

Globalization and earning inequality: evidence from Italian local labour markets

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1 Introduction

The impact of globalization on developed countries' economies is the subject of a heated debate at various level. While several beneficial effects deriving from imports from China and other emerging economies have been documented, including the reduction in consumer prices and possibly faster technical progress among firms exposed to import competition (Bloom et al., 2016), it has also been noticed that their rise as main trade partners has been paralleled by worsening labor market conditions and a steep increase in wage inequality in many western countries. Many developed countries have in fact experienced an increase in wage inequality in the last decades.

However, several different arguments have been provided to explain rising inequality including skill-biased technological change, changes in the institutional settings, globalization and more recently automation. In this study we investigate the link between globalization and wage inequality in Italy exploiting a unique matched employer-employees dataset comprising the universe of private sector non-agricultural employees from 1991 to 2011. We show the behaviour of wage inequality in Italy in the last three decades and the parallel trends in import penetration due to increasing trade with the rest of the world focussing on the growth of imports from China. We exploit the different exposure to trade shocks between local labour markets to identify the effect of import penetration on wage inequality.

2 Theoretical framework

Trade theory has long time ago recognized the important distributional effects that international trade can have among owners of capital and labour respectively and also among workers pertaining to different sectors and firms. The Heckscher-Ohlin model with its Stolper-Samuelson (Stolper and Samuelson, 1941) compendium predicts increasing inequality following trade liberalization in developed countries due to the expected rise in the demand for skilled labour. However, the empirical evidences provided during the nineties and early years of the new century have not been very keen on these Stolper-Samuelson effects and they have shown little empirical evidence in support of the trade-induced labor reallocation across sectors effects implied by the theoretical framework of the Stolper-Samuelson (Goldberg and Pavcnik, 2007). It follows that if openness has had any significant effect on wage distributions it should have been through intra-sectoral effects more than through the inter-sectoral effects predicted by the Stolper-Samuelson theorem.

Heterogeneous firms models (Melitz, 2003) can imply increasing wage inequality within sectors either because of changing workforce composition between firms or because of labor market imperfections. One line of research assumes competitive labor markets, so that all workers with the same characteristics are paid the same wage, but wages vary across firms as a result of changing workforce composition (Yeaple, 2005; Verhoogen, 2008; Bustos, 2011; Burstein and Vogel, 2017 and Monte, 2011). Another line of research calls for labor market frictions to show that similar workers can be paid differently according to the firm they work for. Search and matching friction models can induce wages to vary across firms (Davidson et al., 2008; Coşar et al., 2016; Helpman et al., 2010). Other studies have focused on efficiency or fair wages theories as potential sources of wage variation within sectors as the salary that induces worker effort, or is perceived to be fair, varies across firms (Egger and Kreickemeier, 2009; Amiti and Davis, 2011 and Davis and Harrigan, 2011). Other analysis have focused on the distributional effects of offshoring (Hummels et al., 2014; Feenstra and Hanson, 1997; Grossman and Rossi-Hansberg, 2008) and induced technological change (Bloom et al., 2016).

Over the last few years, more studies have given attention to the effect of trade on regional labor markets. Autor et al. (2013) investigated the effects of import competition with China on U.S. local labor market. They employed commuting zones (CZs) as regional units. Their research found that the CZs more closely associated with China reduced manufacturing employment share, had higher unemployment and lower labor force participation. Chiquiar, 2008, Topalova, 2010, Hakobyan and McLaren, 2016 and Dix-Carneiro and Kovak, 2015 Dix-Carneiro and Kovak, 2017) examined the relationship between trade liberalization and regional labor market outcomes in Mexico, India, US and Brazil, respectively.

These studies pose some questions over some of the underling hypothesis of the international trade models in particular those of workers homogeneous and fully mobile across space and sectors. In reality, labour markets tend to be segmented at the geographical level and markets more exposed to import penetration might feel long-lasting effects on occupational levels and earnings. Many studies have shown that labour market mobility is incomplete Blanchard et al. (1992) and this implies that the effects of trade shocks on local labor markets can be felt for many years.

