

# International Activity and Female Labor Participation

New Evidence for Services Firms  
in Developing Countries

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## Abstract

Using a cross-section of more than 33,000 services firms in 104 low- and middle-income countries from the World Bank's Enterprise Surveys, this paper examines whether the female labor share premium of international firms relative to non-international firms in manufacturing also holds for services firms. Unlike the manufacturing sector, the paper finds a negative relationship between exporting and global value chain participation and the female labor share for services firms, while no relationship is found for importing or foreign ownership status, controlling for firm output, productivity, technology intensity, and fixed effects. The female labor share gap for exporters was larger before

COVID-19, and the gap for global value chain participants is no longer significant after COVID-19. Controlling for sectoral relative wages between men and women does not change the findings in a smaller subsample of economies. Controlling for female top management and ownership reveals a female labor share gap for exporters, global value chain participants, and importers. Using an alternative estimator and data set confirms the female labor share gap in services firms. This may be attributed to the sectoral segregation between women and men, with women tending to pursue work opportunities in less skill- and export-intensive services sectors compared to men.

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# International Activity and Female Labor Participation: New Evidence for Services Firms in Developing Countries<sup>1</sup>

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Authorized for distribution by Sébastien Dessus, Practice Manager, Economic Policy Global Department, World Bank Group

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**JEL codes:** F1, F2, F6

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## 1. Motivation

Several studies have linked trade participation in developing economies to higher female employment and wages (World Bank-World Trade Organization 2020). Empirical evidence indicates a positive correlation between export growth in developing countries during the 1960s and mid-1980s and increased female labor force participation (e.g., Wood 1991). The Heckscher-Ohlin model suggests that trade-induced sectoral reallocation can impact female workers. In developing countries with abundant low-skill labor, trade may increase female labor force participation because women are often concentrated in low-value-added, labor-intensive export sectors like apparel, where these countries have a comparative advantage. This sectoral reallocation mechanism is also emphasized in other studies like Aguayo-Tellez et al. (2013) and Busse et al. (2006).

Focusing on manufacturing firms across a wide sample of low- and middle-income countries (LMICs), Shepherd (2018), Rocha and Winkler (2019), and Rocha, Shepherd and Winkler (2020) assess whether firms that engage in trade and foreign direct investment (FDI) have a higher proportion of female employees compared to non-international firms. Their findings confirm a female labor share premium for exporters, importers, firms participating in global value chains (GVCs), and foreign firms. These results remain consistent even after controlling for factors such as firm output, capital intensity, productivity, female wage gaps, female ownership and management, and fixed effects. In this paper, we build on this earlier work but focus on services firms instead – an area which remains underresearched – using a cross-section of more than 33,000 services firms in 104 low- and middle-income countries (LMICs) from the World Bank’s Enterprise Surveys.<sup>4</sup>

Cross-country evidence also suggests that even across developing economies the relationship between trade and female labor force participation varies substantially (Heath et al. 2024, Wacker et al. 2017, Tejani and Milberg 2016, Aguayo-Tellez 2012), which can depend on several factors. Besides sector reallocation, other channels through which trade participation affects female labor participation include trade-induced increases in competition in export markets, which can foster technological upgrading within firms, as well as changes in firms’ discriminatory behavior (Heath and others 2024, World Bank-World Trade Organization 2020). These channels can work in favor of

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<sup>4</sup> One caveat of using the Enterprise Surveys is that they classify firms into manufacturing or services based on the ISIC Rev. 4 classification of the firm’s main product or service. As a result, firms can be ‘mixed’ producers, so it is not clearly identifiable if exports are aligned with the main activity of the firm.

or against women, depending on several factors including the relative magnitude of channels in the country, the country's comparative advantage, and sector and workforce characteristics.

Studies also show that trade liberalization can reduce the female wage gap and raise female labor demand by reducing discrimination, as seen in Uruguay (Ben Yahmed 2017) and Colombia (Ederington et al. 2009). Oostendorp (2009) found that greater economic development and trade are associated with lower female wage discrimination across a large sample of countries. Junh et al. (2013, 2014) demonstrated that firms entering export markets due to NAFTA, and those which also imported computerized equipment, experienced increased female employment and wages relative to men in blue-collar jobs. In contrast, a study on Norway using matched employer-employee data, for instance, found that the female wage gap is higher in exporting compared to non-exporting firms, but only for higher-skilled jobs. Explanations include that exporting firms demand highly flexible employees (for working peculiar hours, taking late night phone calls and engaging in international travel arranged at short notice) and therefore discriminate against women as they are perceived to be less flexible (Bøler et al. 2018).

In this paper, we focus on the relationship between firms' international status and the female labor share for services firms. Only few studies have emphasized the role of trade in services for female labor participation. Wacker et al. (2017) find in a panel of 80 developing countries over the period 1980-2005 that the effect of services trade on the female labor force participation rate is negative and significant, although small. The authors explain this finding with the fact that tradable services may require higher skills, leading young women to pursue education and delay entering the labor market. These findings align with Bussmann (2009) who found that globalization correlates with fewer women employed in services in non-OECD countries.

This paper contributes to the research on trade and labor in several ways: (1) We adapt the cost share functions of Feenstra and Hanson (1996) to examine trade's impact on female versus male workers, rather than high- versus low-skill workers. (2) We use a comprehensive, harmonized micro-level dataset covering numerous developing and emerging economies, unlike many studies that rely on aggregate data.<sup>5</sup> (3) We focus specifically on services firms across all service sectors, an area with limited research, and compare findings with manufacturing firms. (4) We examine the role of female entrepreneurship, particularly ownership and management, in the female labor share within firms.<sup>6</sup>

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<sup>5</sup> Exceptions include Ederington et al. (2009) for Colombia, Chen et al. (2012) for China, and Juhn et al. (2013, 2014) for Mexico.

<sup>6</sup> For an overview of female entrepreneurship and a discussion of different drivers, see, e.g., Carranza et al. (2018).

(5) We use an alternative dataset which confirms the broad findings of a female labor share gap in services sectors.

Unlike the manufacturing sector, our study finds a negative relationship between exporting and GVC participation and the female labor share for services firms, while no relationship is found for importing or foreign ownership status, controlling for firm output, productivity, technology intensity, and fixed effects. The female labor share gap for exporters is larger before Covid-19, while the gap for GVC participants is no longer significant after Covid-19. Controlling for female top management and ownership reveals a female labor share gap for exporters, GVC participants, and importers. Controlling for sectoral relative wages between men and women does not change the overall findings in a smaller sub-sample of economies for which relative wage data are available. The findings also indicate that higher relative wages between male and female workers – or a higher female wage gap – are associated with a lower female wage share which is in line with expectations. Using an alternative estimator and dataset confirms the female labor share gap in services firms.

The female labor share gap for exporters and GVC participants in services sectors may be attributed to the sectoral segregation between women and men, with women tending to pursue work opportunities in less export-intensive and skill-intensive sectors (such as retail and hospitality), and men being employed in more export-intensive sectors (such as transportation) and skill-intensive services sectors (such as information and communication technologies). Given that global firms in modern services sectors are more likely to hire more skill-intensive or specialized labor, the results would reflect the skill disadvantage that women have relative to men which precludes their employment in such jobs. Since skill-intensive modern services jobs are likely to pay more, this also explains the negative link between the female wage gap and female wage share. In contrast, in manufacturing, women tend to have the “right” skill-set for jobs in GVC-intensive sectors like textiles or computers and electronics, as confirmed by our findings covering manufacturing firms.

Our paper is organized as follows. Section 2 outlines the underlying model and derived descriptive regressions, as well as the data and measurements. Section 3 presents stylized facts of female labor force participation, focusing on variations across international status, sectors, and countries. Section 4 displays the descriptive regression results for the female labor share. Updated results for manufacturing firms are provided in the Appendix to compare with the services firms’ results. Robustness checks, including sample splitting by time period, additional control variables, an alternative fractional probit estimator, and a different dataset, are also performed. Section 5 concludes the paper.

## 2. Descriptive Model, Data, and Measures

### 2.1 Model

A variable unit cost function  $CV$  is specified as follows<sup>7</sup>:

$$CV = CV(Y, w^F, w^M, k, T)$$

where  $Y$  denotes the output and  $w^F$  and  $w^M$  are the exogenous wages for the variable input factors female labor  $L^F$  and male labor  $L^M$ . Capital is considered a quasi-fixed input factor in the form of capital intensity  $k$ . The technology shifter  $T = T(\text{prod}, \text{int})$  is defined as a function of productivity and international activity.

Using the transcendental logarithmic (translog) form of the variable unit cost function as introduced by Brown and Christensen (1981) and applying Shephard's Lemma,<sup>8</sup> the following factor demand function can be derived:

$$S^F = \alpha + \beta_1 \ln Y + \beta_2 \ln(w^M/w^F) + \beta_3 \ln k + \gamma_1 \ln \text{prod} + \gamma_2 \ln \text{int}$$

$S^F$  is the cost share of  $L^F$  in variable costs  $CV$ . Since  $w^F$  and  $w^M$  are the only variable costs,  $CV$  is determined by the sum of the products of the variable factor costs with their respective factors,  $CV = w^F L^F + w^M L^M = wL$ , where  $w$  designates the average wage per labor input  $L$ , regardless of the sex. We refer to the composite term  $S^F = w^F L^F / wL$  as the female wage share. A decrease of  $S^F$  can reflect both a fall in  $L^F$  and/or a fall in  $w^F$ , which for non-declining  $CV$ , implies a rise in  $S^M$  and thus an increase in  $L^M$  and/or in  $w^M$ .

The control variables include output,  $Y$ . The coefficient sign of output  $Y$ ,  $\beta_1$ , is not unambiguously predictable. An increase in  $Y$  can be expected to lead to a higher total wage bill. If the cost increase is equally distributed between female and male labor, there should be no influence on  $S^F$ . If the wage bill of male labor increases more than proportionally, e.g., due to better bargaining power, this results in a higher  $L^M$  and/or  $w^M$ , and  $S^F$  is expected to fall ( $\beta_1 < 0$ ).

One expects a lower  $S^F$  and thus a lower cost share of  $L^F$  in total wages when relative wages for male labor,  $w^M/w^F$ , as part of  $CV$  rise ( $\beta_2 < 0$ ). An increase in the capital intensity,  $k$ , will increase  $S^F$ , if

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<sup>7</sup> This is a modified version of the unit cost functions by Feenstra and Hanson (1996), Geishecker (2006) and others that differentiate between skilled and unskilled labor.

<sup>8</sup> According to Shephard's Lemma (1953), factor demand is determined by the first partial derivative of the cost function with respect to the corresponding factor price, regardless of the kind of production function.

capital is a substitute for male labor ( $\beta_3 > 0$ ), but reduce  $S^F$ , if capital is a substitute for female labor ( $\beta_3 < 0$ ). A higher productivity,  $prod$ , could increase labor demand in favor of female ( $\gamma_2 > 0$ ) or male workers ( $\gamma_2 < 0$ ). The influence of  $int$  on  $S_{HS}$  is not easily predictable, as international activity could increase the relative demand for female ( $\gamma_1 > 0$ ) or male labor ( $\gamma_1 < 0$ ).

## 2.2 Descriptive Regressions

In the absence of sex-specific wage data at the firm-level, the model is modified in two ways to obtain the following descriptive regressions. First, the analysis on international activity and the female wage share combines the Enterprise Survey dataset with sectoral wage data by sex, available from Household Surveys. This assumes equal relative wages between women and men across all firms within a given sector in a specific country. While this is a strong assumption, one could argue that wage-setting often occurs at the sectoral level where sectoral trade unions and employer associations negotiate collective bargaining agreements that cover most firms in that sector.

This allows to estimate the following female wage share equation:

$$S^F_{isrt} = \alpha + \beta_1 \ln Y_{isrt} + \beta_2 \ln(w^M/w^F)_{cst} + \beta_3 \ln k_{isrt} + \gamma_1 \ln prod_{isrt} + \gamma_2 int_{isrt} + D_{cs} + D_r + D_t + \varepsilon_{isrt} \quad (1)$$

Subscripts  $i, c, s, r$ , and  $t$  refer to firm, country, sector, sub-national region, and survey year, while  $D_{cs}$ ,  $D_r$ ,  $D_t$  denote country-sector, sub-national region and time fixed effects, and  $\varepsilon_{isrt}$  the idiosyncratic error term. We allow for heteroskedasticity depending on the full set of explanatory variables (other than fixed effects), and correct all standard errors for clustering by country-sector. International activity,  $int$ , is a binary variable measuring a firm's participating status.

Second, since sex-disaggregated sectoral wage data for services are only available for 31 countries in the Enterprise Surveys, and only 17 of those countries have available data for all the explanatory variables, the baseline analysis assumes equal wage rates for female and male workers,  $w^F = w^M = w$ . Since  $S^F = w^F L^F / wL$ , the dependent variable becomes the female labor share in total employment,  $femsh = L^F / L$ . Similarly, the model no longer controls for relative wages, since we assume  $\ln(w^M/w^F) = \ln 1 = 0$ . This assumption allows us to include over 100 countries in the services sample. The female labor share equation takes the following form:

$$femsh_{isrt} = \alpha + \beta_1 \ln Y_{isrt} + \beta_2 \ln k_{isrt} + \gamma_1 \ln prod_{isrt} + \gamma_2 int_{isrt} + D_{cs} + D_r + D_t + \varepsilon_{isrt} \quad (2)$$

While assuming equal wage rates between female and male workers is a strong assumption, we address possible concerns as follows: (i) We argue that the fixed country-sector effects included in the model partially correct for wage differences. (ii) While equation (2) becomes our baseline specification, allowing us to include all available countries in the analysis, we perform a robustness check based on equation (1) to confirm if key findings continue to hold when controlling for female wage differences. (iii) We also run the descriptive regressions and robustness checks for manufacturing firms – which are based on the same database and assumptions – to identify if the results for services firms are a function of sectoral characteristics rather than specification.

