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Gender, Structural Transformation, and Deindustrialization

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Abstract: This paper uses country-level and firm-level data to examine the trend of women's participation in the labor market as economies undergo a sectoral shift characterized by the expansion of services relative to other sectors, by comparing manufacturing and services from a gender perspective. Particular attention is devoted to economies in Asia. Empirical analysis is conducted to investigate whether the role of women in managerial positions and ownership, as well as in employment, in manufacturing is different from that in services. The overall purpose of this paper is to provide evidence on the possible implications of structural transformation for women in the labor market.

JEL Codes: J1; L8.

Keywords: Services; Trade; Gender.

[1] The views expressed in this paper are those of the authors only and do not necessarily reflect the views or policies of any organization.

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1 INTRODUCTION

Manufacturing has traditionally privileged men over women both in terms of employment and in terms of promotion to managerial roles. The reasons are largely related to social constructs regarding women's ability to undertake physical work, although history in many economies—the United States during World War II, the former Soviet-bloc countries—shows that in times of unusually tight labor markets, women have performed in every way equally to men in that sector when given the opportunity. However, discrimination, both in law and in fact, persists in many countries. As a result, there is considerable potential for the services sector to bring about a valuable contribution to gender equality relative to manufacturing, as discrimination against women has historically been weaker, although still present, in services.

Women's employment plays a vital role in poverty reduction as it increases household income and saving, raises the economic status of women, and drives higher education. Women tend to invest more in the education and health of children than men do. They also tend to employ more women, reinforcing this virtuous cycle and promoting a higher female labor participation rate. According to McKinsey, tapping into the economic potential of women entrepreneurs can add up to $28 trillion to the world's GDP by 2025 (McKinsey, 2015).

As economies grow, consumers tend to shift their spending towards services. At higher incomes, spending on services related to human capital, such as education and healthcare, increases markedly. Historically, most countries have developed through a period of decreasing importance of agriculture relative to total output, with major increases in manufacturing and a slower rate of increase in services. At some point, manufacturing output relative to the size of the economy peaks, and the economy shifts to be predominantly services-based. In more recent times, economies appear to have been shifting relatively earlier into services. As such, the potential for services to be a positive force in terms of gender equity needs to be considered at earlier stages in the development process.

This paper attempts to cast some light on the impact of structural transformation on the gender aspect of employment, focusing particularly on Asia. While social norms ascribing gender roles in some economies still contribute to socio-economic disadvantages for women and limit their involvement in certain industries, the shift towards services may provide a promising channel for unlocking women's potential and driving their engagement in the workforce, as well as in management and entrepreneurship.

Previous studies suggest that occupations in services have traditionally been perceived as more respectable for women as they involve cleaner working conditions and shorter working hours than manufacturing (Goldin, 2006). The reallocations of labor from brawn-intensive (physical skills) manufacturing to brain-intensive (intellectual abilities) services have been associated to the rise in female labor participation (Rendall, 2010).

Against this background, the purpose of this paper is to provide insights into some of these questions by comparing female engagement in manufacturing and in services, in order to better understand whether structural transformation can provide a channel to narrow the gender gap and alleviate discrimination against women. The paper further investigates the gender aspect of structural transformation by examining the variation within sectors as the expanded role of women in the labor market is sometimes not matched with higher quality of employment. In the past, women's opportunities were concentrated in light manufacturing sectors and unskilled jobs in manufacturing which were thought to require less physical strength. Although technological advancement is associated with greater automation of manual work in physically demanding sectors, women are

believed to still have a comparative advantage in the services sectors which use interpersonal skills more than in manufacturing as services are often produced and consumed simultaneously. Women also traditionally worked disproportionately in home production as the labor market did not provide enough social benefits for working women (e.g. subsidized child care) to incentivize them to enter the labor market (Buera, Kaboski, & Zhao, 2013).

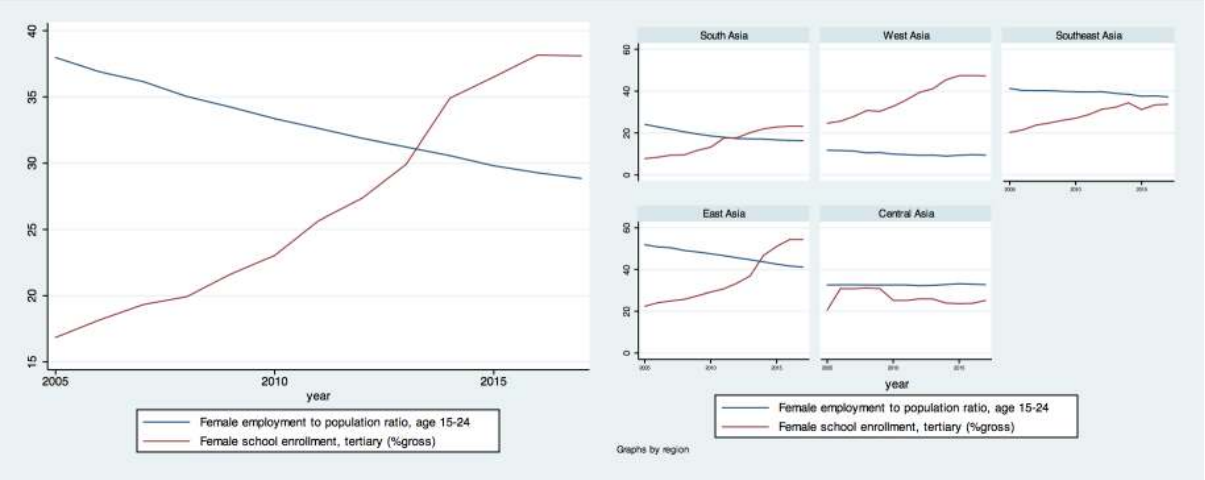
Structural transformation could bring about a rise in sector in which women have comparative advantage, which in turn could have important implications for women's economic opportunities and their involvement in the labor and entrepreneurship markets. This structural shift may pose a question as to whether women are better represented in the services sector. This paper tries to bring some perspectives onto some of these questions by comparing various aspects of gender disparity in manufacturing and services to better understand the implications of services sector growth from a gender point of view.

2 COUNTRY-LEVEL DATA ANALYSIS

As countries develop and shift to be more services oriented, the change potentially generates more employment opportunities for women, on the assumption that services sectors are less closed to women than manufacturing, and more resources are invested in education including female education. In Asia, the average share of female youth in the population (between 15 to 24 years old) attending tertiary school is increasing over time (see Figure 1).

Despite the growing momentum around female education in Asia, the proportion of young women going on to tertiary study and the rate of increase over time varies across all five Asian regions. For instance, South Asia registered the lowest share of women attaining higher education to begin with and a rate of increase that is fairly low compared to other regions. This may reflect differences in cultural norms, quality of education and gender-related policies. A reduction in female youth employment overtime can be interpreted as a positive sign if it is correlated to the rising share of female youth attending tertiary school, as is in fact the case in Figure 1. It indicates that more women in that age category are attaining higher education than working over the past decades. It is vital to ensure equal access to educational and skill development for women as a way to maximize the employability of women and generate greater accumulation of skills needed for inclusive growth in today's economy. Despite similar patterns of female tertiary education in East and West Asia, female youth employment in West Asia settles at a rate much lower than that in East Asia which shows that women's educational progress cannot translate into economic benefits without overcoming a complex set of social and legal barriers. Female educational attainment complemented with the right set of policies leads to greater female participation in the labor market and increased productivity. As service sectors tend to be more skill-intensive than manufacturing and employ more women, gender equality in educational attainment is needed to enhance services competitiveness and better adapt to changing economic realities.

