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Skill upgrading and exports

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HIGHLIGHTS

- Analysis of the causal impact of exports on the relative demand for skilled workers.
- We use the world demand as an exogenous pull factor for local exports.
- Exports generate a sizable quality upgrading in the employed labor force.

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ABSTRACT

This paper analyzes the effects of international trade on the relative demand for skilled workers in Italian local labor markets. We find that exports cause a sizable skill upgrading in the labor force by increasing the average level of education of the workforce and the share of white-collars workers.

1. Introduction

In this paper we empirically evaluate the effect of exports on the skill content of labor in Italian provinces. This papers adds to the long history of analyses of the effects of trade on labor market outcomes. Following this tradition we distinguish at least two different strands: (i) the heated policy debate of the mid-90s on the impact of imports from developing low-skilled labor abundant countries on advanced economies' labor markets (Lawrence and Slaughter, 1993; Sachs and Shatz, 1994; Wood, 1995); (ii) the effect of firms' export activity on labor market outcomes, possibly through the adoption of new technology encouraged by the increased profitability of foreign markets (Yeaple, 2005; Bustos, 2011b; Verhoogen, 2008; Helpman et al., 2010; Davis and Harrigan, 2007; Amiti and Davis, 2008; Egger and Kreickemeier, 2009).

Empirical evidence on the causal impact of exports on labor market outcomes focuses mostly on developing economies (Verhoogen, 2008; Frias et al., 2011, 2012; Bustos, 2011a). The aim of this paper is to fill this gap and estimate the causal impact of exports on the skill content of employment in Italian local labor markets over the period 2000–06.[1] By using an instrumental variable approach that exploits world demand as a pull factor, we show that an increase in exports generates a sizable process of quality upgrading in the labor force, as captured by the increase in the average schooling level of employed workers and in the share of white-collar workers.

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[1] Other papers deal with the trade impact on the Italian wage and employment by skill. Contrary to our results Manasse et al. (2004) conclude that exports have a negative effect on white-collar employment shares, while Falzoni et al. (2011) find a positive effect on low-skilled workers' wages. Matano and Naticchioni (2010) find, instead, that sales to developing countries raise white-collar workers' employment share and wage premia. These papers cannot be easily compared to ours for two reasons: they do not deal with the endogeneity of exports; they all refer mostly to the 1990s, a period when the pre-euro European institutional framework, the Italian labor market institutions, and the intensity and patterns of worldwide trade flows were totally different from those underlying our analysis. Macis and Schivardi (2012) use a linked employer–employee dataset and exploit the 1992 lira devaluation to show that the export wage premium is due to exporting firms paying a wage premium to all its workers and employing workers whose skills command a higher price following devaluation.

An increase in the demand for skilled labor as a reaction to increased export may be explained by several trade theories. Under the traditional Heckscher–Ohlin–Samuelson (HOS) mechanism of comparative advantages, skill intensity should increase (decrease) when skilled labor abundant countries increase their export flows to less (more) skilled labor abundant markets. New-new trade theory, based on heterogeneous firms and selection into the trade activity, predicts that the increase in the skill content of a firm's labor force is due to the joint effect of the increased profitability of foreign markets, that favors the adoption of new technologies, and to the stronger complementarity between new technologies and skilled labor. Our preferred interpretation of our estimates points to this latter mechanism.[2]

This paper contributes to the literature in three ways. First, from an empirical perspective, the cited studies focusing on trade liberalizations or dramatic devaluations are very robust but they are lacking in terms of external validity. Our instrumental variable approach, which can be used for countries that have not experienced path-breaking trade shocks in recent years, applies to a much wider set of countries. Second, although theoretical models are usually solved in general equilibrium, all past empirical validations have a firm-level perspective; we focus instead on local labor markets, which allows us to estimate the direct (on the exporting firms) and indirect (on all other firms in the same labor market) effects by tracking labor market outcomes for the entire population and by appraising the possible reallocation of workers across firms.[3] Third, unlike most of the existing empirical papers we use a richer definition of skill intensity that includes not only the occupational status (white- or blue-collar workers), but also the level of education.[4]

To sum up, this is the first paper to analyze the causal effects of exports on skill upgrading with a local labor market focus. Doing so we complement Autor et al. (forthcoming) who tackle a different line of research in a similar setting. While they study the causal impact of imports from China on a number of labor market outcomes (employment, wages, unemployment, transfers, etc.) to US commuting zones, we provide evidence of the causal impact of exports of Italian firms on the skill content of the local labor force.[5]

