Migration, Production Structure and Exports
Some New Evidence from Italy

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(preliminary and incomplete)

Abstract

In this paper we study the effect of migration in a two-sector model where production is performed with one freely mobile factor and sector-specific CES composites of labor services. Factor demands in the two sectors are specified in terms of labor services and they differ since the the two types of labor services have different productivities to achieve the two tasks. While the freely mobile factor is inelastically supplied and is given within the geographical area that we consider, individuals supply labor services to serve two different types of tasks – simple and complex tasks. Migrants and natives differ in terms of productivity in performing the different tasks. The model shows that an inflow of migrants has an effect on the production structure in favor of the sector that needs more intensively simple tasks, like manufacturing, in the spirit of the Rybczynski effect. In this version of the model the owners of the freely mobile factor gains from immigration since the remuneration of the mobile factor inequivocably rises in nominal and real terms.

We take advantage of a detailed data set of migrants' work permits at the provincial level (NUTS3) in Italy to assess the effect of migrants' inflows on the production and export structure of the Italian provinces. By assuming that the service sector is relatively more intensive in complex rather than simple tasks with respect to the manufacturing sector, our theoretical model is confirmed by the data. We find that in provinces relatively more endowed with migrants the production structure is characterized by a lower services-to-manufacturing ratio in value-added terms. The same pattern is confirmed in the export structure. Nationality concentration seems also to play a role

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1 Introduction

The effect of immigration on the production and export structure of an economy is a highly debated topic. In the traditional Rybczynski framework, a relative increase in the production factor embodied in the migration inflow will bias the production structure towards sectors that more intensively use the increased factor. Indeed, although young and well-educated, legal migrants are usually employed in low-skill positions and are paid less than natives. So, inflows of new migrants usually lower low-skilled wages and favor industries that use relatively more unskilled workers (see for instance Gandal, et al., 2004). In a more dynamic framework, by taking advantage of cheaper effective labor, domestic industries have a strong incentive to delay restructuring and to lag behind in the switch towards more labor-saving technologies.

Figure 1: The Stock of Residence Permits in Italy 1995-2006. (Source: Italian Ministry of the Interior and ISTAT.
Note: there are three clear breakpoints in the data, referring to the introduction of three major amnesties, during 1996 (law n.617/1996) 1998 (law *Turco-Napolitano*) and 2002 (law *Bossi-Fini*).

Indeed, in the recent years the international mobility of workers has increased rapidly. Recent estimates by United Nations reports, in year 2005, over 200 million people around the world that live in a different country from which were born.[1] When focusing on the receiving, developed countries, Italy stands out as an interesting case because of the rapidity of immigration, notwithstanding the absence of typical colonial ties that characterized the other traditional destination countries. In fact, if we concentrate on the Italian case, from 1995 to 2006 (our sample period) immigration in Italy has increased by a factor of 3.

In this paper we take advantage of a very detailed data set of migration work permits in Italy at the provincial level (NUTS3) starting in the mid-1990s, i.e. the years where the migration presence has become more relevant in the Italian economy. The annual data are detailed by country of origin and by type of residence permits (i.e., whether for family reunion or for refugee status).

By assuming that the service sector is relatively more high-skill intensive than the manufacturing sector, we want to determine whether the higher presence and concentration of migrants in a province affects its service-manufacturing production structure. More specifically, we expect that provinces where the endowment of migrants coming from countries with lower (higher) educational standards increases will experience a production shift towards a lower (higher) services-to-manufacturing ratio, measured in value added. This is not only proved in *absolute* terms when considering the provincial change in the migrant-to-natives ratio, but also in *relative* terms when investigating the departure from the national level. This latter analysis can be interpreted as reveling a change in the geographical concentration and add an additional effect to the traditional Rybczynski result based only on absolute changes.

The remaining sections of the paper present our analysis as follows. In the ....

2 Theoretical Framework

Our analysis is related to two different strands of literature that on one hand investigate the effect of migration in receiving countries (mainly on productivity and on the labor market) and on the other relate to the Rybczynski effect in international trade.

[1] The number of international migrants increased from 75 to about 200 million between 1960 and 2005.

The literature on the effects of migration in receiving countries has mainly investigated labor market effects, in particular effects on wages. There is a general consensus that the competition of migrants is more intense only in some segments of domestic labor markets, typically the lower end in terms of education attainment. Borjas (2003) and Card (2001 and 2007) have debated this issue with different geographical perspectives. Ottaviano and Peri (2012) give a different perspectives by assuming competition in all segments, but with imperfect substitutability.

Peri and Sparber (2009) take an original approach borrowing from the recent literature on international trade in task and offshoring (see, for instance, Grossman and Rossi-Hansberg, 2008). They highlight the importance of *labor services* rather than workers and consider the case of a labor supply composed by heterogeneous workers in terms of labor services that are either natives or foreign-born. D'Amuri, et al. (2010, 2012) apply this same methodology to some European countries.

In our model we extend this approach to a two-sector framework and we want to highlight the production effects rather than the wage effect of new immigration flows. According to the traditional theories of international trade, the production effects of an increase in factor endowments is described by the Rybczynski effect. Previous studies that related this effect to migration are Hanson and Slaughter (2002, 2004) when considering the local effect in the US states or in the particular case of Israel (inflow of highly-educated migrants from Russia at the end of the 1980's). These studies have given an important contribution by means of a simple accounting model and with simulation exercises, but without an estimated model.

Let us consider two sectors, manufacturing (M) and services (V), and assume that the two production functions are well-behaved Cobb-Douglas:

$$Y_j = A_j H_j^{(1-\alpha)} N_j^{\alpha}$$

Output Y_j in each sector $j = M, V$ is produced with two different inputs: *(a)* the factor H, which is freely mobile between the two sectors, and *(b)* the specific factor N_j, which is characterized by a sector-specific composition of *labor services*. The setup is similar to the Ricardo-Viner specific-factor model (see Jones, 1971, or Feenstra, 2004, p.72). The elasticity of output to the mobile factor H is the same; the two sectors differ because of the TFP parameter A_j and the different composition of the factor N_j as discussed below.[2]

The mobile factor H can be traditionally interpreted as capital, but it can be any type of production factor that is in fixed supply in our market (being the province in our case), but that can be used by both sectors, i.e. land, a general type of labor, public services, etc.[3]

The demand for H in each sector is given by its marginal productivity:

$$\frac{\partial Y_j}{\partial H_j} = \alpha \left(\frac{N_j}{H_j} \right)^{1-\alpha}$$

Given the sector mobility, arbitrage implies that the nominal remuneration of H be equal in the two sectors; hence:

[2]This simplifying assumption could be easily released, but at the cost of a more cumbersome algebra.

[3]Peri and Sparber (2009) consider a CES production function in one-sector model where one of the two intermediate services corresponds to the amount of high education workers and functions as a sort specific factor.

$$\alpha p_M \left(\frac{N_M}{H_M}\right)^{1-\alpha} = \alpha p_V \left(\frac{N_V}{H_V}\right)^{1-\alpha}$$

or:

$$\left(\frac{H_M}{H_V}\right) = \left(\frac{p_M}{p_V}\right)^{\frac{1}{1-\alpha}} \frac{N_M}{N_V}$$

As a consequence, the relative production is simply a function of the relative output price and the relative specific-factors supply:

$$\frac{Y_M}{Y_V} = \left(\frac{p_M}{p_V}\right)^{\frac{\alpha}{1-\alpha}} \frac{N_M}{N_V} \tag{1}$$

Let us assume for now that the relative price is fixed since, for instance, it is given from abroad (we assume a small-open province or region or economy).

Let us name W_H the nominal "wage" of the mobile factor H, and W_j for $j = M, V$ the nominal "wages" of the two specific factors, respectively N_j, $j = M, V$. From the Cobb-Douglas characteristics:

$$p_j = A W_H^{\alpha} W_j^{1-\alpha}$$

for $j = M, V$, where $A \equiv \left[\left(\frac{\alpha}{1-\alpha}\right)^{1-\alpha} + \left(\frac{\alpha}{1-\alpha}\right)^{-\alpha}\right]$.

It is then well-known:

$$\frac{W_M}{W_V} = \left(\frac{p_M}{p_V}\right)^{\frac{1}{1-\alpha}} \tag{2}$$

Hence, a *given* relative output price implies a *given* relative "wage" index of the specific factors.

Another important consequence of (1) (and given relative prices) is that the dynamics of relative output is fully determined by the relative quantity of the two specific factors, which are composite indexes of labor services or labor tasks.

The composite factor N_j is a sector-specific input because of its composition in terms of labor services. We consider two different types of labor services: "simple" manual tasks (S) and "complex" (abstract, communication intensive) tasks (C). The labor services are then combined differently in the two sectors via a CES aggregation as follows:

$$N_j = \left[\beta_j S_j^{\frac{\sigma-1}{\sigma}} + (1-\beta_j) C_j^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \tag{3}$$

where the coefficient β_j represents the relative productivity of "simple" tasks to "complex" tasks and we assume that simple tasks S are relatively more productive in the M sector, i.e. $\beta_M > \beta_V$. The elasticity of substitution between tasks is equal to σ and does not change between the two sectors.

