	Processing and preserving meat, fish, fruits, vegetables, oils and fats	0.44
9	Manufacture of tobacco product	0.70
10	Manufacture of other metal goods and metal-goods production services	0.25

Panel B: Top 10 Least Offshoring Industries

Rank	Industries	Female share
10	Recycling of metal goods	0.31
9	Recycling of non-metal goods	0.42
8	Foundry industry	0.10
7	Manufacture of watches/clock, bell, and the like	0.49
6	Manufacture of coal product	0.17
5	Industry of four-wheeled or more motor vehicles assembling	0.07
4	*Kapok/cotton industry*	0.76
3	*Manufacture of fur apparel*	0.49
2	*Reproduction recording media, film and video*	0.32
1	*Manufacture of aircraft and its equipment and aircraft reparation*	0.30

Notes: Offshoring is based on the broad definition. The least four offshoring industries (the industries in italics) have zero revenues from outsourcing.

Table 2. Education Attainment of Indonesian Manufacturing Workers in 2006

Educational background	Male	%	Female	%	Total	%
Less than primary	13,193,074	24	19,217,894	34	32,410,968	29
Primary	17,870,772	32	18,263,995	32	36,134,767	32
Junior high	8,659,083	16	7,434,578	13	16,093,661	14
High	13,567,054	24	9,779,335	17	23,346,389	21
University	2,568,103	5	1,614,107	3	4,182,210	4
Total	55,858,086	100	56,309,909	100	112,167,995	100

Notes: Age of workers is equal to or above 25.

Source: BPS, *Annual Survey of Medium and Large Manufacturing Establishment* of 2006.

Table 3. Summary Statistics

Variable	Mean	Std. Dev.
Share of female workers in total employment	0.414	0.299
Share of female workers in production occupation	0.411	0.328
Share of female workers in non-production occupation	0.355	0.276
Ratio of female to male workers in total employment	2.147	5.767
Ratio of female to male workers in production occupation	2.401	9.597
Ratio of female to male workers in non-production occupation	0.746	1.444
Log of value-added in 1,000 rupiahs (2000=100)	13.114	1.964
Log of capital to value-added ratio	0.221	1.554
Log of revenue from manufacturing services in 1,000 rupiahs (2000=100)	2.138	4.761
Dummy variable		
FDI: one if a plant is a foreign affiliate of MNEs; zero otherwise	0.065	0.246
d_trade1: one if a plant exports products and imports materials; zero otherwise	0.054	0.225
d_trade2: one if a plant exports products; zero otherwise	0.188	0.391

Source: BPS, *Annual Survey of Medium and Large Manufacturing Establishment*, various years.

Table 4. Effects on Female Employment in All Occupations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ln(value-added)	-0.0258***	-0.0278***	-0.0175***	-0.0219***	-0.0228***	-0.0267***
	(0.000964)	(0.000959)	(0.00554)	(0.00603)	(0.00484)	(0.00518)
ln(capital/value-added)	-0.0228***	-0.0231***	-0.0182***	-0.0188***	-0.0197***	-0.0201***
	(0.000924)	(0.000920)	(0.00176)	(0.00191)	(0.00157)	(0.00169)
FDI	0.0351***	0.0333***	0.0385***	0.0141	0.0323***	0.0102
	(0.00609)	(0.00610)	(0.00983)	(0.0104)	(0.00912)	(0.00981)
ln(outsourcing)	-0.00100***	-0.00136***	-0.0349**	-0.0465**	-0.0181	-0.0302*
	(0.000269)	(0.000288)	(0.0171)	(0.0196)	(0.0148)	(0.0167)
d_trade1	0.0848***		-0.153*		-0.136*	
	(0.00613)		(0.0803)		(0.0703)	
ln(outsourcing) × d_trade1	0.00309***		0.0893***		0.0849***	
	(0.000694)		(0.0292)		(0.0256)	
d_trade2		0.0766***		-0.106***		-0.0915***
		(0.00358)		(0.0333)		(0.0294)
ln(outsourcing) × d_trade2		0.00271***		0.0905***		0.0848***
		(0.000463)		(0.0158)		(0.0139)
Observations	173,376	173,376	165,222	165,222	165,222	165,222
R-squared	0.310	0.314				
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Instrument			WID	WID	WID share	WID share
Kleibergen-Paap *F*			8.282	7.342	11.07	10.08

Notes: The dependent variable is the share of female employment in the total employment of a plant. The instrument is either world import demand for product *k* (columns (3) and (4)) or its share in world total import demand (columns (5) and (6)). All specifications include a pair of three-digit industry and year fixed effects. Robust standard errors clustered at plant level are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 5. Effects on Female Employment in Production and Non-Production Occupations