Figure 1. Female employment to population ratio and tertiary enrollment rate in Asia

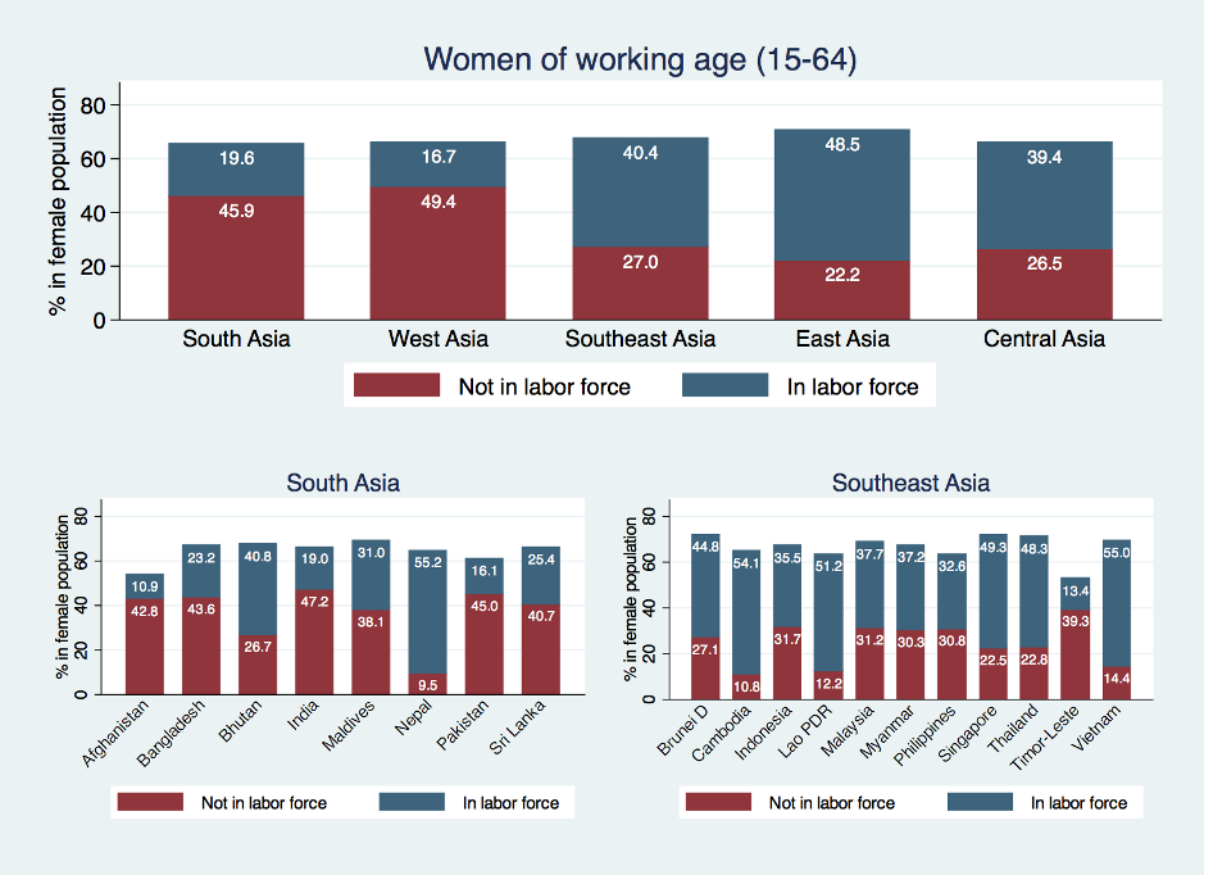


Source: Author's illustration based on the World Development Indicators, World Bank

Even though 60 to 70% of the female population in Asia is of working age, the female labor force participation rate remains low in some regions, particularly in South and West Asia. This indicates underrepresentation and untapped potential of women in the workforce. The proportion of women engaging in the labor market varies greatly across regions, hovering around 19.6% in South Asia and 40.4% in Southeast Asia, for example. Within each region, the variations in female labor force participation across economies are also apparent. Despite the low share of females active in the workforce in South Asia, Nepal employs a large proportion of working-age women. The gender disparity in South Asia is not equally distributed with a higher gap in economies like Afghanistan or Pakistan and a lower gap in Nepal (WEF, 2016).

Nevertheless, a high female labor force participation rate does not necessarily imply gender equality as the quality of employment continues to be unevenly distributed between males and females. Cambodia, for instance, employs the largest share of women workers in Southeast Asia accounting for 54.1% of the female population, but they are largely concentrated in the garment or informal sector. This picture overall shows that there is untapped potential for women's employment in Asia in general

Figure 2. Share of working age individuals in female population in Asia, 2017



Source: Author's illustration based on the World Development Indicators, World Bank

Services have the potential to provide opportunities for women as they are heading into services sector jobs at a rate faster than they do into manufacturing. Structural transformation enlarges the sector in which women have comparative advantage and marketization of services drives the rise of female work (Ngai & Petrongolo, 2017). The share of people employed in the services sector has risen over the past decades globally as well as in Asia, as this is a natural part of structural transformation. As countries develop, they produce and consume more services while technological advancement contributes to labor savings especially in manufacturing. Expansion in services is often accompanied by the shrinking of agriculture sector. While this tends to be the general case, there are observable differences in the shifts of sector allocation between female and male employment in Asia (see Figure 3).

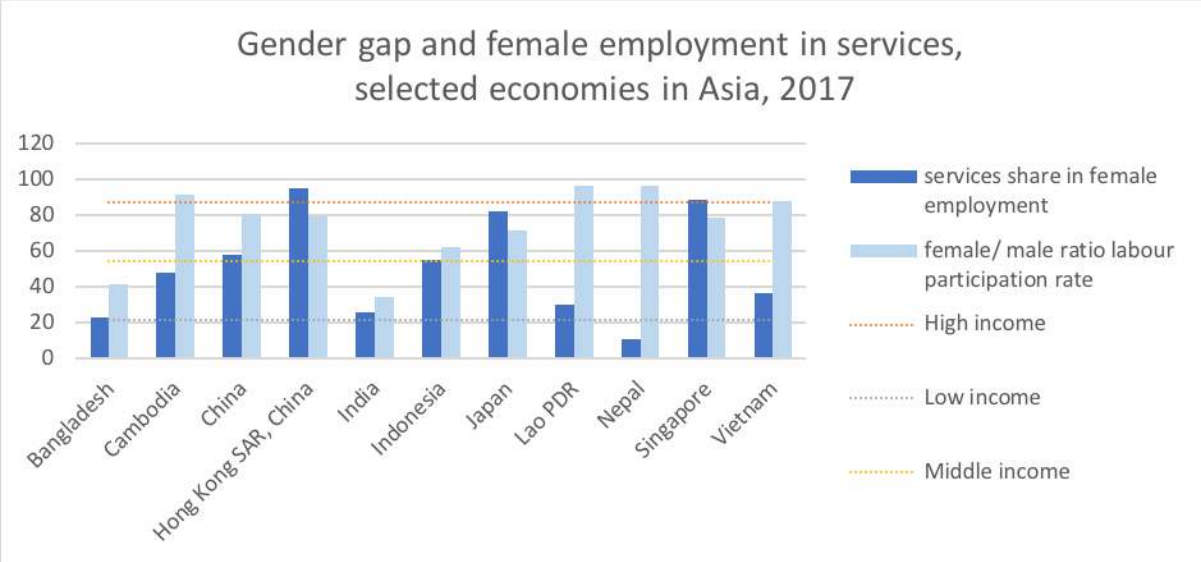
Figure 3. Female and male employment in Asia, 2003 - 2017

Source: Author's calculation based on the World Development Indicators, World Bank.

The distribution of female employment in the three major sectors has continuously shifted away from agriculture and industry and towards services in all regions in Asia. The share of services in female

employment is generally larger than that in male employment with the exception of South Asia where agriculture remains the main source of female employment. The difference in the shifts between female and male employment is particularly apparent in the Southeast Asia and East Asia where services absorb women at a faster rate than men. In Southeast Asia, the contribution of services to female and male employment rose by 15 and 9 percentage points from 2003 to 2017 respectively. Similarly, services share of employment in East Asia rose by 28 percentage points for female 17 percentage points for male. While the agriculture share in employment for both males and females has declined steadily over time, the industry share in employment seems to have slightly risen for males and dropped for females in East Asia. For women, structural change is driven to an important extent by services: female employment in Southeast, East, and Central Asia has changed from being predominantly in agriculture in 2003 to services. A similar pattern is observed for male employment in the region, although the shift towards services seems to move at a slower pace. The relatively quick absorption of women into the services sector can be explained by increasing relative importance of services, the comparative advantage women have in services or inadequate demand for female labor in industry. Existing literature shows that in some cases the growth in services mirrors the growth of female labor in services (Ngai & Petrongolo, 2017). This expansion of services does not necessarily imply the disappearance of manufacturing given the interdependence of the two. It may simply depict the increasing role services plays in other sectors as the production of goods require numerous services inputs. The services share in employment has generally grown faster among females than males in Asia.

Figure 4. Gender gap and female employment in selected economies



Source: Author's calculation based on the World Development Indicators, World Bank

The share of services in female employment varies among Asian economies, with developed economies typically having higher share than developing economies. Hong Kong China, Japan and Singapore are some economies in the region which score a percentage share close to that of the global high income average, hovering around 87%. A number of economies including China and Indonesia attain a percentage share which is fairly close to the average in East Asia Pacific of 58% and comparable to the global middle income average of 54%. Economies in South Asia including India and Nepal have lower services shares in female employment of 26% and 11% respectively since

women are predominantly concentrated in agriculture which accounts for 83% and 56% of female employment in Nepal and India respectively.

While some variations in gender equality in Asia can partly be explained by the expansion of services and different stages of development, this is not always the case. In some developing economies, the majority of women are still employed in the agriculture sector. In other cases, labor intensive light manufacturing such as garments and textiles remain the major employers for women in economies that have comparative advantage in that sector. Large representation of women in agriculture is particularly prominent in South Asia, while the female concentration in light manufacturing is more prominent in East and Southeast Asia (ILO, World Employment and Social Outlook: Trends for women 2017, 2017). Furthermore, there is occupational segregation reflecting gender stereotypes which results in women represented in a less diversified range of occupations than men, typically ones that are informal, poorly remunerated or temporary. Women also work longer than men on average when taking paid and unpaid work into account (Chaudhary & Verick, 2014).

