Migration, labor tasks and production structure ☆

Giuseppe De Arcangelis [a], Edoardo Di Porto [b], Gianluca Santoni [c,*]

[a] Dipartimento di Scienze Sociali ed Economiche, Sapienza University of Rome, Italy
[b] DISES and CSEF, University of Naples Federico II and UCFS, Uppsala University, Sweden
[c] CEPII, France

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ABSTRACT

We assess the effect of migrants' stock on the production structure of the Italian provinces (NUTS3) in 1995–2006. Although the investigated time span is very short, the effect is small but statistically significant: a doubling in the ratio of foreign-born residents to the province population induces a significant increase in manufactures' value added with respect to services' value added between 12 and 21 per cent. These effects are more intense when considering an increase in foreign-born populations drawn from countries more different to Italy (in terms of GDP per capita and educational attainment).
These results are compatible with the reduced form of a two-sector model where we assume that production is performed with one mobile factor and two sector-specific CES labor composites of *simple* and *complex* tasks. If migrants and natives have different productivity when performing simple or complex tasks, an inflow of migrants induces production restructuring in favor of the simple-task intensive sector.

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1. Introduction

In the last decades industrialized economies in North America and in Europe (Continental and UK) have been the destination of many migrants coming from neighbor countries – like Mexico for the US, or North Africa and Eastern Europe for the European Union (EU) – and from more distant origins – for instance, China and South-East Asia.

The incidence of foreign-born population on natives has almost doubled on average starting in 1990 (not counting undocumented migration), but with many different patterns among the various destination countries.

When investigating the effects on the receivers, economists have highly exploited the regional dimension in order to deal mainly with labor market issues (see Okkerse, 2008, for a recent review).

The debate has focussed intensively on the reaction of wages and natives' unemployment rates when the labor force increases due to immigration. In the US a great deal of studies focuses on the low-educated segment of the labor market, which is the one that may be affected the most.[1] In Europe the effect is even more mitigated.[2]

Our work focuses on another issue, that is the effect of immigration on the production structure in terms of sectorial recomposition as a byproduct of the effect on regional labor markets.

We borrow from the intuition of traditional theories of international trade, where immigration can be considered as an increase in one of the factor endowments in a multi-sector (or, simply, two-sector) model

[1] Among the many articles on the subject, Borjas (2003) and Borjas and Katz (2007) found a significative effect on US wages, whereas Card (2007) does not confirm this finding. Ottaviano and Peri (2012) challenge the traditional approach by pointing at the imperfect substitution between natives and migrants in the detailed and fine segments (or cells) of the labor market.
[2] See D'Amuri and Peri (2011) and D'Amuri and Peri (2012). They considered all segments of the European labor markets and not only the low-educated one, as mainly investigated in the US.

that can give rise to different adjustments on the production structure, besides the effect on factor prices. The most relevant ones are the changes in production techniques or, alternatively, the changes in the production mix, also known as the Rybczynski effect.[3]

The main contribution of this paper is empirical. However, we also show that the estimated reduced form can be derived from a theoretical framework that is an extension of the one-sector models recently used in this literature (see Peri and Sparber, 2009; D'Amuri and Peri, 2012).

More precisely, we relate to the recent literature in tasks and offshoring (see, for instance, Grossman and Rossi-Hansberg, 2008) that highlights the importance of *labor services* (or *tasks*) when considering the labor market. As natives and foreign-born are assumed to have different relative productivity in performing simple versus complex tasks, immigration is a comparative statics exercise that changes the relative endowment of the economy in terms of labor services and requires a change in the production structure under some given conditions.

Previous studies have investigated the change in factor endowments implied by immigration and have considered two possible effects when wages are not affected, as in our case.

First, migration may induce firms to switch to techniques that are more complementary to the characteristics of the new labor force. For instance, Hanson and Slaughter (2002) considered the local effect in the US states between 1980 and 1990, whereas Gandal et al. (2004) analyzed the particular case of the sudden inflow of migrants from the former Soviet Union in Israel in 1990. Although the two cases are different in terms of types of immigration – typically low-skilled Mexicans in the former case, but high-skilled Russians in the latter – the authors conclude for a more relevant role of the changes in production techniques rather than the change in the production mix.[4] Along the same line, Lewis (2004) analyzed the large inflow of Cuban migrants in Miami through the Mariel boatlift and reached similar conclusions on the rate of technology adoption (i.e., towards less computer-based techniques in Miami with respect to similar cities in the US) rather than an effect in the industry mix.

Recent studies also emphasize the *type of change* in production techniques; in particular, whether there is an increase or a decrease in the capital-to-labor ratio. Accetturo et al. (2012) conclude for an increase in the ratio when using Italian manufacturing data at the firm level, whereas Lewis (2011) finds a tendency to slow the adoption of automated techniques in US metropolitan areas where migration has been more intense.

