

# Premature Deindustrialization and the Defeminization of Labor

Joshua Greenstein

Hobart and William Smith Colleges

greenstein@hws.edu

Bret Anderson

Southern Oregon University

andersob6@sou.edu

## Abstract

There is growing evidence of two related global processes happening. The late industrializers are deindustrializing at earlier stages of development than their predecessors and the global trends in the gender composition of manufacturing and industrial employment are evolving. What is less well known is how these two trends are related to one another. Starting from the premise that industrial upgrading has been observed to have a male bias, we test the hypothesis that premature deindustrialization is likely to amplify that bias.

For the empirical test and simulation, we use an economy's global competitive position as a proxy for the deindustrialization regime type. To get to this position, we bring together the work of Kaldor, the Feminist scholarship, and the structuralist critiques. The results for 60 countries spanning the years 1990-2013 support our hypothesis that premature deindustrialization is likely to amplify the male bias of industrial upgrading.

Keywords: premature deindustrialization, gender, Kaldor, defeminization of labor, manufacturing industrial upgrading, capital deepening

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## Introduction

Capital deepening in the industrial sector has driven up productivity in most economies. It has also been a mitigating force working against industrial employment creation. In a New York times article titled, “The Mirage of a Return to Manufacturing Greatness”, Joseph Stiglitz stated that, “the observation is uncontroversial. Global employment in manufacturing is going down because productivity increases are exceeding increases in demand for manufactured products by a significant amount” (Porter, 2016). The scarce manufacturing jobs that do remain, however, are likely to be relatively high paying jobs that countries and workers compete for. This paper explores the gender competition for those jobs through a macroeconomic lens. In particular, we assess whether or not premature deindustrialization is a feminizing or defeminizing force in industrial employment.

Premature deindustrialization is a situation in which the shares of manufacturing value added and employment begin to shrink at per capita income levels much lower than those of the early industrializers, along with manufacturing employment peaking at lower levels. Interestingly, this trend is happening alongside another puzzling trend in industrial employment. The widely observed trend of a global feminization of labor that Standing (1989) summarized may have begun to reverse course toward defeminization as industrial production becomes more capital intensive. This trend implies the male bias of industrial upgrading outweighs the perceived female bias of export orientated production.

Complicating matters further is the fact that at the macroeconomic level, very little is known about the consequences of premature deindustrialization and what it may mean for women’s relative employment outcomes as economies move up the industrial ladder. Tejani and Milberg (2016:46) echo this sentiment in their study of global defeminization, stating that “the feminization occurring in Latin America appears to be qualitatively different in nature than the previous experience of Southeast Asia, as it takes place in the context of deindustrialization at the macroeconomic level.” This suggests that the macroeconomic environment is a fruitful arena to explore the factors that condition the link between industrial upgrading and (de)feminization of labor.

Our question is whether or not premature deindustrialization is likely to amplify the male bias of industrial upgrading. By bridging the work of Kaldor with feminist and structuralist critiques, we are able to draw out some causal mechanisms and then simulate the male bias of industrial upgrading by deindustrial regime type. We do this for 60 countries spanning the years 1990-2013. We find that premature deindustrialization is likely to amplify the male bias of industrial upgrading.

The evidence presented here is novel because, to date, much more is known about the causes rather than the consequences of deindustrialization patterns. A better understanding of the consequences of deindustrialization’s timing will better position policy makers to mitigate negative effects of the changing global tides. The next section provides a brief overview of deindustrialization and feminization of industrial employment. This section is followed by a discussion of causal mechanisms, which provide justification for using an economy’s competitive position as a proxy for deindustrial regime type. Lastly, we present our method and findings from the simulation of the male bias of industrial upgrading by regime type.