Then:

$$\frac{N_M}{N_V} = \left[\frac{\beta_M S_M^{\frac{\sigma-1}{\sigma}} + (1-\beta_M) C_M^{\frac{\sigma-1}{\sigma}}}{\beta_V S_V^{\frac{\sigma-1}{\sigma}} + (1-\beta_V) C_V^{\frac{\sigma-1}{\sigma}}}\right]^{\frac{\sigma}{\sigma-1}} =$$

$$= \frac{S_M}{S_V}\left[\frac{\beta_M + (1-\beta_M)c_M^{\frac{\sigma-1}{\sigma}}}{\beta_V + (1-\beta_V)c_V^{\frac{\sigma-1}{\sigma}}}\right]^{\frac{\sigma}{\sigma-1}} \tag{4}$$

where $c_J \equiv \frac{C_j}{S_j}$ for $j = M, V$.

Equation (4) shows that the relative quantity of the two specific factors depends on the two ratios c_M and c_V, and on the ratio $\frac{S_M}{S_V}$. Ultimately, also relative output depends on the same three ratios.

Roadmap

We recall that labor services could "travel" between the two sectors and there exists one single market for complex tasks and one single market for simple tasks for the whole economy. The quantity of each specific labor composite – i.e. N_M and N_V – is determined by the demand for each labor service from each sector and by the wage.

As shown below, the relative price of labor services is linked to the relative wage indexes in the two sectors and, ultimately, by the relative price of output. As cleared up below, the relative demand for labor services in each sector depends only on the relative wage. When the relative wage is given (as in our case because we assume given relative output price), then the relative supply of labor services is given as well as the relative demand of labor services from each sector. The only variable to determine is the relative weight of each sector, which means the ratio $\frac{S_M}{S_V}$ and therefore the output ratio. Then any exercise of comparative statics will have an effect on the relative output ratio.

2.1 The relative wage of tasks

From the CES characteristics, the "wage" of each composite factor is the following:

$$W_j = \left[\beta_j W_S^{1-\sigma} + (1-\beta_j)W_C^{1-\sigma}\right]^{\frac{1}{1-\sigma}}$$

for $j = M, V$. Let us define $\omega \equiv \frac{W_C}{W_S}$. So:

$$\frac{W_M}{W_V} = \left[\frac{\beta_M + (1-\beta_M)\omega^{1-\sigma}}{\beta_V + (1-\beta_V)\omega^{1-\sigma}}\right]^{\frac{1}{1-\sigma}}$$

Let us define $W \equiv \left(\frac{W_M}{W_V}\right)^{\sigma-1}$ and $\widetilde{\omega} \equiv \omega^{\sigma-1}$. Hence:

$$W = \frac{\beta_V\widetilde{\omega} + (1-\beta_V)}{\beta_M\widetilde{\omega} + (1-\beta_M)}$$

and this implies:

$$\widetilde{\omega} = \frac{(1-\beta_M)W - (1-\beta_V)}{\beta_V - W\beta_M} \tag{5}$$

As expected, when the relative price of output is give, then not only the relative "wage" of the two specific composite factors is given, but also the relative "wage" of the two types of labor services that form the composite labor factors.

Moreover, the relative wage $\omega \equiv \frac{W_C}{W_S}$ decreases when W increases, hence when $\frac{p_M}{p_V}$ increases.[4]

A final observation on the determination of the relative wage ω regards the condition for its meaningful value. In order to have a positive value for ω, we need a condition on the relative wage of the composite factors, which implies a condition on the relative output price:

$$\frac{\beta_V}{\beta_M} < \left(\frac{W_M}{W_V}\right)^{\sigma-1} < \frac{1-\beta_V}{1-\beta_M}$$

or

$$\frac{\beta_V}{\beta_M} < \left(\frac{p_M}{p_V}\right)^{\frac{\sigma-1}{1-\alpha}} < \frac{1-\beta_V}{1-\beta_M}$$

where, we recall, $\beta_M > \beta_V$

2.2 Relative demand for tasks

Workers are assumed to freely move between the two sectors, which implies that labor services are freely-mobile between the two sectors since they "travel" with workers.[5]

It is easy to obtain the *sectorial* relative demand for complex tasks as a function of relative task wages, $\omega \equiv \frac{W_C}{W_S}$:

$$\frac{C_j}{S_j} = \left(\frac{1-\beta_j}{\beta_j}\right)^{\sigma} \omega^{-\sigma} \tag{6}$$

Since $\beta_M > \beta_V$ for any given relative task wage, the service sector is always complex-task intensive with respect to the manufacturing sector:[6] $\frac{C_V}{S_V} > \frac{C_M}{S_M}$.

The *total* relative demand for complex tasks is then:

$$\left(\frac{C}{S}\right)^d = s_M \left(\frac{C_M}{S_M}\right)^d + (1-s_M)\left(\frac{C_V}{S_V}\right)^d =$$

$$= \left[\frac{s}{s+1}\left(\frac{1-\beta_M}{\beta_M}\right)^{\sigma} + \frac{1}{s+1}\left(\frac{1-\beta_V}{\beta_V}\right)^{\sigma}\right]\omega^{-\sigma} \tag{7}$$

where $s_M = \frac{S_M}{S_M+S_V} = \frac{\frac{S_M}{S_V}}{\frac{S_M}{S_V}+1} = \frac{s}{s+1}$ is the weight of the demand for simple tasks from the M sector and increases when $s = \frac{S_M}{S_V}$ increases.

[4]It is easy to obtain the straight relationship between the relative wage of tasks ω and the relative output price $p \equiv \frac{p_M}{p_V}$:

$$\omega = \left[\frac{(1-\beta_M)p^{\frac{\sigma-1}{1-\alpha}} - (1-\beta_V)}{\beta_V - p^{\frac{\sigma-1}{1-\alpha}}\beta_M}\right]^{\frac{1}{\sigma-1}}$$

[5]We ought to notice that our estimated model is based on local labor market (using data at the provincial level); so, this latter hypothesis translates into a plausible "free workers mobility within the province".

[6]We have absence of *task-intensity reversal.*

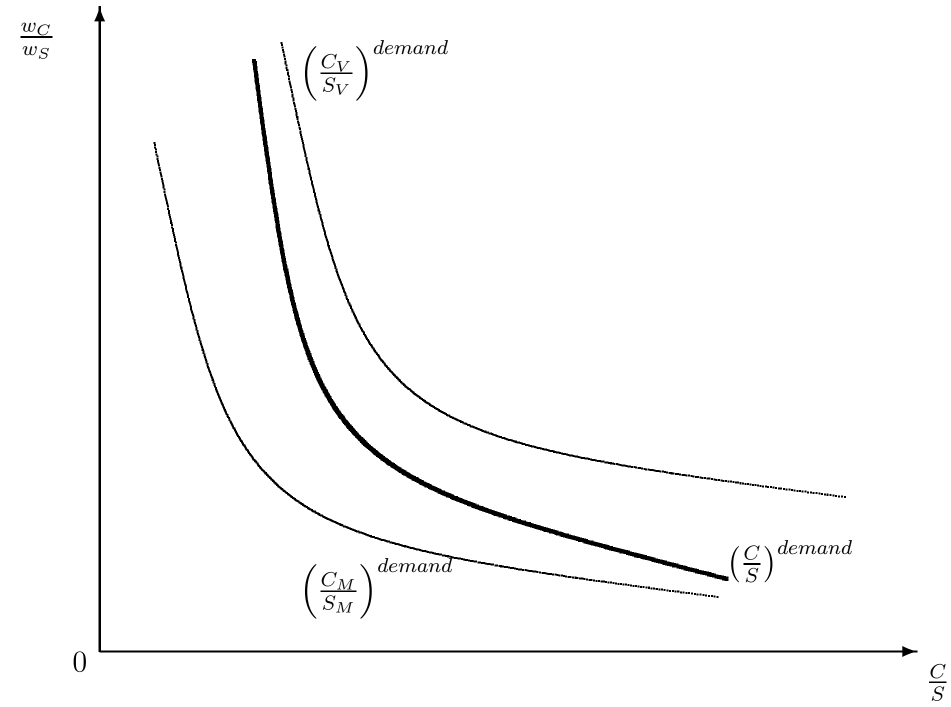


Figure 2: Sectorial and total relative demand for complex-to-simple tasks.

2.3 Relative supply of tasks

By following Peri and Sparber (2009), let us consider two types of individuals $k = D, F$ respectively for native (D) and for foreign-born (F). Each individual is endowed with 1 unit of labor and has to decide how to optimally allocate it between "simple" and "complex" tasks. Being l_k the fraction of labor unit devoted to simple tasks, then $s_k = (l_k)^{\delta}\chi_k$ is the amount of "simple" services that individual k can provide – where χ_k is a measure of the abilities in "simple" tasks by k and $0 < \delta < 1$.[7] Hence, the total wage generated is given by $(l_k)^{\delta}\chi_k w_S$. Similarly, the remaining fraction of labor unit devoted to "complex" services generates the wage $(1 - l_k)^{\delta}\kappa_k w_C$, where κ_k is a measure of the ability in complex services by individual k.

Moreover, following **?**), we assume that "simple" manual services are disliked and this is modeled as a fraction $0 < d_k < 1$ that decreases income that comes from manual services.

