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## Feminization, Defeminization, and Structural Change in Manufacturing

#### DAVID KUCERA and SHEBA TEJANI\*

International Labour Organization, Geneva, Switzerland

Summary. — The paper uses accounting decomposition methods to analyze changes in female shares of manufacturing employment for 36 countries at different levels of development from 1981 to 2008, for the manufacturing sector as a whole and within a group of labor-intensive manufacturing industries for selected countries. For the majority of countries, feminizing and defeminizing, labor-intensive industries contributed most to changes in female shares of total manufacturing employment and within-industry effects were more important than employment reallocation effects. Within labor-intensive industries, textiles, and apparel were the largest drivers of changes in female shares of employment and technological upgrading was associated with defeminization.

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Key words — feminization, defeminization, structural change, manufacturing, decomposition analysis, technological upgrading

#### 1. INTRODUCTION

A 1999 United Nations (UN) report on the role of women in development stated that "It is by now considered a stylized fact that industrialization in the context of globalization is as much female-led as it is export-led" (UN, 1999, p. 29). Archetypes of such female-led and export-led growth are the first-tier newly industrialized countries (NICs) South Korea and Taiwan (China). Yet by the time of the UN report, female shares of manufacturing employment had already been declining in these countries for some time. In this sense, a pivotal development with respect to manufacturing employment is feminization and defeminization, defined in terms of changing female shares of employment. <sup>1</sup>

In her assessment of the large literature on gender and industrialization, Caraway writes that "To this day, we lack a compelling story explaining...different gendered industrialization trajectories," by which she refers to both patterns across countries and over time, particularly patterns of feminization and defeminization (2006, p. 26). Regarding patterns over time, Caraway provides a concise formulation:

Trends over time – feminization versus masculinisation – [are] best explained by the balance of employment between sectors. Since primary EOI [export-oriented industrialization] encourages employment growth in labor-intensive sectors relative to capital-intensive sectors, there is a strong relationship between EOI and feminization. However, as EOI matures, masculinization ensues since employment usually expands more rapidly in capital-intensive sectors (Caraway, 2006, p. 41).

Two premises in Caraway's account are noteworthy. The first is that sectors using more labor-intensive production methods tend to employ higher shares of women workers, and the other way around for sectors using more capital-intensive production methods. The second premise is that feminization and defeminization can be largely explained by the reallocation of employment (female and male) among sectors rather than changes within sectors. <sup>2</sup>

The first premise is commonly expressed in the literature. Regarding Asia, for example, Seguino writes that "within the manufacturing sector, women have been sequestered in labor-intensive industries that produce primarily for export" (2000, p. 33). The wearing apparel and textile industries provide the most clearcut examples. Yet the point can be overstated. There is a remarkably strong similarity in female shares of employment among manufacturing industries between diverse pairs of countries at different levels of development. But the relationship between female shares of employment and the labor-intensity of production among manufacturing industries within countries is comparatively weak, as the next section of the paper describes.

Caraway's second premise also merits remark. Successful economic development is characterized by structural change, including shifts toward higher value-added activities for which labor productivity (value-added per unit of labor) provides a useful measure. As Ocampo, Rada, and Taylor (2009) write in their volume on structuralist economics, "Historically, labor productivity increases have been the major contributing factor to growth in real GDP per capita" (p. 42). But these shifts can occur both within sectors and through compositional shifts toward higher value-added sectors. Indeed, studies applying accounting decomposition methods generally find that within-industry effects are more important than reallocation effects in driving labor productivity growth, consistent with Kaldor's theories of economic growth (Kaldor, 1968; Ocampo et al., 2009; Roncolato & Kucera, 2014). By the same token, changes in female shares of total manufacturing employment can result from the reallocation of employment among manufacturing industries as well as by changes in female shares within manufacturing industries.

The literature on gender and industrialization suggests that shifts in the labor- and capital-intensity of production have different consequences for men and women's employment. To our knowledge, though, no study has provided systematic evidence on the relative importance of within-industry versus employment reallocation effects on the feminization and defeminization of manufacturing employment as well as which industries are driving these changes. <sup>4</sup> Conversely, while the distinction between within-industry and employment reallocation effects

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is central to empirical studies of structural change, this literature has paid scant attention to the gendered impacts of these shifts.

Our paper is situated at the intersection of these two literatures and endeavors to address some of these limitations by applying the tools of structuralist analysis to the debates on gender and industrialization. <sup>5</sup> It applies accounting decomposition methods to analyze changes in female shares of manufacturing employment for 36 countries at different levels of development and addresses which industries—labor-intensive, capital-intensive, or intermediate—contributed most to changes in the female share of manufacturing employment and whether within-industry or employment reallocation effects were more important in explaining these changes. The first-round of analysis encompasses the manufacturing sector as a whole and is conducted at the level of three industry groups classified by the labor-intensity of production. Motivated by the findings of this analysis, we subsequently apply the same methods to analyze changes in female shares of employment within the group of labor-intensive manufacturing industries for five countries of particular interest: South Korea, Taiwan, and Malaysia, which feature prominently in the literature on gender and export-oriented industrialization as well as on successful late-development and experienced the strong defeminization of manufacturing; and Morocco and Turkey, more recent entrants into export-oriented industrialization which experienced the feminization of manufacturing employment.