3 Empirical strategy

We estimate the impact of trade exposure on wage inequality using the following specification:

$$\Delta Ineq_{rt} = \alpha + \beta \Delta IP_{rt} + \gamma C_r + \eta_r \quad (1)$$

where $\Delta Ineq_{rt}$ is the change in wage inequality for local labour market (hereafter LLM) r at time

t , IP_{rt} is the import penetration index for LLM r , C contains a set of control and potentially confounding factors and η_r are a set of province fixed effects. The Dependent variable is an index of wage inequality at the LLM level. We use the Gini coefficient and the log of 90/10, 90/50 and 80/20 percentiles ratios to explore the distributional effects over the period 1991-2007. Moreover, we look at differential wage effects looking at the log of the 10th, 20th, 50th, 80th and 90th quantiles.

The import exposure variable is measured as:

$$IP_{rt} = \sum_j \frac{L_{rjt}}{L_{jt}} \frac{M_{jt}}{L_{rt}}$$

where L_{rjt} is employment in LLM r industry j , L_{jt} is total employment in industry j , L_{rt} total employment in LLM r , M_{jt} are imports from China in industry j . The vector C contains a set of controls for LLM starting year labor force and demographic composition that might independently affect employment and earnings.

Any analysis trying to disentangle a causal effect of trade shocks on labour markets needs to address the potential endogeneity problem. This arises because unobservable characteristics of the local labour market are likely to be correlated with trade shocks. Therefore, simple OLS estimation can produce biased estimates because unobservable demand shocks in the error term are likely to be correlated to changes in import exposure. If imports from China are correlated with demand shocks then OLS may bias upwards the effect of imports from China on earnings as both earnings and imports might be positively correlated to unobserved domestic demand shocks.

To address this problem we need to identify a country whose surge in imports is mainly determined by internal reasons as increased productivity and lower trade barriers. Once this country has been identified, and China is a ideal suspect, we need to isolate the part of the import surge that comes from the supply shock to the one that might come from internal demand shocks. This can be done by using the import flows going into other countries as an instrument.

Autor et al. (2013) instrument for the growth in US imports from China with Chinese import growth into other developed countries. The underlying assumption is that the surge in Chinese imports is caused by Chinese internal supply shocks and by the removal of global impediments to Chinese trade (i.e market reforms and WTO membership). The validity of this approach rests on the fact that demand shocks of the other countries whose imports are adopted as instrument are uncorrelated with domestic demand shocks. If demand shocks across developed countries are correlated then also the IV estimates will be upward biased. Apart from domestic demand shocks also domestic supply shocks can affect identification causing a downward bias in the estimates of the effect of imports on earnings. If domestic productivity or technology shocks drive imports from third countries and are common to high-income countries then IV will fail to correct for the possible bias. This would be the case if poor productivity growth in one domestic sector causes a decrease of domestic sales both domestically and abroad or if technology shocks common to developed countries adversely affect their labour intensive industries. It cannot be ruled out completely that adverse supply conditions in developed countries influence imports but there is compelling evidence showing that the surge in Chinese exports is mainly driven by internal factors and that it is import driving technological change rather than the opposite (Bloom et al., 2016).

We use an instrumental variable approach to address endogeneity concerns. We instrument import from China using the sectoral composition of Chinese imports in a set of developed countries. We use US, Australia, Japan, Canada and New Zealand.

The instrument is computed as:

$$IP_{r,t-1}^{oth} = \sum_j \frac{L_{rj,t-1}}{L_{j,t-1}} \frac{M_{jt}^{oth}}{L_{r,t-1}}$$

where L_{rjt} is employment in LLM r in industry j , L_{jt} is total employment in industry j , L_{rt} total employment in LLM r , M_{jt}^{oth} are other countries imports from China in industry j . An additional feature of the instrument is that in place of start-of-period employment levels by industry and province it uses employment levels from the prior decade ($t-1$). This is done in order to avoid a simultaneity bias as contemporaneous employment is affected by anticipated China trade.

The above approach looks at the overall level of wage inequality without accounting for differences in individual characteristics. A slightly different research question concerns the effect of globalization on residual wage inequality where residual wage inequality is defined as the inequality in earnings for workers with the same characteristics (i.e. gender, education and experience). Residual wage inequality measures the premium on unobserved skills after controlling for observed skill gaps.