The graph above reveals that a narrower gender gap in the workforce in general does not necessarily mean gender equality and it may not necessarily be attributed to the growth of services sector. In Singapore and Hong Kong, China, for instance, the high female to male labor participation ratio is accompanied by a higher share of female employment in services. While female engagement in services does not always translate into female representation in leadership or senior roles where persistent gender segregation exists, the opportunities of women to attain higher roles are more promising in services than in manufacturing. In Hong Kong, China, the proportion of women occupying managerial roles in 2014 is a quarter of that of men in manufacturing compared to a third in financing, insurance, real estate, professional and business services (Women's Commission, 2015).

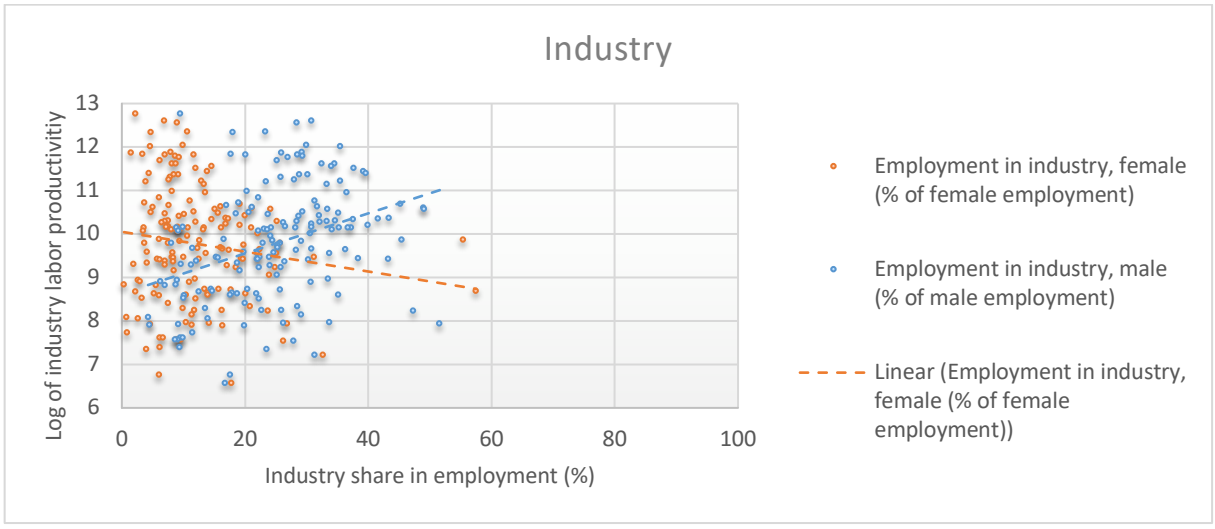
Women may seem to be roughly on par with men in some labor market in terms of their share of employment, but this is not equivalent to gender equality. In some economies such as Lao PDR or Nepal a large share of female employment is concentrated in non-services sectors despite achieving a high female/ male labor participation ratio. In Nepal for instance, agriculture still accounts for the lion's share of 83% of total female employment compared to 60% for male employment. Further, when women work in the informal economy, they are prevented from accessing decent paid work, therefore, it does not translate into economic gains. The segment of women occupied in other sectors is largely clustered in low-skilled jobs and is negligible in high-skilled jobs such as technicians which are still male-dominated (Acharya, 2014). Research on 142 countries shows that women are over-represented in clerical, service and sales workers and elementary occupations. In developed economies, however, women are more represented in higher paid occupations (ILO, 2016).

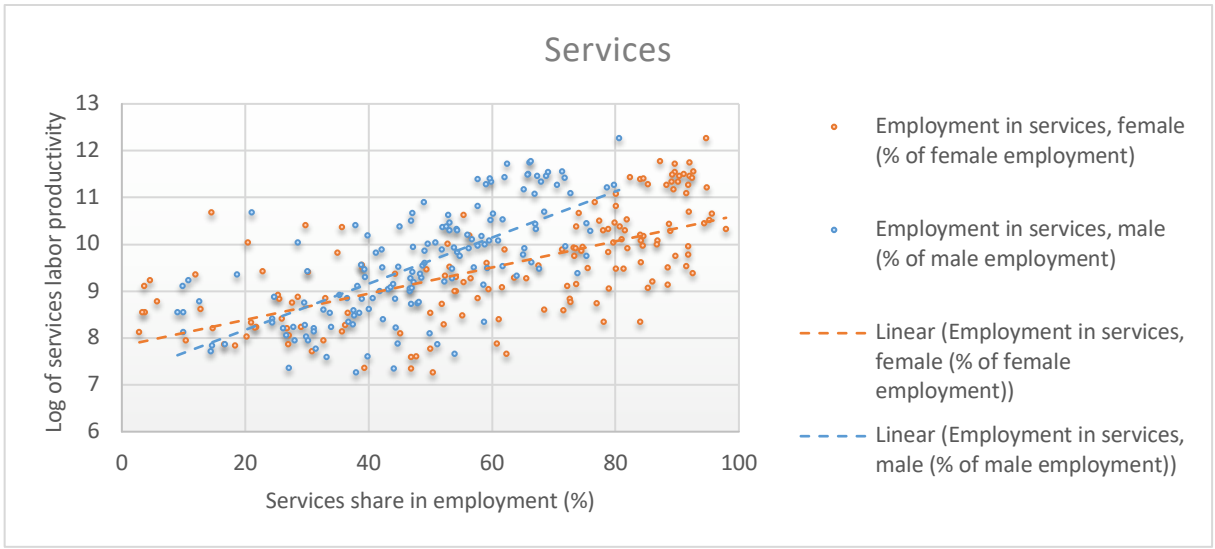
In the case of Nepal, the share of male employment in services is three times higher than for females. With limited absorption capacity in the services sector especially for females in Nepal, a large majority of the female working population is still involved in low productivity agricultural activities which contributed only to 33% of GDP in 2016 compared to 52% for services. In India, the gender disparity in the labor force is high and female employment in services is low. According to research, the gender differentiated wage gap is much lower in services than it is in manufacturing with men earning 5% more than women in services but double the earnings of women in manufacturing (Epod, 2016). This last point is important, as it highlights that the services sector is potentially more accommodating to women than manufacturing.

There is untapped potential for women to enter into services market where the severity of gender discrimination seems to be lower. To attain sustainable growth, a structural transformation from low to higher levels of female productivity is needed.

Figure 5 shows that an increase in the manufacturing share in male employment is correlated with higher labor productivity while a share increase in female employment is correlated with lower labor productivity (value added per worker). Contrary to manufacturing, an increase in the services share in employment is correlated with higher labor productivity for both females and males. However, the impact is slightly more prominent for males than females, indicating the need to invest in education and skills to help women to move into higher productivity sectors in services.

Figure 5. Share in employment and labor productivity, by sector and gender, 2016





Source: Author's calculation based on the World Development Indicators, World Bank