Both descriptive regressions consider four types of international firms: (1) Exporters are firms with an export share (direct or indirect) of at least 10% of total sales. (2) Importers are firms with an imported input share of at least 10% of total inputs. (3) GVC participants are firms that are classified as both exporters and importers. (4) FDI refers to firms with a foreign ownership share of at least 10%. The international variables are dummies taking a value of 1 if the firm trades, and 0 if it does not.

## **2.3 Data**

Our dataset draws on two underlying datasets published by the World Bank Enterprise Analysis Unit, namely the Enterprise Surveys Global Database and the Firm-level TFP Estimates and Factor Ratios. The Enterprise Surveys Global Database covers 242 surveys in 160 countries over the period 2006 to 2024.

The Enterprise Surveys represent a comprehensive source of firm-level data in emerging markets and developing economies. One major advantage of the Enterprise Surveys is that the survey questions are the same across all countries. Moreover, the Enterprise Surveys represent a stratified random sample of firms using three levels of stratification: sector, firm size, and region. Sectors are determined based on the ISIC Rev. 4 classification of the main product or service. One caveat of using the Enterprise Surveys is therefore that firms can be ‘mixed’ and engage in both services and manufacturing activities, so it is not clearly identifiable if exports are aligned with the main activity of the firm.

The Enterprise Surveys Global Database covers a wide range of indicators on firm characteristics, the business environment, innovation and technology, and workforce and skills among others. We merged this dataset with data on firm-level output, value added, and capital stock obtained from the Firm-level Total Factor Productivity (TFP) Estimates and Factor Ratios dataset. It is important to note

that value added, capital stock, and TFP data are only available for manufacturing firms (whose results are shown in the Appendix) but not for services firms in the Enterprise Surveys. In our descriptive regressions, we therefore use technology intensity and labor productivity as alternative control variables, respectively, which are described in section 2.4.

All local currencies have been converted into US dollars and deflated using a GDP deflator in USD (base year 2009). Exchange rates and GDP deflators have been obtained from the World Development Indicators. We aggregated ISIC Rev. 4 sectors up to TiVA 2018 sectors, as the number of services firms in several cases was very spotty, to allow for greater firm coverage per sector.

We apply the following rules to create the services firm dataset: (i) We include only the most recent Enterprise Surveys for each country (excluding EU15 countries and Singapore to focus on emerging markets and developing economies). (ii) We cover the years 2010 to 2024. (iii) We exclude manufacturing firms from the sample, i.e. for which the ISIC Rev. 4 classification of the main product or service is lower than 45 and those that have been classified as manufacturing firm by the Enterprise Surveys. (iv) We drop countries for which female employment data were spotty and firms with missing observations for female employment or total employment. (v) We exclude countries with fewer than 100 services firms after applying the previous steps. (vi) Finally, we exclude TiVA 2018 sectors with only one firm (D64T66, D68, D84, and D86T88).<sup>9</sup>

We applied similar rules as described in Rocha and Winkler (2019) to obtain a separate dataset for manufacturing firms which allows for comparisons with the services firm sample. The procedure above results in more than 33,000 services firms in 104 countries and 34,000 manufacturing firms in 81 countries. The list of countries, year of the most recent survey and number of firms by country and broad sector can be found in Appendix 1. The distribution of firms across TiVA 2018 sectors is shown in Appendix 2.

We combine the firm-level data with Global Employment Sex-disaggregated Statistics (GESS) at the sector level from the World Bank Household Surveys and other public resources. GESS uses harmonized classifications of economic activities and occupation categories. It fills an important information gap in global sex statistics by providing more detailed accounts on education, employment levels, wages, labor income, and employment status at very disaggregated economic activity levels and occupation categories than is usually available. The data are available for 53

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<sup>9</sup> Steps (v) and (vi) remove 2.4% of services firms.

countries at the ISIC Rev. 4 level, but only 31 countries overlap with the Enterprise Survey data sample. These 31 countries are listed under the country list of Appendix 1.

## 2.4 Measures

This study focuses on two measures of *female labor participation*:

- Female labor share,  $fem\_sh$  = number of permanent full-time female employees as % of total number of permanent full-time employees.<sup>10</sup>
- Female wage share,  $S^f$  = total compensation of female employees as % of total compensation of all employees. Since the Enterprise Survey dataset has only information on average wage rates,<sup>11</sup> we approximate female wage rates at the firm level by assuming the same ratio of female-to-average wages in a given sector as in the sex-disaggregated wage data from the World Bank Household Surveys. Total female compensation is then obtained by multiplying the female wage rate with the number of female employees from the Enterprise Surveys.

The analysis examines two measures that describe *trading firms*:

- Exporter,  $exp = 1$  if direct plus indirect export share as % of sales  $\geq 10\%$ , and 0 otherwise.<sup>12</sup>
- Importer,  $imp = 1$  if share of imported inputs as % of total inputs  $\geq 10\%$ , and 0 otherwise.

We additionally include two measures that describe *global firms*:

- GVC participant,  $gvc = 1$  if both  $exp = 1$  and  $imp = 1$ , and 0 otherwise.
- Foreign ownership,  $fdi = 1$  if foreign private ownership  $\geq 10\%$  and 0 otherwise.

Finally, we include the following *control variables* in all regressions:

- Output,  $Y$  = total sales (in natural logarithms).
- Labor productivity,  $lp$ , is measured as output per worker (in natural logarithms).
- Technology intensity,  $tech$ , is captured as  $tech = iso + tech\_for \in \{0, 1, 2\}$ , where  $iso = 1$  if firm owns internationally-recognized quality certification and 0 otherwise, and  $tech\_for = 1$  if firm uses technology licensed from foreign firms and 0 otherwise.

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<sup>10</sup> For manufacturing firms, the variable can be computed for permanent production workers, non-production workers and total workers (sum of both). Non-production workers include managers, administration and sales. This is not feasible for services firms.

<sup>11</sup> These are obtained by dividing a firm's total compensation by its total number of employees.

<sup>12</sup> As stated above, firms in the Enterprise Surveys can engage in both services and manufacturing activities, so it is not clearly identifiable if exports are aligned with the main activity of the firm.

Due to data constraints for services firms, we are not able to use TFP or capital intensity as was done for the manufacturing sample in Rocha and Winkler (2019). In addition, their measure of labor productivity for manufacturing firms used value added as numerator which is unavailable for services firms in the Firm-level Total Factor Productivity (TFP) Estimates and Factor Ratios dataset.

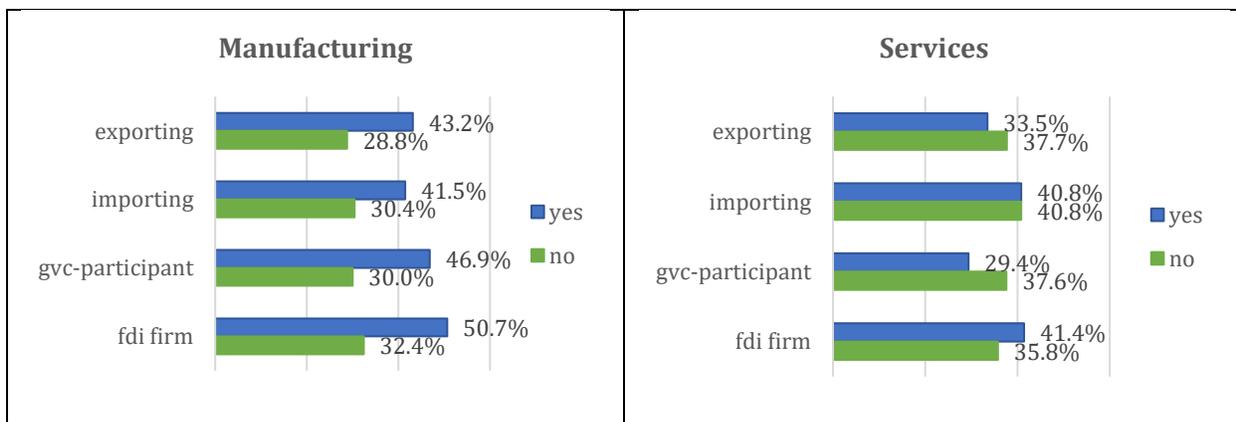
Appendix 1 shows the countries included in the services and manufacturing samples, as well as their survey year. Appendix 2 shows the sector coverage at the TiVA 2018 sector level for both the services and manufacturing sample separately. Similarly, Appendix 3 shows the summary statistics for both samples separately, while Appendix 4 shows updated results for manufacturing firms following the specification suggested by Rocha and Winkler (2019).

### 3. Stylized Facts

#### 3.1 Differences by International Status

To gain an initial understanding of the relationship between the female labor share and international firms, this section first outlines the average share of female workers in a firm’s total workforce across various types of international firms. At this stage, no other factors that could influence the female worker share, as discussed in section 2.1, are controlled for. Figure 1 (left panel) indicates that international manufacturing firms have a higher average share of female permanent workers compared to non-international firms, corroborating the findings of Rocha and Winkler (2019). Appendix Figure 4.1 presents results separately for production and non-production workers, demonstrating that the higher female labor share in international manufacturing firms is largely driven by production workers.

**Figure 1: Female labor share, manufacturing vs. services, by international status**



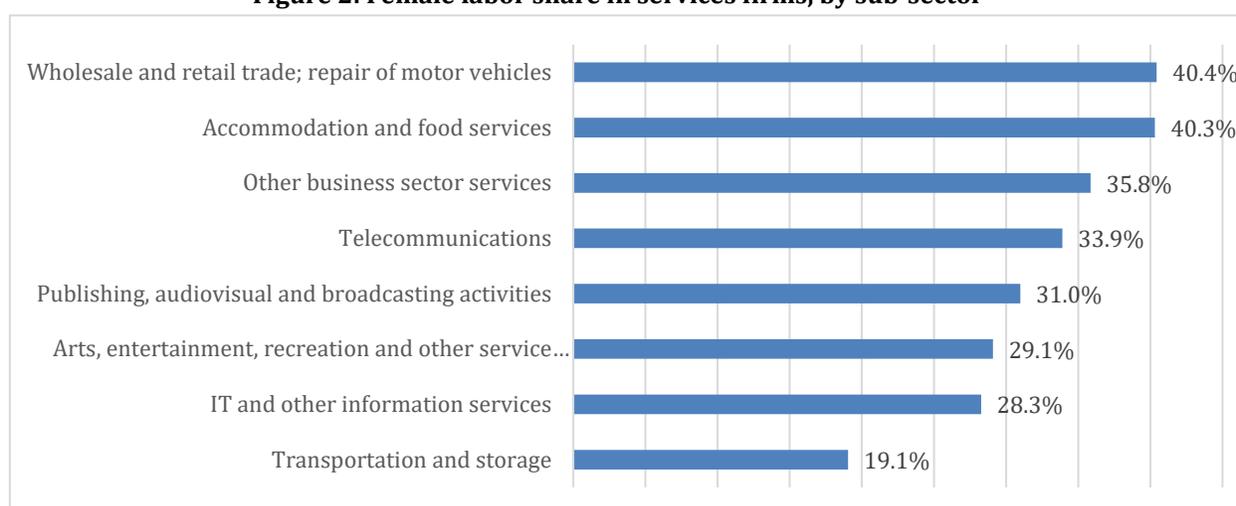
Note: The female labor shares are averages using firm employment as weights.

However, the patterns are less straightforward for services firms. Specifically, the proportion of women in the average permanent workforce of services firms is higher only for importers (40.8%) and FDI firms (41.4%) compared to non-importing (31.2%) and domestically-owned firms (35.8%), respectively. Conversely, services firms that export (33.5%) or participate in GVCs (29.4%) have a *lower* share of women in their permanent workforce compared to non-exporters and non-participants, respectively. To better understand the reasons behind the observed differences between services and manufacturing firms, section 3.2 delves into the trends at the disaggregated sub-sector level.

### 3.2 Sectoral Differences

This section describes the average female labor share across various services sectors. The average share of female permanent workers in all services sectors is 36.8%, compared to 36.6% in manufacturing. The proportion of female permanent workers surpasses 40% in wholesale and retail trade, as well as in accommodation and food services, which are recognized as female-intensive sectors (Figure 2). These are followed by other business services sectors (35.8%), telecommunications (33.9%), and publishing, audiovisual, and broadcasting activities (31%). Notably, the average female labor share in most services sectors falls between 28% and 40%. The transportation and storage sector stands out with a significantly lower female labor share of 19.1%.