## **The Evolving Nature of Deindustrialization and (De)-feminization of Industrial Employment**

Later industrializers have not been following identical patterns of sectoral change and employment to earlier industrializers (Palma 2005; Timmer and Akkus 2008; UNRISD 2010; van der Hoeven 2010, 2012; McMillan and Rodrik 2012; Rodrik 2015; Subramanian 2014). The early industrializers experienced a peak share of manufacturing employment of about 30 percent, but, with the exception of East Asian countries, later industrializers do not seem to follow this pattern (Rodrik 2013a, 2013b). Premature deindustrialization entails both lower levels of industrial employment at all stages of income and peaks in industrial employment at lower levels of GDP per capita (Subramanian 2014; Timmer, de Vries, and de Vries 2014; Rodrik 2013a, 2013b, 2015). Recent research emphasizes the important role that periods of high levels of manufacturing employment have played in now wealthy countries, and the dearth of wealthy countries that have skipped such a phase (Felipe, Mehta, and Rhee 2014).

This change in deindustrialization patterns has occurred alongside changing patterns of women's relative employment in industry. Seminal research from 1970-2000 identified a tendency toward feminization and argued that women were preferred in the competitive export oriented sectors due to cheaper labor costs and being a more flexible labor source (Standing, 1989 and 1999; Cagatay and Ozler, 1995; Elson and Pearson, 1981; Boserup, 1970). In contrast to those earlier works, Desai and Rinalda (2016) recently noted that, "some recent studies question the general feminization of global production...and show that it was always selective and related to the lack of upgrading in manufacturing".<sup>i</sup> As well, Tejani and Milberg (2010; 2016) argue that the feminizing nature of globalization needs to be reconsidered because, as educational gaps have closed, feminization pressures from globalization have softened. Also, industrial upgrading has been defeminizing despite continued success in exports. This industrial upgrading – defeminization link is well supported in the literature.<sup>ii</sup> Figure 1, based on authors' calculations, illustrates this relationship between capital deepening and defeminization of employment for 1990-2013.

[INSERT FIGURE 1 NEAR HERE]

At the micro level, we know a little bit as to why this negative relationship might occur. It may be due to reduced labor cost pressures in capital-intensive production, gender biases, or lack of job training for women. At the macroeconomic level, less is known about what conditions the link between industrial upgrading and women's relative employment outcomes. In fact, dramatic regional differences between Asian and Latin American feminization and deindustrialization patterns suggest that the macroeconomic environment is a fruitful arena to explore the factors that condition the link between industrial upgrading and (de)feminization of labor.

The question that emerges is how the timing of deindustrialization (prematurity) is related to the male bias of industrial upgrading. Another issue is how best to measure premature deindustrialization. In the next section, we argue that the competitive position of manufacturing is an important link between premature deindustrialization and defeminization. We come to this conclusion by bridging the Kaldorian traditions with feminist and structuralist critiques.

## Competitiveness and the Deindustrial Regime Type

For the empirical simulations of the male bias in industrial upgrading, we use an economy's competitive position as a proxy for the deindustrialization regime type. Specifically, we suggest that the prematurely deindustrializing economies are marked as being less competitive.<sup>iii</sup> To get to this position, we bring together the work of Kaldor, the Feminist scholarship, and the structuralist critiques.

In the Kaldorian framework, manufacturing is the engine of growth (Kaldor, 1966; 1967; 1968)<sup>iv</sup>. Faster manufacturing output growth leads to faster manufacturing productivity growth due to dynamic economies of scale and increasing returns (Verdoorn's Law or Kaldor's 2<sup>nd</sup> growth law). This in turn then leads to faster labor reallocation to manufacturing and faster overall productivity growth. Importantly, this observation that manufacturing output growth leads to changes in manufacturing employment growth implies that readily available data on employment intensities are useful in that they capture the intensity of Verdoorn's law.<sup>v</sup> This is especially useful because women and men's employment intensities tend to differ (Kapsos, 2005; Anderson, 2016). Additionally, this Kaldorian process is related to an economy's competitive position as the growth of manufacturing output is constrained by demand; in the later phases of development, this demand must come from exports (Kaldor 1966, 1967; Thirlwall 1983).

