



# Does import competition worsen the gender gap? Evidence from matched employer–employee data

Jeff Chan

Wilfrid Laurier University, Canada

## HIGHLIGHTS

- Examines effect of import competition on gender wage gap, taking into account worker and firm heterogeneity.
- High-wage female workers and firms that hire more women are more likely to exit industries affected by import shocks.
- Accounting for worker and firm selection, I find that import competition actually worsens the gender wage gap.

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## ABSTRACT

Using Italian matched employer–employee data, I examine how accounting for unobserved worker or firm heterogeneity can impact estimates of import competition's impact on industry-level gender wage gaps, and how this can be driven by changes in the composition of female workers and firms within affected industries. First, in wage regressions, I find that import competition *lowers* women's wages relative to men, but only in specifications that include worker or firm fixed effects. Accounting for these sources of heterogeneity matters because: (1) women that earn low wages are more likely than men to change industries or leave the sample, and (2) firms that employ women are more likely to exit and shrink due to import competition. My findings illustrate how, using data or methods that do not account for worker and firm heterogeneity, researchers can conclude that import competition can improve gender equality, when in fact gender equality is worsened.

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## 1. Introduction

In 2010, the median female worker earned 77 cents for every dollar earned by a man, up from 60 cents in 1980. Labour and trade economists have argued that increased competition from imports has played a role. These past studies, however, rely on pooling together multiple cross-sections to form a panel dataset and are subject to composition bias by not accounting for the entry and exit of firms and workers, particularly women.

This paper's objective is to investigate what types of female workers and firms are more impacted by import competition and how this affects industry-level gender wage gaps (GWGs). Specifically, I examine whether low-wage women and firms employing more women are more likely to exit an industry affected by higher pressure from Chinese imports. Prior research has found that industries with higher import competition have narrower GWGs. Industry-level average wages, however, conceal the fact that import competition also induces workers and firms to exit. In

particular, if narrower GWGs are driven by industry exit of low-wage women and female-heavy firms, then pressure from Chinese imports could in fact be detrimental to women. More generally, I demonstrate the importance of examining whether changes to averages of outcomes are driven by changes to worker and firm composition, an important point given the proliferation of studies that utilize industry or regional averages as outcomes of interest.

I first show that worker and firm sorting matters in wage regressions that allow for different impacts of import competition by gender. I find that import competition does not impact women more negatively than men in regressions that do not control for unobserved worker or firm heterogeneity. After adding worker or firm fixed effects, however, import competition decreases female wages more than male wages, increasing the GWG. The difference is driven by changes in the composition of workers and firms. Women, particularly low-wage earners, are more likely than men to change industries or leave employment with increased import competition. Firms that hire more women are also more likely to exit and shrink employment due to import competition; this suggests that women have fewer jobs available to them. This

E-mail address: [jchan@wlu.ca](mailto:jchan@wlu.ca).

finding is of first-order importance when understanding how increased trade openness affects women and the GWG and highlights how high-quality data can overturn results obtained using only repeated cross-sections.

My work adds to work that examines the effects of trade on GWGs. In particular, Black and Brainerd, (2004) calculate the difference between men and women's wage regression residuals and show that it narrows for industries that face more import competition, using CPS data. Ben Yahmed (2015) theoretically shows that trade openness can interact with job commitment to create differentials in changes to GWGs along the skill distribution; my paper, while also emphasizing the role of heterogeneity in trade's impact on gender outcomes, focuses on worker and firm sorting out of affected industries. Davies and Mazhikeyev (2015) shows that female-owned exporters are less productive than male-owned exporters; my work also suggests that firms with more female employees are different, but focuses on the impact of import competition and instead highlights the role of firm exit in driving gender differences. Boler et al. (in press) show how trade can drive gender wage differences, but focus on how the need to operate in multiple time zones helps explain the GWG difference between exporters and non-exporters, while I emphasize how import competition's effect on GWGs can be driven by heterogeneity in both female workers and firms that are induced to exit due to import competition.

## 2. Data description

The Veneto Worker History Panel (VWH) is a longitudinal dataset built using administrative Italian Social Security records for workers in the Italian region of Veneto.<sup>1</sup> The sample used in this paper covers the period 1985–2000. I use only those worker–year observations that can be matched to an industry in the trade data. While all jobs held by a workers at all firms are included in the data, I follow Card et al. (2014) by selecting only a worker's longest spell within a year as his or her job for that year. The VWH contains annual salary and days worked, which are used to calculate average daily wages. These nominal wages are converted to real average daily wages using industry-level price indices from Card et al. (2014).<sup>2</sup> The data covers all job spells that occur within Veneto; any workers that leave the sample may therefore be leaving because they exit the labour force, migrate outside of Veneto, or both.<sup>3</sup>

I use trade flows data as compiled by Feenstra et al. (2005) to construct my measures of import competition. The data reports trade flows at the country–industry–year level. I convert the data to 3–digit NACE industries using a concordance in order to integrate the import measures with the VWH data.