To measure the effect of globalization on residual wage inequality we adopt a region IV quantile approach developed by Chetverikov et al. (2016) to identify the effect of trade shocks on wage inequality. The econometric model is a two stage procedure. In the first step we run quantiles regressions of the individuals log daily earnings on individual characteristics for each LLM separately as follows:

$$\ln(w_{irt}) = \alpha_{rt} + X_{irt}\lambda_{rt} + e_{irt}$$

where the dependent variable is the natural logarithm on daily wage for worker i in LLM r in year t ; α_{rt} are LLM fixed effects and X is a set of worker characteristics that include age and age squared, gender, dummies for occupation categories (blue-collars, white-collars, managers and apprentices), and dummies for part-time vs full-time and permanent vs fixed-term contract. We estimate the above equation for each quantile-LLM-year separately following Chetverikov et al. (2016). The LLM effects α_{rt} are the LLM average log wages for each quantile deperated by the variation due to observable worker characteristics. The second steps involves the estimation of the regression between the LLM effects estimated in the first step and the import penetration index.

$$\Delta\alpha_{rt} = \alpha_{rt} - \alpha_{r,1991} = \psi + \beta\Delta IP_{rt} + \gamma C_r + \eta_r \quad (2)$$

4 Data

We use the Italian Istituto Nazionale di Previdenza Sociale (INPS) data on the universe of private non-agriculture labor contracts to derive information on wages at the local municipal level and on employment by sector.

Data on wages from the INPS database are based on administrative declarations to the social security institute and contain information for each contract on the annual wage, the number of days worked and the main characteristics of the employee and the firm. To obtain our daily wage measure at the individual level we need to undertake some intermediate steps from the raw data. For workers that have worked in more than one LLM in a given year we only take the main LLM defined as the LLM where the worker obtains the highest part of her earnings. We then sum up all job contracts maintained by a single workers to compute the gross daily wage at the individual and LLM level. We trim the top and bottom 0.1% of the observations to reduce the influence of extreme values. Our measures of inequality are the gini coefficient of the daily gross wage and the ratios of wages at different percentiles of the wage distribution.

Employment by sector-province comes from the industrial sector of each firm in the INPS dataset. We have complete data on the NACE (Ateco 1991) sector for each firm only from 1991 onwards and so we restrict the analysis to the interval 1991-2017. We obtain employment for 351 3digits

NACE sectors.

Trade data come from the UN Comtrade dataset and follow the SITC3 classification at 5 digit disaggregation. We match the SITC3 to NACE1 classification developed by WITS. Employment and trade data allow us to compute the import exposure index for each province from 1991 to 2017. Import exposure refers to the manufacturing sector excluding agriculture for which we have no employment data and the service sector for which we have no trade data. Thus, exposure means exposure to manufacture imports from China.

Demographic data come from the ISTAT population census of 1991, 2001 and 2011. We have data on municipality population, female employment, foreign born population, share of college educated people. We weight observations by start of period LLM population shares. Standard errors are clustered at the regional level to account for spatial correlations across LLM within the same region.

[Insert tables 1-4]

5 Results

Table 1 presents estimates of the relationship between Chinese import penetration and some key wage inequality measures and wages at different percentiles of the wage distribution. The estimation follows the specification in (1) and employs the instrumental variable approach highlighted above. The 1991-2007 estimation is run stacking the period 1991-2001 and the 2001-2007 first differences and adding a time period dummy.

Results show that an increase in LLM import exposure increases the LLM gini coefficient and other measures of wage inequality. The coefficient in the first column of table 1 implies that a one percentage point increase in the import exposure per worker rises the gini coefficient by 0.05 percentage points.

Table 1: Chinese import penetration and wage distribution 1991-2007

	(1)	(2)	(3)	(4)	(5)	(6)			
	$\Delta \ln gini$	$\Delta \ln ratio_{99/1}$	$\Delta \ln ratio_{95/5}$	$\Delta \ln ratio_{90/10}$	$\Delta \ln ratio_{90/50}$	$\Delta \ln ratio_{80/20}$			
$\Delta \ln IP$	0.0517** (0.02)	0.101** (0.04)	0.116** (0.05)	0.0945** (0.04)	0.0445 (0.03)	0.0366** (0.02)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$\Delta \ln p_1$	$\Delta \ln p_5$	$\Delta \ln p_{10}$	$\Delta \ln p_{20}$	$\Delta \ln p_{50}$	$\Delta \ln p_{80}$	$\Delta \ln p_{90}$	$\Delta \ln p_{95}$	$\Delta \ln p_{99}$
$\Delta \ln IP$	-0.0613* (0.03)	-0.0707** (0.03)	-0.0448* (0.03)	-0.00999 (0.02)	0.00522 (0.01)	0.0266** (0.01)	0.0497 (0.03)	0.0455 (0.04)	0.0393 (0.04)