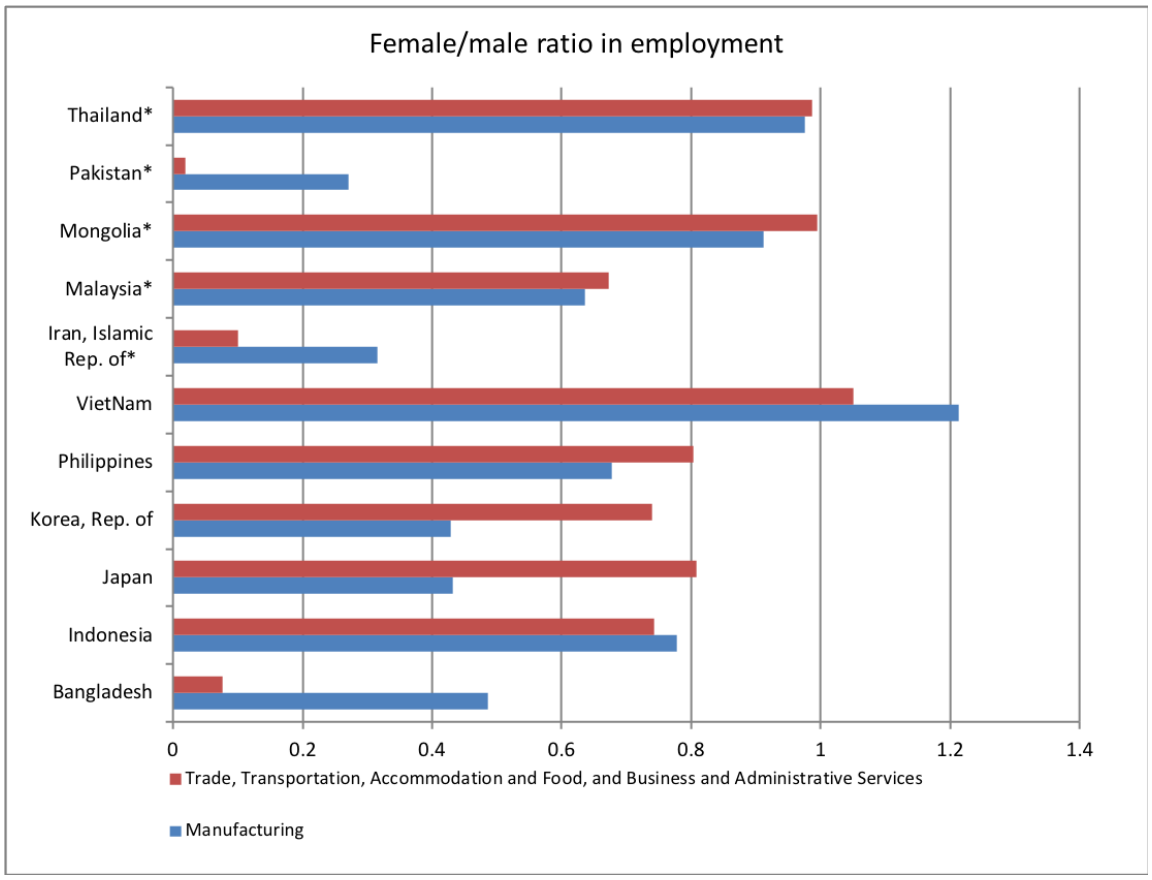
Although correlation does not imply causation, these figures portray the real opportunities services offer for women's economic transformation compared to manufacturing. In other words, gender-based discrimination seems to be less apparent in services than it is in manufacturing. The graph, however, captures the picture at an aggregated level and does not reveal the occupational segregation. Encouraging female employment in services can bring about positive repercussions to labor productivity as a whole. Achieving meaningful economic transformation may require facilitating the

movement of female labor not only between sectors (transitioning from non-services to services sectors), but also within sectors (from low productivity to high productivity occupations).

While deindustrialization provides new economic opportunities for women, there are also risks of increased poverty to women who are left behind by the restructuring. As countries develop, the relative demand for higher skilled labor is likely to increase, and opportunities for those lacking the required skills are likely to become relatively less abundant (Shepherd & Stone, 2017). This poses a risk especially in economies where women tend to enter the labor market with a relatively lower level of education than men. Policy formulations that incorporate gender considerations to help women achieve higher skills will raise the possibilities for women to secure emerging high-skilled and better-paid jobs as countries develop. These policies therefore play an important role in achieving inclusive growth and equitable outcome.

The services sector exhibits better gender balance than manufacturing for many economies in Asia (Figure 6). It may be counterintuitive at first to observe larger differences between manufacturing and services in developed economies such as Japan and smaller differences in developing economies such as Vietnam and Thailand. This can be explained by the fact that the female to male ratio in employment in services exceeds that in manufacturing in most cases except in economies which still rely on agriculture or manufacturing sectors. For instance, the textile and apparel industry in Vietnam is an imperative high growth labor intensive industry that employs largely low skilled workers and mostly women that have few employment alternatives. Similarly, the expansion of employment arising from the garment industry in Bangladesh plays an important role in providing opportunities for women, resulting in a much higher gender ratio in manufacturing than services.

Figure 6. Gender employment ratio in selected economies in Asia, by sector, 2017



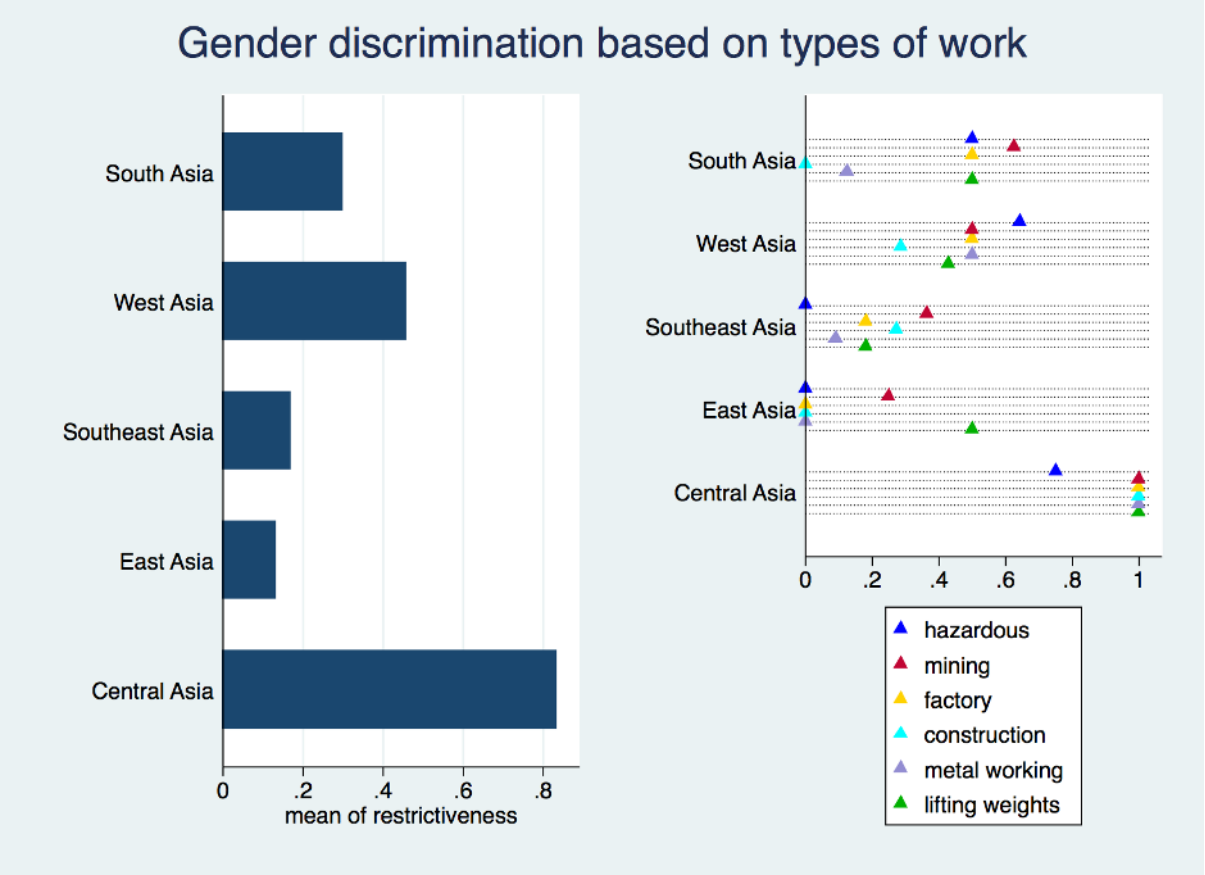
Source: Author's calculation based on the World Development Indicators, World Bank

*2016 data is used because 2017 data is unavailable

Women often do not have the same footing as men due to gender-based legal impediments which continue to exist and perpetuate the gender gap in many economies in Asia. These impediments effectively crystallize and legalize historical discrimination, and drive gender gaps that tend to undermine GDP growth (Gonzales, Jain-Chandra, Kochhar, & Newiak, 2015). Legal restrictions may affect the kinds of work women can perform, the sectors they are allowed to work in, and the conditions under which they can work. The figure shows that gender restrictions based on the types of work are prevalent in Central Asia. The pervasive gender disparity in employment revolves around a range of issues from perception to legal restrictions, which vary across regions. World Bank study reveals that labor market laws not only encourage women to enter the formal labor force, but also increase their earning potential (World Bank, 2018).

Women typically face gender-based restrictions in the types of work or working conditions which are more prevalent in manufacturing than services (see Figure 7). Gender biases may exist in certain services sectors, such as construction, owing to the nature of work similar to that found in heavy industries.