Variables	(1) Production	(2) Non-Production	(3) Production	(4) Non-Production	(5) Production	(6) Non-Production	(7) Production	(8) Non-Production
ln(value-added)	-0.0264***	-0.0123***	-0.0287***	-0.0131***	-0.0230***	-0.0307***	-0.0272***	-0.0324***
	(0.00106)	(0.000764)	(0.00105)	(0.000767)	(0.00524)	(0.00626)	(0.00561)	(0.00667)
ln(capital/value-added)	-0.0246***	-0.00350***	-0.0250***	-0.00364***	-0.0213***	-0.00708***	-0.0218***	-0.00761***
	(0.00101)	(0.000825)	(0.00101)	(0.000826)	(0.00171)	(0.00180)	(0.00184)	(0.00191)
FDI	0.0315***	0.0145***	0.0291***	0.0122***	0.0283***	-0.00874	0.00466	-0.00949
	(0.00680)	(0.00427)	(0.00680)	(0.00424)	(0.00997)	(0.0102)	(0.0107)	(0.00978)
ln(outsourcing)	-0.00134***	0.000462*	-0.00170***	0.000420	-0.0198	0.0554***	-0.0330*	0.0600***
	(0.000295)	(0.000236)	(0.000315)	(0.000257)	(0.0160)	(0.0193)	(0.0181)	(0.0223)
d_trade1	0.0948***	0.0165***			-0.134*	0.0181		
	(0.00684)	(0.00443)			(0.0740)	(0.0603)		
ln(outsourcing) × d_trade1	0.00345***	2.47e-06			0.0880***	0.00586		
	(0.000763)	(0.000528)			(0.0269)	(0.0215)		
d_trade2			0.0872***	0.0215***			-0.0906***	0.0460
			(0.00397)	(0.00321)			(0.0317)	(0.0321)
ln(outsourcing) × d_trade2			0.00291***	0.000257			0.0897***	-0.00536
			(0.000514)	(0.000401)			(0.0150)	(0.0142)
Observations	173,339	145,656	173,339	145,656	165,198	138,967	165,198	138,967
R-squared	0.308	0.073	0.313	0.074				
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Instrument					WID share	WID share	WID share	WID share
Kleibergen-Paap *F*					11.08	6.680	10.09	5.808

Notes: In odd (even) columns, the dependent variable is the share of female employment in the production (non-production) occupation of a plant. The instrument is the share of world import demand for product *k* in world total import demand. All specifications include a pair of three-digit industry and year fixed effects. Robust standard errors clustered at plant level are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 6. Heterogeneous Effects on Female Employment in Production Occupation: OLS

Variables	(1) Full sample	(2) Unskilled-worker intensive	(3) Low-technology industries	(4) Light industries	(5) Full sample	(6) Unskilled-worker intensive	(7) Low-technology industries	(8) Light industries
ln(value-added)	-0.0264***	-0.0271***	-0.0274***	-0.0286***	-0.0287***	-0.0297***	-0.0299***	-0.0315***
	(0.00106)	(0.00118)	(0.00112)	(0.00128)	(0.00105)	(0.00117)	(0.00111)	(0.00127)
ln(capital/value-added)	-0.0246***	-0.0261***	-0.0255***	-0.0291***	-0.0250***	-0.0266***	-0.0259***	-0.0299***
	(0.00101)	(0.00113)	(0.00107)	(0.00124)	(0.00101)	(0.00112)	(0.00106)	(0.00123)
FDI	0.0315***	0.0309***	0.0300***	0.0413***	0.0291***	0.0294***	0.0279***	0.0378***
	(0.00680)	(0.00827)	(0.00770)	(0.00964)	(0.00680)	(0.00833)	(0.00775)	(0.00963)
ln(outsourcing)	-0.00134***	-0.00168***	-0.00158***	-0.00150***	-0.00170***	-0.00202***	-0.00188***	-0.00176***
	(0.000295)	(0.000349)	(0.000321)	(0.000377)	(0.000315)	(0.000378)	(0.000344)	(0.000407)
d_trade1	0.0948***	0.112***	0.105***	0.120***				
	(0.00684)	(0.00829)	(0.00774)	(0.00944)				
ln(outsourcing) × d_trade1	0.00345***	0.00328***	0.00314***	0.00330***				
	(0.000763)	(0.000971)	(0.000891)	(0.00108)				
d_trade2					0.0872***	0.0950***	0.0919***	0.106***
					(0.00397)	(0.00432)	(0.00416)	(0.00470)
ln(outsourcing) × d_trade2					0.00291***	0.00267***	0.00254***	0.00251***
					(0.000514)	(0.000597)	(0.000562)	(0.000648)
Observations	173,339	149,625	159,530	125,646	173,339	149,625	159,530	125,646
R-squared	0.308	0.272	0.290	0.236	0.313	0.278	0.295	0.244
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports OLS results. The dependent variable is the share of female employment in the production occupation of a plant. Columns (1) and (5) reproduce the results for the full sample in Table 5. Columns (2) and (6) present the results for industries that employ unskilled workers intensively. Columns (3) and (7) present the results for low-technology industries, while columns (4) and (8) present those for light industries. All specifications include a pair of three-digit industry and year fixed effects. Robust standard errors clustered at plant level are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 7. Heterogeneous Effects on Female Employment in Production Occupation: TSLS