Hence, the utility of individual k from the allocation of its labor unit is the following:

$$U_k = (l_k)^{\delta}\chi_k w_S + (1 - l_k)^{\delta}\kappa_k w_C - d_k(l_k)^{\delta}\chi_k w_S = (1 - d_k)(l_k)^{\delta}\chi_k w_S + (1 - l_k)^{\delta}\kappa_k w_C \quad (8)$$

Let us assume that natives are relatively more productive in complex tasks: $\frac{\kappa_D}{\chi_D} > \frac{\kappa_F}{\chi_F}$; moreover, we assume that natives dislike more simple tasks that foreign-born: $d_D > d_F$.

Utility maximization determines the optimal allocation of the labor unit and the relative k-individual supply of tasks is the following:

[7] As explained in Peri and Sparber (2009), the restriction on the δ parameter captures the decreasing abilities in the tasks and avoid full specialization.

$$\frac{c_k}{s_k} = \left(\frac{w_C}{w_S}\right)^{\frac{\delta}{1-\delta}} \left(\frac{1}{1-d_k}\right)^{\frac{\delta}{1-\delta}} \left(\frac{\kappa_k}{\chi_k}\right)^{\frac{1}{1-\delta}} \tag{9}$$

for $k = F, D$. Not surprisingly, for the same relative wage a native individual D supplies relatively more complex tasks and this is due to to two different reasons: *(a)* natives are relatively more productive in complex tasks, and *(b)* natives dislike more simple tasks.

We obtain the relative supply of tasks by weighing with the fraction of foreign-born supply of manual services:

$$\frac{C}{S} \equiv \frac{C_F + C_D}{S_F + S_D} \equiv \frac{S_F}{S_F + S_D}\frac{C_F}{S_F} + \left(1 - \frac{S_F}{S_F + S_D}\right)\frac{C_D}{S_D} = \phi(f)\frac{c_F}{s_F} + [1 - \phi(f)]\frac{c_D}{s_D} =$$

$$= \left\{\phi(f)\left(\frac{1}{1-d_F}\right)^{\frac{\delta}{1-\delta}}\left(\frac{\kappa_F}{\chi_F}\right)^{\frac{1}{1-\delta}} + [1-\phi(f)]\left(\frac{1}{1-d_D}\right)^{\frac{\delta}{1-\delta}}\left(\frac{\kappa_D}{\chi_D}\right)^{\frac{1}{1-\delta}}\right\}\left(\frac{w_C}{w_S}\right)^{\frac{\delta}{1-\delta}} \tag{10}$$

where $f = \frac{L_F}{L_F + L_D}$ is the fraction of *foreign-born residents*; $0 < \phi(\cdot) < 1$ is monotonically increasing, $\phi(0) = 0$ and $\phi(1) = 1$.

When f increases there is a recomposition effect in favor of simple labor services and for any given relative wage there is a decrease in the relative supply of complex-to-simple tasks; formally $\frac{\partial \frac{C}{S}}{\partial f} < 0$.

2.4 Equilibrium

Equilibrium in the markets for tasks is obtained in relative terms by considering the relative demand and supply of complex-to-simple labor services and the relative wage of complex-to-simple labor services.

As shown in Section 2.2, when the output price ratio is given at p^*, the relative wage of the specific factors is given, as well as the relative wage of labor services $\omega \equiv \frac{W_C}{W_S} = \omega^* = \left[\frac{(1-\beta_M)(p^*)^{\frac{\sigma-1}{1-\alpha}} - (1-\beta_V)}{\beta_V - (p^*)^{\frac{\sigma-1}{1-\alpha}}\beta_M}\right]^{\frac{1}{\sigma-1}}$ is also given — see equations (2) and (5) — therefore, the relative supply $\frac{C}{S}$ from equation (10) is determined:

$$\left(\frac{C}{S}\right)^* = \Xi\left(\underset{--}{f}\,;\underset{+}{d_D}, \underset{+}{d_F}, \underset{+}{\frac{\kappa_D}{\chi_D}}, \underset{+}{\frac{\kappa_F}{\chi_F}}\right)(\omega^*)^{\frac{\delta}{1-\delta}} \tag{11}$$

In equilibrium total relative supply is equal to total relative demand, as given from equation (7):

$$\Xi\left(f; d_D, d_F, \frac{\kappa_D}{\chi_D}, \frac{\kappa_F}{\chi_F}\right)(\omega^*)^{\frac{\delta}{1-\delta}} = \left[\frac{s}{s+1}\left(\frac{1-\beta_M}{\beta_M}\right)^{\sigma} + \frac{1}{s+1}\left(\frac{1-\beta_V}{\beta_V}\right)^{\sigma}\right](\omega^*)^{-\sigma}$$

where the unknown is the relative weight s, i.e. the relative weight of the M sector:

$$\frac{S_M}{S_V} \equiv s = \frac{c_V(\omega^*) - c(\omega^*; f, \cdot)}{c(\omega^*; f, \cdot) - c_M(\omega^*)} \tag{12}$$

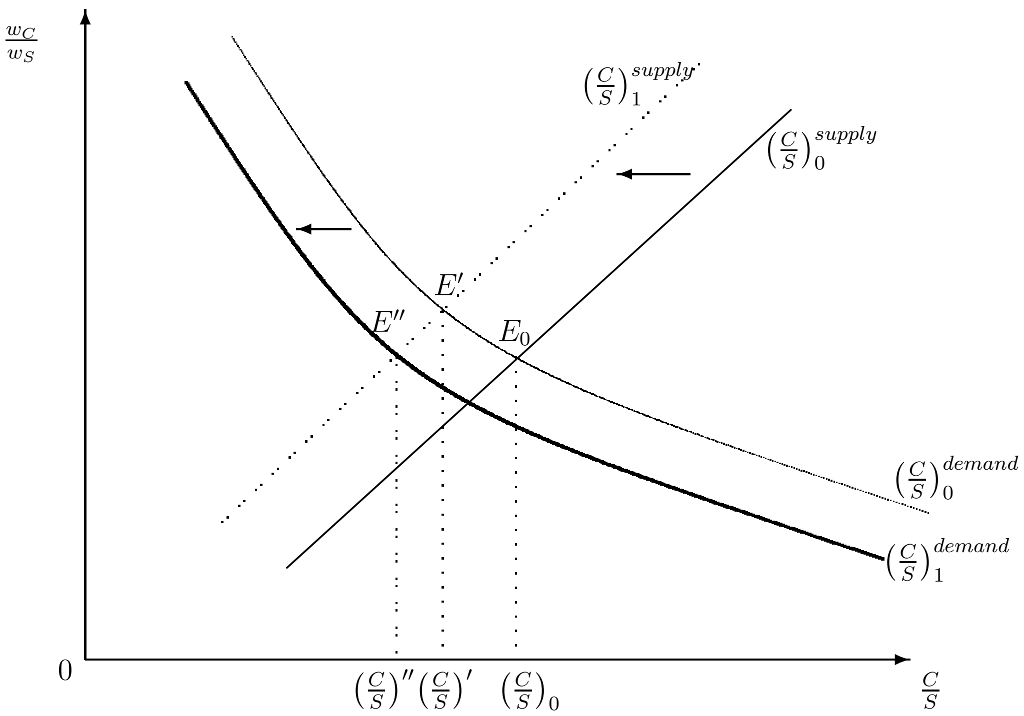


Figure 3: Effect of the increase in f in the complex-to-simple ratio and wage.

where

$$c(\omega^*; f, \cdot) \equiv \Xi(f; d_D, d_F, \kappa_D, \chi_D, \kappa_F, \chi_F)(\omega^*)^{\frac{\delta}{1-\delta}}$$

$$c_j(\omega^*) equiv \left(\frac{1-\beta_j}{\beta_j}\right)^{\sigma} (\omega^*)^{-\sigma} \qquad \text{for} j = M, V$$

2.5 Increase in Foreign-Born Residents

Let us consider an increase in the fraction f of foreign-born residents.

Equation (11) shows that when f rises the relative supply of overall complex tasks lowers.

Since the relative wage cannot change because it is linked to the (provincial) relative output price, then the relative (total) demand must decrease of the same amount.

The sectorial relative demand for complex-to-simple labor services depends only on the relative wage of tasks that does not change. Hence, the only reduction in total relative demand can occur via a recomposition of the total demand by giving more weight to the less complex-task intensive sector, i.e. the M sector.

Formally, it is easy to see in equation (12) that when $c(\omega^*; f, \cdot)$ increases because there is an increase in f and ω^* does not change, then the s ratio increases. Consequently, the sector-specific composite factors and the output ratio changes in favor of the simple-task-intensive sector, i.e. both $\frac{N_M}{N_V}$ and $\frac{Y_M}{Y_V}$ rise when f increases.

