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Global Value Chains and Women's Labor: Firm-Level Evidence

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Abstract: This chapter examines the link between absolute and relative demand for female production and non-production workers, and GVC participation through exporting, importing, foreign investment, use of international certification, use of foreign inputs, and use of foreign technology. Based on an analysis of firm-level data for 138 countries, we find robust evidence that participation in GVCs—as proxied by observables—is associated with stronger absolute demand for female production and non-production workers, as well as stronger relative demand for female production workers. These results are robust to exclusion of the textiles and garments sector, which is known to be intensive in its use of female labor. GVC participation can therefore be beneficial for female workers, but the outcome for any particular worker depends on the interplay between comparative advantage, the pattern of trade opening and GVC participation, sectoral specialization, and skills. Future research using richer data can help determine the conditions under which women can benefit from GVC integration, as well as the characteristics of firms, markets, and workers that might lead to losses on a gross basis, so that appropriate policy responses can be designed.

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HIGHLIGHTS

- Integration with the world economy, as proxied by observable indicators of global value chain (GVC) participation, is robustly associated with demand for female production and non-production workers.
- The same GVC participation proxies also show evidence of a positive association with the proportion of female production workers in total production workers, but the evidence is weaker for non-production workers.
- Results are generally robust to exclusion of the textiles and apparel sector.
- From a policy perspective, these results suggest that integration with the world economy, including through GVC participation, can help promote better labor market outcomes for women, although entrenched discrimination through cultural practices and legal restrictions cannot be overcome through economic integration alone.

1 INTRODUCTION

There are many channels through which interactions with the international economy can be gendered. Shepherd and Stone (2017) show that women interact with world markets in ways that can be distinct from the ways in which men do, as consumers, workers, and business owners. Many of these channels are poorly understood, in part due to lack of gender disaggregated data in many areas and countries. However, the economic mechanisms can be elaborated from first principles and basic data, and further research can shed light on the ways in which they work in particular contexts. Shepherd and Stone (2017) refer to previous work, and present descriptive statistics and selected research results, showing some of the ways in which engagement with the international economy, specifically through trade, can be seen through the lens of gender.

Against this background, the present chapter focuses on one mechanism in particular: labor markets. Demand for local goods from world markets is not uniform across firms or sectors, but affects some more than others, according to the interaction of a range of factors including comparative advantage, policy, and trade costs. Focusing on comparative advantage, as Shepherd and Stone (2017) do in their analysis from first principles, if a country opens to trade and has comparative advantage in sectors that are relatively intensive in their use of female labor relative to male labor, then the outcome will be positive for women's employment: demand for female labor will rise, leading to higher employment and, if labor markets are sufficiently tight, higher wages. If, on the other hand, it is comparative disadvantage sectors that are relatively intensive in their use of female labor, then opening to trade will cause a shift in relative labor demand towards men, and conditions on the female labor market will worsen. The balance of these effects in particular countries and sectors is an open question that can only be answered with data. That is what this chapter aims to do by investigating whether or not integration with the world economy, based on observable GVC proxies, increases the absolute and relative demand for female labor at the firm-level.

The analysis of the links between trade and women's employment in this chapter is at the firm-level. We use data from the World Bank Enterprise Surveys to look at the links between employment of female production and non-production workers on the one hand, and indicators of Global Value Chain (GVC) participation on the other. Of course, GVC participation cannot be observed directly in the data, so it needs to be proxied by observables. We cumulatively use dummies for firms that export directly, those that are majority foreign owned, those that use some inputs of foreign origin, those that license foreign technology, those that have an internationally recognized quality certification, and those that import some of their intermediate goods directly. Each of these dummies captures an aspect of GVC participation.

We generally find strong support for the proposition that each of these types of participation by firms in the world economy is positively and statistically significantly associated with employment of female production and non-production workers, even after controlling for country-sector fixed effects that account for comparative advantage, and common controls like total factor productivity (TFP), average wages, and capital intensity. Moreover, we show that our results are not driven by a single sector known to use female labor intensively—textiles and garments—by dropping firms from that sector and repeating the analysis: we find the same results.

A variety of previous work provides context for our results. ILO (2010) reports that 1.2 billion women were employed out of a total of 3 billion in 2008, for a proportion of 40.4%. Although there is some evidence that women's labor force participation has been declining in more recent years (ILO, 2016), it nonetheless remains true that women account for a major part of the labor force in most countries, although discriminatory laws and practices in many areas mean that they are sometimes prevented

from working in certain sectors (such as those using chemicals) or at certain times (such as at night); see Lan and Shepherd (Forthcoming). Clearly, legal restrictions on women's right to work limits the possibilities for GVC integration to improve their labor market situation. Our conclusions do not suggest that integration with the world market is all that is necessary to improve labor market conditions for women, but rather that it is one mechanism that can do so. Removal of legal impediments to women's work should clearly be a concrete policy priority in the interests of promoting gender equity under the SDGs framework.

Figure 1 shows that women's relationship to labor markets differs markedly across regions. Only Latin America and the Caribbean has seen a significant increase in women's labor relative to men's labor over the last twenty-five years, while South Asia has seen a noticeable decline. The other regions are notable for their relative stability over a long period. Moreover, the period analyzed in Figure 1 is one where engagement with the international economy took off in all regions of the world, especially following establishment of the World Trade Organization in 1995. Starting in East Asia and the Pacific, the GVC business model has gradually expanded during this time period to include most world regions, although to different degrees and in different ways. The key takeaway from Figure 1 is that the labor market does not work in a gender neutral way, but is instead framed by country-level institutions that affect women's labor market prospects. The evolution of women's labor force share during a period of enhanced engagement with the world economy varies considerably across regions, which suggests that the interaction between labor market institutions and trade integration is not straightforward from a gender point of view..

From the perspective of interactions with the world economy, the distribution of women's employment by sector is also important. Figure 2 shows the percentage of female employment in industry, a classification that combines manufacturing with mining and quarrying. It clearly shows that industry is a less important proportion of women's employment in all regions except South Asia and Sub-Saharan Africa. The decline in East Asia and the Pacific is particularly noteworthy: again, the time period in the figure is the same one that saw the rise of GVC business models in manufacturing, so the change in industry as a share of total female employment is again suggestive of the fact that this change may not be gender neutral. One hypothesis is that as the manufacturing sector in East and Southeast Asia has developed, it has become more capital intensive (i.e., "heavier" industry)—and it is traditionally such sectors that have failed to use female labor due to stereotypes about the need for "brawn". We show in the conclusion, for instance, that many countries maintain explicit laws that prevent women from working in certain types of heavy industry. Of course, there is little in the way of physical reasons why women should not work in heavy industry: during the Second World War, for example, much of heavy industry in the United States was driven by female workers, as male employees were scarce due to military demands. Nonetheless, these stereotypes persist in most parts of the world. For instance, a 2010 survey in Greece found that occupations like construction contracting, as well as electrical contracting and plumbing, were strongly identified with men, while nursery teachers and nursing were associated strongly with women.[2]

The dynamic in South Asia and Sub-Saharan Africa, which bucks the global trend, is also of interest. These two regions have seen the rise of light manufacturing, particularly textiles and clothing, which is traditionally a sector that has used female labor relatively intensively for production activities. The reason is again likely related to stereotypes about male and female skills and competences, but the

[2] https://www.eurofound.europa.eu/publications/article/2010/stereotypes-about-gender-and-work

differing dynamics are important from a research standpoint. Clearly, sectoral distributions matter for the analysis, and careful account will need to be taken of them.

The combination of Figures 1 and 2 suggests that as women have been drawn into the work force over the last two decades, it has typically not been in industry—although there are exceptions, as noted above. In some countries, women remain predominantly in the agricultural sector, but in others they have moved into services, a sector where the stereotype of "brains" over "brawn" persists (Lan and Shepherd, forthcoming). The role of women workers in the services sector is an important question to explore, but we exclude it from this chapter. Services GVCs are at the emerging stage in most countries, so we focus on the manufacturing sector where the GVC business model is most established.