Variables	(1) Full sample	(2) Unskilled-worker intensive	(3) Low-technology industries	(4) Light industries	(5) Full sample	(6) Unskilled-worker intensive	(7) Low-technology industries	(8) Light industries
ln(value-added)	-0.0230***	-0.0257***	-0.0243***	-0.0194***	-0.0272***	-0.0290***	-0.0270***	-0.0227***
	(0.00524)	(0.00477)	(0.00530)	(0.00529)	(0.00561)	(0.00452)	(0.00515)	(0.00515)
ln(capital/value-added)	-0.0213***	-0.0226***	-0.0217***	-0.0226***	-0.0218***	-0.0223***	-0.0216***	-0.0228***
	(0.00171)	(0.00197)	(0.00196)	(0.00244)	(0.00184)	(0.00203)	(0.00205)	(0.00256)
FDI	0.0283***	0.0169	0.0200	0.0453***	0.00466	-0.00591	-0.00382	0.00942
	(0.00997)	(0.0158)	(0.0144)	(0.0174)	(0.0107)	(0.0142)	(0.0131)	(0.0152)
ln(outsourcing)	-0.0198	-0.0184	-0.0221	-0.0463**	-0.0330*	-0.0415***	-0.0450***	-0.0760***
	(0.0160)	(0.0149)	(0.0164)	(0.0182)	(0.0181)	(0.0156)	(0.0174)	(0.0200)
d_trade1	-0.134*	-0.312***	-0.305***	-0.399***				
	(0.0740)	(0.113)	(0.109)	(0.128)				
ln(outsourcing) × d_trade1	0.0880***	0.161***	0.154***	0.187***				
	(0.0269)	(0.0410)	(0.0394)	(0.0441)				
d_trade2					-0.0906***	-0.121***	-0.127***	-0.151***
					(0.0317)	(0.0304)	(0.0310)	(0.0357)
ln(outsourcing) × d_trade2					0.0897***	0.114***	0.112***	0.131***
					(0.0150)	(0.0152)	(0.0149)	(0.0172)
Observations	165,198	142,730	152,173	119,174	165,198	142,730	152,173	119,174
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap *F*	11.08	18.12	14.01	13.79	10.09	18.93	14.42	14.91

Notes: This table reports TSLS results where the instrument is the share of world import demand for product *k* in world total import demand. The dependent variable is the share of female employment in the production occupation of a plant. Columns (1) and (5) reproduce the results for the full sample in Table 5. Columns (2) and (6) present the results for industries that employ unskilled workers intensively. Columns (3) and (7) present the results for low-technology industries, while columns (4) and (8) present those for light industries. All specifications include a pair of three-digit industry and year fixed effects. Robust standard errors clustered at plant level are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 8. Robustness Check: FDI as an Alternative Measure of Offshoring