**Figure 2: Female labor share in services firms, by sub-sector**



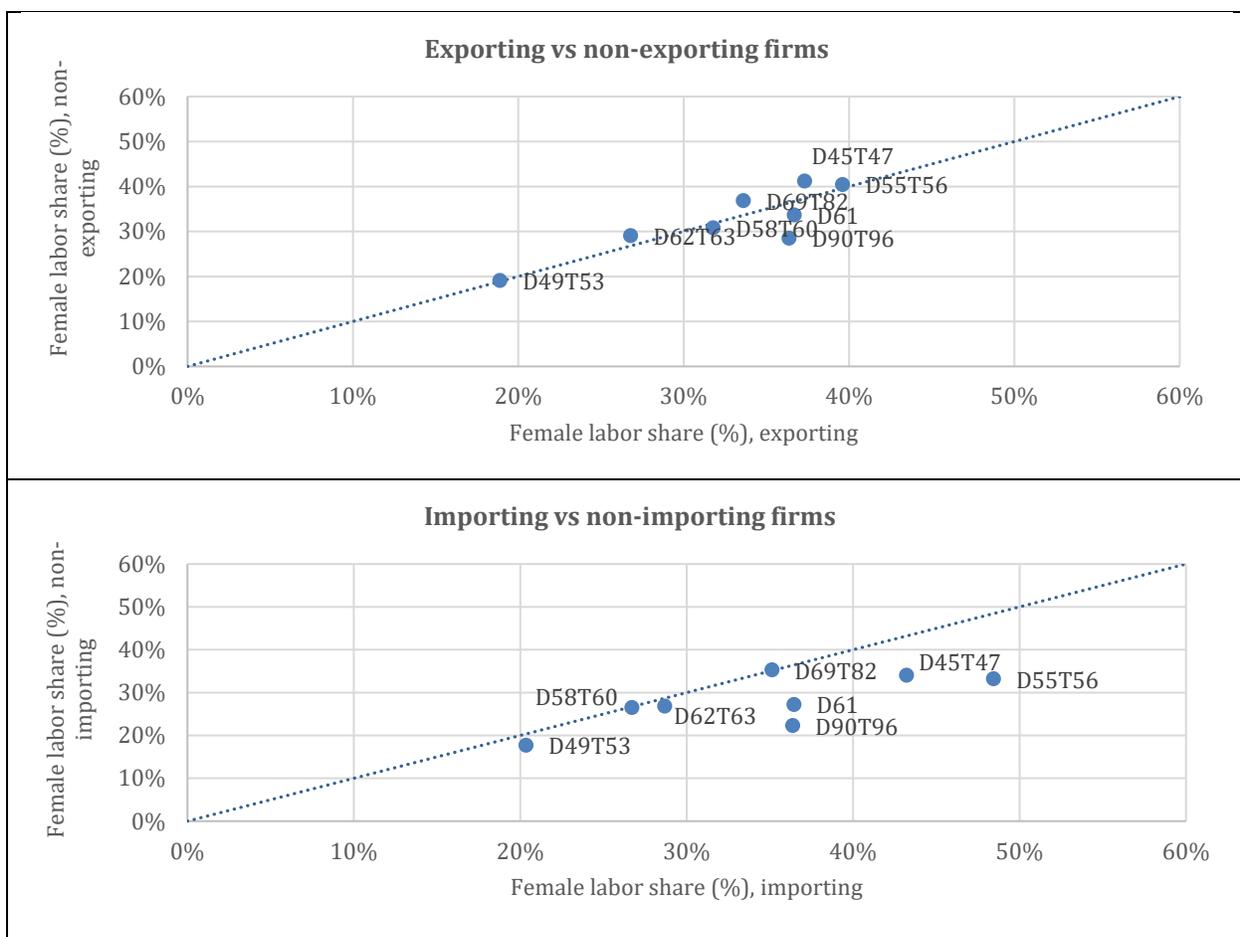
Note: For the sectoral distribution of firms, see Appendix 2. For female labor shares in manufacturing sub-sectors, see Appendix Figure 4.2. The female labor shares are averages using firm employment as weights.

This is in contrast to manufacturing firms, which exhibit a much wider variation in female labor share across different sectors. Textiles, apparel, and leather (57.9%) and computer and electronics

(42.5%) are highly female-intensive. On the other hand, several other sectors, such as coke and petroleum, mineral and metal products, as well as motor vehicles and machinery and equipment, have female labor shares below 25% (Appendix Figure 4.2).

The previous figure does not distinguish between international and non-international firms. Figure 3 (top panel) therefore displays the average female labor share of permanent workers for exporters on the x-axis and non-exporters on the y-axis by sector. Many sectors are positioned around or above the dotted  $y = x$  line, indicating *lower* female labor shares for exporting firms compared to non-exporting firms. The exceptions are arts, entertainment, recreation, and other service activities (D90T96) and telecommunications (D61), where exporters are more female-intensive. This sharply contrasts with manufacturing firms, where exporters tend to have a higher female labor share than non-exporters (Appendix Figure 4.3, top panel).

**Figure 3: Female labor share, trading vs. non-trading firms, by services sub-sector**

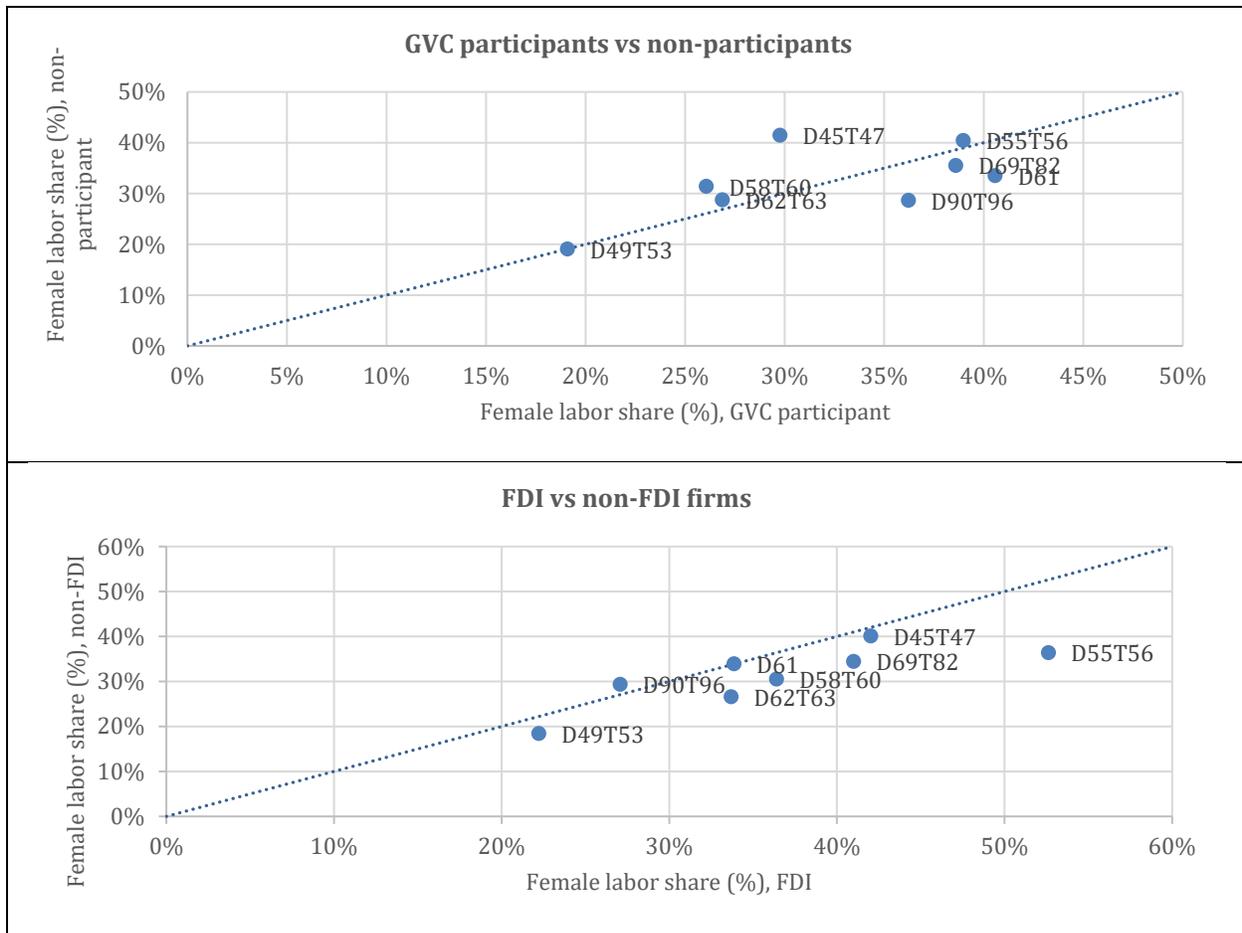


Source: The female labor shares are averages using firm employment as weights. Sector numbers relate to TiVA 2018 sectors. For sector names and the sectoral distribution of firms, see Appendix 2.

In contrast, Figure 3 (bottom panel) indicates that importing firms generally have a *higher* female labor share compared to non-importers across most services sectors—a pattern also observed in manufacturing firms (Appendix Figure 4.3, bottom panel). Similar to exporters, the female labor share premium is notably high in entertainment, recreation, and other service activities (D90T96), telecommunications (D61), as well as accommodation and food services (D55T56).

GVC participation exhibits mixed patterns across services sectors (Figure 4, top panel). Several services sectors display *higher* female labor shares for firms that both import inputs and export compared to firms that do not participate in GVCs, especially in entertainment, recreation, and other service activities (D90T96) and telecommunications (D61). In contrast, GVC-participating firms show *lower* female labor shares in some sectors, particularly wholesale and retail trade and repair of motor vehicles (D45T47). This pattern contrasts sharply with the manufacturing sample, where GVC firms demonstrate a female labor share premium (Appendix Figure 4.4, top panel).

**Figure 4: Female labor share, global vs. non-global firms, by services sub-sector**



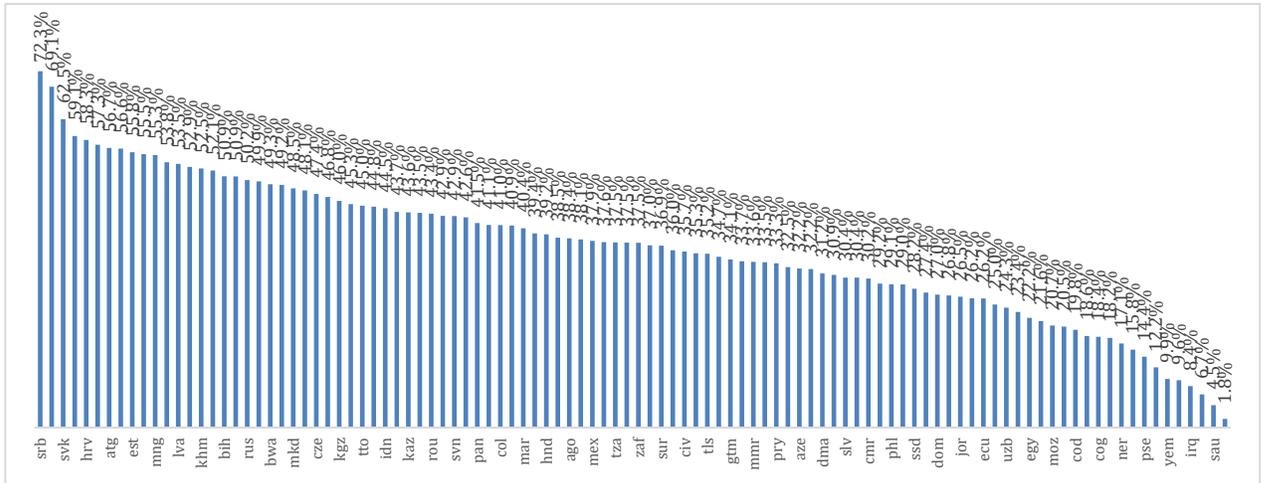
Source: The female labor shares are averages using firm employment as weights. Sector numbers relate to ISIC Rev. 3 sectors. For sector names and the sectoral distribution of firms, see Appendix 2.

Finally, focusing on the role of foreign ownership, the scatterplot in Figure 4 (bottom panel) suggests that FDI firms generally have a *higher* female labor share compared to domestic firms across nearly all services sectors. This pattern is also confirmed for manufacturing sectors (Appendix Figure 4.4, bottom panel).

### 3.3 Differences across Countries

This section shifts the focus to the average female labor share of services firms by country. The number of surveyed services firms varies significantly across the country sample, ranging from over 3,400 firms in India, to over 1,000 firms in Indonesia and Nigeria, to around 100 in Guinea, Niger, and Sierra Leone, among others. Therefore, the findings of the country analysis should be interpreted with caution. However, they provide an initial insight into female labor participation across different countries. The main observation from Figure 5 is that the female labor share ranges from over 58% in Eastern European and Central Asian countries, particularly Serbia and Belarus, to less than 10% in some Middle Eastern and South Asian economies, such as the Republic of Yemen, Iraq, Pakistan, Saudi Arabia, and Bangladesh.

**Figure 5: Female labor share in services firms, by country**



Note: See Appendix 1 for full country names. The female labor shares are averages using firm employment as weights.

Since the previous analysis does not distinguish between international and non-international firms, Figure 6 (top panel) plots the average female labor share of permanent workers for exporting services firms on the x-axis and non-exporting firms on the y-axis by country. More countries are located below the dotted  $y = x$  line, indicating higher female labor shares for exporting firms compared to non-exporting firms. Notable exceptions include East Asian and Pacific countries such

as Cambodia, the Lao People’s Democratic Republic, and the Philippines, as well as North African countries like Morocco and Tunisia. In Eastern European and Central Asian economies, female labor shares in services firms tend to be higher for non-exporters. Regarding importer status, more countries fall below the dotted  $y = x$  line, suggesting higher female labor shares for importers compared to non-importing firms (Figure 6, bottom panel).

**Figure 6: Female labor share in services firms, trade participants vs. non-participants, by country**



Source: The female labor shares are averages using firm employment as weights. See Appendix 1 for full country names.



relative to the rest of the sample (Appendix Figures 4.6 and 4.7). This is particularly true for exporting and GVC participation status, and to a lesser extent for importing and foreign ownership status. In contrast, the results for services firms are more mixed, with no clear trends in the female labor share, except for importing status, which tends to benefit the female labor share. Interestingly, countries in East Asia and Eastern Europe show a female labor share premium for global manufacturing firms but a male labor share premium for global services firms (Appendix Figure 4.7).

## 4. Descriptive Regression Results

### 4.1 Baseline Results

This section presents the results of the regression analysis based on the specification of equation (1). Table 1 displays results on mean differences in female labor share between trading and non-trading firms, while Table 2 focuses on global versus non-global firms. Regarding the control variables, labor productivity is negatively associated with the female labor share, suggesting that women are more likely to be employed in less-productive services firms. The coefficient for technology intensity is also negative, indicating a higher female labor share in less technology-intensive services firms. Both factors might be influenced by the lower average skills of female workers. Output is negatively correlated with the female labor share, suggesting that smaller services firms have higher female labor shares, while it loses statistical significance once productivity differences across firms are accounted for. These findings are consistent with those for the manufacturing sample, although the relationship between higher female labor share and smaller firm size is observed for manufacturing firms in the exporter-status regressions even when controlling for productivity differences (Appendix Table 5.1).