Figure 7. Women, Business and the Law indicators, Asia



Source: Author's calculation based on Women, Business and the Law Data, World Bank

Note: the graph on the left averages out the restrictiveness across 15 variables related to gender-based discrimination in different types of work

Figure 7 reveals that gender-based legal restrictions vary across all five regions in Asia. For instance, gender inequality or restrictions in jobs deemed hazardous is rated at 0% in East and Southeast Asia compared to 50% in South Asia. Socially constructed beliefs that women need protection from high-risk work, especially in South Asia, can partly explain the low female engagement in heavy industries. A large share of economies in South and West Asia deem women to be unable to work in the same industries as men when in fact research found that eliminating barriers preventing women from working in certain sectors or occupations can increase labor productivity by as much as 25% in some economies (World Bank, 2011). The notion that men are stronger than women and therefore better suited to certain jobs is deeply entrenched in some societies, which may partly explain the restrictions women face in manufacturing or certain services sectors which are deemed physically more demanding, such as construction. While women face fairly low restrictions in East Asia, gender-based discriminations still exist in occupations which involve mining or lifting weights. In contrast, women in Central Asia face legal impediments in most types of work perceived as more suitable for men. Such restrictions limits women's possibilities of employments in sectors that are available for men and exacerbate gender segregation in labor markets. Implicit on restrictions on working hours is perhaps the belief that women need to undertake (unpaid) domestic labor during evening and night hours, such as meal preparation and childcare. Restrictions like this legalize historical patterns of

discrimination against women, with corresponding negative economic impacts. Biased gender perceptions along with legal gender differences tend to cluster women in certain sectors. Services, complemented with proper policies and sectoral development strategies, can contribute to gender equity by providing equal opportunity for women and raising their economic independence. Policies enabling a level playing field between women and men should be central to the nexus of deindustrialization and gender employment trends.

3 FIRM LEVEL DATA ANALYSIS

The World Bank Enterprise Survey compiles firm level data covering more than 130,000 firms in a large range of economies across the different regions in different years. The survey covers a cross-section of firms for a single year of data in a particular country. While some countries are surveyed more than once, they may not be the same set of firms. The surveys employ stratified random sampling in which all population units are grouped within homogeneous groups and simple random samples are selected within each group.

The dataset contains gender specific information on the firms including indicators of whether or not the senior manager is female, whether or not there is a female owner, and the number of female employees. Other relevant gender variables may or may not be used depending on the number of observations available. It also contains other information on output, employment, wages, among others. Data points which are deemed unreliable by the surveyor are dropped. Data points for manufacturing are found to be more complete than they are in services. Therefore, variables that do not capture enough observations for services are omitted from this analysis. Estimates of TFP produced by the World Bank based on sales are used to capture data from manufacturing and services firms; the reason for this is that measurement of value added is problematic for services firms. Data is transformed into common currency and deflated to 2009 using the GDP deflator for United States from the relevant fiscal year. Similarly, data on female production and non-production workers are only available for firms that answered the manufacturing survey, so we cannot investigate this from a services perspective. Table 1 gives a list of variables we use and their definitions

Table 1. Variable definitions

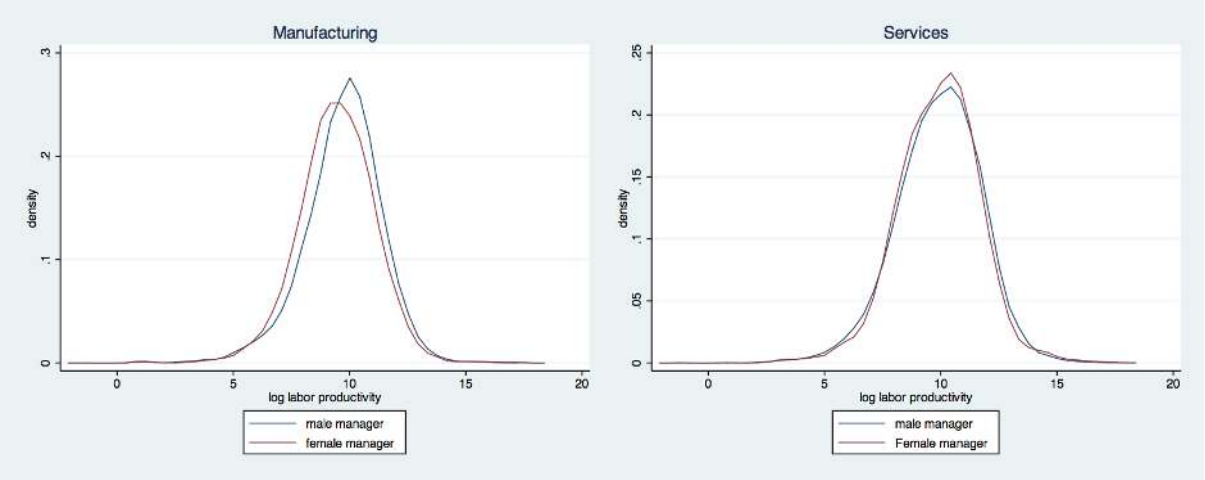
Variable	Definition
Female manager	Dummy variable equals to 1 for firms that have a female top manager
Female owner	Dummy variable equals to 1 for firms that have at least 1 female owner
% Female ownership	Share of female ownership in a firm
Log(female employees)	Logarithm of the number of female employees
Log(employees)	Logarithm of the number of total full-time employees
Log(sales)	Logarithm of total sales for the last fiscal year, deflated to USD 2009
Log(labor productivity)	Logarithm of output per worker, deflated to USD 2009
Log(capital per worker)	Logarithm of estimated capital per worker calculated using perpetual inventory method and investment in the last fiscal year (in USD 2009)
Log (wage per worker)	Logarithm of wage per worker, deflated to USD 2009
Firm's age	Number of years elapsed since the year the firm was established
Level of education	Share of workers who completed high school
% skilled production workers	Share of skilled workers among total production workers

3.1 Preliminary analysis

This section analyzes the gender aspect of firms in manufacturing compared to services. Preliminary analysis is conducted using descriptive statistics without implying any causal relationship. The associations between female variables and other characteristics of the firm can be examined using graphical methods. The descriptive statistics part of the analysis is simply aimed at shedding light simply on observed differences and correlations.

The kernel density chart below examines whether female-managed firms tend to have higher labor productivity and if there is any difference between manufacturing and services in this regard. Female managed firms are compared with non-female managed firms in the case of manufacturing as well as services. The density for female-managed firms is slightly shifted to the right compared to non-female-managed firms in the case of services. This shows preliminary evidence that female managed firms tend to have higher labor productivity than non-female managed firms in services.

Figure 8. Kernel density of labor productivity, by sector

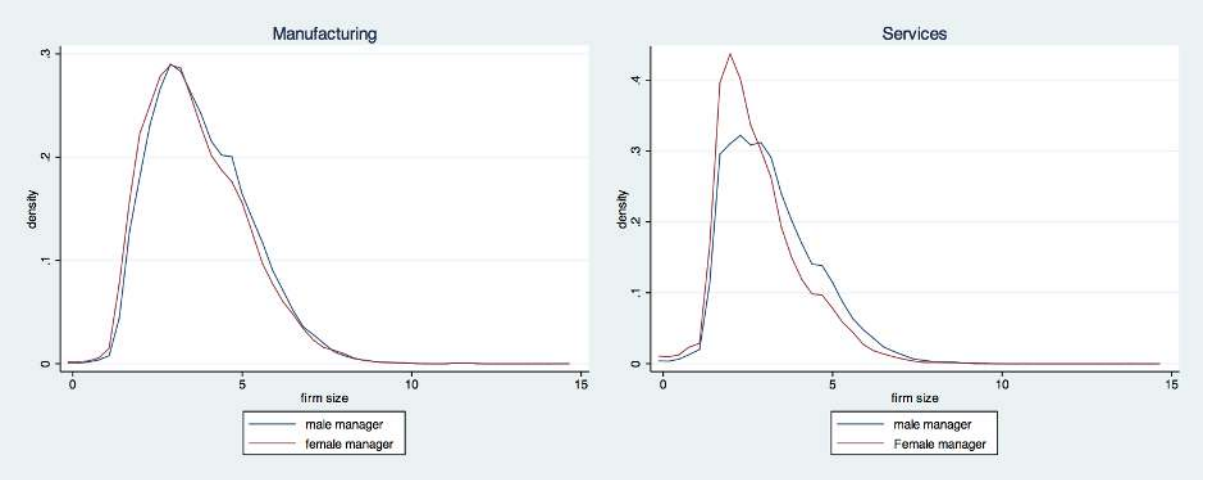


Source: Author's calculation based on the World Bank Enterprise Survey Data

Unlike in manufacturing, female and male-managed firms perform more equally in terms of generating productivity in services. This shows that female leadership and its relationship with productivity (measured by sales per worker) is more pronounced in services than it is in manufacturing, indicating better opportunities for female manager in services than manufacturing.

A similar analysis is conducted to examine any association between the same female variable and the size of the firms for services as well as manufacturing. Services firms tend to be smaller than manufacturing in general. Unlike manufacturing, services firms tend to have lower capital requirements and can operate at a small scale without confronting a cost disadvantage. Manufacturing firms invest in machinery which pressures the firm to grow and operate at a larger scale to drive down average cost. Some services on the other hand generally do not demand large production facilities. This should be interpreted with caution as there may be variation within services itself with smaller clustering in certain sectors such as restaurants or business services for instance.