Most research on women and labor markets has focused on the gender wage gap, i.e. the premium that men enjoy relative to women. Some contributions have looked specifically at the role of trade. For example, Berik et al. (2003) show that competition from trade in Korea and Taiwan was positively associated with wage discrimination against women. Similarly, Busse and Speilman (2006) find that the concentration of women in export-intensive sectors in Special Economic Zones has tended to reduce their bargaining power, and as a result their wages. Finally, Boler et al. (2015) find that Norwegian exporters tend to have a higher gender wage gap than non-exporters. There is therefore evidence that trade integration can be gendered through its effect on relative wages, but there is as yet little evidence on the effects of other types of integration associated with GVC participation, such as foreign investment, use of foreign technology, or use of foreign-sourced intermediate inputs. This chapter seeks to address those issues through the lens of labor demand, rather than wages; firm-level data on wages by gender are not available for a broad cross-section of countries, so such an analysis is not yet possible.

Against this background, the paper proceeds as follows. Section 2 discusses our data source, and provides some preliminary analysis using graphical methods and descriptive statistics. Section 3 turns to a fully-specified econometric model and discusses results. Finally, Section 4 concludes and provides some policy implications.

2 Data and Descriptive Analysis

2.1 Sectoral Data

The OECD-WTO TiVA database is a commonly used reference in the policy literature for metrics of GVC participation. It provides data on 63 countries and 34 sectors, covering agriculture, manufacturing, and services. The database combines trade data with national accounts and input-output tables to allow the computation of GVC-relevant measures, including the percentage of the value of gross exports by sector accounted for by foreign origin value added (FVASH). A higher value on this metric is consistent with a higher degree of GVC participation, as it is indicative of greater use of imported intermediates in the production of a country's exports. For descriptive purposes, we focus on the kind of GVC activity most common in Asia by limiting attention to the aggregate manufacturing sector (ISIC sectors 15 to 37).

Figure 3 shows the correlation between FVASH and the female labor force participation rate, across all countries for which data on both variables are available (62). The line of best fit is upward sloping, which is consistent with a positive effect of GVC participation on the female labor market, but the fit is poor and the correlation is not statistically significant. Figure 4 takes a different approach, correlating FVASH—which here is limited to the manufacturing industry—with the proportion of women employed in industry, as a proportion of total female employment. The line of best fit is more strongly upward sloping, which is consistent with a positive effect of GVC participation on women's

employment in industry. Moreover, in this case the correlation is statistically significant at the 1% level. We therefore take this as some first, suggestive evidence that GVC participation is positively associated with the demand for female labor. Other research, such as Said-Allsopp and Tallontire (2015) as well as Bamber and Staritz (2016), highlights the potential for positive labor market outcomes for women through involvement in GVCs, while also stressing the complex issues at play, such as the nature and conditions of work involved; aggregate data on labor force participation does not address those questions.

2.2 Firm-Level Data

The main data source for this chapter is the World Bank's Enterprise Surveys dataset. It currently has data on over 135,000 firms in 141 mostly developing and transition economies. After limiting the sample to manufacturing firms only,[3] for the reasons set out above, and also excluding unreliable observations,[4] we have a starting sample of 65,108 firm-level observations. The data are not panel data, in the sense that each observation is on a firm for a single year. However, not all variables of interest are available for all firms, so that number drops substantially in our regressions. That is quite typical in firm-level work using the Enterprise Surveys, and is to be expected.

The process for undertaking Enterprise Surveys is highly standardized. The World Bank works with local partners to develop a sampling frame based on the business register, or similar resource. Survey companies are then engaged to contact firms using stratified random sampling. Interviews are conducted face to face, typically with a senior manager. Topics covered include basic financial and performance information, business constraints, international integration, and relations with government. The breadth of the Enterprise Surveys makes them an incomparable resource for conducting policy relevant firm-level empirical work in developing countries.

In addition to making the basic data available, the World Bank team behind the Enterprise Surveys has also worked with panel data wherever available to produce firm-level estimates of total factor productivity. When we merge these estimates in, we have 35,071 observations. We believe the loss of observations is justified, because the alternative is to use a less informative measure, like sales or value added per worker; we believe results will be superior with TFP as a control in our regressions.

In terms of international integration, the Enterprise Surveys have a number of variables that are of interest. First, each firm reports the percentage of its sales that are directly exported. If that number is greater than zero, we code the firm as an exporter. Next, firms report the percentage of ownership that is held by foreigners. If that figure is greater than 50%, we code the firm as foreign owned. In addition, firms report whether or not they import intermediate inputs; if they do, we code them as an importer. Related data record the percentage of intermediate inputs that are of foreign origin, so we code a firm as a user of foreign inputs if that number is greater than zero. Finally, we also construct dummy variables for firms that report using foreign technology under license, and firms that have an international quality certification. None of these variables on its own captures GVC participation—which we cannot directly observe in these data—but together we would argue that the summarize the core dimensions of involvement in a manufacturing GVC, and so can proxy for GVC participation in our analysis. Many of these variables, like importing intermediates or exporting output, are directly

[3] We use two filters to achieve this. First, we eliminate firms coded as "services" in the Enterprise Surveys' own screener question. Then, we eliminate firms the main production of which is outside ISIC sectors 15 to 37, which are commonly understood as manufacturing.

[4] In accordance with standard practice, an observation is considered unreliable if the interviewer records a belief that responses were "not truthful". 8,545 observations are dropped in this way.

related to common measures of GVC participation at a more aggregate level used in the literature on trade in value added.

Of course, the variables of main interest relate to women's participation in the surveyed firms. On the labor side, we observe the number of female workers, sub-divided into production and non-production categories. In addition, we observe whether or not a firm has at least one female owner, and whether or not the firm's senior manager is female.

Table 1 provides variable definitions, Table 2 shows descriptive statistics, and Table 3 shows a correlation matrix. The key takeaway from Table 2 is that not all data of interest are observed for all firms: data are frequently missing, so our effective sample falls away rapidly from the starting point of over 65,000 observations. Nonetheless, even accounting for this sample attrition, we still have a significant number of observations to work with.

Our core hypothesis for this paper is that GVC involvement, as proxied by observable indicators, is robustly associated with increased female employment. The hypothesis is broadly stated, relative to the economic mechanisms set out above. In particular, we expect country and sectoral heterogeneity to play a role in driving results. But stating the hypothesis in this way allows us to test whether or not GVC participation is, in a general sense, beneficial for female employment. The hypothesis is consistent with a simple model in which engaging with the world economy through GVC participation increases the market size for a firm's outputs, which in turn results in greater derived demand for labor, including women's labor.

A secondary hypothesis is that GVC participation, as proxied by observable indicators, is robustly associated with greater effects on female employment relative to male employment. This difference in relative labor demand would be expressed through an increase in the proportion of female workers at the firm-level. Again, we deliberately state the hypothesis broadly in order that it can be tested, after taking proper account of country and sector-level heterogeneity. It is difficult to have a theoretical prior belief on this mechanism, but the market expansion dynamic referred to above could have different implications for male and female labor in the presence of occupational specialization, or persistent cultural or legal discrimination against women.

Before moving to a fully-specified econometric model in the next section, we first examine the general tendencies in the data using graphical means and descriptive statistics. In conducting this analysis, we are careful to use the sampling weights included in the Enterprise Surveys dataset, to take account of the way in which the sample was constructed.