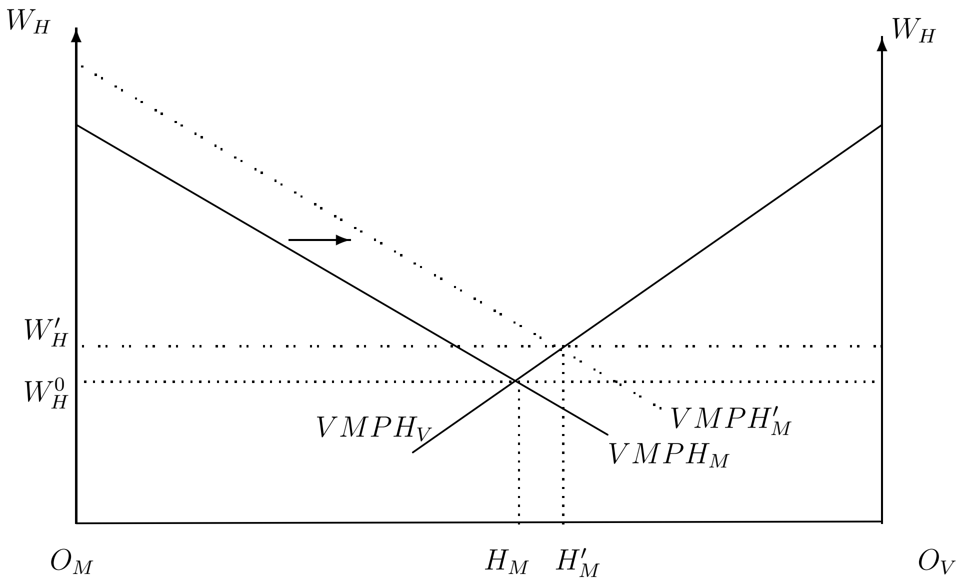


Figure 4: Effect of the increase in the f in the market of the "mobile" factor H.

This change induces also an increase in the relative demand for the mobile factor H from sector M. As shown in Figure 4, H_M rises, H_V lowers and there is an increase in the nominal "wage" of H.

Differently from the one-sector model of Peri and Sparber (2009) and **?**) the adjustment in the model works via a sectorial recomposition in favor of the simple-task-intensive sector and not via an increase in the relative wage of tasks.

However, in our model the inflow of new migrants causes a wage increase, but in the mobile sector rather than in the tasks.

Increase in the fraction g of less complex-task-productive foreign-born residents

Let us assume that foreign-born residents are not homogeneous, but they differ in terms of relative productivity in complex tasks. For simplicity, let us assume that there are two types of foreign-born residents (1 and 2) and that: $\frac{\kappa_D}{\chi_D} > \frac{\kappa_F^1}{\chi_F^1} > \frac{\kappa_F^2}{\chi_F^2}$. By assuming no differences in the "dislike" parameter d_F between the two groups, from equation (9) it is easy to rank their individual relative task supply: $\frac{c_k^1}{s_k^1} > \frac{c_k^2}{s_k^2}$

Then the average relative supply of the overall foreign-born is the following:

$$\frac{C_F}{S_F} \equiv \frac{S_F^2}{S_F^2 + S_F^2}\frac{C_F^2}{S_F^2} + \left(1 - \frac{S_F^2}{S_F^2 + S_F^2}\right)\frac{C_F^1}{S_F^1} = \lambda(g)\frac{c_F^2}{s_F^2} + [1 - \lambda(g)]\frac{c_F^1}{s_F^1} \tag{13}$$

where $g = \frac{L_F^2}{L_F^1 + L_F^2}$ and L_F^i is equal to the number of foreign-born residents of type $i = 1, 2$ and the $\lambda(\cdot)$ function has the characteristics of the $\phi(\cdot)$ function: $\lambda(0) = 0$, $\lambda(1) = 1$, $0 < \lambda(\cdot) < 1$ and is monotonically increasing.

The overall supply is therefore:

$$\frac{C}{S} \equiv \frac{S_F}{S_F + S_D}\frac{C_F}{S_F} + \left(1 - \frac{S_F}{S_F + S_D}\right)\frac{C_D}{S_D} = \phi(f)\frac{c_F}{s_F} + [1 - \phi(f)]\frac{c_D}{s_D} =$$

$$= \phi(f)\lambda(g)\frac{c_F^2}{s_F^2} + \phi(f)[1 - \lambda(g)]\frac{c_F^1}{s_F^1} + [1 - \phi(f)]\frac{c_D}{s_D} \tag{14}$$

An increase in g, i.e. in the fraction of less productive migrants in complex tasks, for a given f, lowers the relative supply of complex tasks more since the composition effect gives more weight to the migrants who are relatively less productive in complex tasks.

The same effects occurs in the market for the mobile factor H. Hence, the complete relationship between the relative output of manufacture-to-services is the following:

$$\left(\frac{Y_M}{Y_V}(f)\right) = \left(\frac{H_M}{H_V}\underset{+}{(f}\;,\;\underset{+}{g)}\right)^{(1-\alpha)}\left(\frac{N_M}{N_V}\underset{+}{(f}\;,\;\underset{+}{g)}\right)^{\alpha} \tag{15}$$

3 Econometric Strategy

We estimate the causal impact of a relative inflows of migrants in province i at time t on the relative added value of manufactures over services. We derive our estimated reduce form from the aforementioned theoretical model. Intuitively, a relative inflows of migrants in the local labor market generates an overall positive effects on the value added, but increases relatively more the production in the manufacture sector than service one. This reflects the fact that manufacturing production process involves relatively more simple tasks with respect to services, and that migrants provide such tasks more likely than natives. This effect should appear more evident when the skills provided by a new inflow of migrant alters severely the worker skills distribution. In example, if a large number of arriving migrants are relatively low skilled we should expect a stronger relative increase in manufacture value added. This does not mean necessarily that service value added is penalized by an increase in low skill migrants, in principle migrants arrival can help both productions.

A variation in the migrants to natives ratio is a reliable indicator for the changes in the local production process. As underlined in 15, a change in relative production is driven by a change in f, therefore in the relative abundance of simple to complex tasks. Even if this is unobserved in the data, a variation in the migrants to native ratio can approximate f given that migrants provide more likely simple tasks. This simplify a lot the specification of a reduced form model. We use the logarithm of migrants to native ratio in province i at time t, lMN_{it}, as our covariate of interest, specifying the econometric model:

$$y_{it} = \beta_0 + \beta_1 lMN_{it} + \boldsymbol{X}'_{it}\beta_k + \eta_i + \nu_t + \epsilon_{it} \tag{16}$$

Our dependent variable of interest y_{it} is defined as the ration between the value added in manufacture over service sectors in province i and time t, $(VA_{man}/VA_{serv})_{it}$. in order to estimate β_1 consistently, we need to address several econometric issues. First, as usually reported to the economic literature on migration we should expect that $COV(lMN_{it}, \epsilon_{it}) \neq 0$, this because of different reasons. Migrants location choices are not random, in fact, there are two main drivers for this choice, which for simplicity we can call networks and economic magnet effects, both these effects are variant over time so we need some kind of instrument to exploit the variation from these effects to value added. Second, some provinces may show natural or historical advantages that may affect value added raising time invariant unobserved heterogeneity (COMBES et al. 2010). Third, time specific factors can influence the provincial value added distribution, i.e. macroeconomic cycles, national political elections, national labor market reforms etc. Fourth, $E(\epsilon_{it} \mid \epsilon_{it-1})$ will be considerably different from 0 in the value added series. (REFERNZA! – St. Bond Dynamic panel data model). Moreover when value added is very persistent over time computation of a static model may be difficult (Cassette & Edoardo 2012) both these considerations suggest a dynamic specification for our reduce for model. In this new fashion equation 16 became:

$$(VA_{man}/VA_{serv})_{it} = \beta_0 + \rho(VA_{man}/VA_{serv})_{it-1} + \beta_1 lMN_{it} + \boldsymbol{X}'_{it}\beta_k + \eta_i + \nu_t + \epsilon_{it} \qquad (17)$$

Where $(VA_{man}/VA_{serv})_{it-1}$ is an autoregressive term assuring that $E(\epsilon_{it} \mid \epsilon_{it-1}) = 0$, η_i is a provincial fixed effect controlling for unobserved time invariant heterogeneity and ν_t is a time specific fixed effect. Given model in 17 it seems reasonable to employ a Sys-GMM estimator *à la* Blundel and Bond in order to consistently estimate β_1 (CITARE). Moreover, such estimator provides several advantages, IVs is very well understood it allows discussion of the identifying assumptions and a number of useful tests for exogeneity while it is quite robust to functional forms assumptions. Endogeneity issues can be addressed through the use of the same method including a set of instruments Z_{it}. In particular, considering the aforementioned endogeneity problems Z_{it} includes two year lag of the potentially endogenous covariates, namely the lagged dependent variable $(VA_{man}/VA_{serv})_{it-1}$ and the migrants to native ratio lMN_{it}. The vector $\boldsymbol{X}_{it}$ contains a full set of controls for province i at time t, namely the level of migrants[8], the degree of urbanization (as residents per squared kilometer), the average skill level of the population (as the number of college graduates over the total population) and two measures on infrastructures quality (specifically the airports and highways extension).

Over the period 1995-2006 there were three major amnesties which considerably impact on migrant distribution, as typical for any such regularization, the actual presence of migrants dates back before they appear in the official statistics. Hence, when including the incidence of illegal migration, the profile of the time series would become smoother, but the trend would not change. In order to control for that policy change we include in the vector Z a dummy variable – which takes the value of one when the policy was implemented – interacted with the consequent growth rate in residence permits registered in the province i[9].

The robustness of our regression is evaluated with the classic tests after IV estimations, we report Hansen-J test for all our estimations this ensures that the instrument are not correlated with the residuals, i.e. that the equation is not overidentified. To check for weak identification we include the Kleimbergen-Paap rank F-test for our instrumental variable estimations

[8]In defining GMM structure we consider as potentially endogenous such variable, but in this case we restrict the set of instruments only to the equation in levels.