2. Empirical specification and identification

We estimate the following equation:

$$SI_{pst} = \alpha_{ps} + \beta \ln X_{pst} + \gamma_1 D_t + \gamma_2 D_s * D_t + \varepsilon_{pst} \quad (1)$$

where SI_{pst} is the average skill intensity of workers in sector s, province p and year t. Skill intensity is proxied by either the log of average schooling or the share of white-collar workers. X_{pst} are export flows from sector s and province p at time t. α_{ps} is a set of fixed effects by sector and province: they capture time-invariant differences in skill intensity across sectors and provinces, like, for example, the presence of universities (that are likely to increase the local supply of skilled individuals) or the existence of highly productive firms (that employ both qualified individuals and record large flows of exports). D_t is a set of year dummies. The interaction terms between sector and time dummies ($D_s * D_t$) control for a sector-specific year effect due, for example, to technological changes or import competition. All regressions are weighted according to the size of the observational cell in terms of the number of individuals interviewed within the Labor Force Survey (see Section 3 for more details); standard errors are clustered at the sector-province level.

Table 1
Statistics: average 2000–06.
Source: Authors' calculations.

	No. obs.	Mean	Standard deviation
Log (Average level of education)	12,171	2.283	0.118
Average level of education	12,171	9.879	1.184
Share of white-collar workers	12,171	0.274	0.159
Log(Exports)	12,171	4.975	2.216
Exports	12,171	669.1	1264.60

Note: Weighted averages according to the size of each cell (in terms of interviewed individuals).

We concentrate our analysis on the 2000–2006 period. We focus on the period after the introduction of the euro and before the 2008–09 crisis to rule out confounding factors like large exchange rate fluctuations or the collapse of world trade in 2008.

The coefficient of interest is β which captures the relationship between exports and skill intensity. Its estimation by a fixed effect model (FE) like (1) is potentially biased in at least two respects. First, there could be an omitted variable bias: skill-biased technical change could affect both exports and demand for skilled labor, inducing an upward bias in the FE estimates. A second issue of concern is reverse causality: for example, firms getting prepared for exports could increase their share of skilled workers before starting to export so that the FE estimates would be downward biased. To address these concerns we resort to an instrumental variable-fixed effect estimation (IV-FE) where we instrument province/sector exports with a demand pull variable constructed as follows:

$$\hat{X}_{pst} = \sum_c X_{psct_0} \frac{M_{sct}}{M_{sct_0}} \quad (2)$$

where X_{psct_0} is the export flow from province p, sector s to country c in an initial period t_0 (1995 in our data), M_{sct} and M_{sct_0} are the imports of country c from the world (excluding Italy) in a sector s at time, respectively, t and t_0. In words, the instrument $\hat{X}_{pst}$ is constructed by appending the dynamics of the destination country's total sectoral imports to the initial sector-province level of exports to that country.

The exclusion restriction is based on the hypothesis that foreign demand in a certain sector is sufficiently exogenous to local exporting performance. This requires that all sector-province exports toward each country are small enough not to influence the trading partners' demand (i.e. X_{psct_0}/M_{sct_0} is low). We deem that this is guaranteed by the fact that the 99-th percentile of X_{psct_0}/M_{sct_0} distribution is 0.0008. These *abnormal* trade flows account for the 0.26% of total Italian exports in 1995 and their exclusion does not affect our final result. This supports our idea that even the relatively largest sector-province export flows are negligible in comparison with world trade.

3. Data

The key dataset is the microdata of the Italian Labor Force survey (henceforth LFS): each quarter the Italian National Institute

[2] Further empirical evidence, available upon request, shows that trade shocks hitting sector-provinces initially more open to skilled labor abundant countries (skill intensity is approximated by per capita GDP in PPP) generated a process of skill upgrading of the labor force not statistically different from the one caused by a trade shock hitting a sector-province initially more exposed to unskilled labor abundant countries. This contradicts HOS's predictions.

[3] This obviously comes at a cost: this paper cannot be considered a direct test of the different mechanisms highlighted in the theoretical models that are based on firms' behavior and highlight heterogeneous effects among firms.

[4] For the sake of clarity, it is important to note that, in this study, skill content is measured in terms of the level of competence attained by workers at school and of occupational status (white- or blue-collar). We do not investigate, however, on-the-job human capital accumulation which, in any case, appears to be a negligible phenomenon in Italy. Our data (based on the Italian Labor Force Survey; see Section 3) show, indeed, that on-the-job human capital accumulation is really rare: just the one per cent of employed individuals were enrolled at school over the period 2000–06. This implies that the effect of exports on skill intensity can be due either to the reallocation of workers across provinces or sectors or to the turnover (hiring/firing) of individuals with different skill levels. Unfortunately, our data do not allow us to disentangle these two mechanisms.

[5] A similar identification strategy ensures the causal interpretation of results in both studies—Autor et al. (forthcoming) uses the growth of imports from China in a set of advanced economies (excluding US) as an exogenous supply shock.