It is not informative to conduct the analysis repeatedly for all observable proxies for GVC participation. We therefore just look at the effect of being a direct exporter on the proportion of female production workers, to fix ideas. Applying sampling weights, we find that the average proportion of female production workers is 30.4% in exporters, but only 28.7% in non-exporters. The difference between the two is not large in absolute terms, but is nonetheless meaningful, in particular since the definition of an exporter is a firm that directly exports any of its production; the difference would likely be more pronounced if we adopted a stricter definition, such as directly exporting 10% or 20% of its production.

Figure 3 breaks the data out differently, again looking at the proportion of female production workers but this time looking at differences across sectors, aggregating across countries. We again apply sampling weights. In 13 out of 23 sectors, exporters have on average a higher proportion of female production workers than non-exporters. But the difference is highly variable across sectors, in part in

line with the a priori expectation expressed above that female workers tend to be concentrated in light industry, in part due to stereotypes about "brawn" requirements in heavy industry. We see, for example, that among exporting firms, women production workers represent 58.9% of the total in the apparel sector, followed by 48.7% in textiles, and 36.7% in food products; however, the corresponding figures are only 11.2% in transport equipment, 13.4% in office equipment, and 14.0% in machinery and equipment. Moreover, the distinction between female proportions in exporting versus non-exporting firms differs considerably by sector: as we have noted, exporters employ a greater proportion of female workers than non-exporters in 13 sectors, but a lower proportion in 10 sectors. Clearly, it will be important to take account of this cross-sectoral heterogeneity in the analysis.

3 MODEL AND RESULTS

To build on the descriptive results presented in Section 2, this section develops a fully specified econometric model. The basic model, which is essentially a conditional labor demand function that can be derived from basic microeconomic theory, takes the following form:

$$Female_{fcst} = d_{cst} + b_1 \log Sales_{fcst} + b_2 \log \frac{K_{fcst}}{L_{fcst}} + b_3 \log \frac{W_{fcst}}{L_{fcst}} + b_4 TFP_{fcst} + FemaleOwner_{fcst} + FemaleManager_{fcst} + GVC_{fcst} + e_{fcst}$$

Where: Female is a measure of female employment, either the number of female production workers or the number of female non-production workers; K/L is the level of capital per worker, W/L is the average wage rate; TFP is total factor productivity, as estimated by World Bank staff; FemaleOwner is a dummy indicating whether or not at least one of the owners is female; FemaleManager is a dummy indicating whether the firm's senior manager is a woman; e is a standard error term, and GVC refers to a set of variables of interest, namely dummies for majority foreign ownership, exporter status, use of foreign inputs, use of foreign technology, ISO certification, and direct import of intermediates. In terms of the microeconomics underlying the model, the inclusion of total sales makes labor demand conditional on output, while the other variables are indicators of technology and other factors that could reasonably be expected to shift the curve in different directions.

We use TFP and the capital/labor ratio to proxy for firm productivity and capital intensity of production, both of which are likely to be associated with employment outcomes. We also include a measure of the firm's average wage (as disaggregated data are not available), as higher wages should be associated with stronger labor demand. Finally, we include dummies for firms that have at least one female owner and firms where the senior manager is a female to deal with the possibility that firms where women are in positions of authority may have different hiring practices to male-dominated firms.

We estimate the model incrementally by OLS, adding one additional proxy for GVC participation in each regression. The specification of greatest interest is the one in which all GVC proxies enter simultaneously, but the sample size is considerably reduced, so we present it last.

Table 4 presents results for the number of female production workers. In the baseline regression (column 1) we see that firm size is positively and 1% statistically significantly associated with greater employment of female production workers, while capital intensity, wages, and productivity all display a negative and 1% statistically significant association. The dummy for firms with at least one female owner has a positive coefficient that is statistically significant at the 5% level. The results on productivity, wages, and capital intensity can be explained by a range of factors. On the one hand, we know that due to persistent stereotypes and discrimination, women tend to be over-represented in

smaller, less productive firms, and in particular in lower wage occupations within those firms. Similarly, they are under-represented in more capital intensive (heavier) manufacturing sectors.t

The variables from the baseline regressions remain relatively stable across the remaining columns of Table 4. Turning to the variables of interest, we see that when the variables are added one at a time from columns 2 to 6, some of the GVC participation proxies are consistently positively and statistically significantly (1% level) associated with higher female employment. Column 7 maintains this pattern when all variables are added together, but with one anomalous result: the use of foreign inputs now has an unexpected negative and 1% statistically significant coefficient. We believe this result is due to the significant reduction in sample size brought about by inclusion of the importer variable. Due to this drop in sample size, our preferred model is in column 6, where we see that exporter status, use of foreign technology, and ISO certification are all positively and statistically significantly associated with female employment. A possible reason why not all variables have statistically significant coefficients is that they are correlated: for instance, TFP is likely correlated with measures of GVC integration, as higher productivity firms tend to self-select into GVCs. This issue results in inflated standard errors, and thus reduced statistical significance.

In Section 2, we noted that the textiles and apparel sector stands out as having a high proportion of female production workers. We therefore repeat these regressions, but drop those sectors from the estimation sample, as a robustness check. Results are in Table 5. They are fairly consistent with what was reported in Table 4 in terms of the signs and statistical significance of the coefficients on the variables of interest. We therefore conclude that there is evidence that integration with the international economy, including through proxies for GVC participation, is robustly associated with higher levels of employment for female production workers. This effect holds true even after controlling for cross-sectoral heterogeneity, and is not an artefact of sectors that are known to be intensive in female labor, like textiles and apparel, but is more general.

In Tables 6 and 7, we repeat the same regression but change the dependent variable to female non-production workers. Performance of the control variables is very similar to the production workers model, although we see that firms with female owners and female managers both tend to employ significantly more women in non-production roles. In this case, all proxies for GVC participation in column 6, except foreign investment, are positive and statistically significant.

Results in Table 7 show that in this case, the textiles and apparel sector plays a significant role in driving the results discussed above. First, we see that the coefficient on TFP is now positive and statistically significant at the 1% level, which is more in line with expectations. Surprisingly, firms with a female senior manager seem to employ fewer women in non-production roles in this case, which is contrary to other findings in the literature (Coffmann et al., 2018). In terms of the variables of main interest, we find robust evidence that most of the GVC proxies are positively and significantly associated with greater female employment in non-production roles.

Thus far, we have been concerned with the raw number of female employees, and its relationship with indicators of GVC participation. Our findings therefore reflect absolute demand for female labor: as firms integrate with the international economy, they tend to grow, which increases labor demand. That dynamic applies to women, as it has been found to apply to workers in general by much previous work. However, from a gender perspective, we also need to be concerned about the relative demand for female labor. We therefore re-run the above models using the proportion of female workers as the dependent variable, distinguishing between production and non-production workers, and again with and without the textiles sector. We follow Papke and Wooldridge (1996) and estimate these models—which have a dependent variable contained between zero and unity—using the fractional logit estimator.

Results are in Tables 8 through 11. In general, they paint a more mixed picture than those obtained using absolute numbers of female workers. For production workers (Tables 8 and 9), we see that the controls have similar signs and levels of statistical significance to the baseline conditional labor demand models. Results on the female owner and female manager dummies now accord with expectations, in that they are positive and statistically significant. In terms of the observable proxies for GVC participation, however, it is really only the exporter dummy that gives robust results: as in other specifications, it has a positive and statistically significant coefficient. The evidence of use of foreign intermediate inputs is less consistent across specifications, but there are also positive and statistically significant coefficient. Table 9 shows that these results generally are not driven by the textiles and apparel sector, but when it is dropped, only exporter status has a robust positive association with the proportion of female production workers.

Tables 10 and 11 turn to the proportion of female non-production workers as the dependent variable. Results are generally less robust than for production workers, with controls that are often not statistically significant, in particular when textiles and apparel are dropped from the estimation sample.

In terms of the observable GVC proxies, we find some evidence of significant positive associations between the proportion of female non-production workers and exporter status, as well as the use of foreign technology; however, results on exporter status are not robust to dropping apparel and textiles from the estimation sample.