The results in Table 1 indicate that exporting is negatively correlated with the female labor share, which is statistically significant after controlling for firm size and technology intensity (column 3) and when also including productivity (column 4). The results in column 4 suggest that the female labor share is 3.1 percentage points *lower* for exporting firms compared to non-exporting firms, after accounting for firm-level factors and fixed effects. This gap is smaller than the 4.2 percentage points difference shown in Figure 1, which can be attributed to the inclusion of control variables and fixed country-sector, subnational region, and year effects. These results contrast sharply with those for manufacturing firms, where exporters have a female labor share premium of 4.6 percentage points, after controlling for firm-level factors and fixed effects (Appendix Table 5.1).

**Table 1: Female labor share difference of trading vs. non-trading services firms, OLS**

Dependent variable:	Exporter, exp				Importer, imp			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>fem_sh<sub>isrt</sub></i>								
<i>lnY<sub>isrt</sub></i>		-0.109 (0.158)	-0.156 (0.205)	0.222 (0.254)		-0.187** (0.037)	-0.212* (0.099)	0.174 (0.387)
<i>Intech<sub>isrt</sub></i>			-1.187*** (0.007)	-1.357*** (0.002)			-1.880*** (0.000)	-2.053*** (0.000)
<i>lnlp<sub>isrt</sub></i>				-0.637** (0.012)				-0.661** (0.012)
<i>global<sub>isrt</sub></i>	<b>-0.502</b> <b>(0.248)</b>	<b>-0.635</b> <b>(0.170)</b>	<b>-3.112***</b> <b>(0.000)</b>	<b>-3.161***</b> <b>(0.000)</b>	<b>0.564</b> <b>(0.125)</b>	<b>0.594</b> <b>(0.125)</b>	<b>0.588</b> <b>(0.241)</b>	<b>0.597</b> <b>(0.233)</b>
<i>Obs.</i>	33105	29509	14591	14591	25383	23415	13792	13792
<i>R2</i>	0.36	0.36	0.32	0.32	0.37	0.38	0.31	0.31

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects.

Regarding importing firms, no significant differences are found between importers and non-importers for services firms (Table 1, columns 5 to 8), while there is a female labor share premium for manufacturing firms, although it is smaller than for exporters (Appendix Table 5.1).

Table 2 examines the mean differences between global and non-global services firms. The female labor share is 3.2 percentage points *lower* for GVC participants compared to non-participants (columns 1 to 4). In other words, GVC participation accounts for approximately 39% (3.2 out of 8.2 percentage points) of the female labor share gap relative to non-participants, as shown in Figure 1. Similar to the findings for exporting, the results for services firms contrast sharply with those for the manufacturing sample, where there is a significant female labor share premium of 4.57 percentage points for GVC participants compared to non-participants (Appendix Table 5.2).

Finally, we do not find any difference in the female labor share between foreign-owned and domestically-owned services firms (Table 2, columns 5 to 8). This contrasts with the manufacturing firm sample, where foreign firms have a female labor share premium of 1.8 percentage points compared to domestic firms, after controlling for firm-level factors and fixed effects (Appendix Table 5.2).

In summary, we find a female labor share gap for exporters and GVC participants, whereas there is no relationship for importers and foreign firms in services sectors. This may be attributed to the sectoral segregation between women and men resulting in a selection bias with women tending to pursue work opportunities in less export- and skill-intensive sectors and men being employed in more export- and skill-intensive sectors.

Possible explanations for such a selection bias include longer working hours, higher travel requirements, or less flexible working conditions in international firms, which can be challenging for women, especially those with family responsibilities (see, e.g., Bøler et al. 2018). Business services (D69T82), for example, show a lower female labor share for exporting firms relative to non-exporting firms. However, flexibility in the workplace has been slower to increase within the business and financial sectors (Goldin and Katz 2011). In addition, tradable services may require higher skills, leading young women to pursue education and delay entering the labor market (Wacker et al. 2017). Supporting this prior, our analysis confirms that the female labor share is smaller in sectors such as IT and other information services (section 3.2).

**Table 2: Female labor share difference of global vs. non-global services firms, OLS**

Dependent variable:	GVC participant, gvc				Foreign ownership, FDI			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>fem_sh<sub>isrt</sub></i>								
<i>lnY<sub>isrt</sub></i>		-0.102 (0.187)	-0.165 (0.178)	0.203 (0.296)		-0.136* (0.082)	-0.223* (0.072)	0.130 (0.507)
<i>Intech<sub>isrt</sub></i>			-1.238*** (0.005)	-1.405*** (0.002)			-1.464*** (0.001)	-1.620*** (0.000)
<i>lnl<sub>p<sub>isrt</sub></sub></i>				-0.623** (0.014)				-0.594** (0.019)
<i>global<sub>isrt</sub></i>	<b>-1.466** (0.013)</b>	<b>-1.635*** (0.009)</b>	<b>-3.283*** (0.000)</b>	<b>-3.320*** (0.000)</b>	<b>0.724 (0.127)</b>	<b>0.663 (0.195)</b>	<b>0.926 (0.233)</b>	<b>0.842 (0.278)</b>
<i>Obs.</i>	33105	29509	14591	14591	33105	29509	14591	14591
<i>R2</i>	0.36	0.36	0.32	0.32	0.36	0.36	0.32	0.32

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects.

On the other hand, exporters in entertainment, recreation, and other service activities (D90T96) and telecommunications (D61) are more female-intensive. The nature of the work including direct interactions with foreign customers, and possibly more flexible work arrangements, could attract more women. Note that other sectors such as health or education, which are known to be female-intensive, are not part of the services firm sample.

## 4.2 Robustness Checks

This section carries out a number of robustness checks. First, we divide the sample into two periods, 2010-2019 and 2020-2024, to determine if the findings remain consistent before and after Covid-19. Second, we add the ratio of male to female sectoral wages as an additional control measure for a sub-sample of countries to check if findings hold when accounting for relative wage differences. Third, we additionally control for female firm ownership and management, as these could shape the relationship between international status and the female labor share. Fourth, we implement the

fractional probit estimator as a final robustness check to address the fact that the dependent variables are bounded between zero and unity.

Table 3 divides the sample into two periods, 2010-2019 and 2020-2024. The correlations between exporting and GVC participation and the female labor share are mostly statistically significant only in the pre-Covid period; only exporting has a statistically significant and smaller coefficient in both periods. This indicates that the female labor share gap for services exporters has narrowed after Covid-19. The sharp decline in services trade due to the pandemic and slower recovery relative to manufacturing could also explain this finding. This finding may partly also be due to the different sample sizes, so it should not be over-interpreted. However, it is possible that the increased adoption of digital technologies across all firms during Covid-19 (as suggested by the reduced coefficient on technology intensity) might have played a role (Avalos Almanza et al. 2023).

**Table 3: Female labor share difference of international vs. non-international services firms, 2010-2019 vs. 2020-2024, OLS**

Dependent variable:	2010-2019				2020-2024			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>fem_sh<sub>isrt</sub></i>	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>
$\ln Y_{isrt}$	0.103 (0.764)	0.0980 (0.790)	0.0778 (0.821)	0.00652 (0.985)	0.250 (0.291)	0.194 (0.419)	0.236 (0.318)	0.182 (0.445)
$\ln tech_{isrt}$	-2.332*** (0.007)	-4.609*** (0.000)	-2.563*** (0.003)	-2.992*** (0.001)	-0.859* (0.098)	-1.159** (0.029)	-0.876* (0.092)	-1.004* (0.054)
$\ln lp_{isrt}$	-1.271*** (0.004)	-1.488*** (0.003)	-1.251*** (0.005)	-1.207*** (0.007)	-0.392 (0.201)	-0.402 (0.198)	-0.384 (0.211)	-0.361 (0.240)
<i>trade<sub>isrt</sub> / global<sub>isrt</sub></i>	<b>-6.931*** (0.000)</b>	<b>-0.283 (0.767)</b>	<b>-8.124*** (0.000)</b>	<b>0.0223 (0.990)</b>	<b>-1.553** (0.043)</b>	<b>0.953 (0.106)</b>	<b>-1.409 (0.118)</b>	<b>0.845 (0.330)</b>
<i>Obs.</i>	4311	3789	4311	4311	10280	10003	10280	10280
<i>R2</i>	0.38	0.35	0.38	0.38	0.29	0.29	0.29	0.29

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects.

The findings for the manufacturing sample are in sharp contrast, with exporting and GVC participation showing a higher female labor share in the post-Covid period, whereas importing shows a reduced premium and foreign ownership status is no longer statistically significant (Appendix Table 5.3).

One potential source of omitted variable bias could arise from the absence of sex-specific wage data in the Enterprise Surveys. We address this issue by using sex-specific wage data available at the TiVA 2018 sector level for 31 countries in our dataset. We calculate the ratio of male to female wages as our control measure of relative wages at the sector level in a country. Another important modification to the model is the change in the dependent variable. Instead of estimating the female labor share (see equation 2), the regressions in this section estimate the female wage share (see

equation 1). Importantly, once all the independent variables are included in the descriptive regressions the country sample falls to 17 for services firms.

Table 4 presents results for female wage share for different firm categories, where the dependent variable is calculated using all workers. The findings indicate that higher relative wages between male and female workers – or a higher female wage gap – are associated with a lower female wage share, which aligns with expectations (see section 2.1). Regarding the international variables of interest, we now observe a premium of 1.6 percentage points for importers and 3.4 percentage points for foreign firms. The female wage share gap for exporters and GVC participants is not evident in columns 1 and 3. The results contrast sharply with those for manufacturing firms where exporting, GVC participation and foreign ownership status – but not importing – remain linked to female labor share premia (Appendix Table 5.4).

**Table 4: Female wage share difference of international vs. non-international firms, reduced country sample, OLS**

Dependent variable:	Total				Dependent variable:	Total			
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
$S^F_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>	$fem\_sh_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>
$\ln Y_{isrt}$	-0.659*	-0.733**	-0.721**	-0.766**	$\ln Y_{isrt}$	-0.934**	-0.994***	-1.002***	-1.053***
	(0.063)	(0.042)	(0.042)	(0.031)		(0.013)	(0.009)	(0.007)	(0.005)
$\ln tech_{isrt}$	1.905**	1.576*	1.788**	1.610**	$\ln tech_{isrt}$	1.950**	1.598*	1.829**	1.637*
	(0.020)	(0.067)	(0.029)	(0.048)		(0.024)	(0.077)	(0.034)	(0.058)
$\ln lp_{isrt}$	0.917**	0.967**	0.949**	0.965**	$\ln lp_{isrt}$	1.130**	1.138**	1.165**	1.184**
	(0.048)	(0.042)	(0.041)	(0.037)		(0.022)	(0.025)	(0.018)	(0.016)
$\ln(w^M/w^F)_{cst}$	-4.593***	-4.261**	-4.537**	-4.542**					
	(0.010)	(0.019)	(0.011)	(0.010)					
$trade_{isrt} / global_{isrt}$	<b>-1.257</b>	<b>1.638*</b>	<b>1.843</b>	<b>3.414**</b>	$trade_{isrt} / global_{isrt}$	<b>-1.709</b>	<b>1.656</b>	<b>1.531</b>	<b>3.429**</b>
	<b>(0.296)</b>	<b>(0.080)</b>	<b>(0.230)</b>	<b>(0.012)</b>		<b>(0.187)</b>	<b>(0.102)</b>	<b>(0.343)</b>	<b>(0.017)</b>
<i>Obs.</i>	3782	3624	3782	3782	<i>Obs.</i>	3782	3624	3782	3782
<i>R2</i>	0.26	0.26	0.26	0.26	<i>R2</i>	0.23	0.23	0.23	0.23

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses) for the sample of 17 countries for which relative wage rates at the sector level and other control variables are available. All regressions include sector, subnational region and year fixed effects.

While these results provide important indicative information, it is crucial not to over-interpret them for two reasons. First, the results for the reduced sample of 17 countries only cover a sixth of the full country sample for services firms, so observed trends may be country-specific. To test for this possibility, we estimate the baseline regressions (equation 2) just for these 17 countries (columns 5 to 8). Only foreign ownership status is associated with a higher female labor share, with coefficients of similar magnitude compared to the alternative specification in equation (1) (column 4). Additionally, the regressions include sectoral (not country-sector) fixed effects. This is a key difference from the other descriptive regressions presented previously, due to the inclusion of wage

data, which vary only by sector within countries, not by firm. Overall, the findings do not change when including relative wage rates as additional control variable.

As an additional robustness check, we revert to the original specification in equation (2) and incorporate two more potential influences on the female labor share to address concerns about omitted variables. Specifically, we include the female ownership share of each firm and a dummy variable for firms with a female top manager. Both variables are expected to have a positive association with the female labor share, based on the assumption that women are less likely to discriminate against other women in the hiring process compared to male owners or managers (see, e.g., Song 2022).

The estimation equation therefore becomes:

$$fem_{sh_{isrt}} = \alpha + \beta_1 \ln Y_{isrt} + \beta_2 \ln k_{isrt} + \gamma_1 \ln prod_{isrt} + \gamma_2 trade_{isrt} + \gamma_3 female_{isrt} + D_{cs} + D_r + D_t + \varepsilon_{isrt} \quad (2a)$$

where the *female* vector includes variables measuring the female ownership percentage and a dummy for a female top manager.

Table 5 presents the results. As expected, female ownership and female management are both associated with higher female labor shares in services firms, with all effects being statistically significant at the 1% level. Importantly, the negative coefficients on exporting and GVC participation remain similar to those reported in Tables 1 and 2 above and are statistically significant at the 1% level. Foreign ownership status still does not impact the female labor share of services firms. The only difference is that importers now also exhibit a statistically significant female labor share gap. Therefore, we conclude that integration with the global economy is an important determinant in explaining female labor share gaps in services firms, even after accounting for female involvement in firm ownership and management. This finding, however, does not apply to foreign-owned firms. The results for manufacturing firms suggest that the female labor share premium continues to hold for exporting, GVC participation and foreign ownership status, but not for importing firms (Appendix Table 5.5).

Finally, from an econometric point of view, it is important to take account of the fact that the dependent variables in equations (1) and (2) are shares, so they are bounded between zero and unity. Papke and Wooldridge (1996) derive the fractional logit estimator as a solution to exactly this kind of problem. We implement the closely related heteroskedastic fractional probit model of Bluhm (2013), which we prefer to the in-built Stata command for fractional response regression because it

is significantly more rapid in terms of computation time. We report coefficient estimates as average marginal effects, with standard errors computed using the delta method. The results in Appendix 6 broadly confirm the overall findings.