Some causes of deindustrialization from this literature include productivity increases without the needed increase in demand to create employment in the modern sector (Taylor 2009), with exports being one possibly important source of demand in such situations (Thirlwall 1983), relative changes in manufacturing productivity (Singh, 1977; Rowthorn and Ramaswamy, 1997; Palma, 2005; Tregenna, 2009; 2011, 2014) or relative price changes for manufactured goods (Singh, 1977; Thirlwall, 1982; Palma, 2005).<sup>vi</sup>

In Rodrik's (2015) work on premature deindustrialization, he finds that the decline in manufacturing employment that stems from a drop in relative prices is smaller in countries with more competitive manufacturing sectors. This, again, is strongly suggestive that an economy's competitiveness is related to the deindustrialization regime.

Global competitiveness also appears within the structuralist critique literature in a related way. In particular, modern global production networks (GPN) are the contemporary analogue of past peripheral commodity exports that Prebisch (1949) popularized. Milberg and Winkler's (2013) argument is that the intra-industry trade share is falling due to dense and far-flung supplier networks. This leads to a string of monopsony bargaining power imbalances from the top GPN downward. They also argue that "the export-led growth strategy adopted by most developing countries following the debt crisis in the 1980s...has suffered from a 'fallacy of composition' problem" (ibid:279). Razmi and Blecker (2008) similarly argue that "excess supplies in global markets can lead to falling terms of trade for developing country exports of manufactures, similar to what happened historically for exports of primary commodities (Grilli and Yang, 1988; Ocampo and Parra, 2003). In such a competitive environment, developing country exporters may feel pressured to hold down their export prices through currency depreciation or wage repression, thus foregoing some of the potential income gains from increased exports..." In short, the same processes that affected primary commodity exporters in the past century appear to be a barrier for exporters of manufactured goods that find themselves on the lower rungs of GPNs.

In addition to the above structuralist critiques, much of the feminist scholarship on the causes of feminization overlap with Verdoorn's Law. In addition to the potential reversal of feminization trends described above, a vast literature argues that women in the formal sector tend to lose their job faster than men, and usually have worse access to social safety nets, which can ultimately impact their relative bargaining power (Seguino and Were, 2014; Braunstein and Heintz, 2008; Epstein, 2007; Seguino and Grown, 2006; Seguino, 2000; Elson and Cagatay, 2000). Others more explicitly illustrate how this gendered process extends to Verdoorn's law. Kapsos (2005) shows that women's employment is generally more sensitive to output fluctuations than is men's. Building off that, Anderson (2016) provides evidence that this is especially true in the industrial sector.

Three primary lessons emerge. First is the observation that for the late industrializers, relative price declines in manufacturing have outpaced relative productivity gains. Second is that for premature deindustrializers, the decline in manufacturing employment that stems from a drop in relative prices is smaller for more competitive manufacturing countries. Lastly, since women's employment is more responsive to output fluctuations, a drop in the relative prices of manufacturing will result in a drop in women's share of manufacturing employment relative to men's.

Our take-away is that premature deindustrializers are likely to be in a less competitive position and when relative prices of manufacturing fall, this will result in a drop in the ratio of women to men in manufacturing employment. This leads to lower bargaining power for women and will amplify the male bias of industrial upgrading.

### **Simulating the Male Bias of Industrial Upgrading**

Figure 1 is a simple scatter plot that illustrates the negative correlation between industrial upgrading and the relative proportion of women in industrial employment. Our aim in this section is to simulate that relationship by the deindustrial regime type, while controlling for explanatory factors. Our sample is of 60 countries covering the years 1990-2013. Women and men's industrial employment data is from the ILO's Key Indicators of the Labor Market (2014).<sup>vii</sup> The peak years and moving averages of industrial and manufacturing employment were calculated using data from the Groeningen Growth and Development Centre (Timmer, de Vries, and de Vries, 2014). The peak years were supplemented when necessary using peak years calculated by Felipe, Mehta, and Rhee (2014). All other data is from the World Bank's World Development Indicators (2014), unless otherwise noted.