Taking these results together, we conclude that there is robust evidence that some observable GVC proxies, such as exporter status, use of foreign inputs, and ISO status, are associated with a higher proportion of female production workers, even after controlling for cross-sectoral heterogeneity. This result is not driven to a significant extent by the textiles and garments sector, which is known to use female labor intensively. Evidence for the proportion of female non-production workers is more mixed: of the GVC proxies, only the use of foreign technology is commonly associated with a higher proportion of female non-production workers.

4 Conclusion and Policy Implications

Policymakers are increasingly recognizing that integration with the world economy is not gender neutral. Shepherd and Stone (2017) show that basic economic principles suggest that the pattern of trade opening interacts with women's labor and consumption practices to produce complex outcomes that are as yet poorly understood. This paper represents a contribution towards a better understanding of one aspect of that equation: the labor market implications for women of increased integration with the world economy, including through GVC participation.

The focus of this chapter has been on the ways in which integration with the world economy can affect the demand for female labor. More robust demand for female labor due to increased market size can translate into higher employment rates for women, as well as increased wages as labor markets tighten. In an absolute sense, we find strong evidence that firms that engage with the world market through one of the GVC proxies we have studied tend to employ more women. The size effect of the world market is therefore very present in the data analyzed here, and extends to production and non-production workers alike.

An equally important issue, however, is the demand for female relative to male labor. This dynamic is a key way in which economic integration can be gendered, and there is no clear evidence on this point in a systematic sense in the literature. We therefore provide some first evidence that the relative demand for female production workers also increases as firms integrate with the world economy, although the evidence is not as consistent as for absolute labor demand; results are noticeably weaker for non-production workers. Nonetheless, putting these two results together suggests that in the context of the wide range of developing countries studied here, GVC participation tends to be associated with improved absolute and relative labor market outcomes for women, and is therefore a factor that tends to promote gender equity to some degree.

A major caveat on our results is that the models we have estimated are not causal: we have been careful to frame the analysis in terms of correlations and associations rather than causal effects. To isolate causal effects would require data tracking individual firms over multiple years, which is difficult in the Enterprise Surveys data. Future research using national sources could fruitfully explore this alternative research design. However, many countries do not maintain gender disaggregated statistics, which makes detailed analysis difficult or even impossible. A first step towards moving forward on understanding the links between GVC participation and women's labor market outcomes is to invest in gender disaggregated statistics.

A second issue that needs to be stated clearly is that although international economy integration seems to have potential to increase the absolute and relative demand for some kinds of female labor, it cannot on its own bring about gender equity in labor markets. Even in developed countries with strong records on gender, issues like the gender pay gap continue to plague labor markets. This persistence shows that gender discrimination is deeply engrained in cultural practices, and sometimes even codified in law. For instance, Lan and Shepherd (Forthcoming) show that in Asian countries, there are many restrictions on women's working practices, ranging from prohibitions on working outside certain hours (such as at night) to prohibitions on working in particular industries (such as those that use hazardous chemicals). Figure 6 shows the prevalence of this problem across Asia, but also demonstrates significant variation across sub-regions. The interplay between social and cultural values, legal restrictions, and economic interests is complex. It is likely not a coincidence that restrictions on female labor are least prevalent in the most integrated Asian sub-regions (East and Southeast Asia), but we do not claim that economic integration was the decisive factor in that development. At most, it was one factor among many. Nonetheless, there is scope for GVC participation to improve the lot of working women, provided that there is also forward movements on other fronts, most urgently a relaxation of legal rules limiting women's right to work.

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TABLES

Table 1: Variables and definitions.

Variable	Definition	Source
Log(Female Production Workers)	Logarithm of the number of female production workers at a firm.	WBES question l5a.
Female Production Workers %	Number of female production workers at firm divided by the total number of production workers.	WBES questions l5a and l3a.
Log(Female Non-Production Workers)	Logarithm of the number of female non-production workers at a firm.	WBES question l5b.
Female Non-Production Workers %	Number of female non-production workers at firm divided by the total number of production workers.	WBES questions l5b and l3b.
Log(Cap/Empl)	Logarithm of the net book value of land plus vehicles and equipment, divided by the total number of employees.	WBES questions n6a, n6b, l1, l6.
Log(Wage/Empl)	Logarithm of the firm's total wage bill divided by the total number of employees.	WBES questions n2a, l1, l6.
Log(Sales)	Logarithm of the firm's total sales.	WBES question d2.
TFP	Index of total factor productivity.	World Bank Staff.
Female Owner	Dummy equal to unity for firms with at least one female owner.	WBES question b4.
Female Manager	Dummy equal to unity for firms where the senior manager is female.	WBES question b7a.
Foreign	Dummy variable equal to unity for firms that are majority foreign owned.	WBES question b2b.
Exporter	Dummy variable equal to unity for firms that directly export part of their production.	WBES question d3c.
Foreign Inputs	Dummy variable equal to unity for firms that use some foreign inputs.	WBES question d12b.
Foreign Technology	Dummy variable equal to unity for firms that license foreign technology.	WBES question e6.
ISO	Dummy variable equal to unity for firms with an internationally-recognized quality certification.	WBES question b8.
Importer	Dummy variable equal to unity for firms that directly import some of their intermediate inputs.	WBES question d13.

Source: Author.

Table 2: Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Log(Female Production Workers)	32,267	2.397	1.618	0.000	9.159
Female Production Workers %	56,034	0.245	0.310	0.000	1.000
Log(Female Non-Production Workers)	36,088	1.538	1.248	0.000	8.189
Female Non-Production Workers %	52,115	0.326	0.314	0.000	1.000
Log(Cap/Empl)	42,460	12.148	3.001	-6.802	26.801
Log(Wage/Empl)	57,486	11.395	2.615	-6.098	23.901
Log(Sales)	59,075	17.058	3.165	0.000	33.846
TFP	35,071	2.757	1.412	-2.846	10.401
Female Owner	61,558	0.322	0.467	0.000	1.000
Female Manager	50,102	0.134	0.341	0.000	1.000
Foreign	64,151	0.080	0.271	0.000	1.000
Exporter	64,531	0.240	0.427	0.000	1.000
Foreign Inputs	57,208	0.550	0.497	0.000	1.000
Foreign Technology	62,154	0.149	0.356	0.000	1.000
ISO	63,257	0.278	0.448	0.000	1.000
Importer	36,885	0.481	0.500	0.000	1.000

Source: Author's calculations based on World Bank Enterprise Surveys data. Note: Table presents raw statistics, without application of sampling weights.

Table 3: Correlation matrix.

	Log(Female Production Workers)	Female Production Workers %	Log(Female Non-Production Workers)	Female Non-Production Workers %	Log(Cap/Empl)	Log(Wage/Empl)	Log(Sales)	TFP	Female Owner	Female Manager	Foreign	Exporter	Foreign Inputs	Foreign Technology	ISO	Importer
Log(Female Production Workers)	1.00															
Female Production Workers %	0.40	1.00														
Log(Female Non-Production Workers)	0.60	0.13	1.00													
Female Non-Production Workers %	0.09	0.33	0.07	1.00												
Log(Cap/Empl)	-0.02	-0.07	0.03	-0.04	1.00											
Log(Wage/Empl)	0.01	-0.01	0.07	0.02	0.77	1.00										
Log(Sales)	0.35	0.01	0.41	0.01	0.68	0.78	1.00									
TFP	0.01	0.03	0.06	0.03	0.02	-0.01	0.14	1.00								
Female Owner	0.02	0.22	0.02	0.21	-0.03	0.00	0.03	0.01	1.00							
Female Manager	-0.02	0.24	-0.05	0.23	-0.01	0.04	-0.02	0.02	0.38	1.00						
Foreign	0.16	0.04	0.18	0.06	0.05	0.07	0.17	0.02	-0.04	-0.02	1.00					
Exporter	0.34	0.10	0.32	0.07	-0.01	0.00	0.21	0.01	0.06	-0.01	0.20	1.00				
Foreign Inputs	0.15	0.07	0.18	0.10	-0.02	0.00	0.12	0.03	0.05	-0.03	0.17	0.28	1.00			
Foreign Technology	0.15	0.03	0.20	0.05	0.01	0.01	0.14	0.04	0.02	-0.01	0.17	0.16	0.14	1.00		
ISO	0.25	-0.03	0.34	-0.01	0.02	0.01	0.25	0.04	0.03	-0.04	0.14	0.30	0.13	0.23	1.00	
Importer	0.25	0.07	0.30	0.09	0.01	0.02	0.21	0.03	0.08	-0.01	0.23	0.38	0.20	0.19	0.21	1.00

Source: Author's calculations, based on World Bank Enterprise Surveys data. Note: Table presents pairwise correlations.