**Table 5: Female labor share difference of international vs. non-international services firms, role of female ownership and top manager, OLS**

Dependent variable:	Ownership				Management			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>fem_sh<sub>isrt</sub></i>	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>
$\ln Y_{isrt}$	0.183 (0.357)	0.445** (0.029)	0.165 (0.405)	0.113 (0.571)	0.247 (0.205)	0.392** (0.048)	0.212 (0.276)	0.159 (0.416)
$\ln tech_{isrt}$	-1.530*** (0.001)	-2.216*** (0.000)	-1.604*** (0.000)	-1.798*** (0.000)	-1.360*** (0.002)	-2.005*** (0.000)	-1.419*** (0.001)	-1.597*** (0.000)
$\ln lp_{isrt}$	-0.613** (0.017)	-0.845*** (0.001)	-0.606** (0.018)	-0.582** (0.024)	-0.666*** (0.008)	-0.771*** (0.003)	-0.633** (0.012)	-0.622** (0.014)
<i>female<sub>isrt</sub></i>	0.0703*** (0.000)	0.185*** (0.000)	0.112*** (0.000)	0.0957*** (0.009)	7.893*** (0.000)	15.19*** (0.000)	7.936*** (0.000)	10.27*** (0.000)
<i>trade<sub>isrt</sub> / global<sub>isrt</sub></i>	<b>-4.279*** (0.000)</b>	<b>-3.100*** (0.000)</b>	<b>-5.025*** (0.000)</b>	<b>-0.854 (0.336)</b>	<b>-4.576*** (0.000)</b>	<b>-2.521*** (0.000)</b>	<b>-4.725*** (0.000)</b>	<b>-1.148 (0.167)</b>
<i>Obs.</i>	14172	13417	14172	14172	14564	13766	14564	14564
<i>R2</i>	0.32	0.33	0.32	0.32	0.32	0.33	0.32	0.32

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include sector, subnational region and year fixed effects.

### 4.3 Alternative Trade in Employment Dataset

This section examines whether the female labor share gaps or premia can also be detected at the sector level within countries. The OECD Trade in Employment (TiE) and Trade in Value-added (TiVA) databases provide value-added and employment measures for 45 sectors over the period 1995-2020 for 76 countries. Employment data are available separately for men and women as part of the extended Trade in Employment by Workforce Characteristics (TiMBC) database. Importantly, the dataset publishes these measures for direct export activities, i.e., value added and employment in exports. By taking the difference (total minus export-linked), one can obtain measures for value added and employment for the rest of the sector. These measures allow for the computation of the female labor share and value added for export activities and the rest of the sector. This alternative dataset also addresses the main caveat of using the Enterprise Surveys, namely that is not clearly identifiable if exports are aligned with the main activity of the firm.

Domestic employment by industry statistics are drawn from various sources such as OECD's Annual National Accounts and Structural Analysis (STAN) databases, official national statistics and, in a very few cases, from research projects such as, for example, India KLEMS (Das et al., 2017). Employment is defined as persons engaged in production activity within the National Accounts

boundary of the resident institutional unit (domestic concept) and includes both employees and self-employed. If there are no estimates of employment by industry in official National Accounts statistics, then Labor Force Survey (LFS) statistics are exploited. National Accounts are preferred to LFS as a source for employment by industry since LFS are usually based on residential households and thus exclude non-resident workers while including resident workers commuting abroad (national concept).

To generate insights, Figures 8 and 9 illustrate the female labor share for export and non-export activities in our sample of 76 countries for the years 2010 and 2020, distinguishing between services sectors and manufacturing industries. The initial observation for manufacturing sectors suggests a female labor share premium of export activities compared to non-export activities for several countries which was more pronounced in 2010 compared to 2020 (Figure 8). In contrast, the scatterplot suggests a female labor share gap in services sectors across most countries, which has persisted over time (Figure 9).

Although female labor force participation varies across countries, a wage premium in the manufacturing sector is observed in several economies like Viet Nam, Bulgaria, Philippines, Cyprus, and Türkiye. These countries have actively participated in GVCs, particularly in female-dominated sectors such as apparel and electronics. The results are less pronounced than for the Enterprise Survey manufacturing sample, possibly because the OECD sample includes high-income economies where manufacturing jobs can be more male-dominated (e.g., machine operators, technicians) compared to those in low- and middle-income countries.

To rule out that unobserved factors at the country and sector level do not influence the results, we specify the following female labor share regressions:

$$fem\_sh_{csat} = \alpha + \beta_1 exp_{csat} + D_{ct} + D_{st} + D_{cs} \quad (3^a)$$

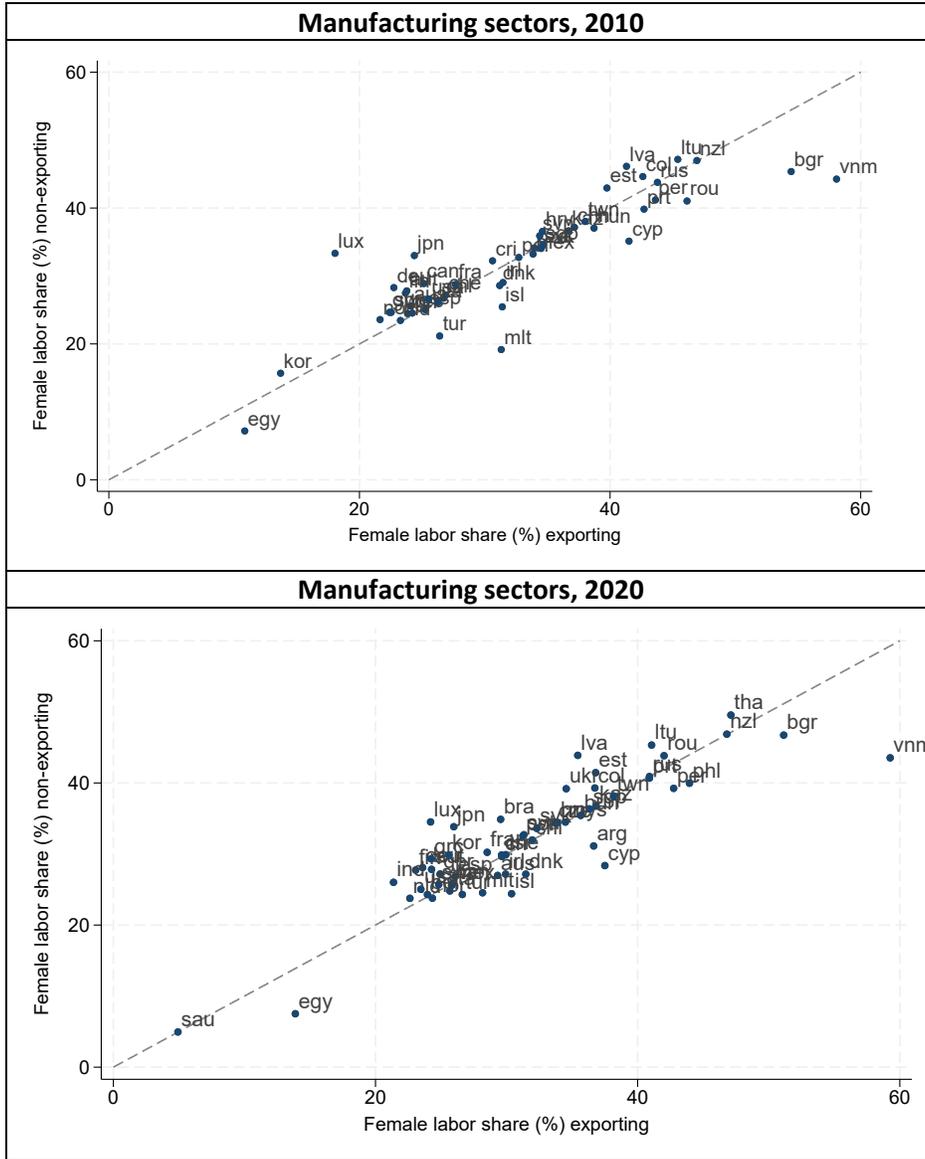
where  $femsh$  designates the female labor share,  $c$  a country,  $s$  a sector, and  $a$  the type of economic activity (direct export activity or rest of the sector).  $Exp$  is a dummy taking the value of 1 if a worker is linked to an export activity within sector  $s$ , and 0 if the worker is linked to non-export activities in the sector. We rely on a vector of unobserved country and sector fixed effects.

We also specify an augmented regression model that is more closely related to equation (2) in section 2.2 as follows:

$$fem\_sh_{csat} = \alpha + \beta_1 exp_{csat} + \beta_2 \ln Y_{csat} + D_{ct} + D_{st} + D_{cs} \quad (3b)$$

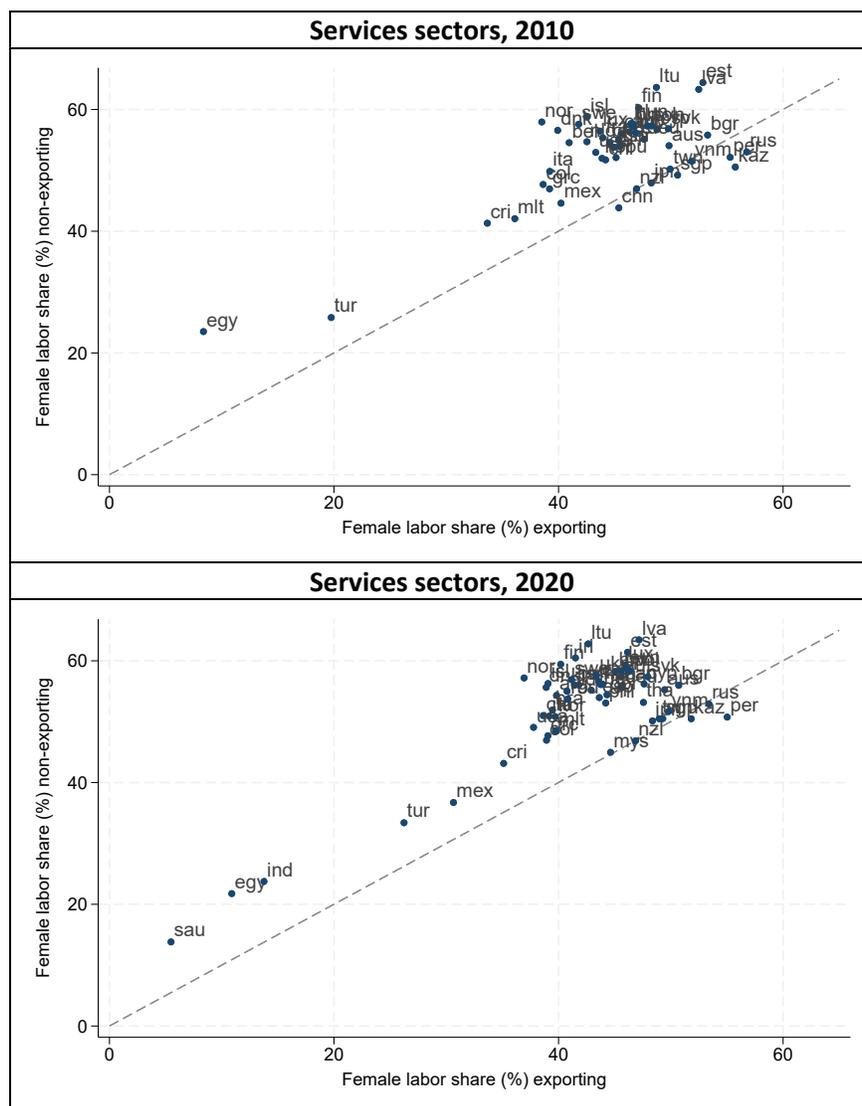
where  $Y$  denotes output for export and non-export activities.

**Figure 8: Female labor share difference by exporting activity, manufacturing sectors, 2010 vs. 2020**



Source: OECD Trade in Employment by Workforce Characteristics and Trade in Value added data. See Appendix 2 for the types of manufacturing sectors included in the database.

**Figure 9: Female labor share difference by exporting activity, services sectors, 2010 vs. 2020**



Source: OECD Trade in Employment by Workforce Characteristics and Trade in Value added data. See Appendix 2 for the types of services sectors included in the database.

Our findings in Table 6 suggest that exporting activities show a significantly higher female labor share relative to non-exporting activities for manufacturing sectors, while we find a female labor share gap for services sectors. After controlling for output, only the female labor share gap for services remains statistically significant. Overall, this robustness check confirms the female labor share gap for services exporters at the firm level using the Enterprise Survey data.

**Table 6: Female labor share by exporting activity of exporting vs. non-exporting activity, services vs. manufacturing, 2010-2020**

Dependent variable: <i>fem_sh<sub>cst</sub></i>	Services				Manufacturing			
	OLS		Fractional Probit		OLS		Fractional Probit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>lnY<sub>cst</sub></i>		-0.00335 (0.142)		-0.00309 (0.233)		0.00334 (0.480)		0.00314 (0.498)
<i>exp<sub>cst</sub></i>	<b>-0.0113***</b> <b>(0.004)</b>	<b>-0.0191***</b> <b>(0.000)</b>	<b>-0.0111***</b> <b>(0.003)</b>	<b>-0.0257***</b> <b>(0.000)</b>	<b>0.00843*</b> <b>(0.074)</b>	<b>0.00992</b> <b>(0.125)</b>	<b>0.00850**</b> <b>(0.036)</b>	<b>0.00980</b> <b>(0.110)</b>
<i>Obs.</i>	7503	7227	7503	7228	2504	2412	2504	2412
<i>R2/Pseudo-R2</i>	0.922	0.931	0.629	0.671	0.953	0.952	0.0922	0.0969

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses). The fractional probit results present average marginal effects. All regressions include country-sector, country-time and sector-time fixed effects.