We use a country's competitive position as a proxy for premature deindustrialization. This allows for a continuous, rather than discrete, measure. We construct a Balassa Index (Balassa and Noland 1989) of relative competitive advantage, for all countries and years in our sample, which is calculated as:

$$RCA_{ij} = \frac{\frac{x_{ij}}{X_{ij}}}{\frac{x_w}{X_w}} \quad (1)$$

Where  $RCA_i$  is the relative competitive advantage in manufacturing for country  $i$ ,  $x_i$  is the manufacturing exports for country  $i$ , and  $X_i$  is total exports for country  $i$ . The symbols  $x_w$  and  $X_w$

represent manufacturing exports for the world and for total world exports, respectively. The RCA is calculated for every country,  $i$ , and year,  $j$ .

Figure 2 shows the kernel density probability distribution of competitiveness. Two groups of countries are obvious: those that are more competitive and those that are less competitive. Figure 3 then disaggregates by timing of peak of manufacturing employment, as measured by a 7 year moving average of manufacturing employment calculated by the authors using data from GGDC (Timmer, de Vries, and de Vries, 2014). It clearly illustrates a difference in competitiveness between countries with more recent peaks and earlier peaks in manufacturing employment. Countries that peaked in manufacturing employment before 1990 are more competitive, and countries that peaked more recently are more likely to be uncompetitive. This result lends credence to the theory that premature deindustrialization, a phenomena prevalent in late-peakers, is associated with competitiveness.

[INSERT FIGURE 2 NEAR HERE]

[INSERT FIGURE 3 NEAR HERE]

With reasonable confidence that our measure of competitiveness is a good proxy for deindustrialization regime, we ran a country fixed effects regression model to estimate the impact that industrial upgrading has on women's relative employment share in industry. The foundation of this model builds on that of Tejani and Milberg (2016) with one significant extension. Notably, we include the interaction of competitiveness and capital to labor ratios. This allows us to re-draw figure 1 by deindustrial regime type. The regression takes the following form:

$$F:M emp_{it} = \beta^0 + \beta^1(RCA)^{it} + \beta^2(KL)^{it} + \beta_3(RCA*KL)_{it} + \beta_4(X)_{it} + \alpha_{it} + u_{it} \quad (2)$$

Where  $F:M$  is the female to male ratio in industrial employment, RCA is our Balassa Index of revealed comparative advantage, KL is the capital/labor ratio, and  $RCA*KL$  is an interactive term. Control variables include F/M gross educational enrollment, urban density, fertility rates, log real GDP per capita, share of employment in services, and the female to male labor participation rate.

The results of the regression are illustrated in table 1. Of the variables of interest, the Balassa Index of competitiveness has a positive, significant relationship with the ratio of female to male workers in industry. More competitive countries have higher relative rates of female industrial employment. The capital labor ratio also has the expected negative effect, suggesting that industrial upgrading is defeminizing. Perhaps most interesting for the purposes of our question, however, is the interactive term, which has a positive, statistically significant effect. This result suggests that competitiveness mitigates the negative effect on female employment of capital deepening. Less competitive countries, the premature deindustrializers, have a more intense male bias of industrial upgrading.

[INSERT TABLE 1 NEAR HERE]

Figure 4 provides a monte-carlo simulation built from the previous regression. It illustrates the effect of the K/L ratio on the ratio of female to male employment in industry by deindustrial regime type. It provides another way of seeing that less competitive countries, the premature deindustrializers, have a more intense male bias of industrial upgrading.