Table 4: Regression results--number of female production workers.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.768***	0.765***	0.741***	0.749***	0.746***	0.745***	0.734***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Cap/Empl)	-0.111***	-0.112***	-0.112***	-0.117***	-0.117***	-0.120***	-0.125***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Wage/Empl)	-0.611***	-0.610***	-0.599***	-0.602***	-0.600***	-0.602***	-0.633***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TFP	-0.606***	-0.606***	-0.595***	-0.599***	-0.595***	-0.596***	-0.611***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Owner	0.057**	0.059**	0.054**	0.059**	0.061**	0.057**	-0.009
	(0.018)	(0.013)	(0.022)	(0.016)	(0.013)	(0.021)	(0.796)
Female Manager	0.054	0.057*	0.057*	0.055	0.054	0.067*	0.069
	(0.121)	(0.095)	(0.096)	(0.129)	(0.133)	(0.065)	(0.156)
Foreign		0.114**	0.071	0.057	0.043	0.045	0.030
		(0.022)	(0.146)	(0.242)	(0.383)	(0.367)	(0.576)
Exporter			0.215***	0.207***	0.204***	0.179***	0.251***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Inputs				0.036	0.034	0.032	-0.665***
				(0.210)	(0.244)	(0.270)	(0.001)
Foreign Technology					0.068**	0.059*	0.006
					(0.033)	(0.070)	(0.880)
ISO						0.083***	0.061
						(0.010)	(0.109)
Importer							0.025
							(0.524)
Constant	-0.911***	-0.851***	-0.674***	-0.715***	-0.696***	-0.620***	0.693*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.053)
N	11456.000	11422.000	11411.000	10696.000	10657.000	10367.000	6095.000
R2	0.347	0.350	0.356	0.364	0.365	0.365	0.341

Note: Dependent variable is log(female production workers) in all cases. Estimation is by OLS. All models have fixed effects by country-sector-year. P-values based on robust standard errors corrected

for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 5: Regression results--female production workers, excluding textiles and garments.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.712***	0.712***	0.693***	0.706***	0.704***	0.701***	0.676***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Cap/Empl)	-0.112***	-0.113***	-0.113***	-0.120***	-0.120***	-0.124***	-0.117***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Wage/Empl)	-0.558***	-0.558***	-0.549***	-0.556***	-0.554***	-0.557***	-0.580***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TFP	-0.556***	-0.556***	-0.548***	-0.552***	-0.548***	-0.547***	-0.543***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Owner	0.058**	0.055*	0.049*	0.053*	0.054*	0.051*	-0.001
	(0.048)	(0.059)	(0.089)	(0.075)	(0.074)	(0.096)	(0.979)
Female Manager	0.021	0.027	0.028	0.016	0.016	0.032	0.048
	(0.640)	(0.543)	(0.523)	(0.726)	(0.733)	(0.509)	(0.464)
Foreign		0.032	-0.007	-0.017	-0.033	-0.032	-0.039
		(0.564)	(0.898)	(0.760)	(0.541)	(0.561)	(0.558)
Exporter			0.182***	0.182***	0.179***	0.154***	0.248***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Inputs				-0.017	-0.020	-0.029	-0.574***
				(0.588)	(0.529)	(0.374)	(0.006)
Foreign Technology					0.047	0.032	-0.026
					(0.216)	(0.419)	(0.614)
ISO						0.111***	0.116**
						(0.003)	(0.013)
Importer							-0.023
							(0.646)
Constant	-0.855***	-0.831***	-0.682***	-0.711***	-0.705***	-0.593**	0.482
	(0.000)	(0.000)	(0.001)	(0.002)	(0.002)	(0.012)	(0.270)
N	8204.000	8175.000	8165.000	7618.000	7594.000	7360.000	4284.000
R2	0.309	0.311	0.314	0.323	0.323	0.325	0.295

Note: Dependent variable is log(female production workers) in all cases. Estimation is by OLS. All models have fixed effects by country-sector-year. P-values based on robust standard errors corrected for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 6: Regression results--female non-production workers.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.623***	0.621***	0.611***	0.620***	0.618***	0.603***	0.622***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Cap/Empl)	-0.064***	-0.064***	-0.064***	-0.066***	-0.067***	-0.068***	-0.068***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Wage/Empl)	-0.392***	-0.392***	-0.388***	-0.392***	-0.391***	-0.384***	-0.369***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TFP	-0.389***	-0.389***	-0.385***	-0.387***	-0.385***	-0.379***	-0.373***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Owner	0.075***	0.078***	0.076***	0.096***	0.098***	0.091***	0.055**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.039)
Female Manager	0.072***	0.071***	0.073***	0.066***	0.068***	0.068***	0.131***
	(0.001)	(0.001)	(0.001)	(0.005)	(0.004)	(0.004)	(0.000)
Foreign		0.055	0.039	0.018	0.011	-0.003	-0.046
		(0.106)	(0.261)	(0.598)	(0.760)	(0.934)	(0.254)
Exporter			0.091***	0.077***	0.075***	0.053*	0.063**
			(0.000)	(0.003)	(0.005)	(0.050)	(0.042)
Foreign Inputs				0.053***	0.049**	0.045**	-0.427**
				(0.009)	(0.014)	(0.028)	(0.012)
Foreign Technology					0.074***	0.065**	0.041
					(0.005)	(0.016)	(0.193)
ISO						0.167***	0.129***
						(0.000)	(0.000)
Importer							0.083***
							(0.003)
Constant	-3.028***	-2.993***	-2.906***	-2.992***	-2.977***	-2.835***	-2.899***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	13120.000	13074.000	13065.000	12324.000	12280.000	11900.000	7371.000
R2	0.352	0.353	0.359	0.374	0.377	0.387	0.380

Note: Dependent variable is log(female non-production workers) in all cases. Estimation is by OLS. All models have fixed effects by country-sector-year. P-values based on robust standard errors corrected for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 7: Regression results--female non-production workers, excluding textiles and garments.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.611***	0.608***	0.600***	0.612***	0.609***	0.594***	0.608***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Cap/Empl)	-0.066***	-0.066***	-0.066***	-0.070***	-0.070***	-0.072***	-0.071***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Wage/Empl)	-0.366***	-0.366***	-0.363***	-0.369***	-0.368***	-0.361***	-0.341***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TFP	0.068***	0.073***	0.071***	0.096***	0.098***	0.093***	0.054*
	(0.004)	(0.002)	(0.003)	(0.000)	(0.000)	(0.000)	(0.069)
Female Owner	0.085***	0.083***	0.085***	0.075***	0.076***	0.074***	0.174***
	(0.001)	(0.002)	(0.001)	(0.008)	(0.006)	(0.009)	(0.000)
Female Manager	-0.393***	-0.391***	-0.389***	-0.392***	-0.389***	-0.384***	-0.376***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign		0.069*	0.055	0.032	0.020	0.005	-0.029
		(0.056)	(0.136)	(0.386)	(0.584)	(0.885)	(0.506)
Exporter			0.076***	0.058**	0.056**	0.033	0.044
			(0.007)	(0.038)	(0.048)	(0.266)	(0.204)
Foreign Inputs				0.057***	0.053***	0.049**	-0.375**
				(0.006)	(0.009)	(0.020)	(0.031)
Foreign Technology					0.081***	0.072**	0.048
					(0.004)	(0.013)	(0.134)
ISO						0.158***	0.123***
						(0.000)	(0.000)
Importer							0.076**
							(0.015)
Constant	-3.065***	-3.024***	-2.951***	-3.041***	-3.023***	-2.881***	-2.999***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	102570	102160	102070	96260	95960	92670	56940
R2	0.331	0.332	0.337	0.354	0.358	0.368	0.358