Import competition is defined as the share of imports flowing into Italy in an industry–year originating in China:

$$IMP_{st} = \frac{IMP_{st}^{CHINA}}{\sum_{c \in C} IMP_{st}^c}$$

where  $s$  subscripts industry/sector,  $t$  subscripts year, and  $c$  subscripts the country of origin. This measure has been used by Bloom et al. (2016).

One concern with estimating impacts of import competition is endogeneity. For example, industries in which labour market

outcomes are worsened may be more attractive to foreign exporters, as they may be likely to be weaker and more susceptible to competition. Conversely, industries facing a positive demand shock, which may also affect gender equality within-industry, may attract more imports from China; these confounding factors make identification of import competition's effect on GWGs challenging. I therefore instrument the Chinese share of imports by Italy in an industry with the share of Chinese imports by non-European countries. This instrument is similar to that used by Autor et al. (2013). I focus on non-EU countries to mitigate concerns that the IV uses variation from common trends or factors that apply to both industries in Veneto and the rest of Europe, such as a common demand shock. The instrument therefore utilizes only the variation in Chinese imports driven by supply-side factors, such as the large growth in Chinese productivity or reductions in industry-specific trade costs.

## 3. Results

In all Table 1 present both results estimated using OLS and using the IV described above. For brevity, I discuss only the OLS results, as the IV results largely confirm the qualitative results from OLS with similar levels of statistical significance.

The main empirical specification in Table 1 regresses logged average real daily wages,  $\ln(w_{jst})$ , on both my measure of Chinese import competition,  $IMP_{st}$ , with an interaction of  $IMP_{st}$  and a female dummy variable. The coefficient on the  $IMP_{st} * female_i$  interaction term captures any female-specific differences in response to import competition. Additional controls are described in the table.

Column 1 in Table 1 include only year, occupation, and industry fixed effects. The results corroborate prior findings; increased import competition lowers men's wages more than women's wages, narrowing the GWG.<sup>4</sup> Columns 2–4 include worker, firm, and spell fixed effects, respectively. In all three specifications, import competition actually significantly lowers women's wages, implying that the GWG widens with increased import competition once unobservable worker and firm heterogeneity is accounted for. These results suggest that investigating how worker and firms are selected into or out of affected industries is crucial to understanding the impact of import competition on the GWG.<sup>5</sup> I next investigate what types of workers and firms are sorted out of affected industries.

In order to examine the extent to which workers of different genders switch industries or leave the sample in times of high import competition, I estimate the following specification at the gender–industry–year level:

$$\ln(\text{leave}_{gst}) = \beta_0 + \beta_1 IMP_{st} + \beta_2 IMP_{st} * female_g + \delta_g + \alpha_s + \gamma_t + \epsilon_{gst} \quad (1)$$

$\ln(\text{leave}_{gst})$  is the logged number of workers of gender  $g$  who leave industry  $s$  for another industry in year  $t$ . The results in columns 1 and 5 of Table 2, which estimate this specification, show that women do change industries and leave employment in the area with relatively higher frequency compared to men as a response to import competition shocks.

I also investigate whether workers who leave an industry for another or leave employment, particularly female workers, are

<sup>4</sup> The IV estimates of this specification, in column 5, do not find a statistically significant impact of imports on wages for either men or women, but nonetheless confirm, relative to columns 6–8, that not accounting for firm or worker unobserved heterogeneity results in qualitatively different conclusions about the impacts of trade on the relative wages of women.

<sup>5</sup> This is an omitted variable bias problem. In this case, if worker or firm unobservable characteristics are correlated with both wages (which they clearly must be) as well as gender-specific import shocks but are omitted from the regression, then there is an omitted variables bias. Since worker and firm fixed effects only vary by workers or firms exiting an industry, worker and firm sorting must play a key role in the differences in results in Table 1.

<sup>1</sup> This data was previously used by Tattara and Valentini (2010).

<sup>2</sup> In practice, the measure of earnings used do not impact the results in a qualitative manner.

<sup>3</sup> While this does not invalidate my findings highlighting the importance of worker and firm selection, I am nonetheless careful to state that workers are leaving the sample by exiting employment within Veneto, and not exiting employment entirely.

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