[INSERT FIGURE 4 NEAR HERE]

## **Summary**

The late industrializers are deindustrializing at earlier stages of development than their predecessors and the global trends in the gender composition of industrial employment are evolving. Starting from the premise that industrial upgrading has a male bias, we test the hypothesis that premature deindustrialization is likely to amplify that bias.

For the empirical test and simulation, we used an economy's competitive position as a proxy for the deindustrialization regime type. To get to this position, we brought together the work of Kaldor, the Feminist scholarship, and the structuralist critiques. The results for 60 countries spanning the years 1990-2013 support our hypothesis that premature deindustrialization is likely to amplify the male bias of industrial upgrading. Of course, the evidence could be made more reliable with more refined employment data that is disaggregated by gender and skill-intensity of manufacturing industries. Even with these limitations in mind, this study does add to the nascent literature by focusing on the gendered consequences of premature deindustrialization.

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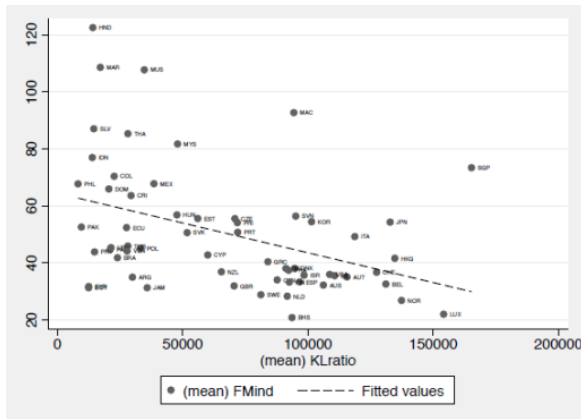
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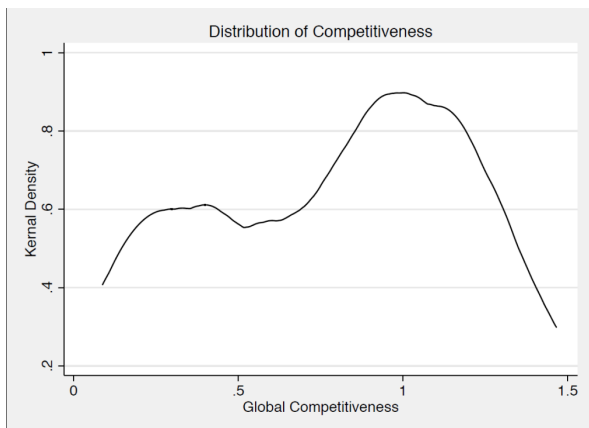
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Figure 1. Female/male industrial employment vs the K/L ratio, for 60 countries 1990-2013



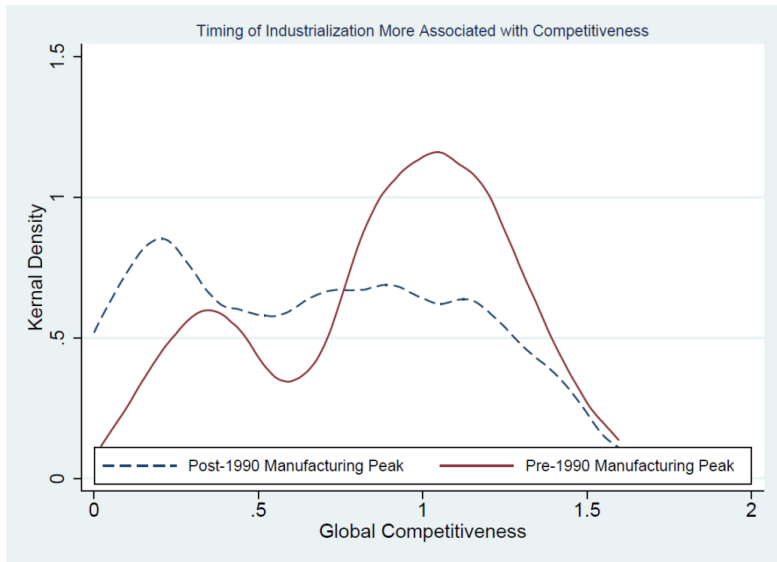
Source: Authors' Calculations.