Variables	(1) All occupations	(2) Production	(3) Non-Production	(4) All occupations	(5) Production	(6) Non-Production
ln(value-added)	-0.0259***	-0.0266***	-0.0122***	-0.0278***	-0.0288***	-0.0130***
	(0.000963)	(0.00105)	(0.000763)	(0.000957)	(0.00105)	(0.000765)
ln(capital/value-added)	-0.0228***	-0.0247***	-0.00350***	-0.0232***	-0.0251***	-0.00363***
	(0.000924)	(0.00101)	(0.000825)	(0.000920)	(0.00101)	(0.000826)
FDI	0.0309***	0.0260***	0.0163***	0.0181**	0.00952	0.0117**
	(0.00663)	(0.00741)	(0.00482)	(0.00721)	(0.00818)	(0.00564)
d_trade1	0.0893***	0.0990***	0.0181***			
	(0.00699)	(0.00774)	(0.00512)			
FDI × d_trade1	0.0137	0.0179	-0.00564			
	(0.0109)	(0.0121)	(0.00774)			
d_trade2				0.0801***	0.0904***	0.0218***
				(0.00355)	(0.00394)	(0.00324)
FDI × d_trade2				0.0267***	0.0341***	0.00131
				(0.00862)	(0.00972)	(0.00659)
Observations	173,376	173,339	145,656	173,376	173,339	145,656
R-squared	0.310	0.308	0.073	0.314	0.313	0.074
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports OLS results. The dependent variable is the share of female employment in all occupations (columns (1) and (4)), production occupations (columns (2) and (5)), or non-production occupations of a plant (columns (3) and (6)). All specifications include a pair of three-digit industry and year fixed effects. Robust standard errors clustered at plant level are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 9. Robustness Check: Ratio of Female to Male Workers as the Dependent Variable

Variables	(1) All occupations	(2) Production	(3) Non-Production	(4) All occupations	(5) Production	(6) Non-Production
ln(value-added)	-0.242***	-0.127	-0.0585**	-0.284***	-0.196	-0.0671**
	(0.0862)	(0.157)	(0.0266)	(0.0947)	(0.191)	(0.0281)
ln(capital/value-added)	-0.364***	-0.375***	-0.0228***	-0.374***	-0.393***	-0.0248***
	(0.0276)	(0.0342)	(0.00662)	(0.0303)	(0.0454)	(0.00699)
FDI	0.364**	0.576*	0.0299	0.205	0.251	-0.00245
	(0.148)	(0.302)	(0.0480)	(0.179)	(0.421)	(0.0516)
ln(outsourcing)	0.108	0.295	0.140*	0.0705	0.177	0.133
	(0.250)	(0.408)	(0.0799)	(0.273)	(0.454)	(0.0859)
d_trade1	-2.243	-5.444	-0.220			
	(1.606)	(4.055)	(0.324)			
ln(outsourcing) × d_trade1	1.154*	2.518*	0.141			
	(0.596)	(1.519)	(0.120)			
d_trade2				-1.161**	-3.191***	-0.0654
				(0.533)	(1.186)	(0.141)
ln(outsourcing) × d_trade2				0.833***	1.869***	0.107
				(0.266)	(0.619)	(0.0670)
Observations	163,921	161,848	131,051	163,921	161,848	131,051
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap *F*	10.96	10.99	6.687	9.952	10.04	5.945

Notes: This table reports TSLS results where the instrument is the share of world import demand for product *k* in world total import demand. The dependent variable is the ratio of female to male workers of a plant in all occupations (columns (1) and (4)), production occupations (columns (2) and (5)), or non-production occupations (columns (3) and (6)). All specifications include a pair of three-digit industry and year fixed effects. Robust standard errors clustered at plant level are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 10. Robustness Check: Excluding Plant Size Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)
FDI	-0.00412	-0.0113**	0.0226	-0.0117	0.0112	-0.0223*
	(0.00575)	(0.00573)	(0.0140)	(0.0146)	(0.0125)	(0.0132)
ln(outsourcing)	-0.00186***	-0.00231***	-0.0492***	-0.0609***	-0.0359***	-0.0486***
	(0.000255)	(0.000273)	(0.0141)	(0.0160)	(0.0121)	(0.0137)
d_trade1	0.0372***		-0.201***		-0.207***	
	(0.00591)		(0.0752)		(0.0690)	
ln(outsourcing) × d_trade1	0.00339***		0.0977***		0.0982***	
	(0.000674)		(0.0272)		(0.0248)	
d_trade2		0.0418***		-0.138***		-0.141***
		(0.00348)		(0.0285)		(0.0268)
ln(outsourcing) × d_trade2		0.00315***		0.0951***		0.0950***
		(0.000448)		(0.0139)		(0.0129)
Observations	188,099	188,099	178,268	178,268	178,268	178,268
R-squared	0.278	0.281				
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Instrument			WID	WID	WID share	WID share
Kleibergen-Paap *F*			11.21	10.87	17.14	16.03

Notes: The dependent variable is the share of female employment in the total employment of a plant. The instrument is either world import demand for product *k* (columns (3) and (4)) or its share in world total import demand (columns (5) and (6)). All specifications include a pair of three-digit industry and year fixed effects. Robust standard errors clustered at plant level are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.