Second, immigration may cause an effect in the production structure, but at a highly disaggregated level. Card and Lewis (2007) and Card (2007) find effects on the production structure, but claim that this occurs *within sectors* (or *within firms*) rather than between sectors. Bettin et al. (2012) find evidence of production recomposition in favor of low-skilled manufacturing when using firm-level data for the case of Italy, but only for the years 2001–2003.

More recent work has focused on the composition of the labor force, which generally implies that migration increases the ratio of low-skilled to high-skilled workers.[5] As recalled above, most contributions, like Peri and Sparber (2009) or D'Amuri and Peri (2014), are more interested in the effect of migration in the relative wage and use a one-sector model as a reference. D'Amuri and Pinotti (2010) use a similar framework to ours in order to address the effect of migration on female labor supply.

Besides the US and overall Europe, there have been recent studies on other specific countries. González and Ortega (2011) consider the case

of Spain, which has some similarities to the Italian case because of the rapid and intense inflow of immigrants (from 4.8% to 10.8% of the population between 2001 and 2006). They find that the adjustment has occurred mainly in production techniques with firms located in the high-immigration regions employing relatively more unskilled labor than firms located in similar low-migration regions. Dustmann and Glitz (2015) analyze the case of Germany with firm-level data and distinguish the effects of migration depending on whether we consider a traded or a nontraded sector. In the latter case, they find an effect on factor prices, whereas in traded sectors the adjustment occurs on both the output mix and the change in techniques, but mainly through the latter with firms taking advantage of the greater availability of low-skilled labor. The other important contribution by Dustmann and Glitz (2015) is the effect on the dynamics of entry and exit of heterogeneous firms as a consequence of the labor supply shock caused by immigration.

The contribution of this paper is twofold.

First, we propose a *two-sector* version of the task-based model initially proposed by Peri and Sparber (2009) that resembles the traditional *sector-specific* model of international trade – see Jones (1971), or Feenstra (2004, p.72).

Similarly to (Peri and Sparber, 2009), migrants are *relatively* more productive when performing simple tasks; therefore, since they are willing to supply relatively more simple than complex tasks, the inflow of new migrants causes an increase in the *relative* supply of simple labor services in the overall economy.

Differently from Peri and Sparber (2009), since we assume that output prices are given, the relative wage of complex-to-simple tasks is given. This assumption implies a completely different way of closing the model: the equilibrium is established with the compatible weight of the two sectors in determining a total weighted sum of relative demand for tasks and no longer by the relative wage. Hence, the inflow of new migrants causes an adjustment in the production structure in favor to the simple-task intensive sector rather than on the relative wage of simple-to-complex tasks.

Second, we use Italian provincial data to test for the effect on the production structure of immigration stock changes, which is compatible with the reduced form of our theoretical framework. More precisely, we used the data on foreign-born work permits at the provincial level (NUTS3) starting in the mid-1990s – i.e. the years where the migration presence has become more relevant for the Italian economy – in order to estimate production-composition changes that, we expect, are in favor of manufacturing plus construction (i.e. the relative simple-task intensive aggregate sector) with respect to a subset of services (i.e. the relative complex-task intensive sector).

Many other studies have used regional data within the same country in order to evaluate the effect of migration on wages and some concerns have been raised about the use of regional data following the remark by Borjas et al. (1996), i.e. the fact that the use of regional data may show an attenuated variation due to a dominant national effect. This concern is less important in our case where the production structure can vary substantially among the regions of the same country.

We highlight that, among the receiving developed countries, Italy stands out as an interesting setting. Immigration has been very rapid, notwithstanding the absence of colonial ties with the origin countries. From 1995 to 2006 (our sample period) immigration in Italy has increased by a factor of three. Moreover, the immigration has been very diverse in terms of origin countries and both our theoretical framework and empirical model will take account of these characteristics.

Our main empirical findings are encouraging and bring to two main conclusions.

First, an increase in immigration rates (i.e. percentage of foreign-born residents on the total population of the province) raises the relative weight of the simple-task intensive sector, identified as manufacturing and construction. In terms of value added, a doubling of foreign-born presence in percentage terms causes an increase in the

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[3] Recently, Romalis (2004) obtains the Rybczynski result in a revised Heckscher-Ohlin model.

[4] They relate their results to the debate on skill-biased technological change in the US, or *imported* skill-biased technological change in the case of Israel.

[5] The excellent survey in Lewis (2013) shows the mathematical conditions required in the production function to marginalize the effect on capital and concentrate on the ratio low- to high-skilled labor as emphasized in the recent literature, e.g. Ottaviano and Peri (2012).