Figure 2. Kernel density probability distribution of global competitiveness, as measured by the Balassa Index



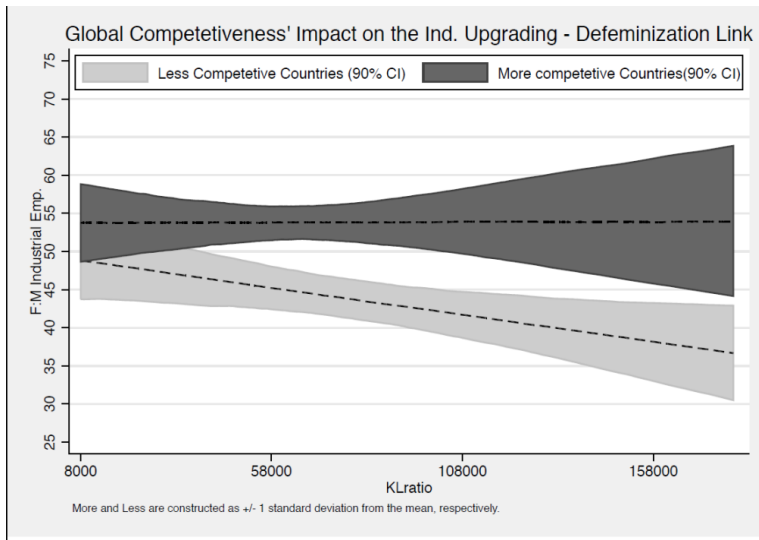
Source: Authors' Calculations.

Figure 3. Kernel density probability distributions of global competitiveness, disaggregated by timing of peak of manufacturing employment



Source: Authors' Calculations.

Figure 4. Effect of the K/L ratio on the ratio of female to male employment in industry, disaggregated by level of competitiveness



Source: Authors' Calculations.

Table 1

Table 1. Country Fixed Effects Panel Data Estimation	
Dependent Variable	F/M Industrial Employment
RCA	5.2833300* (3.0359199)
K/L ratio	-0.0001041** (0.0000471)
Interactive term RCA*KL	0.0000875** (0.0000388)
ln GDP per capita	-2.83e+01*** (3.2082587)
Share of employment in Services	0.1806848*** (0.0681036)
Female to male labor participation rate	-0.3996428*** (0.0981467)
Fertility Rate	9.3012851*** (1.3250496)
% Population Urban	0.0610313 (0.1408307)
F/M Gross Enrollment	0.0789735 (0.0723629)
Constant	2.38e+02*** (3.15e+01)
N	843
R-sq	0.918
adj. R-sq	0.91
Standard errors in parentheses, * p<.10, ** p<.05, *** p<.01	
Sample size is 60 countries covering the years 1990-2013.	
Data ILO 2014, WDI 2014.	

## Endnotes

<sup>i</sup> In this regard, Desai and Rinalda point specifically to Salzinger (2004; 2016), which argues that global production was always selective and that the lack of industrial upgrading was the cause of feminization trends.

<sup>ii</sup> Tejani and Milberg (2016) provide an in depth literature review of this linkage.

<sup>iii</sup> We recognize that competitiveness is complex. We elaborate on our measure in the next section.

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<sup>iv</sup> See also Singh (1977).

<sup>v</sup> Generally, an employment intensity measures the responsiveness of employment to output changes. See Kapsos (2005) for more detail.

<sup>vi</sup> Others have suggested that outsourcing (Alderson, 1999; Kucera and Milberg, 2003) and north-south trade have driven deindustrialization as well (Rowthorn and Couts, 2004).

<sup>vii</sup> While gender disaggregated manufacturing employment (particularly by skill intensity) would be preferable, that level of detail is less widely available.