N=1222. All regressions include a constant, a time dummy and controls for LLM start of period employment to population ratio and female, foreign born, blue-collar and manufacture ratios of total employment.

Observation are weighted by start of period LLM population shares. Region-clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The bottom panel of table 1 contains results of estimations of the impact of import penetration on

the daily wages at different percentiles of the wage distribution. Import exposure has a negative effect on lower wages particularly the at the first quantile of the distribution. A one percentage point increase in the import penetration reduces wages growth at the first quantile by 0.045 percentage points. It increases instead wages at the top of the distribution although the effect is statistically significant only for wages at the 8th quantile.

Table 2 and 3 below show results for the same model but this time estimated separately for the 1991-2001 and 2001-2007 periods. Results for the 1991-2001 period show that the inequality enhancing effect of Chinese import penetration is mainly concentrated in the first decade considered. In fact, table 2 shows that a one percentage point increase in the import penetration rises the gini coefficient by 0.08 percentage points. In the 2001-2007 period the effect is reverted although smaller in magnitude.

Table 2: Chinese import penetration and wage distribution 1991-2001

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta \ln gini$	$\Delta \ln ratio_{99/1}$	$\Delta \ln ratio_{95/5}$	$\Delta \ln ratio_{90/10}$	$\Delta \ln ratio_{90/50}$	$\Delta \ln ratio_{80/20}$
$\Delta \ln IP$	0.0859** (0.04)	0.177** (0.06)	0.193** (0.08)	0.173*** (0.06)	0.0694 (0.04)	0.0516** (0.03)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$\Delta \ln p_1$	$\Delta \ln p_5$	$\Delta \ln p_{10}$	$\Delta \ln p_{20}$	$\Delta \ln p_{50}$	$\Delta \ln p_{80}$	$\Delta \ln p_{90}$	$\Delta \ln p_{95}$	$\Delta \ln p_{99}$
$\Delta \ln IP$	-0.105** (0.05)	-0.112** (0.06)	-0.0937** (0.04)	-0.0119 (0.03)	0.00987 (0.02)	0.0397** (0.02)	0.0792** (0.05)	0.0803 (0.05)	0.0717 (0.05)

N=611. All regressions include a constant, a time dummy and controls for LLM start of period employment to population ratio and female, foreign born, blue-collar and manufacture ratios of total employment.

Observation are weighted by start of period LLM population shares. Region-clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Chinese import penetration and wage distribution 2001-2007

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta \ln gini$	$\Delta \ln ratio_{99/1}$	$\Delta \ln ratio_{95/5}$	$\Delta \ln ratio_{90/10}$	$\Delta \ln ratio_{90/50}$	$\Delta \ln ratio_{80/20}$
$\Delta \ln IP$	-0.0347** (0.01)	-0.0504 (0.06)	-0.0562** (0.03)	-0.0675*** (0.02)	-0.0230 (0.02)	-0.0156 (0.02)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$\Delta \ln p1$	$\Delta \ln p5$	$\Delta \ln p10$	$\Delta \ln p20$	$\Delta \ln p50$	$\Delta \ln p80$	$\Delta \ln p90$	$\Delta \ln p95$	$\Delta \ln p99$
$\Delta \ln IP$	0.00473 (0.04)	0.0134 (0.02)	0.0395** (0.02)	0.0000 (0.02)	-0.00494 (0.01)	-0.0155 (0.01)	-0.0280 (0.02)	-0.0428** (0.02)	-0.0456 (0.04)

N=611. All regressions include a constant, a time dummy and controls for LLM start of period employment to population ratio and female, foreign born, blue-collar and manufacture ratios of total employment.