Note: Dependent variable is log(female non-production workers) in all cases. Estimation is by OLS. All models have fixed effects by country-sector-year. P-values based on robust standard errors corrected for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 8: Regression results--percentage of female production workers.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.104***	0.101***	0.077***	0.076***	0.076***	0.075***	0.052***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)
Log(Cap/Empl)	-0.059***	-0.060***	-0.059***	-0.065***	-0.066***	-0.067***	-0.078***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Wage/Empl)	-0.144***	-0.143***	-0.132***	-0.139***	-0.139***	-0.139***	-0.158***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TFP	-0.151***	-0.150***	-0.139***	-0.152***	-0.151***	-0.149***	-0.142***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Owner	0.159***	0.161***	0.157***	0.174***	0.176***	0.177***	0.115***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Female Manager	0.388***	0.391***	0.389***	0.357***	0.359***	0.371***	0.334***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign		0.095	0.042	0.042	0.040	0.041	0.058
		(0.110)	(0.475)	(0.481)	(0.504)	(0.506)	(0.375)
Exporter			0.240***	0.226***	0.225***	0.208***	0.224***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Inputs				0.079**	0.077**	0.072**	0.293
				(0.023)	(0.025)	(0.043)	(0.333)
Foreign Technology					0.007	0.002	-0.005
					(0.849)	(0.958)	(0.913)
ISO						0.050	0.064
						(0.188)	(0.185)
Importer							-0.002
							(0.967)
Constant	-2.472***	-2.425***	-2.219***	-2.083***	-2.077***	-2.063***	-1.551***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	19461.000	19409.000	19394.000	17589.000	17527.000	17075.000	9606.000
R2	0.514	0.514	0.516	0.520	0.520	0.523	0.580

Note: Dependent variable is Female Production Workers % in all cases. Estimation is by fractional Logit. All models have fixed effects by country-sector-year. P-values based on robust standard errors corrected for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 9: Regression results--percentage of female production workers, excluding textiles and garments.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.100***	0.100***	0.076***	0.079***	0.081***	0.080***	0.064***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Log(Cap/Empl)	-0.066***	-0.067***	-0.067***	-0.075***	-0.076***	-0.077***	-0.078***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Wage/Empl)	-0.131***	-0.131***	-0.121***	-0.133***	-0.133***	-0.132***	-0.151***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TFP	-0.139***	-0.139***	-0.130***	-0.147***	-0.146***	-0.140***	-0.129***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Owner	0.123***	0.120***	0.116***	0.134***	0.137***	0.137***	0.091*
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.054)
Female Manager	0.328***	0.333***	0.335***	0.294***	0.295***	0.311***	0.312***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign		0.026	-0.032	-0.033	-0.031	-0.034	-0.005
		(0.687)	(0.606)	(0.602)	(0.621)	(0.597)	(0.944)
Exporter			0.251***	0.256***	0.256***	0.243***	0.238***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Inputs				0.063	0.064	0.056	0.415
				(0.114)	(0.112)	(0.175)	(0.212)
Foreign Technology					-0.044	-0.055	-0.071
					(0.325)	(0.231)	(0.204)
ISO						0.060	0.072
						(0.184)	(0.218)
Importer							0.010
							(0.862)
Constant	-2.495***	-2.480***	-2.271***	-2.092***	-2.109***	-2.114***	-1.975***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	15516.000	15469.000	15455.000	13898.000	13851.000	13463.000	7513.000
R2	0.393	0.393	0.395	0.401	0.401	0.403	0.444

Note: Dependent variable is Female Production Workers % in all cases. Estimation is by fractional Logit. All models have fixed effects by country-sector-year. P-values based on robust standard errors

corrected for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 10: Regression results--percentage of female non-production workers.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.046***	0.047***	0.041***	0.041***	0.039***	0.038***	0.003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)	(0.833)
Log(Cap/Empl)	-0.007	-0.007	-0.007	-0.010	-0.010	-0.011	-0.016
	(0.357)	(0.315)	(0.306)	(0.166)	(0.153)	(0.149)	(0.108)
Log(Wage/Empl)	-0.027*	-0.027*	-0.025*	-0.031**	-0.031**	-0.031**	-0.009
	(0.077)	(0.072)	(0.095)	(0.041)	(0.041)	(0.044)	(0.619)
TFP	0.003	0.003	0.006	-0.001	0.000	-0.002	0.020
	(0.866)	(0.860)	(0.734)	(0.952)	(0.983)	(0.910)	(0.337)
Female Owner	0.148***	0.148***	0.147***	0.170***	0.172***	0.171***	0.155***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Manager	0.547***	0.550***	0.552***	0.520***	0.520***	0.525***	0.443***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign		-0.006	-0.021	-0.018	-0.025	-0.026	-0.022
		(0.881)	(0.597)	(0.650)	(0.532)	(0.515)	(0.617)
Exporter			0.061**	0.051*	0.050*	0.049	0.101***
			(0.049)	(0.088)	(0.097)	(0.110)	(0.008)
Foreign Inputs				0.009	0.004	0.000	0.478
				(0.740)	(0.884)	(0.992)	(0.307)
Foreign Technology					0.072**	0.075**	0.003
					(0.029)	(0.027)	(0.935)
ISO						0.022	-0.018
						(0.423)	(0.610)
Importer							0.006
							(0.873)
Constant	-3.451***	-3.454***	-3.386***	-3.285***	-3.258***	-3.226***	-0.401
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.444)
N	18683.000	18633.000	18620.000	16876.000	16817.000	16375.000	9370.000
R2	0.381	0.381	0.381	0.391	0.392	0.395	0.450

Note: Dependent variable is Female Non-Production Workers % in all cases. Estimation is by fractional Logit. All models have fixed effects by country-sector-year. P-values based on robust standard errors corrected for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