Figure 9 Kernel density of firm size, by sector

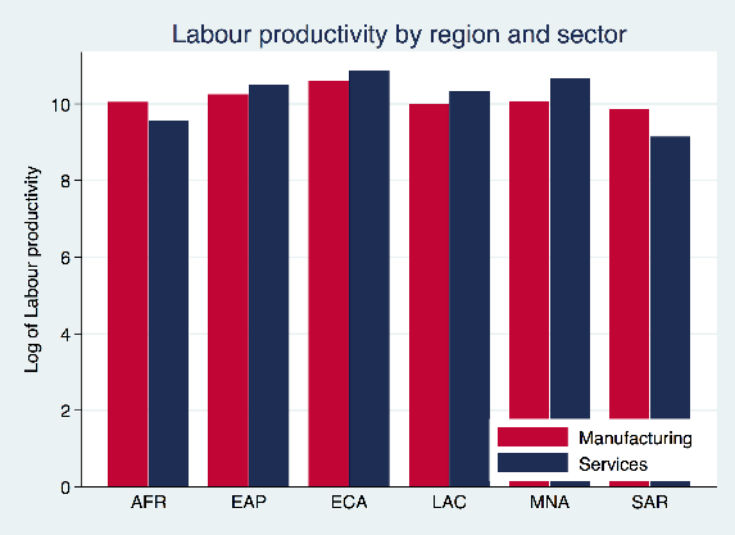


Source: Author's calculation based on the World Bank Enterprise Survey Data

Female-managed firms tend to be smaller in size in both, but more so in manufacturing. This may reflect higher self-employment among women or women entrepreneurship in services which typically face lower gender based discrimination than in manufacturing. It is easier for women to start and operate a small scale business in services than it is in manufacturing.

While simple averages only reveal observed differences without controlling for other factors, the survey data show that labor productivity is slightly higher in services than it is in manufacturing except in South Asia and Africa. The same pattern is observed for female managed and non-female managed firms. However, this should be interpreted with care as there may be variation across sectors in services with higher productivity in knowledge intensive business sectors for example. In addition, the interlinkages between manufacturing and services must be taken into account as manufacturing firms that integrate more and better service inputs tend to have higher productivity than those who do not.

Figure 10. Labor productivity, by region and sector



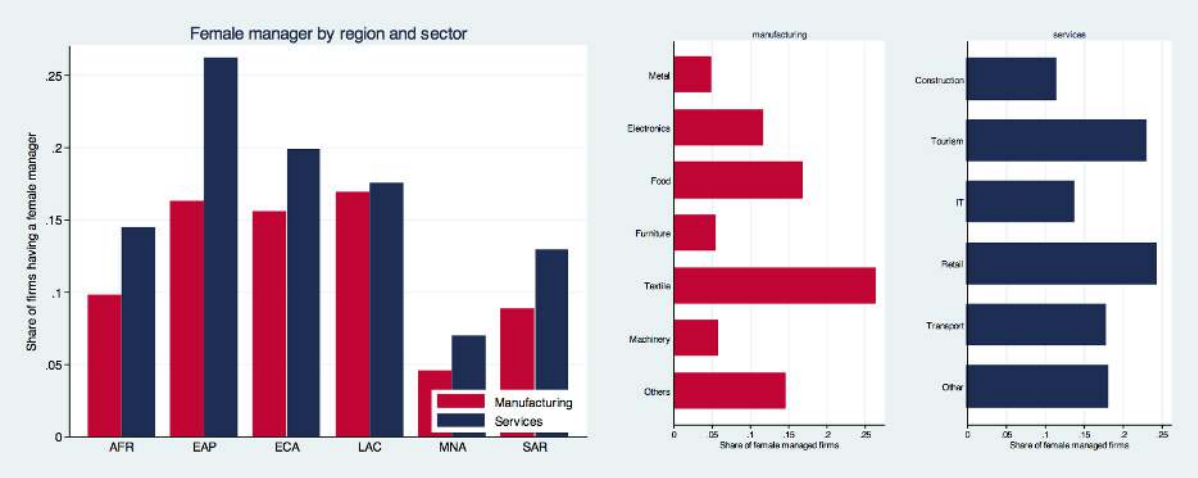
Source: Author's calculation based on the World Bank Enterprise Survey Data and TFP estimates

Even though labor productivity in services seems to be slightly lower than manufacturing in South Asia, there is variation within the region. India's rapid growth in services and rather stagnant manufacturing is likely to result in higher labor productivity in services than manufacturing. Other economies may still be relying largely on agriculture and caught in low productivity jobs in services. Sectoral shifts happening around the globe imply that more resources are gradually being reallocated to the services sector as the services share of employment grows.

The decline in the shares of manufacturing in employment may pose concerns which stem from beliefs as to the role manufacturing plays as a driver of productivity growth. As shown in the earlier section, female employment in Asia is generally shifting away largely from agriculture and partly from manufacturing towards services which is different from the case of men, where employment is shifting away from agriculture towards both manufacturing and services. Therefore, the concerns of bypassing the traditional manufacturing sector may be more prominent among female workers in this case. A question may arise on whether displaced female workers in agriculture could be equally or more productive in services as they would have been in manufacturing. This largely depends on human capital accumulation to boost absorption in high-end services as well as tradable services. For instance, large mobility cost associated with switching sectors negatively affects output (Lee & Wolpin, 2006).

Female leadership in firms is generally low around the world, which may be attributed to discriminatory practices in hiring women in higher positions. However, the picture looks more promising in services than it is in manufacturing. The share of female managed firms is on average higher in services than it is in manufacturing in all regions (Figure 11). This difference is particularly profound in the EAP region. One in four services firms in EAP is managed by women, surpassing the shares in all other regions. For instance, this share is nearly halved in South Asia where the role of women in leadership is still limited, but it is still higher than in manufacturing on average.

Figure 11. Female managed firms by region



Source: Author's calculation based on the World Bank Enterprise Survey Data

The variation within sectors is then examined to provide better insights into the opportunities for women in managerial roles (Figure 11). The share of female managed firms is highest in food and textile for manufacturing which shows that the opportunities for women acquiring higher positions are still limited to light manufacturing which is also relatively intensive in employing female labor.

Heterogeneity also exists in services with certain sectors having relatively higher shares of female-managed firms including tourism and retail. Tourism is a top foreign exchange earner in many developing economies and it is typically labor-intensive allowing quick entry of women into workforce. Compared to other sectors, tourism may generally require a lower level of education and less financing therefore allowing more women to run their own businesses in this sector. As digital technology revolutionizes the tourism industry through the emergence of sharing platforms, it offers a flexible employment model for women who often cannot commit to a full time job due to family responsibilities where burden sharing is not equal with male partners. This time limitation may contribute to the crowding of women in occupations that are typically lower paid. While it may be easier for women to reach higher positions in female-dominated sectors which face less competition from men, there may still be disparity in women's ability to take up senior roles. In addition, female managed firms in this sector may largely be still in the informal sector.

The descriptive regressions below attempt to analyze the associations between female leadership roles (female manager) and other basic information on firm performance including sales, firm size, labor productivity, capital intensity, wage and the number of female employees. The labor productivity variable used here is defined as output per worker, instead of value added per worker as defined in the kernel density chart above so as to capture more observations.

Female managed firms are associated with lower sales, more so in services than in manufacturing (Table 2). As female managed firms tend to be smaller in size especially in services, the sales generated and the wages paid may be lower than is the case for larger firms, although no causal relationship can be drawn at this stage. The association between having a female manager and the size of firms is stronger in services than it is in manufacturing. In other words, female managed firms tend to run smaller firms in services than non-female managed firms. It is generally harder for women to gain access to the necessary financing and resources needed to expand or formalize their businesses. Female managed firms tend to have lower productivity than non-female managed firms especially in manufacturing, which may indicate higher barriers for women in leadership roles in manufacturing. WEF (2017) finds that the representation of women in leadership roles is particularly low in some fields such as energy, mining and manufacturing. Female managed firms also tend to have lower capital intensity in both sectors, but it is more apparent in manufacturing than services. This may suggest the tendency of women to cluster around less capital-intensive sectors or more limited access to capital. There is no obvious association between female employees and manager.