[9]The first major regularization law was passed in 1995 – around 250 thousands accepted applications. Then, in 1998 the "Turco-Napolitano" law resulted in the regularization of around 200 thousands migrants, and finally in 2002 the "Bossi-Fini" law induced amnesty included 640 thousands migrants over the next two years. See 5 in the next section

(KP2006). Given the dynamic specification we need to employ an Arellano Bond(1991) test, to prove that the residuals of the first differenced estimating equations are not second order correlated. An accurate choice of the instrument solves the problem of instrument proliferation (Roodman2009) the number of instrument used does not weaken the Hansen test statistic.

Given the fact that the number of elements in the matrix of instruments grows quadratically in the time dimension, we want to be sure that the sample we are using contains adequate information to estimate them. In order to exclude the eventuality that our estimations are affect by the so called "small sample bias" we exploit the fact that estimating a dynamic model with OLS will produce an upward bias while estimate it using a FE estimator will generate a downward bias. We use the coefficients estimated via OLS and FE as upper and lower bound for our preferred estimator (GMM-sys), as reported in 6, the autoregressive coefficient obtained through GMM actually lies the interval define by OLS and FE confirming that our sample contains enough information to ensure consistency of the estimator.

In order to control if the skill composition of migrants at province level plays a role in affecting the local production, we re-aggregate foreign workers in province i and time t into three classes according to the complexity of tasks they are more likely to provide. The rationale of that is related to the fact that the more the foreign workers are similar to natives, in terms of tasks they are likely to provide, the smaller should be the impact of a change in f to local production process. However we do not observe exactly the tasks provided by each worker, moreover educational data on migrants are rarely available for such a variety of countries and for a long time span, a possible rough proxy can be represented by the level of development of the origin country, as approximated by the per-capita GDP. Since such approximation may be difficult to hold country by country, here we use the ranking of origin countries on GDP per-capita distribution in order to distinguish three classes of rising educational attainment among the migrants[10].

Finally, we test our theoretical model also with respect to export structure. A consolidated branch of the empirical literature has highlighted the positive effect of migrants on bilateral trade, the rationale behind that, originally developed in Rauch (2001) and Rauch and Trinidade (2002), is that information costs plays a major role in the fixed cost that firms have to pay to enter foreign markets and ethnic networks are likely to reduce some of these information costs. Cross-border networks of people sharing the same country of origin can substitute or integrate organized markets in matching international demand and supply. Moreover, *immigrant networks may provide contract enforcement through sanctions and exclusions, which substitutes for weak institutional rules and reduces trade costs* (Briant et al., 2009). While the aforementioned channels have been deeply scrutinized, less attention has been provided on sectoral export composition. Starting from the empirical evidence on value added, which underline a positive effect of migrants on low skill intense production, we want to test our results also with respect to exports. Intuitively, if a change of workers skill composition do have an effect on production process we should expect a similar outcome also on export composition, if we assume that production is not totally absorbed by the local market. That why in the next set of regressions we define a new dependent variable as the ratio between low/high technology exports at province level.

[10]As reported in 7 in 6 countries' per capita GDP is indeed highly correlated with schooling attainment.

3.1 Data and Descriptive Statistics

The main objective of this paper is to analyze the impact of migration[11] on the production and the export structure of the Italian economy over the period of more intense and significant increase in foreign-born presence, 1995-2006. In the following sections we report some important characteristics of the migration phenomenon in Italy and of the production structure.

The analysis is conducted at the level of *Province*, i.e. NUTS3. We recall that the 103 Italian provinces[12] have an average size of 2,800 square km with a coefficient of variation at 0.17. They are 57 times tinier than American states and more than 200 times smaller than the Canadian provinces. They are also smaller and more regular in size with respect to French metropolitan *départements* and Spanish provinces. We deem the *Province* as the finest geographical entity to investigate migration externalities and the choice of this geographical level is justified by two main reasons. First, detailed data on residence permits, including origin countries, are not available at a finer level than the *Province*. Second, the fact of being well-confined areas allows us to avoid the size effect of the Modifiable Area Unit Problem – MAUP (see Briant et al. (2010) on the issue). This same geographical entity is used in Bratti et al (2012) for an analysis of the pro-trade effect of migration and in Jayet et al (2010) to study the network effect on Italian migration.

3.1.1 Migration Origin and Location in Italy

Migration in Italy has been characterized by two main stylized facts. First, it has been a very rapid phenomenon. Second, due to absence of strong colonial links, migration into Italy has been more diversified in terms of origin countries than in any other European country (189 is the number of nationalities currently present). Migration to Italy has increased by a factor of 3 in slightly more than a decade. The presence of the foreign-born individuals increased from 1.4 million in 2002 to 4.6 million in 2011, which equals 7.6% of the Italian population.

Figure 5 reports a measure of the rising stock of foreign-born presence in 1995-2006, as measured by the number of residence permits which are the data we use in this paper.[13] Detailed measures of residence permits can go back to 1992, but we use 1995 as the starting year since previous years were not reliable and less representative of the migration phenomenon due to low numbers, especially when considering data at the provincial level. Due to the EU Eastern enlargement in 2004-2007, the requirement for residence and work permits has been levied for some relevant nationalities (like Romanians and Polish). So, we considered 2006 as the ending year of our study.

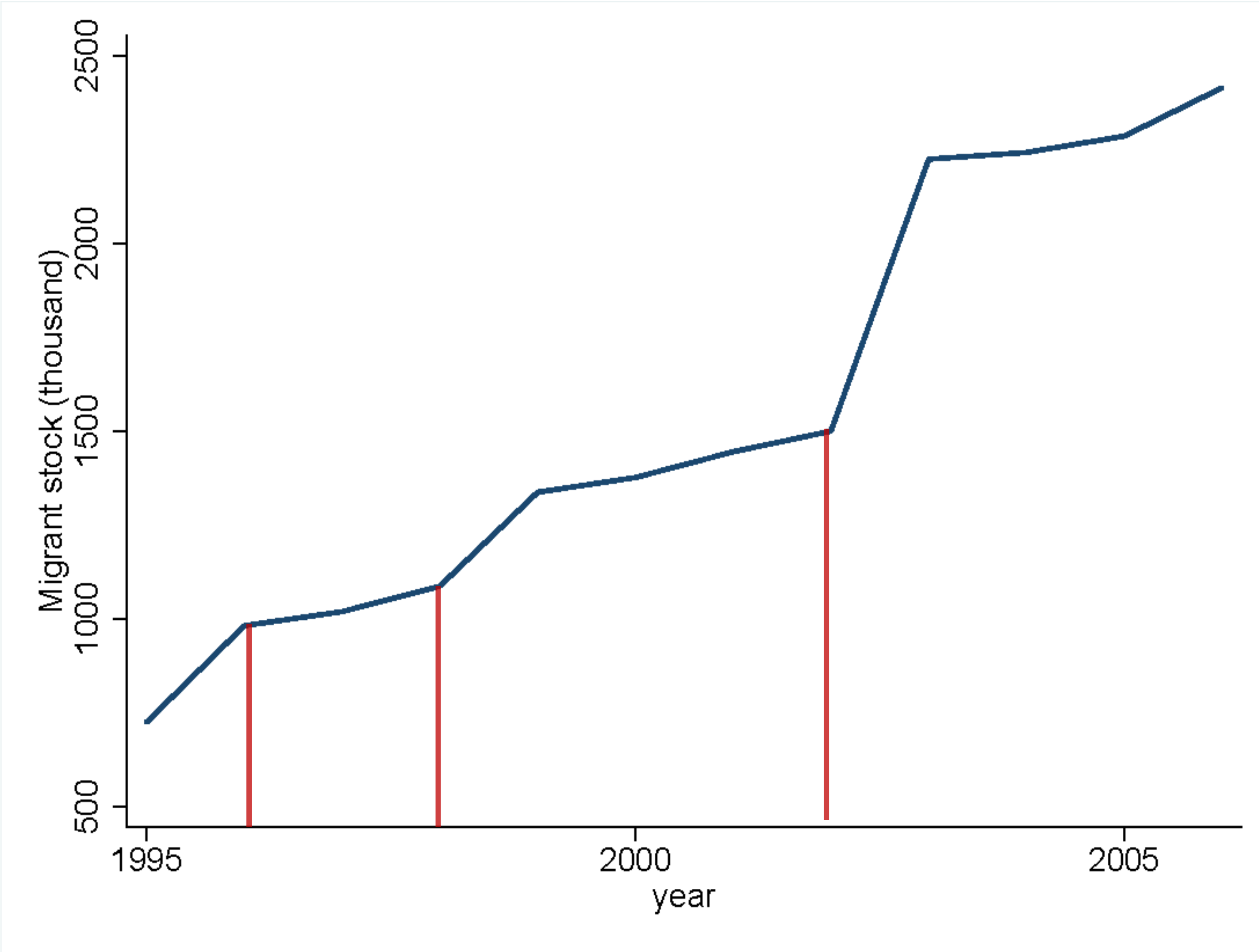
When investigating more thoroughly this rapid increase in foreign presence, two characteristics ought to be noticed: first, the rapid change also in the composition of migration by country of origin; second, the uneven localization of migrants in the Italian territory. As a matter of fact, the rapid increase in the foreign-born population was also characterized by a

[11] We refer here to migration as measured by stock of foreign-born individuals. No data on pure flows are available in Italy at the disaggregated level we investigate; hence, when we address "flows" we are actually using stock variations.