## 5. Conclusions

Using a cross-section of more than 33,000 services firms in 104 LMICs from the World Bank's Enterprise Surveys, this paper assessed whether the female labor share premium of international relative to non-international firms in manufacturing also holds for services firms. It focused on four types of international firms: exporters, importers, GVC participants and FDI firms.

The stylized facts found important differences across broad sectors and countries. In manufacturing, international firms, especially exporters and GVC participants, generally have higher female labor shares than other firms. This trend is less pronounced for importers and foreign-owned firms. However, in services, the results are less clear, with no consistent trends except for a positive relationship between importing and the female labor share. Notably, East Asia and Eastern Europe show a female labor share premium in global manufacturing but a male premium in global services.

A negative relationship exists between exporting and GVC participation and the female labor share, while no relationship is found for importing or foreign ownership, controlling for firm output, productivity, technology intensity and fixed effects. The negative correlations for exporting and GVC participation are mainly significant pre-Covid-19, with only exporting remaining significant (though smaller) in both periods. Including female top management and female ownership confirms the negative relationship for exporting and GVC participation and reveals a negative relationship for importing services firms. Controlling for sector-level relative wages between men and women does not change the findings in a smaller sub-sample of 17 economies. The findings also indicate that higher relative wages between male and female workers – or a higher female wage gap – are

associated with a lower female wage share which is in line with expectations. Using an alternative estimator and dataset confirms these findings, highlighting a female labor share gap for services traders and a premium for manufacturing traders.

The female labor share gap for exporters and GVC participants in services sectors may be attributed to the sectoral segregation between women and men, with women tending to pursue work opportunities in less export-intensive and skill-intensive sectors (such as retail and hospitality), and men being employed in more export-intensive sectors (such as transportation) and skill-intensive services sectors (such as information and communication technologies). Given that international firms in modern services sectors are more likely to hire more skill-intensive or specialized labor, the results would reflect the skill disadvantage that women have relative to men which precludes their employment in such jobs.

Possible explanations include longer working hours, higher travel requirements, or less flexible working conditions in trading firms, which can be challenging for women, especially those with family responsibilities (see, e.g., Bøler et al. 2018). In addition, tradable services may require higher skills, leading young women to pursue education and delay entering the labor market (Wacker et al. 2017). Since skill-intensive modern services jobs are likely to pay more, this also explains the negative link between the female wage gap and female wage share. In contrast, in manufacturing, women tend to have the “right” skill-set for jobs in GVC-intensive sectors like textiles or computers and electronics and these sectors also tend to be more outward-oriented, as confirmed by our findings covering manufacturing firms.

While this paper examined the relationship between trade and female labor force participation from multiple perspectives, including various trade types and firm-level female labor participation, several areas warrant further research: (1) The role of policy, such as labor regulations, in shaping the relationship between trade and female labor share. (2) Whether the patterns observed remain consistent when incorporating more direct measures of technology or innovation. (3) Whether the findings hold when considering worker characteristics. (4) Whether a subgroup of countries with panel data can be used to establish a stronger causal link.

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## Appendices

**Appendix 1: Number of firms by country, services vs. manufacturing**

Services			Manufacturing		
<b>Economy</b>	<b>Year</b>	<b>Firms</b>	<b>Economy</b>	<b>Year</b>	<b>Firms</b>
Albania	2019	190	Albania	2019	126
Angola	2010	137	Argentina	2017	625
Antigua and Barbuda	2010	104	Armenia	2020	270
Argentina	2017	291	Bangladesh	2022	531
Armenia	2020	242	Belarus	2018	322
Azerbaijan	2019	152	Bolivia (Plurinational State of)	2017	105
Bangladesh	2022	262	Bosnia and Herzegovina	2023	130
Belarus	2018	231	Botswana	2023	163
Bolivia (Plurinational State of)	2017	213	Bulgaria	2023	371
Bosnia and Herzegovina	2023	179	Cambodia	2023	261
Botswana	2023	386	Chile	2010	763
Bulgaria	2023	212	China	2012	1638
Cambodia	2023	242	Colombia	2023	290
Cameroon	2016	228	Congo, Dem. Rep.	2013	235
Chile	2010	238	Costa Rica	2023	106
China	2012	868	Côte d'Ivoire	2023	272
Colombia	2023	503	Croatia	2023	143
Congo, Rep.	2024	219	Czechia	2019	280
Congo, Dem. Rep.	2013	268	Egypt, Arab Rep.	2020	1988
Costa Rica	2023	221	El Salvador	2023	287
Côte d'Ivoire	2023	356	Estonia	2023	129
Croatia	2023	290	Ethiopia	2015	364
Cyprus	2019	125	Georgia	2023	221
Czechia	2019	169	Ghana	2023	193
Djibouti	2013	159	Guatemala	2017	127
Dominica	2010	112	Hungary	2023	391
Dominican Republic	2016	231	India	2022	5212
Ecuador	2017	227	Indonesia	2023	1007
Egypt, Arab Rep.	2020	891	Iraq	2022	335
El Salvador	2023	266	Jamaica	2010	101
Estonia	2023	172	Jordan	2019	242
Ethiopia	2015	331	Kazakhstan	2019	846
Georgia	2023	330	Kenya	2018	440
Ghana	2023	430	Kosovo	2019	109
Grenada	2010	108	Kyrgyzstan	2023	148
Guatemala	2017	177	Lao PDR	2018	139
Guinea	2016	101	Latvia	2019	119
Honduras	2016	223	Lebanon	2019	261
Hong Kong SAR, China	2023	473	Lithuania	2019	121
Hungary	2023	261	Malaysia	2019	659
India	2022	3423	Mauritius	2023	108
Indonesia	2023	1061	Mexico	2023	648
Iraq	2022	382	Mongolia	2019	113
Jamaica	2010	211	Morocco	2023	239
Jordan	2019	174	Mozambique	2018	283
Kazakhstan	2019	394	Myanmar	2016	345
Kenya	2018	489	Namibia	2014	148
Kyrgyzstan	2023	166	Nepal	2023	210
Lao PDR	2018	170	Nicaragua	2016	104
Latvia	2019	182	Nigeria	2014	822

Lebanon	2019	231
Lithuania	2019	197
Madagascar	2022	221
Malawi	2014	170
Malaysia	2019	436
Mauritius	2023	186
Mexico	2023	495
Mongolia	2019	167
Morocco	2023	205
Mozambique	2018	273
Myanmar	2016	224
Namibia	2014	285
Nepal	2023	364
New Zealand	2023	178
Nicaragua	2016	204
Niger	2017	101
Nigeria	2014	1017
North Macedonia	2023	199
Pakistan	2022	422
Panama	2010	223
Paraguay	2023	230
Peru	2023	478
Philippines	2023	507
Poland	2019	223
Romania	2023	311
Russian Federation	2019	353
Rwanda	2023	222
Saudi Arabia	2022	514
Senegal	2014	316
Serbia	2019	183
Sierra Leone	2023	101
Slovak Republic	2023	155
Slovenia	2019	181
South Africa	2020	611
South Sudan	2014	599
Sri Lanka	2011	242
Sudan	2014	503
Suriname	2018	118
Tajikistan	2019	128
Tanzania, United Republic of	2023	383
Timor-Leste	2021	112
Trinidad and Tobago	2010	209
Tunisia	2020	205
Türkiye	2019	405
Uganda	2013	340
Ukraine	2019	307
Uruguay	2017	206
Uzbekistan	2019	295
Venezuela, RB	2010	216
Viet Nam	2023	300
West Bank and Gaza	2023	203
Yemen, Rep.	2013	207
Zambia	2019	358
Zimbabwe	2016	295
<b>TOTAL</b>		<b>33,284</b>

North Macedonia	2023	116
Pakistan	2022	844
Panama	2010	107
Paraguay	2023	102
Peru	2023	432
Philippines	2023	360
Poland	2019	743
Romania	2023	489
Russian Federation	2019	739
Rwanda	2023	132
Saudi Arabia	2022	642
Senegal	2014	225
Serbia	2019	114
Sierra Leone	2023	101
Slovak Republic	2023	108
Slovenia	2019	153
South Africa	2020	332
Sri Lanka	2011	354
Tajikistan	2019	115
Tanzania, United Republic of	2023	193
Trinidad and Tobago	2010	113
Tunisia	2020	354
Türkiye	2019	1020
Uganda	2013	351
Ukraine	2019	886
Uzbekistan	2019	782
Viet Nam	2023	556
West Bank and Gaza	2023	123
Yemen, Rep.	2013	107
Zambia	2019	162
Zimbabwe	2016	276
<b>TOTAL</b>		<b>34,221</b>

Note: The following 17 countries with sectoral sex-disaggregated wage data are included in the services firm samples: Botswana, Cambodia, Colombia, Costa Rica, Djibouti, El Salvador, Georgia, Indonesia, Jordan, Mexico, Mongolia, Mauritius, Nepal, Philippines, Russian Federation, Sierra Leone, and Viet Nam.

The manufacturing firm sample includes the following 26 countries: Argentina, Bangladesh, Bolivia (Plurinational State of), Botswana, Chile, Colombia, Costa Rica, Ethiopia, Georgia, Indonesia, Iraq, Jordan, Cambodia, Mexico, Mongolia, Mauritius, Nicaragua, Nepal, Peru, Philippines, Russian Federation, Sierra Leone, El Salvador, Tajikistan, Uganda, Viet Nam.

## Appendix 2: Number of firms, services vs. manufacturing

<b>Services</b>		<b>Firms</b>	<b>Percent</b>
<b>TiVA 2018 Sector name</b>			
D45T47	Wholesale and retail trade; repair of motor vehicles	20,561	61.8%
D49T53	Transportation and storage	2,607	7.8%
D55T56	Accommodation and food services	7,287	21.9%
D58T60	Publishing, audiovisual and broadcasting activities	278	0.8%
D61	Telecommunications	271	0.8%
D62T63	IT and other information services	842	2.5%
D69T82	Other business sector services	1,109	3.3%
D90T96	Arts, entertainment, recreation and other service activities	329	1.0%
<b>TOTAL</b>		<b>33,284</b>	<b>100%</b>

<b>Manufacturing</b>		<b>Firms</b>	<b>Percent</b>
<b>TiVA 2018 Sector name</b>			
D10T12	Food products, beverages and tobacco	7,517	22.0%
D13T15	Textiles, wearing apparel, leather and related products	6,889	20.1%
D16	Wood and products of wood and cork	932	2.7%
D17T18	Paper products and printing	1,141	3.3%
D19	Coke and refined petroleum products	87	0.3%
D20T21	Chemicals and pharmaceutical products	2,044	6.0%
D22	Rubber and plastic products	1,980	5.8%
D23	Other non-metallic mineral products	2,779	8.1%
D24	Basic metals	1,082	3.2%
D25	Fabricated metal products	3,406	10.0%
D26	Computer, electronic and optical products	455	1.3%
D27	Electrical equipment	848	2.5%
D28	Machinery and equipment, nec	1,925	5.6%
D29	Motor vehicles, trailers and semi-trailers	887	2.6%
D30	Other transport equipment	164	0.5%
D31T33	Other manufacturing; repair and installation of machinery and equipment	2,085	6.1%
<b>TOTAL</b>		<b>34,221</b>	<b>100%</b>

Note: TiVA classification based on most important product of firm.

### Appendix 3: Summary statistics, services vs. manufacturing

#### Services

Variable	Obs	Mean	Std. dev.	Min	Max
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#### Female labor participation

fem_sh_perm	33,210	33.13996	27.71175	0	100
fem_sh_per~w	6,261	34.69018	24.72865	0	99.5521
lnwage_rat~f	28,741	7.606307	1.794615	-8.2284	22.45576

#### Trade

exporter	33284	0.113508	0.317218	0	1
importer	25501	0.433709	0.495596	0	1
gvc	33284	0.054981	0.227947	0	1
FDI	33284	0.083524	0.276676	0	1

#### Controls

lnsales_def	29660	12.51409	2.376369	-0.58821	23.35165
tech_med	16102	0.234257	0.493444	0	2
lnprod_med	29636	9.559747	1.930512	-4.72144	20.16372
lnrel_wage	6320	4.753926	0.369997	3.458598	6.523321

#### Characteristics

fem_own	31110	17.32414	33.84011	0	100
fem_man	33198	0.191759	0.39369	0	1

**Manufacturing**

Variable	Obs	Mean	Std. dev.	Min	Max
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**Female labor participation**

fem_sh_perm	34,028	31.58238	31.7928	0	100
fem_sh_prod	33,749	29.94768	35.03853	0	100
fem_sh_nonp	31,605	36.94851	33.59327	0	100
fem_sh_per~w	5,768	33.34079	27.98353	0	100

**Trade**

exporter	34,221	0.272698	0.445353	0	1
importer	33,670	0.403267	0.490561	0	1
gvc	34,221	0.177055	0.381721	0	1
FDI	34,206	0.089721	0.285786	0	1

**Controls**

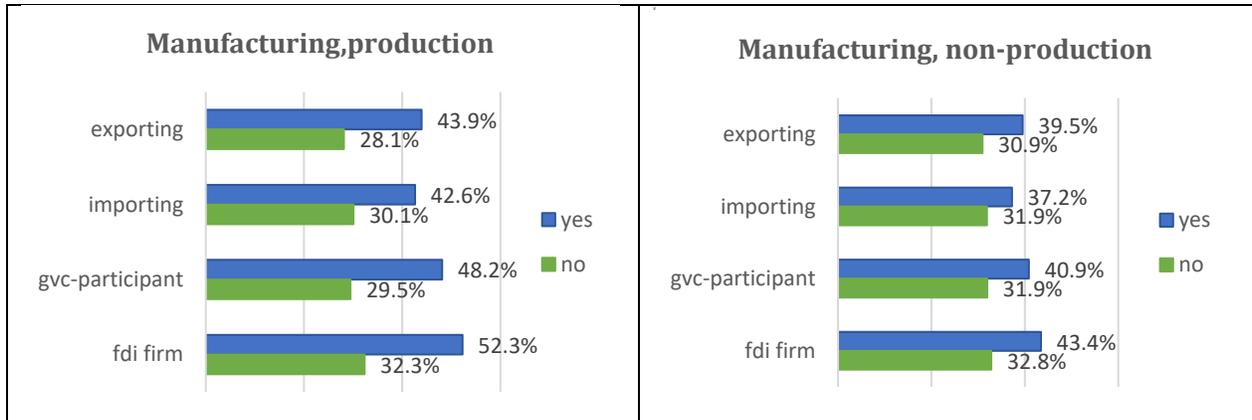
lnsales_def	30,182	13.37472	2.312589	0.808394	21.12873
lncapint	23,985	-1.1668	1.780617	-15.0195	9.416192
lnthp	21,370	0.586996	0.720478	-6.48438	2.124743
lnrel_wage	5,881	4.786585	0.367216	2.359362	7.570676