Table 2. Descriptive regressions, female manager

Manufacturing	ln_sales	ln_employees	ln_lab_prod	ln_cap_empl	ln_wage_empl	ln_female_employees
female_manager	-0.295***	-0.177***	-0.150***	-0.205***	-0.064**	-0.036
	(0.000)	(0.000)	(0.000)	(0.002)	(0.030)	(0.328)
_cons	13.236***	3.742***	9.496***	9.571***	7.535***	2.376***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	23297.000	29199.000	23246.000	11315.000	23045.000	18336.000
Services						
female_manager	-0.366***	-0.330***	-0.059*	-0.128*	-0.072**	-0.003
	(0.000)	(0.000)	(0.057)	(0.056)	(0.024)	(0.892)
_cons	13.034***	3.175***	9.877***	9.943***	7.723***	1.839***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	20540.000	25818.000	20407.000	9486.000	20056.000	21104.000

Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

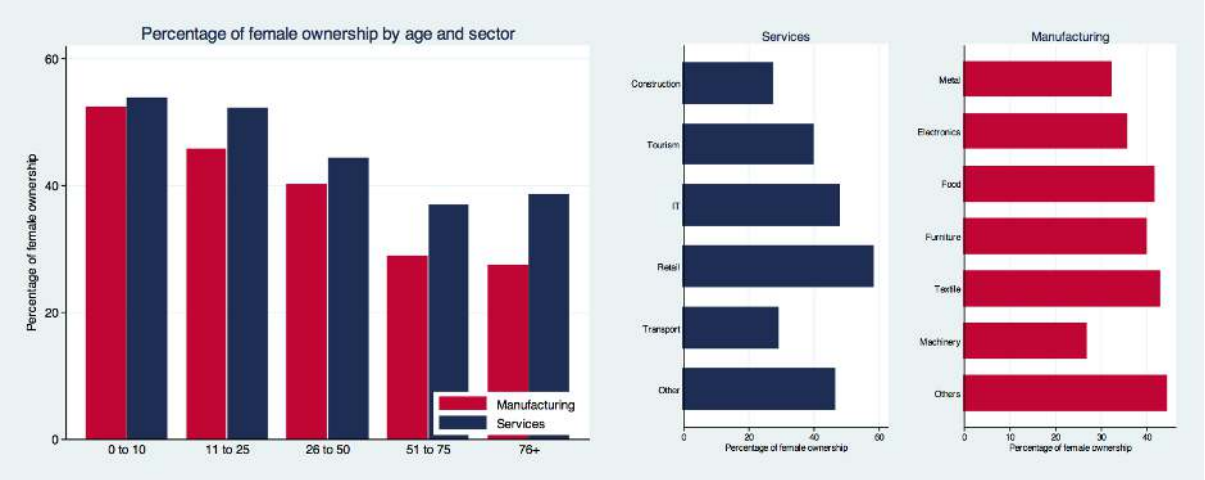
Source: Author's calculation based on the World Bank Enterprise Survey Data

It is important to benchmark female participation not only in managerial positions but also in ownership. The dataset includes an indicator on female ownership which takes the value of 1 for the presence of at least one female owner. While another indicator would allow the disentangling of different levels of female ownership, the observations captured are limited.

Women's share in firms' ownership has been on the rise as the world moves towards narrowing gender inequality. Figure 12 uses the percentage share of female ownership in a firm and compares the

situation between manufacturing and services. Women's share of ownership has on average been higher in services than manufacturing indicating lower barriers for women in services than manufacturing to begin with. The share of women's ownership is therefore higher and the difference between manufacturing and services is narrowed among younger firms. There are more women in managerial and ownership positions than there were decades ago. Over time more economies are adopting reforms to address discriminatory legal provisions including laws discriminating against women in relation to opening a bank account and registering their businesses among other areas, which dissuade female participation in ownership or entrepreneurship. As they become less prevalent, women's ownership naturally increases.

Figure 12. Share of female ownership by firm's age and sector



Source: Author's calculation based on the World Bank Enterprise Survey Data

The patterns in the variations of the share of female ownership across different subsectors is similar to that observed for women in leadership roles, reflecting persistent occupational segregation. In services, the largest average share of female ownership is found to be highest in retail and lowest in construction. In manufacturing, the largest average share of female ownership is found to be highest in textile and lowest in machinery. Overall, the average share of female ownership is relatively low in the male-dominated sectors.

Firms that have gender diversity in their ownership tend to be larger in size and have higher sales especially in manufacturing. However, female owned firms generally employ more female workers and this association is stronger in services than manufacturing. Similar to our previous observations for female managed firms, female owned firms tend to have lower capital intensity. This may indicate greater ability of women to acquire ownership in less capital-intensive sectors. There is no clear association between the gender diversity in ownership and labor productivity.

Table 3. Descriptive regressions, female owner

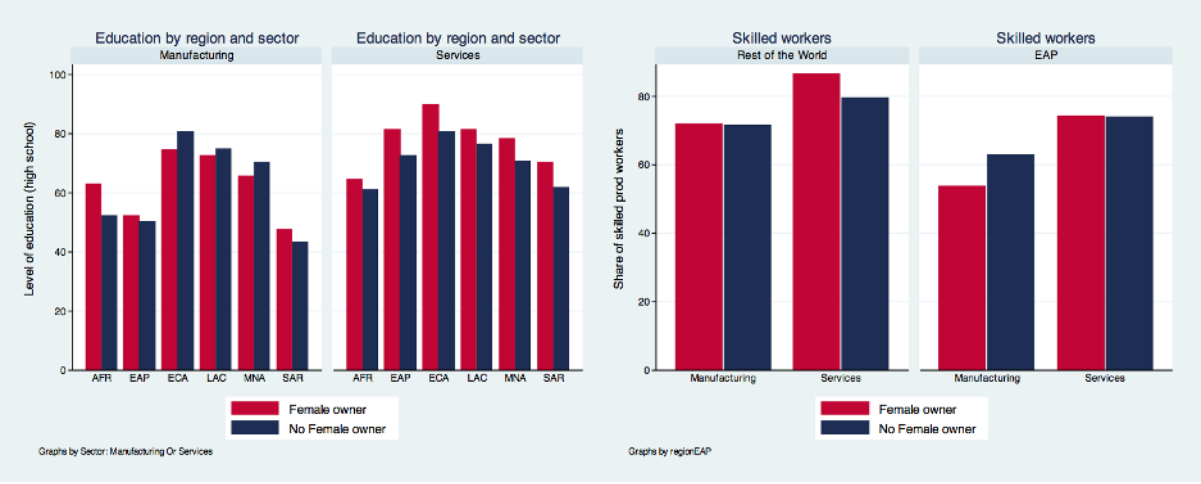
Manufacturing	ln_sales	ln_employees	ln_lab_prod	ln_cap_empl	ln_wage_empl	ln_female_employees
female_owner	0.103***	0.150***	-0.035	-0.068*	-0.015	0.121***
	(0.007)	(0.000)	(0.110)	(0.050)	(0.381)	(0.000)
_cons	13.026***	3.569***	9.471***	9.643***	7.588***	2.204***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	30718.000	38006.000	30670.000	15506.000	30423.000	24908.000
Services						
female_owner	-0.005	0.022	-0.037	-0.069*	-0.028	0.142***
	(0.875)	(0.314)	(0.103)	(0.091)	(0.182)	(0.000)
_cons	12.874***	3.052***	9.830***	9.983***	7.719***	1.782***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	25314.000	30793.000	25187.000	11826.000	24846.000	19980.000

Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Source: Author's calculation based on the World Bank Enterprise Survey Data

Structural transformation implies a change in the composition of jobs and skills. In addition, the potential jobs lost from automation can be offset by jobs gained from products and services enabled by technologies only if it is complemented with the appropriate level of skills. The rise of services is likely to be dominated more and more by sectors that are high-skill intensive and skill-biased technological change will increase the need for human capital accumulation and higher skills.

Figure 13. Level of education and skills, by region and sector



Source: Author's calculation based on the World Bank Enterprise Survey Data

Figure 13 reveals that the level of education of workers is generally higher in services than it is in manufacturing. The level of education is measured by the share of workers attaining a high school

education. From a gender perspective, it is interesting to observe that services firms with diversified ownership tend to be slightly higher-skilled than those firms which are purely owned by men across all regions. This is not the case for manufacturing where the results are mixed. The difference in the level of education between services and manufacturing is particularly prominent in the EAP and South Asian regions. While this chart presents preliminary observations and one cannot derive a solid conclusion, it shows the importance of investing in education to facilitate the transition of displaced workers from manufacturing to services. While one cannot assume that higher educational attainment is synonymous with higher skills, a similar pattern is observed when looking at the difference between the share of skilled workers in manufacturing and services. Services firms are typically characterized by larger share of skilled workers compared to manufacturing. From the gender perspective, services firms with diversified ownership have equal (in East Asia Pacific region) or higher (rest of the world) share of skilled workers compared to men-owned services firms. The opposite is true for manufacturing where firms with diversified ownership tend to have equal or lower share of skilled firms than men-owned firms.

3.2 Econometric Models

The following section uses econometric modeling to examine women's prospects in services relative to manufacturing, focusing on managerial responsibility, entrepreneurship (ownership), and labor. Specifically, we estimate models of the probability of observing female management or female ownership based on firm level characteristics. Then we estimate conditional labor demand models for female labor. In all cases, we distinguish between manufacturing and services firms so that we can see how the impact of firm-level covariates varies according to sector.

Table 4 presents results for a conditional (fixed effects by country-sector-year) logit model of the dummy for female manager. Column 1 uses manufacturing firms only, while column 2 uses services firms only. Larger firms are less likely to have female managers, and the effect is stronger in services than in manufacturing which is consistent with the kernel density figures presented in the previous section. More productive firms are more likely to have a female senior manager in services, but not in manufacturing. The result for services is statistically significant. The relationship between labor productivity and female manager indicate that women have better prospects in services. More capital-intensive firms are less likely to have a female manager in manufacturing and services. We conclude that services offer opportunities for female managers, but it is difficult to assess those opportunities relative to manufacturing, as the size and productivity relationships move in opposite directions. Based on productivity, there is evidence that services are more open to female managers than manufacturing, but we do not draw a strong conclusion based on these results.