[12] The number of *Province* changes over the sample period due to the creation of new provinces. We use data that consider the 1995 distribution of 103 entities.

[13] They slightly differ from the data on population registers since minors are not counted since they are included in the residence permits of their custodians. Data on residence permits are released by ISTAT, but they refer to data from the Ministry of the Interior through their local offices (*Questure*).

Figure 5: The Stock of Residence Permits in Italy 1995-2006. (Source: Italian Ministry of the Interior and ISTAT.



drastic change in the composition by country of origin. In 1995, most migrants were coming from richer countries, whereas in 2006 this is overturned. Figure 6 reports the composition of migrants with respect to the relative GDP per capita of their origin country (in year 1995), by grouping countries in terms of their GDP per-capita quartiles form the poorest (1st quartile) to the richest (4th quartile).

Figure 6a shows that the 1995 distribution is slightly skewed towards "richer" origin countries: 52% of the migrants were arriving from economies with per-capita GDP higher that than the median. Moreover, the "richest" origin countries (4th quartile) were the most represented in the upper 50% and the second most important group overall (31% versus 36% from 2nd-quartile countries). This picture is completely reversed starting in 2000 and even more drastically in 2006. The overall majority of migrants comes from poorer countries and the percentage of migrants coming from the top 4th-quartile countries drops to 9%. In 2006 over 90% of foreigners with regular residence permits in Italy were born in countries with less than 8,000 US$ per capita (1995 data).

Also the distribution of migrants between Northern and Southern Italy changes over time and become more and more similar as Figure 6b shows when reporting for each per-capita GDP quartile the differences in the fraction of migrants in the North and in the South. The big divergence – the South seems to be relatively more attractive by the migrants coming from the lower and the upper end in 1995 and partly in 2000, whereas the North from origin countries in the 2nd quartile – tends to fade away in 2006.

The second important characteristic is the geographical uneven distribution of migrants in Italy, as shown in Figure **??** where we report the localization of migrants among the different Italian provinces. Migrants tend to settle down where pull factors – like favorable conditions of the labor market, availability of public services, network linkages with previous migrants of the same or similar nationalities – are stronger. From this point of view, the dual characteristic of the Italian economy explains very well why the overall majority of migrants locates in Center or Northern Italy.

3.1.2 Production and Exports

Data on the local production and export structure, are publicly available on a yearly base from the Italian National Institute of Statistics (ISTAT), and reports the sectoral[14]. Value Added composition at the province level covers the period from 1995 to 2006, while sectoral export series starts from 1997. In Table 1 we report some general characteristics of the provinces, including some general infrastructure indexes that may be important to consider in order to control for other characteristics of the local economic environment.

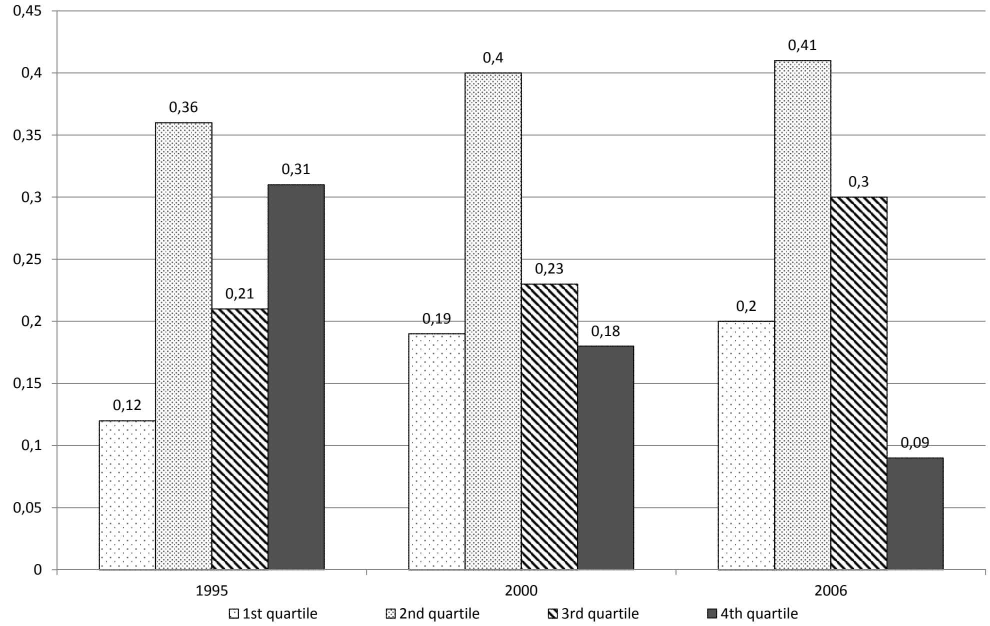
4 Results

In Table 2 we report the results for value added specification. Along with our main covariate of interest lMN_{it} the estimated equation contains controls for the degree of urbanization, skill composition and infrastructure endowment of province i at time t along with a control for

[14] In detail, production data are aggregated in six macro-sectors: agriculture, construction, manufactures, retail and professional services - i.e. logistics, ICT etc.- financial services, household services; while export flows are classified using the Italian version of NACE rev2.

Figure 6: Yearly distribution of migrants' origin countries by GDP per capita quartile

(a) Italy



(b) Difference in the distribution (North – South)

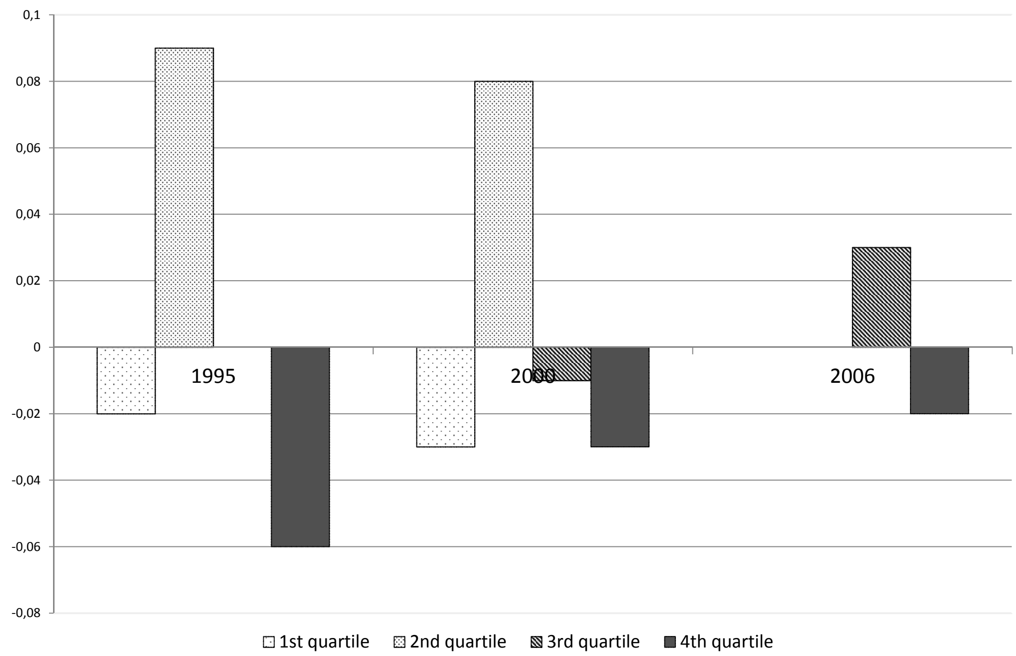


Table 1: Summary Statistics

variable	mean	sd	min	p25	p50	p75	max
Services	2.57	1.40	0.81	1.58	2.10	3.45	9.88
Migrants	23.79	17.63	0.30	10.17	18.43	34.06	98.10
Density	243.47	329.01	22.99	103.68	172.08	258.14	2639.63
Graduate	2.35	3.37	0.00	0.00	0.70	3.79	22.01
Airports	29.28	76.33	0.00	0.00	0.00	29.94	637.33
Highways	24.99	20.82	0.00	10.06	23.00	34.37	94.09

Note: *Services* represents the service sector value added over manufactures, *Migrants* reports the number of foreign born residents over the overall population (1000 inhabitants); *Density* is the number of residents by squared km, *Graduates* is the number of college graduates over the population; *Airports* and *Highways* are measured as the runaway/road extension per squared km. All the variable are measured at Province level.

the overall level of migrants in the province. In column (1) of Table 2 the function f is approximated using the ratio of the overall number of foreign born residents in the province, the associated coefficient is statistically significant and positive, as predicted by the theoretical model described in Section 2 an increase in the relative availability of simple tasks benefits the sector which uses then more intensively[15]. This does not imply that the other sector is somehow penalized; the coefficient associated with the level of migrant in the province $lmig_{it}$[16] suggests that when we consider only the absolute stock of migrants, what we found is a relative increase of service sector[17], but this is indeed only part of the story.