**Characteristics**

fem_own	32,054	12.51198	29.01237	0	100
fem_man	34,162	0.128827	0.335014	0	1

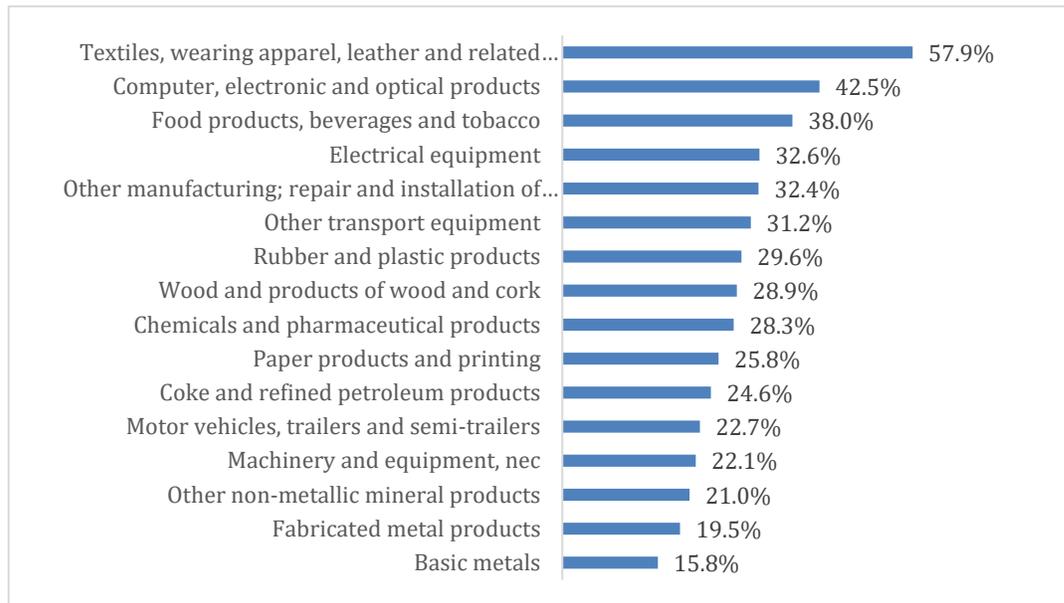
## Appendix 4: Analysis for manufacturing firms

**Appendix Figure 4.1: Female labor share, services vs. manufacturing, by international status**



Note: The female labor shares are averages using firm employment as weights.

**Appendix Figure 4.2: Female labor share in manufacturing firms, by sub-sector**



Note: For the sectoral distribution of firms, see Appendix 2. The female labor shares are averages using firm employment as weights.

**Appendix Figure 4.3: Female labor share, trade participants vs. non-participants, by manufacturing sub-sector**



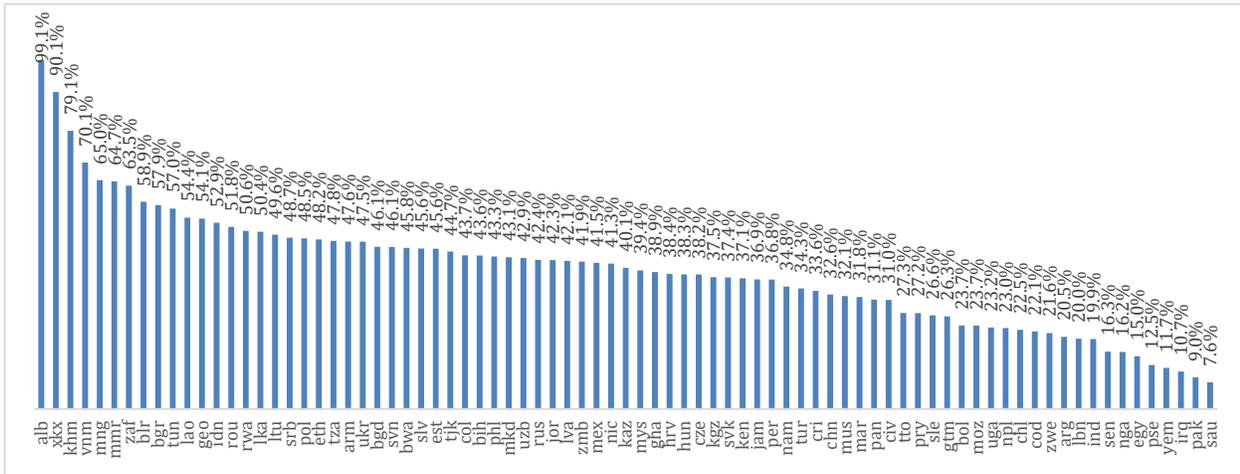
Source: The female labor shares are averages using firm employment as weights. Sector numbers relate to TiVA 2018 sectors. For sector names and the sectoral distribution of firms, see Appendix 2.

**Appendix Figure 4.4: Female labor share, global firms vs. non-global firms, by manufacturing sub-sector**



Source: The female labor shares are averages using firm employment as weights. Sector numbers relate to TiVA 2018 sectors. For sector names and the sectoral distribution of firms, see Appendix 2.

**Appendix Figure 4.5: Female labor share in manufacturing firms, by country**



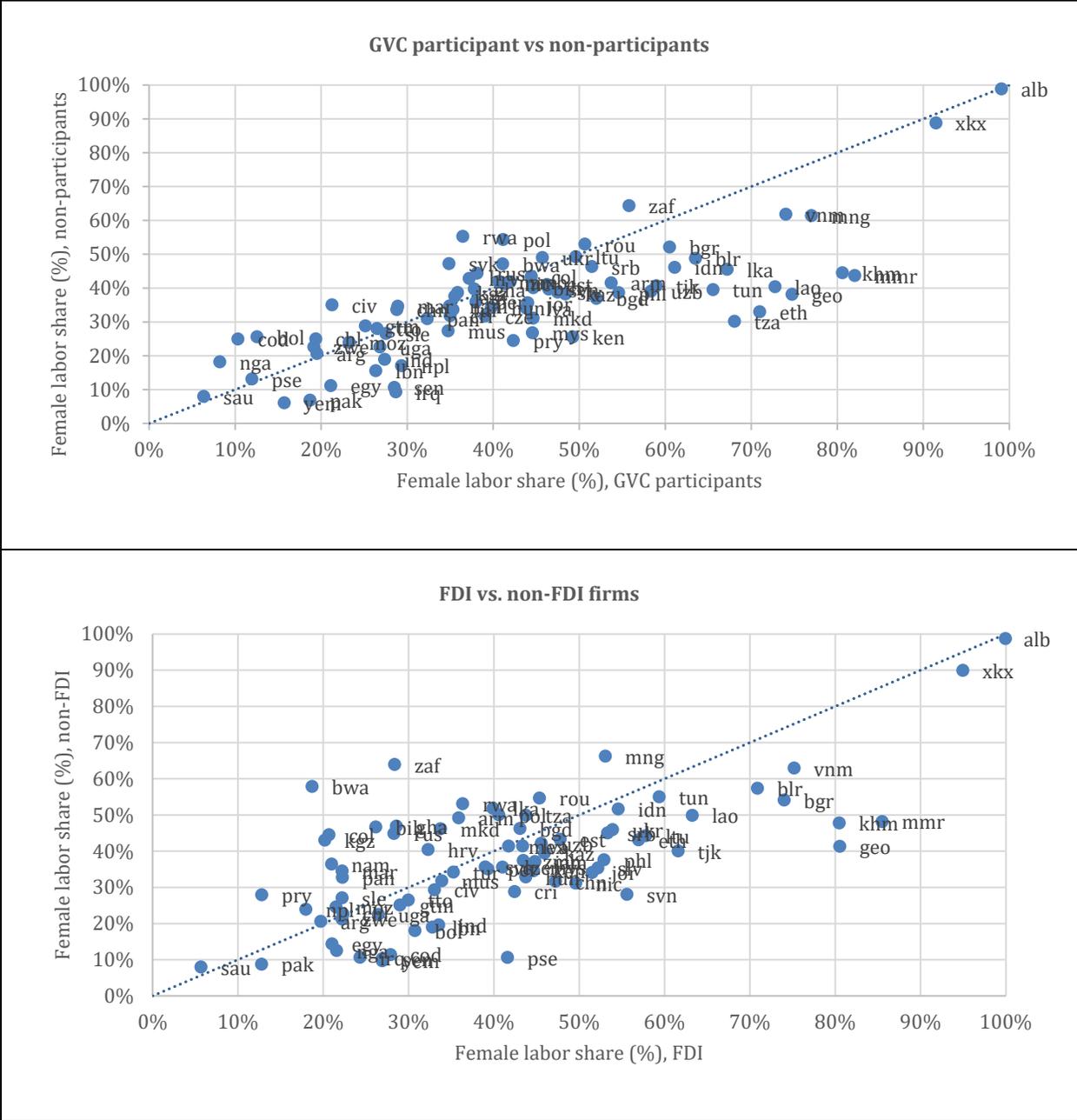
Note: See Appendix 1 for full country names. The female labor shares are averages using firm employment as weights.

**Appendix Figure 4.6: Female labor share in manufacturing, trade participants vs. non-participants, by country**



Source: The female labor shares are averages using firm employment as weights. See Appendix 1 for full country names.

Appendix Figure 4.7: Female labor share in manufacturing, global vs. non-global firms, by country



Source: The female labor shares are averages using firm employment as weights. See Appendix 1 for full country names.

## Appendix 5: OLS estimates manufacturing firms

**Appendix Table 5.1: Female labor share difference of trading vs. non-trading manufacturing firms, OLS**

Dependent variable:	Exporter, exp				Importer, imp			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>fem_sh<sub>isrt</sub></i>								
<i>lnY<sub>isrt</sub></i>		-0.475*** (0.000)	-0.370*** (0.000)	-0.383*** (0.000)		-0.277*** (0.001)	-0.164* (0.095)	-0.144 (0.173)
<i>incapint<sub>isrt</sub></i>			-0.368*** (0.002)	-0.390*** (0.002)			-0.322*** (0.006)	-0.322** (0.012)
<i>lntfp<sub>isrt</sub></i>				-0.159 (0.724)				-0.0977 (0.828)
<b><i>global<sub>isrt</sub></i></b>	<b>2.596*** (0.000)</b>	<b>3.902*** (0.000)</b>	<b>4.229*** (0.000)</b>	<b>4.626*** (0.000)</b>	<b>0.750** (0.029)</b>	<b>1.279*** (0.000)</b>	<b>1.754*** (0.000)</b>	<b>1.687*** (0.000)</b>
<i>Obs.</i>	33921	29922	23777	21309	33399	29543	23560	21144
<i>R2</i>	0.45	0.47	0.48	0.48	0.45	0.47	0.48	0.48

Note: P-values are in parentheses. p\* < 0.1, p\*\* < 0.05, p\*\*\* < 0.01 (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects.

**Appendix Table 5.2: Female labor share difference of global vs. non-global manufacturing firms, OLS**

Dependent variable:	GVC participant, gvc				Foreign ownership, FDI			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>fem_sh<sub>isrt</sub></i>								
<i>lnY<sub>isrt</sub></i>		-0.408*** (0.000)	-0.295*** (0.003)	-0.298*** (0.005)		-0.284*** (0.001)	-0.151 (0.122)	-0.114 (0.283)
<i>incapint<sub>isrt</sub></i>			-0.352*** (0.002)	-0.370*** (0.004)			-0.322*** (0.006)	-0.331*** (0.010)
<i>lntfp<sub>isrt</sub></i>				-0.139 (0.757)				-0.151 (0.740)
<b><i>global<sub>isrt</sub></i></b>	<b>2.959*** (0.000)</b>	<b>3.780*** (0.000)</b>	<b>4.197*** (0.000)</b>	<b>4.573*** (0.000)</b>	<b>1.341*** (0.007)</b>	<b>2.054*** (0.000)</b>	<b>2.398*** (0.000)</b>	<b>1.832*** (0.006)</b>
<i>Obs.</i>	33921	29922	23777	21309	33905	29910	23767	21299
<i>R2</i>	0.45	0.47	0.48	0.48	0.45	0.47	0.48	0.48

Note: P-values are in parentheses. p\* < 0.1, p\*\* < 0.05, p\*\*\* < 0.01 (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects.

**Appendix Table 5.3: Female labor share difference of trading vs. non-trading manufacturing firms, 2010-2019 vs. 2020-2024, OLS**

Dependent variable:	2010-2019				2020-2024			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>fem_sh<sub>isrt</sub></i>								
<i>lnY<sub>isrt</sub></i>	-1.128*** (0.000)	-0.928*** (0.000)	-1.030*** (0.000)	-0.917*** (0.000)	0.0199 (0.884)	0.292** (0.030)	0.0989 (0.464)	0.328** (0.014)
<i>incapint<sub>isrt</sub></i>	-0.613*** (0.002)	-0.536*** (0.008)	-0.593*** (0.003)	-0.565*** (0.005)	-0.240 (0.145)	-0.176 (0.285)	-0.218 (0.186)	-0.174 (0.292)
<i>lntfp<sub>isrt</sub></i>	1.064 (0.103)	1.030 (0.116)	1.004 (0.124)	0.890 (0.181)	-0.925 (0.125)	-0.769 (0.204)	-0.847 (0.161)	-0.756 (0.211)
<b><i>trade<sub>isrt</sub> / global<sub>isrt</sub></i></b>	<b>4.036*** (0.000)</b>	<b>1.838*** (0.005)</b>	<b>3.768*** (0.000)</b>	<b>2.636*** (0.003)</b>	<b>5.218*** (0.000)</b>	<b>1.537*** (0.009)</b>	<b>5.345*** (0.000)</b>	<b>1.388 (0.163)</b>
<i>Obs.</i>	8236	8120	8236	8226	13072	13023	13072	13072
<i>R2</i>	0.48	0.48	0.48	0.48	0.47	0.46	0.46	0.46

Note: P-values are in parentheses. p\* < 0.1, p\*\* < 0.05, p\*\*\* < 0.01 (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects.