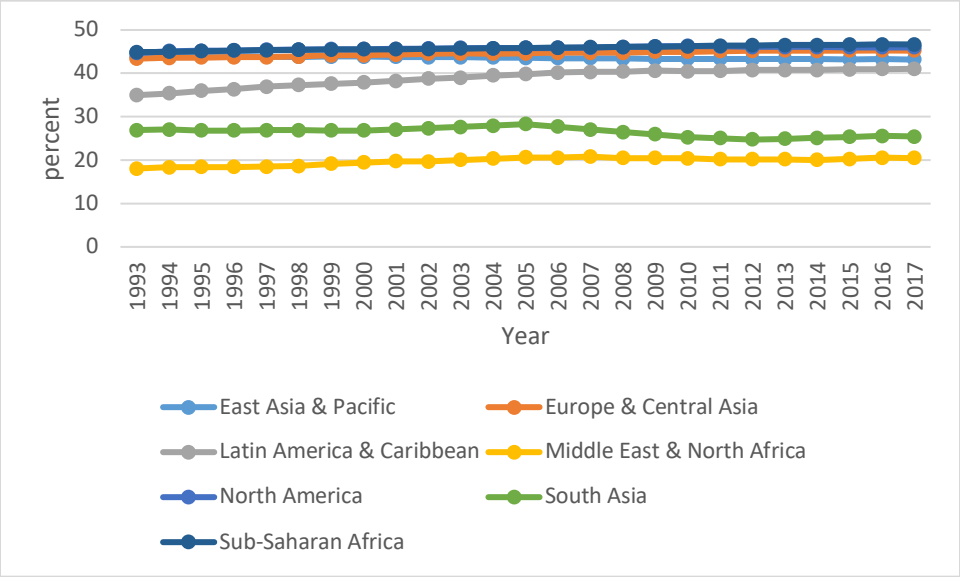
Table 11: Regression results--percentage of female non-production workers, excluding textiles and garments.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	0.024**	0.026**	0.023*	0.019	0.016	0.018	-0.020
	(0.047)	(0.040)	(0.088)	(0.156)	(0.228)	(0.208)	(0.247)
Log(Cap/Empl)	-0.006	-0.007	-0.007	-0.007	-0.008	-0.009	-0.014
	(0.419)	(0.395)	(0.373)	(0.350)	(0.320)	(0.269)	(0.231)
Log(Wage/Empl)	0.002	0.001	0.001	-0.006	-0.006	-0.008	0.022
	(0.921)	(0.950)	(0.940)	(0.736)	(0.736)	(0.642)	(0.282)
TFP	0.012	0.012	0.013	0.006	0.008	0.005	0.031
	(0.544)	(0.544)	(0.513)	(0.761)	(0.684)	(0.813)	(0.187)
Female Owner	0.138***	0.138***	0.137***	0.156***	0.160***	0.160***	0.146***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Manager	0.556***	0.559***	0.562***	0.520***	0.516***	0.519***	0.453***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign		-0.020	-0.030	-0.033	-0.045	-0.041	-0.023
		(0.630)	(0.468)	(0.434)	(0.288)	(0.344)	(0.636)
Exporter			0.033	0.036	0.035	0.037	0.067
			(0.319)	(0.293)	(0.300)	(0.282)	(0.121)
Foreign Inputs				0.033	0.028	0.024	0.559
				(0.289)	(0.381)	(0.467)	(0.280)
Foreign Technology					0.093**	0.093**	0.010
					(0.018)	(0.021)	(0.804)
ISO						-0.002	-0.050
						(0.948)	(0.182)
Importer							0.014
							(0.734)
Constant	-3.426***	-3.437***	-3.394***	-3.259***	-3.223***	-3.200***	-0.436
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.458)
N	14949.000	14904.000	14891.000	13381.000	13336.000	12955.000	7339.000
R2	0.379	0.379	0.380	0.389	0.390	0.393	0.444

Note: Dependent variable is Female Non-Production Workers % in all cases. Estimation is by fractional Logit. All models have fixed effects by country-sector-year. P-values based on robust standard errors corrected for clustering by country-sector-year are reported in parentheses below the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

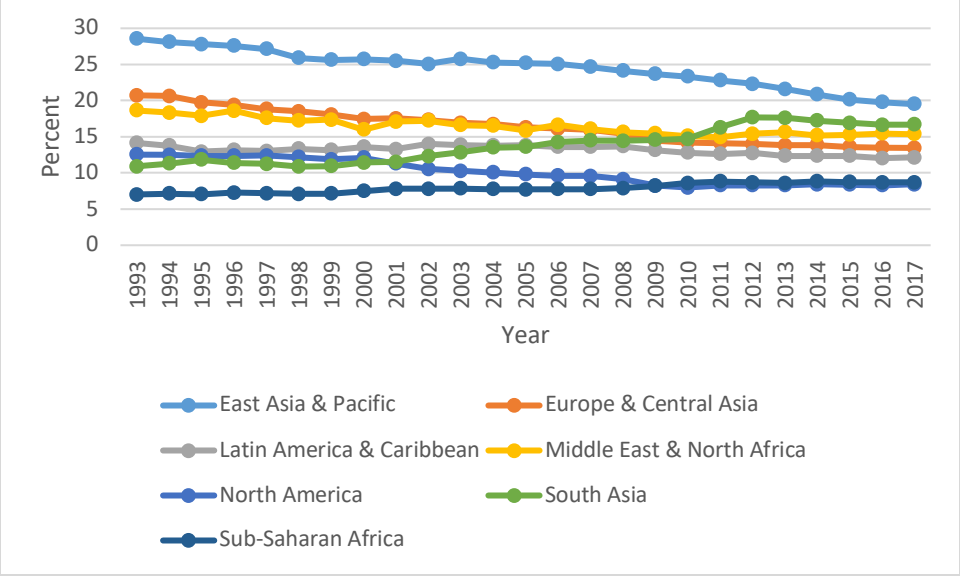
FIGURES

Figure 1: Women as a percent of the total labor force, 1993-2017, by World Bank region.



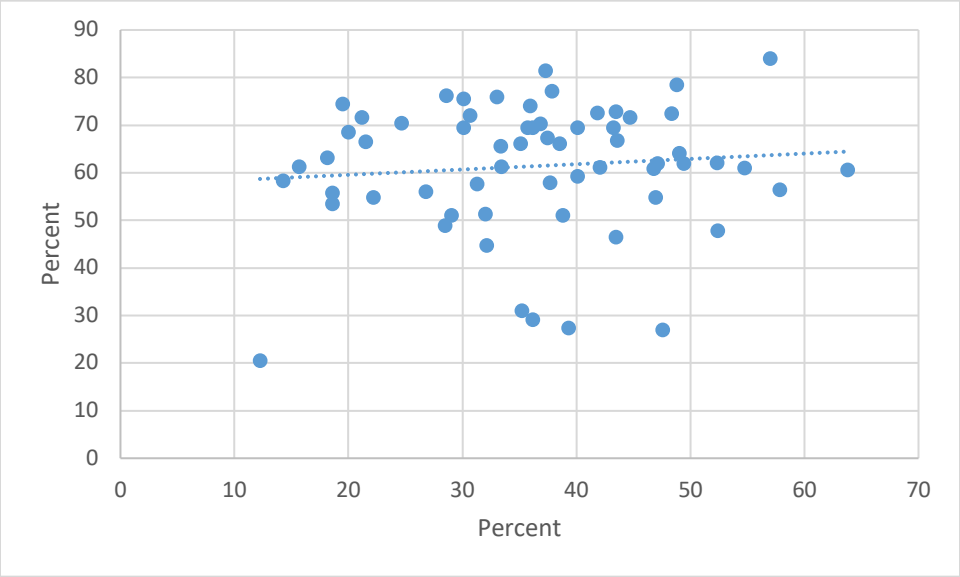
Source: World Development Indicators.

Figure 2: Employment in industry as a percentage of total female employment, 1993-2017, by World Bank region.