The aggregate effect just described is magnified when we consider explicitly the skill composition of the foreign born residents in province i, as we have already mentioned we approximate that by using as proxy the GDP per capita in the origin country. In column (2) to column (4) we present the results associated with three different aggregation of our covariate of interest, in $lMNI_{it}$ we consider only the migrants from the lower income countries, while $lMNII_{it}$ only those from middle income, and $lMNIII_{it}$ those from high income countries. As predicted by the theoretical model, the response of local production structure to a change in the relative skill composition is higher the more different are the tasks provided by natives and migrants. In column (4), where we consider only those migrants from high income countries, in fact, we do not find any effect on relative production.

Looking at the magnitude of the point estimates for the relative migrants incidence on local labor force, we see that the effect of low skills foreign workers is stronger with respect to the medium and high skills (our excluded group in column (2)). The point estimates associated with our variable of interest is in fact 0.048 **in this case, when we refers only to the high skill foreign workers instead, see column (4), the effect is no more statistically different from zero, meaning that for such a high skill migrants (roughly measured as per-capita gdp) the effect on**

[15] In our framework the production of manufactures is more intense in simple tasks with respect to services, such as financial and professional ones.

[16] Even if it is only marginally significant

[17] Considering that the dependent variable is a ratio between Manufactures and Services value added, the negative sign of $lmig_{it}$ coefficient suggests that an increase in the stock of migrants induce a relative increase in services over manufactures production

production is not different from the excluded group (medium-low skills). Giving our identification strategy, which consider each group in a separated regression, mainly in order to be more parsimonious and avoiding that number of instruments raises[18], we do not comment directly the coefficient associated with the medium skill regression (column 3) because in such case the reference group contains both low and high skills migrant workers and possibly confounding the relative effect of medium skilled.

Furthermore, we employ a different classification of foreign born workers according to their schooling attainment, in order to proxy their skill level more precisely. In particular we use the information compiled by (Docquier et al., 2008) which classify foreign born residence in OECD countries by nationality and schooling attainment[19]. For each province i we consider the share of low skill foreign workers aggregating the stock of migrants according to the source country share of primary school attainment[20]. Table 3 reports the estimates of skills specific regression using the (Docquier et al., 2008) classification. As we can see from column(1) the coefficient associated with the low skill foreign workers is higher with respect to the excluded group (medium-high skills), while the one associated to the high-skill migrants is lower and only marginally different from zero.

The same results hold when we consider as dependent variable the ration between low to high technology exports[21], see Table 2, also in this case the magnitude of the effect is much stronger when we consider only those workers which are more likely to provide simpler tasks with respect to natives, column (2). Same results holds when we classify foreign born workers according to the level of schooling, in table 5, column (1) reports the point estimates for the low skill with respect to medium and high skill foreign worker, again the impact is much stronger for such group, while the same effect considering only the high skill fraction of migrants is not statistically . Across specifications one main result emerge robust and stable, the relative concentration of immigrants at province level, causes a shift in the local production bundle towards manufacturing with respect to services. This result, confirmed throughout the different model specifications (see Table 2 4), seems to confirm the theoretical explanation we gave in the previous section. However another very interesting result, that emerge when we use schooling as measure of foreign workers skills, which indeed is a more accurate proxy for the migrant skill composition, is the significative coefficient associated with the relative availability of high skills migrants, see column(3) 5; this effect, in fact, seems to be associated to the fact that even if some high skilled workers are likely to

[18] Such a concern is motivated by the structure of our panel, which reports only 103 different individuals – Italian Provinces, given the fact that the number of elements in the estimated variance matrix is quadratic in the instrument count (as in T), a relatively finite sample, as ours, may lack adequate information to estimate large matrix.

[19] Specifically, the stock (and rates) of migration inflows for each OECD country are provided by level of schooling and gender for 195 source countries in 1990 and 2000

[20] In such a way we do not exclude any nationality in building our skill specific lMN but we consider only the fraction of residence which reports a specific school attainment. Of course in doing so we implicitly assume that, by nationality, the distribution of skills over Italy is uniform.

[21] As relatively higher technology export industries we consider chemicals and rubber, pharmaceutical products, computers and electronic devices

provide the same kind of tasks with respect to natives they are somehow underemployed. There may be then a discrimination in the labor market which result in a significant skill waste.

Table 2: GMM: Value Added Regression

VARIABLES				
	(1)	(2)	(3)	(4)
$\ln(VA_{man}/VA_{serv})_{t-1}$	0.950***	0.949***	0.952***	0.937***
	(0.021)	(0.024)	(0.019)	(0.023)
ln *Migr/Pop*	0.048**			
	(0.022)			
ln *Migr*	-0.033*			
	(0.017)			
ln *Migr/Pop (low GDPpc)*		0.048**		
		(0.023)		
ln *Migr (low GDPpc)*		-0.040*		
		(0.021)		
ln *Migr/Pop (medium GDPpc)*			0.044**	
			(0.019)	
ln *Migr (medium GDPpc)*			-0.030*	
			(0.017)	
ln *Migr/Pop (high GDPpc)*				0.007
				(0.018)
ln *Migr (high GDPpc)*				-0.006
				(0.014)
Density	0.016	0.022*	0.014	0.005
	(0.011)	(0.012)	(0.011)	(0.009)
Graduate	2.331*	2.642	1.979	1.285
	(1.365)	(1.621)	(1.334)	(1.036)
Highways	-0.002	-0.001	-0.002	0.001
	(0.003)	(0.003)	(0.003)	(0.002)
Airports	-0.003	-0.002	-0.003	-0.006*
	(0.002)	(0.003)	(0.002)	(0.003)
Constant	0.366**	0.412**	0.345**	0.012
	(0.164)	(0.198)	(0.163)	(0.164)
Observations	1,133	1,133	1,133	1,133
Number of ID	103	103	103	103
AR(1) p-value	0	0	0	0
AR(2) p-value	0.559	0.543	0.541	0.550
Hansen p-value	0.101	0.105	0.165	0.0598
Kleibergen-Paap (LM)	316.60	296.83	272.34	283.88
Instruments	66	66	66	66

t Statistics in parentheses: $*p < 0.1, **p < 0.05, ***p < 0.01$. All regressions contain time dummies. Variables are expressed in natural logarithms, coefficient may be interpreted as elasticities. In all regression the estimated model employs two year lag on $\ln(VA_{man}/VA_{serv})_t$, ln *Migr/Pop* and ln *Migr* as instruments, including *PolicyDummy* in the set of exogenous instruments as well. Note: GDPpc class are constructed using World Bank data for 1995, the average values are 1000 US$ for the low class, 3600 US$ for the medium and 15000US$ for the high one.

Table 3: GMM: Value Added Regression by schooling attainment

VARIABLES			
	(1)	(2)	(3)
$\ln(VA_{man}/VA_{serv})_{t-1}$	0.952***	0.948***	0.947***
	(0.021)	(0.021)	(0.023)
ln *Migr/Pop (prim School)*	0.046**		
	(0.020)		
ln *Migr (prim School)*	-0.028*		
	(0.016)		
ln *Migr/Pop (sec School)*		0.047**	
		(0.023)	
ln *Migr (sec School)*		-0.034*	
		(0.018)	
ln *Migr/Pop (ter School)*			0.042*
			(0.025)
ln *Migr (ter School)*			-0.035**
			(0.017)
Density	0.014	0.017	0.017*
	(0.010)	(0.011)	(0.010)
Graduates	1.996	2.309*	2.511**
	(1.366)	(1.340)	(1.280)
Highways	-0.003	-0.002	-0.000
	(0.003)	(0.003)	(0.003)
Airports	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.003)
Constant	0.345**	0.383**	0.367*
	(0.158)	(0.182)	(0.194)
Observations	1,133	1,133	1,133
Number of ID	103	103	103
AR(1) p-value	0	0	0
AR(2) p-value	0.553	0.553	0.564
Hansen p-value	0.114	0.0942	0.0742
Kleibergen-Paap (LM)	316.331	310.58	280.41
Instruments	66	66	66

t Statistics in parentheses: $*p < 0.1, **p < 0.05, ***p < 0.01$. All regressions contain time dummies . Variables are expressed in natural logarithms, coefficient may be interpreted as elasticities. In all regression the estimated model employs two year lag on $\ln(VA_{man}/VA_{serv})_t$, ln *Migr/Pop* and ln *Migr* as instruments, including *PolicyDummy* in the set of exogenous instruments as well. Note: *prim*, *sec* and *ter* refers to schooling attainment (primary, secondary and tertiary).