**Appendix Table 5.4: Female wage share difference of trading vs. non-trading manufacturing firms and global vs. non-global manufacturing firms, reduced country sample, OLS**

Dependent variable:	Total				Dependent variable:	Total			
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
$S^F_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>	$fem\_sh_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>
$\ln Y_{isrt}$	-0.812*** (0.000)	-0.257 (0.224)	-0.647*** (0.002)	-0.337 (0.113)	$\ln Y_{isrt}$	-0.712*** (0.004)	-0.127 (0.607)	-0.552** (0.027)	-0.178 (0.480)
$\ln capint_{isrt}$	-0.581** (0.030)	-0.415 (0.123)	-0.548** (0.041)	-0.448* (0.097)	$\ln capint_{isrt}$	-0.740** (0.016)	-0.561* (0.068)	-0.709** (0.021)	-0.591* (0.056)
$\ln tfp_{isrt}$	-1.050 (0.261)	-1.089 (0.245)	-1.098 (0.241)	-0.995 (0.287)	$\ln tfp_{isrt}$	-2.171* (0.061)	-2.229* (0.053)	-2.233* (0.054)	-2.099* (0.068)
$\ln(w^M/w^F)_{cst}$	-16.10*** (0.000)	-15.97*** (0.000)	-15.99*** (0.000)	-16.38*** (0.000)					
$\frac{trade_{isrt}}{global_{isrt}}$	<b>7.557*** (0.000)</b>	<b>0.774 (0.392)</b>	<b>6.546*** (0.000)</b>	<b>2.426* (0.066)</b>	$\frac{trade_{isrt}}{global_{isrt}}$	<b>8.164*** (0.000)</b>	<b>1.037 (0.310)</b>	<b>7.338*** (0.000)</b>	<b>2.230 (0.120)</b>
<i>Obs.</i>	3517	3492	3517	3517	<i>Obs.</i>	3517	3492	3517	3517
<i>R2</i>	0.52	0.52	0.52	0.52	<i>R2</i>	0.48	0.47	0.48	0.47

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses) for the sample of 26 countries for which relative wage rates at the sector level are available. All regressions include sector, subnational region and year fixed effects

**Appendix Table 5.5: Female labor share difference of trading vs. non-trading manufacturing firms, role of female ownership and top manager, OLS**

Dependent variable:	Ownership				Management			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$fem\_sh_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>
$\ln Y_{isrt}$	-0.349*** (0.002)	-0.0729 (0.509)	-0.282** (0.011)	-0.0940 (0.393)	-0.371*** (0.001)	-0.0889 (0.401)	-0.289*** (0.007)	-0.111 (0.296)
$\ln capint_{isrt}$	-0.405*** (0.002)	-0.313** (0.018)	-0.388*** (0.003)	-0.350*** (0.008)	-0.375*** (0.003)	-0.277** (0.031)	-0.357*** (0.005)	-0.319** (0.013)
$\ln tfp_{isrt}$	-0.159 (0.733)	-0.0701 (0.881)	-0.122 (0.793)	-0.131 (0.782)	-0.126 (0.779)	-0.0216 (0.962)	-0.114 (0.799)	-0.113 (0.803)
$female_{isrt}$	0.0528*** (0.000)	0.0773*** (0.000)	0.0359** (0.036)	0.0204 (0.507)	4.408*** (0.000)	8.326*** (0.000)	4.873*** (0.000)	5.288*** (0.002)
$\frac{trade_{isrt}}{global_{isrt}}$	<b>4.150*** (0.000)</b>	<b>0.695 (0.138)</b>	<b>4.326*** (0.000)</b>	<b>1.508** (0.046)</b>	<b>4.069*** (0.000)</b>	<b>0.597 (0.183)</b>	<b>3.954*** (0.000)</b>	<b>1.206* (0.084)</b>
<i>Obs.</i>	20052	19898	20052	20044	21284	21119	21284	21274
<i>R2</i>	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48

Note: P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects.

Appendix 6: Fractional probit estimates, services firms

Appendix Table 6.1: Female labor share difference of trading vs. non-trading services firms, fractional probit

Dependent variable: <i>fem_sh<sub>isrt</sub></i>	Exporter, exp				Importer, imp			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>lnY<sub>isrt</sub></i>		-0.000922 (0.413)	-0.00122 (0.454)	0.00241 (0.447)		-0.00183 (0.174)	-0.00211 (0.198)	0.00138 (0.666)
<i>Intech<sub>isrt</sub></i>			-0.0221** (0.029)	-0.0237** (0.026)			-0.0296*** (0.006)	-0.0311*** (0.006)
<i>lnlp<sub>isrt</sub></i>				-0.00599 (0.210)				-0.00581 (0.238)
<b><i>global<sub>isrt</sub></i></b>	<b>-0.00963 (0.227)</b>	<b>-0.0105 (0.185)</b>	<b>-0.0446*** (0.001)</b>	<b>-0.0451*** (0.001)</b>	<b>0.00655* (0.096)</b>	<b>0.00560 (0.198)</b>	<b>0.00441 (0.466)</b>	<b>0.00446 (0.460)</b>
<i>Obs.</i>	33210	29618	14658	14658	25477	23512	13860	13860
<i>Pseudo-R2</i>	0.36	0.37	0.32	0.32	0.37	0.38	0.31	0.31

Appendix Table 6.2: Female labor share difference of global vs. non-global services firms, fractional probit

Dependent variable: <i>fem_sh<sub>isrt</sub></i>	GVC participant, gvc				Foreign ownership, FDI			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>lnY<sub>isrt</sub></i>		-0.000972 (0.382)	-0.00147 (0.360)	0.00196 (0.535)		-0.00138 (0.223)	-0.00212 (0.200)	0.00120 (0.707)
<i>Intech<sub>isrt</sub></i>			-0.0226** (0.028)	-0.0241** (0.026)			-0.0250** (0.016)	-0.0264** (0.016)
<i>lnlp<sub>isrt</sub></i>				-0.00566 (0.237)				-0.00548 (0.258)
<b><i>global<sub>isrt</sub></i></b>	<b>-0.0198** (0.039)</b>	<b>-0.0241** (0.016)</b>	<b>-0.0504*** (0.000)</b>	<b>-0.0511*** (0.000)</b>	<b>0.00795 (0.108)</b>	<b>0.00680 (0.206)</b>	<b>0.00655 (0.465)</b>	<b>0.00580 (0.523)</b>
<i>Obs.</i>	33210	29618	14658	14658	33210	29618	14658	14658
<i>Pseudo-R2</i>	0.36	0.37	0.32	0.32	0.36	0.36	0.32	0.32

Appendix Table 6.3: Female labor share difference of trading vs. non-trading services firms, 2010-19 vs. 2020-24, fractional probit

Dependent variable: <i>fem_sh<sub>isrt</sub></i>	2010-2019				2020-2024			
	(1) <i>exp</i>	(2) <i>imp</i>	(3) <i>gvc</i>	(4) <i>fdi</i>	(5) <i>exp</i>	(6) <i>imp</i>	(7) <i>gvc</i>	(8) <i>fdi</i>
<i>lnY<sub>isrt</sub></i>	0.000774 (0.885)	-0.000116 (0.983)	-0.000106 (0.984)	-0.000694 (0.898)	0.00254 (0.520)	0.00142 (0.713)	0.00227 (0.560)	0.00156 (0.693)
<i>Intech<sub>isrt</sub></i>	-0.0656*** (0.000)	-0.0911*** (0.000)	-0.0720*** (0.000)	-0.0760*** (0.000)	-0.00927 (0.434)	-0.0124 (0.310)	-0.00913 (0.434)	-0.0101 (0.391)
<i>lnlp<sub>isrt</sub></i>	-0.0119 (0.108)	-0.0132 (0.110)	-0.0113 (0.127)	-0.0118 (0.127)	-0.00349 (0.549)	-0.00313 (0.586)	-0.00332 (0.568)	-0.00293 (0.616)
<b><i>trade<sub>isrt</sub> / global<sub>isrt</sub></i></b>	<b>-0.123*** (0.000)</b>	<b>-0.00451 (0.688)</b>	<b>-0.125*** (0.000)</b>	<b>0.00288 (0.851)</b>	<b>-0.0181 (0.135)</b>	<b>0.00773 (0.277)</b>	<b>-0.0205* (0.091)</b>	<b>0.00596 (0.567)</b>
<i>Obs.</i>	4345	3821	4345	4345	10313	10039	10313	10313
<i>Pseudo-R2</i>	0.07	0.05	0.06	0.06	0.20	0.21	0.19	0.19

Note: The table presents average marginal effects. P-values are in parentheses. p\*<0.1, p\*\*<0.05, p\*\*\*<0.01 (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects. The dependent variable now ranges from 0-1 instead of 0-100.

**Appendix Table 6.4: Female wage share difference of trading vs. non-trading services firms and global vs. non-global services firms, reduced country sample, fractional probit**

Dependent variable:	Total				Dependent variable:	Total			
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
$S^F_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>	$fem\_sh_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>
$\ln Y_{isrt}$	-0.0102 (0.281)	-0.00948 (0.257)	-0.0110 (0.220)	-0.0108 (0.241)	$\ln Y_{isrt}$	-0.0143* (0.078)	-0.0147* (0.071)	-0.0155* (0.059)	-0.0160** (0.049)
$\ln tech_{isrt}$	0.0244* (0.070)	0.0217 (0.138)	0.0235* (0.084)	0.0220 (0.112)	$\ln tech_{isrt}$	0.0270* (0.069)	0.0244 (0.141)	0.0259* (0.075)	0.0249* (0.074)
$\ln lp_{isrt}$	0.0125 (0.206)	0.0115 (0.190)	0.0130 (0.173)	0.0125 (0.196)	$\ln lp_{isrt}$	0.0168* (0.060)	0.0165* (0.058)	0.0175** (0.049)	0.0176** (0.046)
$\ln(w^M/w^F)_{cst}$	-0.0388 (0.650)	-0.0468 (0.400)	-0.0421 (0.566)	-0.0451 (0.461)					
$\frac{trade_{isrt}}{global_{isrt}}$	<b>-0.0188</b> <b>(0.523)</b>	<b>0.0148*</b> <b>(0.086)</b>	<b>0.0216</b> <b>(0.248)</b>	<b>0.0353*</b> <b>(0.010)</b>	$\frac{trade_{isrt}}{global_{isrt}}$	<b>-0.0311</b> <b>(0.345)</b>	<b>0.0154</b> <b>(0.121)</b>	<b>0.0136</b> <b>(0.547)</b>	<b>0.0393**</b> <b>(0.018)</b>
<i>Obs.</i>	3796	3642	3796	3796	<i>Obs.</i>	3796	3642	3796	3796
<i>Pseudo-R2</i>	0.27	0.26	0.27	0.27	<i>Pseudo-R2</i>	0.24	0.24	0.24	0.24

**Appendix Table 6.5: Female labor share difference of trading vs. non-trading services firms, role of female ownership and top manager, fractional probit**

Dependent variable:	Ownership				Management			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$fem\_sh_{isrt}$	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>	<i>exp</i>	<i>imp</i>	<i>gvc</i>	<i>fdi</i>
$\ln Y_{isrt}$	0.00195 (0.539)	0.00324 (0.333)	0.00150 (0.635)	0.00114 (0.719)	0.00265 (0.404)	0.00235 (0.493)	0.00198 (0.530)	0.00150 (0.637)
$\ln tech_{isrt}$	-0.0254** (0.024)	-0.0308*** (0.005)	-0.0263** (0.021)	0.0294** (0.010)	-0.0234** (0.030)	-0.0293*** (0.009)	-0.0241** (0.028)	-0.0269** (0.014)
$\ln lp_{isrt}$	-0.00562 (0.243)	-0.00682 (0.165)	-0.00538 (0.265)	-0.00539 (0.268)	-0.00627 (0.190)	-0.00562 (0.250)	-0.00572 (0.232)	-0.00582 (0.228)
$female_{isrt}$	0.104*** (0.000)	0.181*** (0.000)	0.173*** (0.000)	0.143*** (0.010)	0.131*** (0.000)	0.161*** (0.000)	0.143*** (0.000)	0.159*** (0.001)
$\frac{trade_{isrt}}{global_{isrt}}$	<b>-0.0659***</b> <b>(0.000)</b>	<b>-0.0373***</b> <b>(0.000)</b>	<b>-0.0834***</b> <b>(0.000)</b>	<b>-0.0144</b> <b>(0.185)</b>	<b>-0.0752***</b> <b>(0.000)</b>	<b>-0.0337***</b> <b>(0.000)</b>	<b>-0.0844***</b> <b>(0.000)</b>	<b>-0.0195*</b> <b>(0.051)</b>
<i>Obs.</i>	14238	13484	14238	14238	14632	13835	14632	14632
<i>Pseudo-R2</i>	0.32	0.34	0.32	0.32	0.33	0.34	0.32	0.32

Note: The table presents average marginal effects. P-values are in parentheses.  $p^* < 0.1$ ,  $p^{**} < 0.05$ ,  $p^{***} < 0.01$  (robust standard errors corrected for clustering by country-sector in parentheses). All regressions include country-sector, subnational region and year fixed effects. The dependent variable now ranges from 0-1 instead of 0-100.