For the manufacturing sector as a whole, our main findings are that for 25 of the 36 countries in our sample—feminizing and defeminizing and at different levels of developmentlabor-intensive industries contributed most to changes in the female share of total manufacturing employment. For 33 of 36 countries, within-industry effects were more important than reallocation effects in accounting for these changes. In turn, changes in the female share of total manufacturing employment were most commonly driven by changes in the female share of employment within the group of labor-intensive manufacturing industries. Though at odds with Caraway (2006), these findings are unsurprising in light of the weak correlation between the labor-intensity of production and the femaleintensity of employment for the countries in our sample. In this context, even structural change characterized by sustained shifts away from labor-intensive industries would not have a decisive effect on female shares of manufacturing employment, given that both feminization and defeminization are generally driven by within-industry rather than reallocation effects.

Within the group of labor-intensive manufacturing industries, we find that the textile and apparel industries played key roles in South Korea, Taiwan, Malaysia, Morocco and Turkey. In South Korea and Taiwan in particular, the single most important driver of the defeminization of manufacturing employment was the declining female share of employment within the textile industry, which was associated with significant technological upgrading in the industry. These findings are relevant to debates in the literature on global production networks on whether "economic upgrading" leads to "social upgrading," with the latter defined in terms of improvements in the quality of employment for different groups of workers (Milberg & Winkler, 2011; Rossi, 2013). Other studies have also observed defeminization in the context of technological upgrading within particular manufacturing industries. 8 Deepening our understanding of the phenomena of defeminization occurring alongside technological upgrading is essential for enabling women to benefit from processes of structural change, as regards new industrial jobs created through employment reallocation as well as within industries.

Several studies have wrestled with an explanation of employers' seeming preference for men workers in the context of technological upgrading (Barrientos et al., 2004; Joekes, 1999; Seguino, 2005; Seguino, Berik, & Rodgers, 2010; Sundaram, 2009; Tejani & Milberg, 2010; Tejani, 2012). These studies invoke the lesser importance of low-wage women's labor in more capital-intensive production; gender norms designating men as breadwinners and women as secondary workers, with men more likely to be hired for higher paying jobs; and the different skills requirements of new industrial jobs combined with the purportedly different skills of men and women workers and whether these differences are real or perceived. A useful overview is provided by Seguino (2005) in the East Asian context, who writes: "An additional problem for East Asia has been that the new industrial jobs that are emerging are gender-typed.... *The reason for gender-typing such jobs is not clear*" (p. 7, italics added). <sup>9</sup>
As a complement to our decomposition analysis of changes

As a complement to our decomposition analysis of changes in female shares within labor-intensive manufacturing industries, we provide preliminary evidence on these debates for South Korea, Taiwan, Malaysia, Morocco, and Turkey. In particular, we document for the textile and apparel industries the association between technological upgrading and defeminization as well as industry expansion and feminization. We also describe patterns of female shares of employment within services and agriculture and for the economy as a whole.

## 2. DATA AND PATTERNS OF GENDER REPRESENTATION

Our analysis is based on manufacturing employment data from the United Nations Industrial Development Organization's (UNIDO) Industrial Statistics Database (UNIDO, 2011a). These data refer to employees and exclude "home workers...working proprietors, active business partners and unpaid family members" (UNIDO, 2011b, p. 33). Sorting out the countries with adequate data left us with the 36 countries in Figure 1, showing female shares of total manufacturing employment from 1981 to 2008. Data are provided at the ISIC (International Standard Industrial Classification) two-digit level, Revision 3, for which there are 22 manufacturing industries. 10 Motivated by Caraway's (2006, p. 41) discussion of labor-intensive and capital-intensive industries and to facilitate presentation and the construction of consistent time series (given missing data at the two-digit level), the data for the 22 industries are compiled into three industry groups classified by the labor-intensity of production. We refer to these as laborintensive, intermediate, and capital-intensive industry groups, as shown in Table 1.

Labor-intensive manufacturing industries are similar to those characterized as such by other studies and include textiles (ISIC 17) and apparel (ISIC 18) and other light manufacturing for which there are not prohibitive technological barriers, at least for many products within these industries. <sup>12</sup> Intermediate manufacturing industries include all machinery-producing industries, a set of closely allied industries making rubber, plastic, and non-metallic mineral products, as well as printing and publishing and paper and paper products. Capital-intensive manufacturing industries are those for which the product lends itself to production by highly automated "continuous-process" technologies (Chandler, 1977).

The textile and apparel industries play central roles in the literature on gender and structural change as well as on global production networks, and both tend to be female-intensive and labor-intensive. Yet other female-intensive industries

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