Observation are weighted by start of period LLM population shares. Region-clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

An interesting question concerns whether trade openness influences returns to observable worker characteristics (i.e. the observable skill premium) or returns to unobservable characteristics (i.e. the residual wage). Different trade theories have different implication for the returns to skills vs residual wage effect. Standard trade models tend to imply that openness should affect the skill premium through reduced demand for low-skilled workers due to competing imports from low-income countries coupled with increased demand for high-skilled jobs in exporting firms. Theories of heterogeneous firms however suggest that openness could have an impact on residual wage inequality. Trade models augmented with labour market match and searching frictions or fair wage or efficiency wage models all imply that workers with similar characteristics can receive different wages following increased trade openness leading to higher dispersion in residual wages.

In order to investigate the effect of Chinese penetration on residual wages we adopt the quantile regression approach described above. We thus run quantile regressions for each LLM separately where we estimate the wage for each quantile/LLM combination as a function of observable worker and job characteristics. We then filter out of the individual's wage the returns to observable worker characteristics and obtain the residual wage. The average residual wage for each quantile/LLM is our measure of residual wage. We then explore how import penetration influenced residual wages at different quantiles using equation 2 above.

Table 4 shows the results for the stacked first difference 1991-2007 model. The effect of import penetration on the 90/10, 80/20 and 90/50 ratios although positive is not statistically different from zero. The effect is in fact negative on residual wage growth for all quantiles of the wage distribution. Although the coefficients are quantitatively larger at the bottom two quantiles the 10th quantile is not statistically significant. The effect on wage inequality that was quite precisely estimated when looking at the overall wage is not so well established when looking at residual wage inequality only. This last result seems to suggest that import penetration has had an impact more through changing returns to observable workers characteristics at different level of the wage distribution than on residual wage inequality.

Table 4: Chinese import penetration and residual wage distribution 1991-2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\Delta \ln p10$	$\Delta \ln p20$	$\Delta \ln p50$	$\Delta \ln p80$	$\Delta \ln p90$	$\Delta \ln ratio90/10$	$\Delta \ln ratio80/20$	$\Delta \ln ratio90/50$
$\Delta \ln IP$	-0.113 (0.08)	-0.0851* (0.05)	-0.0139 (0.03)	-0.0318* (0.02)	-0.0195 (0.01)	0.0932 (0.09)	0.0533 (0.05)	0.0004 (0.02)

N=1222. All regressions include a constant, a time dummy and controls for LLM start of period employment to population ratio and female, foreign born, blue-collar and manufacture ratios of total employment.

Observation are weighted by start of period LLM population shares. Region-clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Chinese import penetration and residual wage distribution 1991-2001

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\Delta \ln p_{10}$	$\Delta \ln p_{20}$	$\Delta \ln p_{50}$	$\Delta \ln p_{80}$	$\Delta \ln p_{90}$	$\Delta \ln \text{ratio}_{90/10}$	$\Delta \ln \text{ratio}_{80/20}$	$\Delta \ln \text{ratio}_{90/50}$
$\Delta \ln IP$	-0.186 (0.13)	-0.128* (0.08)	-0.0126 (0.05)	-0.0453* (0.03)	-0.0270 (0.02)	0.159 (0.14)	0.0825 (0.07)	-0.0063 (0.03)

N=611. All regressions include a constant, a time dummy and controls for LLM start of period employment to population ratio and female, foreign born, blue-collar and manufacture ratios of total employment.

Observation are weighted by start of period LLM population shares. Region-clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Chinese import penetration and residual wage distribution 2001-2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\Delta \ln p_{10}$	$\Delta \ln p_{20}$	$\Delta \ln p_{50}$	$\Delta \ln p_{80}$	$\Delta \ln p_{90}$	$\Delta \ln \text{ratio}_{90/10}$	$\Delta \ln \text{ratio}_{80/20}$	$\Delta \ln \text{ratio}_{90/50}$
$\Delta \ln IP$	-0.0020 (0.04)	-0.0196 (0.02)	-0.0125 (0.01)	-0.0068 (0.02)	-0.0039 (0.02)	0.0019 (0.04)	0.0128 (0.02)	0.0086 (0.01)

N=611. All regressions include a constant, a time dummy and controls for LLM start of period employment to population ratio and female, foreign born, blue-collar and manufacture ratios of total employment.

Observation are weighted by start of period LLM population shares. Region-clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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