Table 4. Regression results for female management

	Manufacturing	Services
ln_sales	-0.103***	-0.190***
	(0.002)	(0.000)
ln_wage_empl	0.002	-0.029
	(0.964)	(0.320)
ln_lab_prod	0.001	0.171***
	(0.982)	(0.000)
ln_cap_empl	-0.039*	-0.036*
	(0.052)	(0.068)
N	8471.000	7434.000
Pseudo R2	0.008	0.011
Fixed Effects	Country-Sector-Year	Country-Sector-Year

Note: All models are estimated by conditional (fixed effects) logit with female management as the dependent variable. Samples are indicated at the top of each column. P-values based on robust standard errors adjusted for clustering by country-sector-year are presented in parentheses underneath the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 5 presents results from similar models for female ownership. The variable takes the value 1 if the firm has at least 1 female owner. The relationship between firm size and the probability of having a female owner is the reverse of what was seen for a female manager: there is a positive association between firm size and the probability of seeing a female owner, but the relationship is significant only in manufacturing. By contrast, more productive firms are less likely to see a female owner, and that effect is stronger for manufacturing than services. The results for labor productivity are reverse of what was observed for a female manager, but they again indicate better prospects for women in services. There is no clear relationship between wages or capital intensity and female ownership. Results from the regression models confirm that services offer prospects for female entrepreneurship, but there is only weak evidence that the environment is more conducive to female ownership in services than manufacturing, based on the fact that the negative relationship between productivity and female ownership is stronger in manufacturing than services.

Table 5. Regression results for female ownership

	Manufacturing	Services
ln_sales	0.071***	0.036
	(0.000)	(0.116)
ln_wage_empl	0.007	0.024
	(0.792)	(0.259)
ln_lab_prod	-0.106***	-0.071**
	(0.000)	(0.015)
ln_cap_empl	-0.007	-0.016
	(0.558)	(0.235)
N	13326.000	10145.000
Pseudo R2	0.002	0.001
Fixed Effects	Country-Sector-Year	Country-Sector-Year

Note: All models are estimated by conditional (fixed effects) logit with female ownership as the dependent variable. Samples are indicated at the top of each column. P-values based on robust standard errors adjusted for clustering by country-sector-year are presented in parentheses underneath the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

Table 6 finally presents results for conditional labor demand models for female workers. These models fit the data much better than the two conditional logit models: most independent variables have coefficients that are statistically significant at the 5% level or better. In terms of the relationship between these variables and female labor demand, we see a positive impact of size in both sub-samples, with stronger coefficient for manufacturing. Labor productivity has negative coefficients, but it is stronger in the case of manufacturing than services. Capital intensity also has a negative coefficient in both manufacturing and services. Although the pattern of signs is ambiguous, these results provide evidence that services offer opportunities for women workers, and in particular that the negative effect of productivity is lower than in the case of manufacturing. Again, we do not draw strong conclusions, but we believe the data are consistent with superior labor market conditions for women in services as compared with manufacturing.

Table 6. Regression results for conditional labor demand models for women

	Manufacturing	Services
ln_sales	0.926***	0.816***
	(0.000)	(0.000)
ln_wage_empl	0.069***	0.041***
	(0.000)	(0.000)
ln_lab_prod	-1.000***	-0.780***
	(0.000)	(0.000)
ln_cap_empl	-0.020***	-0.027***
	(0.001)	(0.000)
_cons	-0.878***	-1.209***
	(0.000)	(0.000)
N	10562.000	6943.000
R2	0.609	0.571
Fixed Effects	Country-Sector-Year	Country-Sector-Year

Note: All models are estimated by OLS with the logarithm of the number of female employees as the dependent variable. Samples are indicated at the top of each column. P-values based on robust standard errors adjusted for clustering by country-sector-year are presented in parentheses underneath the parameter estimates. Statistical significance is indicated as follows: * (10%), ** (5%), and *** (1%).

While the relationship between labor productivity and all three female variables vary, the results consistently indicate that women have better prospects in services. For instance, more productive firms tend to have lower gender diversity in ownership and fewer female workers, but this result is more apparent in the case of manufacturing than services. Similarly, more productive firms are likely to have female manager in services, but not necessarily the case for manufacturing.

4 CONCLUSION

Using both country-level and firm-level data, this paper provides some evidence that sectoral shift towards services is in fact not gender neutral. While women are still largely clustered in lower order services such as retail and tourism, evidence from this paper indicates that services generally provide better prospects for women in the labor market compared to manufacturing. Formal legal barriers and cultural norms confine women to a narrower range of sectors which are perceived by society as more suitable or appropriate for women than men, namely sectors that require less physical skills or provide a safer environment. This partly explains the limited involvement of women in heavy industries and overrepresentation of women in light manufacturing, driving occupational segregation. Services sectors are typically characterized by occupations that require less manpower and more interpersonal or intellectual skills. Our findings reveal that services firms, especially ones with gender diversity in ownership, generally employ workers with a higher level of education and skills. Therefore, a shift towards a sector in which women have a comparative advantage such as services has the potential to

promote gender equality participation in the labor market. For instance, the share of services in employment is rising relatively faster for women than men in Asia, particularly in East Asia.

Gender differences in terms of entrepreneurship or leadership are also more apparent in manufacturing than services. The gender-based barriers faced by women are lower in services than manufacturing. For instance, while women's share of firms' ownership is increasing over the past decades, women's share of ownership has on average always been higher in services than manufacturing. In addition, the share of female managed firms is higher in services compared to manufacturing, particularly in East Asia and Pacific region. The descriptive regressions in this paper indicate that women are also likely to occupy managerial positions or participate in the ownership of a firm which is smaller in size, has lower capital intensity and requires lower entry cost, more commonly found in services than manufacturing.

Globally, the share of services in employment is positively correlated with labor productivity for both men and women. However, this is not the case for women employment in industry. Observations from the enterprise survey indicate that unlike in manufacturing, female and male-managed firms perform more equally in terms of generating productivity in services. Similarly, our regression results show that women have better prospects in services not only in terms of employment, but also leadership. More productive firms are likely to have a female manager in services.

Several policy implications can be drawn from these findings. The rise of services has the potential to promote gender equality in the labor market, contributing to the fifth Sustainable Development Goal. However, structural transformation will only translate into real economic opportunities for women by addressing other factors affecting occupational segregation including through legal reforms, promoting women's education and facilitating access of women to capital. Additionally, institutional changes can address gender differences in carrying family responsibilities by providing more flexible employment and better working conditions for women. Achieving meaningful economic transformation may require facilitating the movement of female labor not only between sectors (transitioning from non-services to services sectors), but also within sectors (from low productivity to high productivity occupations). While structural transformation provides economic opportunities for women, it engenders risks for women who are left behind by the restructuring. The ability to absorb female labor into higher-skilled and more productive services sectors is key to women's empowerment and it largely depends on investment in skills and education for women. Services can serve as a powerful avenue towards achieving gender equality given the proper policies in place.

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APPENDIX

	Figure 2	Figure 3	Figure 7
South Asia			
Afghanistan	X	X	X
Bangladesh	X	X	X
Bhutan	X	X	X
India	X	X	X
Maldives	X	X	X
Nepal	X	X	X
Pakistan	X	X	X
Sri Lanka	X	X	X
West Asia			
Armenia	X	X	X
Azerbaijan	X	X	X
Bahrain	X	X	X
Georgia	X	X	X
Iran, Islamic Rep.	X	X	X
Iraq	X	X	X
Israel	X	X	
Jordan	X	X	X
Kuwait	X	X	
Lebanon	X	X	X
Oman	X	X	X
Qatar	X	X	X
Saudi Arabia	X	X	X
Syrian Arab Republic	X	X	X
United Arab Emirates	X	X	X
Yemen, Rep.	X	X	X

Southeast Asia			
Myanmar	X	X	X
Brunei Darussalam	X	X	X
Cambodia	X	X	X
Indonesia	X	X	X
Lao PDR	X	X	X
Malaysia	X	X	X
Philippines	X	X	X
Singapore	X	X	X
Thailand	X	X	X
Timor-Leste	X	X	X
Vietnam	X	X	X
East Asia			
China	X	X	X
Taiwan, China			X
Hong Kong SAR, China	X	X	X
Japan	X	X	
Korea, Dem. People's Rep.	X	X	
Korea, Rep.	X	X	
Macao SAR, China	X	X	
Mongolia	X	X	X
Central Asia			
Kazakhstan	X	X	X
Kyrgyz Republic	X	X	X
Tajikistan	X	X	X
Turkmenistan	X	X	
Uzbekistan	X	X	X