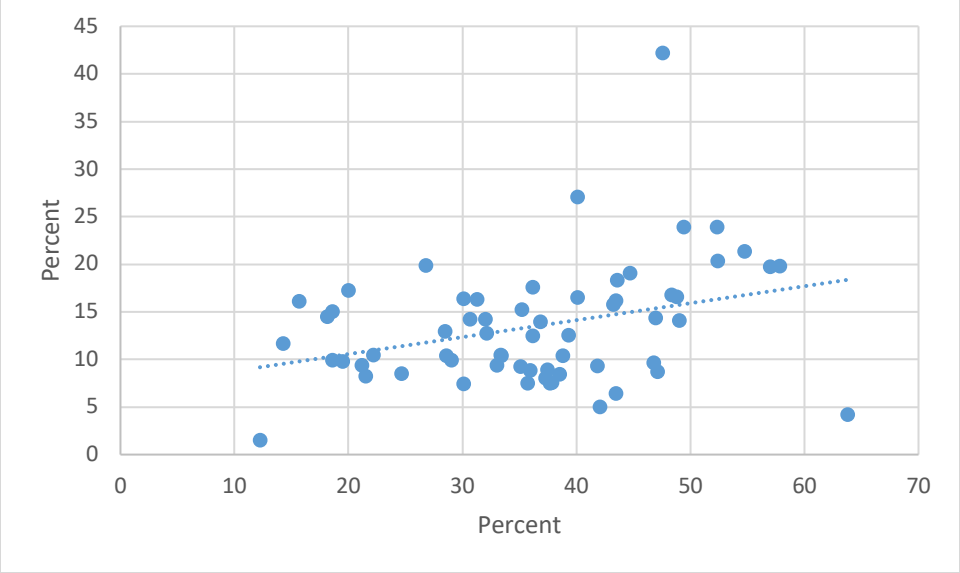
Source: World Development Indicators.

Figure 3: Percentage of foreign value added in gross exports (manufacturing only) vs. female labor force participation rate, 2011.



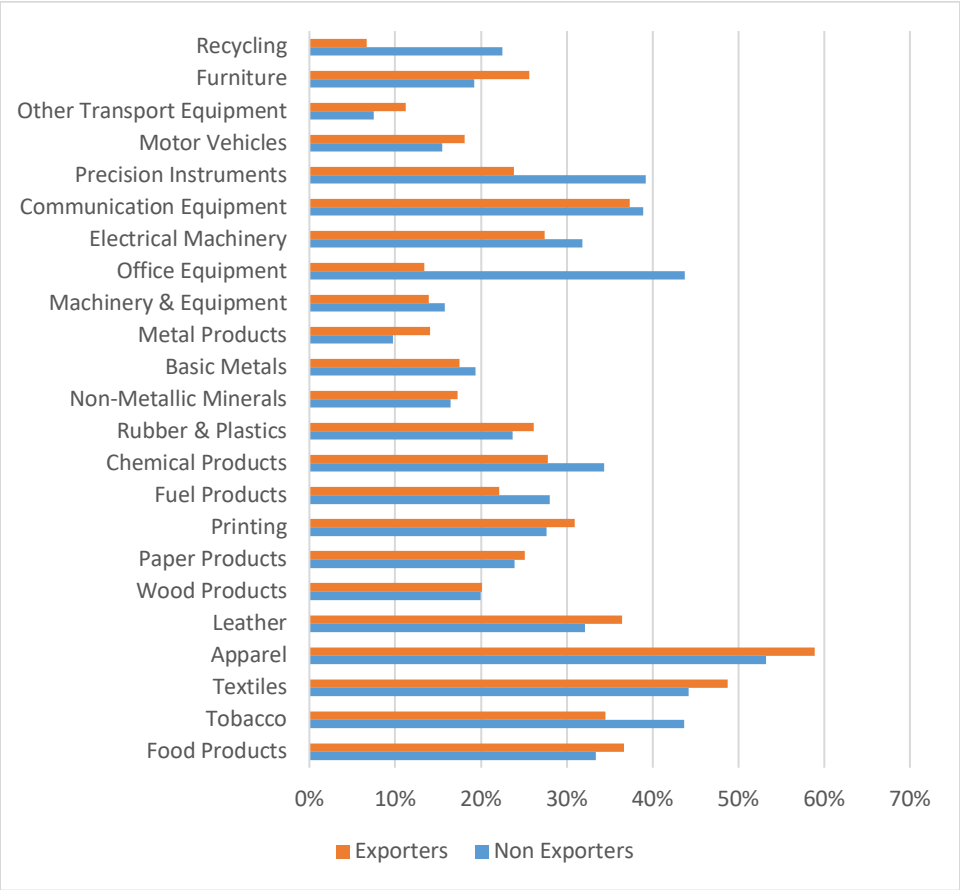
Source: OECD-WTO TiVA database; and World Development Indicators.

Figure 4: Percentage of foreign value added in gross exports (manufacturing only) vs. women's employment in industry as a percentage of total female employment, 2011.



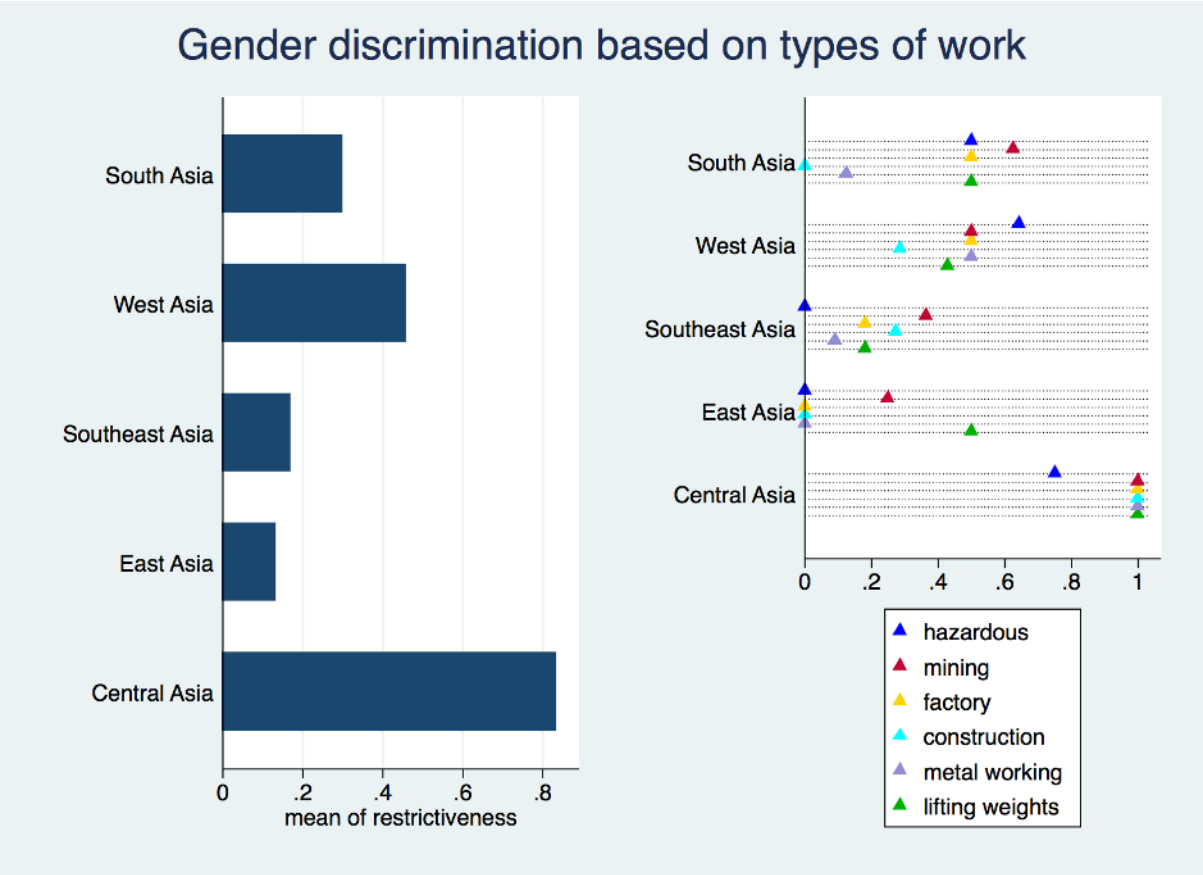
Source: OECD-WTO TiVA database; and World Development Indicators.

Figure 5: Percentage of production workers who are female, by sector and export status.



Source: Author's calculations, based on World Bank Enterprise Surveys data.

Figure 6: Gender discrimination in Asian labor markets.



Source: Lan and Shepherd (Forthcoming).