Table 4: GMM: Export Regression

VARIABLES				
	(1)	(2)	(3)	(4)
$\ln(EXP_{high}/EXP_{low})_{t-1}$	0.893***	0.879***	0.875***	0.879***
	(0.044)	(0.049)	(0.042)	(0.051)
ln *Migr/Pop*	0.223**			
	(0.101)			
ln *Migr*	-0.303***			
	(0.098)			
ln *Migr/Pop (low GDPpc)*		0.282**		
		(0.125)		
ln *Migr (low GDPpc)*		-0.322**		
		(0.137)		
ln *Migr/Pop (medium GDPpc)*			0.231	
			(0.146)	
ln *Migr (medium GDPpc)*			-0.320**	
			(0.128)	
ln *Migr/Pop (high GDPpc)*				0.131
				(0.118)
ln *Migr (high GDPpc)*				-0.222**
				(0.102)
Density	0.127**	0.112	0.146**	0.100**
	(0.058)	(0.073)	(0.072)	(0.051)
Graduates	8.738	4.150	11.504	7.337
	(6.354)	(8.066)	(8.154)	(7.393)
Highways	0.028	0.034	0.029	0.016
	(0.023)	(0.029)	(0.023)	(0.020)
Airports	0.024	0.018	0.022	0.012
	(0.018)	(0.022)	(0.020)	(0.016)
Constant	3.011***	3.442***	3.066**	1.898
	(0.972)	(1.334)	(1.340)	(1.193)
Observations	927	927	927	927
Number of ID	103	103	103	103
AR(1) p-value	0.0149	0.0152	0.0154	0.0157
AR(2) p-value	0.211	0.212	0.210	0.213
Hansen p-value	0.641	0.514	0.451	0.770
Kleibergen-Paap (LM)	347.10	291.02	297.91	241.97
Instruments	54	54	54	54

t Statistics in parentheses: $*p < 0.1, **p < 0.05, ***p < 0.01$. All regressions contain time dummies. Variables are expressed in natural logarithms, coefficient may be interpreted as elasticities. In all regression the estimated model employs two year lag on $\ln(EXP_{high}/EXP_{low})_t$, ln *Migr/Pop* and ln *Migr* as instruments, including *PolicyDummy* in the set of exogenous instruments as well.

Table 5: GMM: Export Regression

VARIABLES			
	(1)	(2)	(3)
$\ln(EXP_{high}/EXP_{low})_{t-1}$	0.890***	0.892***	0.895***
	(0.045)	(0.044)	(0.040)
ln *Migr/Pop (prim School)*	0.242**		
	(0.101)		
ln *Migr (prim School)*	-0.310***		
	(0.097)		
ln *Migr/Pop (sec School)*		0.220**	
		(0.104)	
ln *Migr (sec School)*		-0.299***	
		(0.102)	
ln *Migr/Pop (ter School)*			0.154
			(0.127)
ln *Migr (ter School)*			-0.278**
			(0.116)
Density	0.129**	0.124**	0.126**
	(0.059)	(0.058)	(0.061)
Graduate	7.870	9.256	10.707
	(6.620)	(6.339)	(6.574)
Highways	0.029	0.029	0.028
	(0.024)	(0.023)	(0.019)
Airports	0.025	0.023	0.017
	(0.019)	(0.018)	(0.017)
Constant	3.093***	2.891***	2.306*
	(0.964)	(1.003)	(1.259)
Observations	927	927	927
Number of ID	103	103	103
AR(1) p-value	0.0148	0.0150	0.0152
AR(2) p-value	0.211	0.211	0.210
Hansen p-value	0.594	0.615	0.848
Kleibergen-Paap (LM)	343.42	341.13	283.22
Instruments	54	54	54

t Statistics in parentheses: $*p < 0.1, **p < 0.05, ***p < 0.01$. All regressions contain time dummies. Variables are expressed in natural logarithms, coefficient may be interpreted as elasticities. In all regression the estimated model employs two year lag on $\ln(EXP_{high}/EXP_{low})_t$, ln *Migr/Pop* and ln *Migr* as instruments, including *PolicyDummy* in the set of exogenous instruments as well.

5 Concluding remarks

References

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6 Appendix

6.1 Additional Statistics

Figure 7: Correlation between per-capita GDP and level of schooling. (Source:)

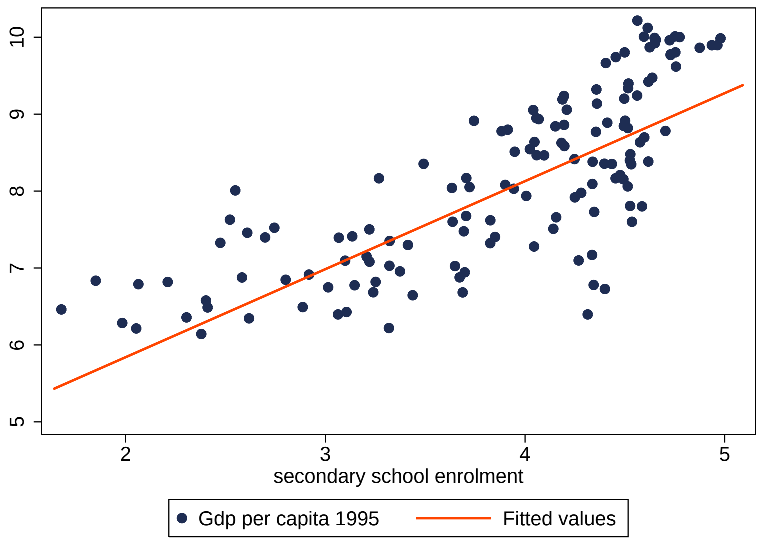

Table 6: Coefficient boundary for dynamic panel estimation

VARIABLES			
	(1)	(2)	(3)
$\ln(VA_{man}/VA_{serv})_{t-1}$	0.987***	0.954***	0.780***
	(0.004)	(0.022)	(0.026)
ln *Migr/Pop*	0.001	0.043*	-0.088
	(0.004)	(0.022)	(0.125)
ln *Migr*	-0.001	-0.027*	0.092
	(0.002)	(0.016)	(0.122)
Constant	0.016	0.444**	-1.373
	(0.031)	(0.210)	(1.588)
Observations	1,133	1,133	1,133
R-squared	0.988		0.776
Number of ID		103	103
AR(1) p-value		0	
AR(2) p-value		0.548	
Hansen p-value		0.0786	
Kleibergen-Paap (LM)		349.24	
Instruments		62	

Note: Robust SE in parenthesis $*p < 0.1, **p < 0.05, ***p < 0.01$. All regressions contain time dummies. Columns (2) reports the GMM-sys results the estimated model employs two year lag on the dependent variables $\ln(VA_{man}/VA_{serv})_t$, ln *Migr/Pop* and ln *Migr* as instruments.

Table 7: Im-Pesaran-Shin unit-root test for $Serv\_Share$

			Fixed-N exact critical values		
	Statistic	p-value	1%	5%	10%
t-bar	-2.178		-2.390	-2.320	-2.290
t-tilde-bar	-1.824				
Z-t-tilde-bar	-7.191	0.000			

Note: AR parameter: Panel-specific; included Panel means and Time trend.

6.2 Robustness Check: Baseline model

In this section we reports some robustness check of the baseline econometric model, using two different instrumental variable for the actual stock of migrants. The first one is maybe the most accepted instrument based on the original idea of (Altonji and Card, 1991) on immigrants *enclaves*. The basic idea is that immigrants tend to settle where there are already established communities from the same country: this, in fact, may reducing migration costs and maximize benefits (probability to find an accommodation or a job for example), under the assumption that this dynamic provides an exogenous source of variation for immigration stocks. In our case we use the first year of available data on residence permits in Italy, 1991, and, based on the distribution of nationality across provinces in that year, we construct predicted stock of immigrants for the period 1995-2006, using the predicted stock to compute our covariates of interests lMN and $lmig$. Since in 1991 the number of Italian provinces was 95, in constructing our instrument we follows two approaches, in column (1) 8 we consider only the provinces already operating in the 1991, while in column (2) we rescale the distribution in 1991 according to the regional population shares ini 1995 – the first year with 103 operating provinces.
The second approach we follow in order to build an instrument for the actual stock of migrants is to regress the immigration growth rate on a set of dummies and predict an expected growth rate, which we then use to impute the actual stock[22]. In detail, the predicted growth rate is based on the following regression:

$$mig\_growt_{ijt} = \alpha_{it} + \alpha_{jt} + \alpha_{ij} + \epsilon_{ijt} \tag{18}$$

[22]In this case we consider only those nationalities that were already present in Italy in 1995

Table 8: GMM: IV Robustness Check

VARIABLES		
	(1)	(2)
$\ln(VA_{man}/VA_{serv})_{t-1}$	0.953***	0.953***
	(0.022)	(0.021)
ln *Migr/Pop*^{95pr}	0.033*	
	(0.019)	
ln *Migr*^{95pr}	-0.028*	
	(0.017)	
ln *Migr/Pop*^{103pr}		0.044*
		(0.027)
ln *Migr*^{103pr}		-0.033
		(0.023)
Density	0.014	0.015
	(0.010)	(0.012)
Graduate	1.530	1.850
	(1.184)	(1.563)
Highways	0.000	-0.000
	(0.003)	(0.003)
Airports	-0.002	-0.003
	(0.003)	(0.004)
Constant	0.289*	0.368
	(0.171)	(0.251)
Observations	1,045	1,133
Number of ID	95	103
AR(1) p-value	0	0
AR(2) p-value	0.327	0.523
Hansen p-value	0.171	0.0784
Kleibergen-Paap (LM)	363.31	373.66
Instruments	65	65

t Statistics in parentheses: $*p < 0.1, **p < 0.05, ***p < 0.01$. All regressions contain time dummies. Variables are expressed in natural logarithms, coefficient may be interpreted as elasticities. In all regression the estimated model employs two year lag on $\ln(VA_{man}/VA_{serv})_t$, ln *Migr/Pop* and ln *Migr* as instruments, since the reference distribution of immigrants refers to 1991 we do not include *PolicyDummy* in the set of exogenous instruments. Note: the superscript associated to ln *Migr/Pop* and ln *Migr* refers to the number of provinces we consider in the construction of the instrument.