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Evidence from Italian Local Labour Markets**

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Abstract

We study the effects of low skilled immigration on firm profits, average wages, capital and total factor productivity (TFP) by combining firm-level and local labour market data from Italy. We find that low skilled immigration increases profits. This effect is small on average, larger for small firms and considerably larger for firms operating in local labour markets with a higher than median share of (before sample) low skilled employment. In these areas, substitution effects reduce average wages much more than elsewhere. Low skilled immigration has increased profits by lowering average wages and by increasing the capital stock, with no effect on TFP.

Introduction

Do firms benefit from low skilled immigration? In the short-run and with flexible wages, an inflow of unskilled immigrants increases the supply of low skilled labour, reduces its price and increase the price of skilled labour (Altonji and Card, 1991; Card, 2001; Dustmann et al, 2008). Firms using intensively unskilled labour initially benefit in terms of higher profits. Firms employing mainly skilled labour face instead increasing labour costs. Over time, as firms expand their production and/or the capital stock, the demand for unskilled labour increases, pushing unskilled wages up and profits down toward their value prior to the immigration shock (Borjas, 1995; Olney, 2013; Jaeger et al, 2018).

Immigration can influence firm performance via alternative routes. For instance, birthplace diversity can affect productivity by stimulating innovations and introducing new ideas to solve problems (see Parrotta et al. 2014; Alesina et al., 2016; Docquier et al. 2018); networks of immigrants in firms can reduce information costs and facilitate offshoring activities (e.g., Moriconi et al., 2018), or promote trade in the countries of origin (e.g., Gould, 1994; Combes et al., 2005); suppliers hiring cheap unskilled labour can transfer part of the benefit to downstream firms via lower output prices. Overall, the effects of low skill immigration on profits are likely to vary depending on the time horizon being considered, the adopted technology and the interactions among firms in a local labour market.

In this empirical paper, we investigate the effects of low skill immigration on firm performance using firm micro data. We focus on Italy, a relatively large manufacturing economy specialized in traditional sectors that are intensive in unskilled labour, which stands out among OECD destination countries because it disproportionately attracts low-skilled immigrants, who have at most high

school education.¹ Using the variation over time and across local labour markets (LLM) in the supply of immigrants and a sample of more than 17 thousand incorporated manufacturing firms observed between 2007 and 2016, we estimate the effects of immigration on profits, labour costs, the capital stock and total factor productivity (TFP) of firms located in these markets..

Since immigrants are not randomly allocated across local labour markets, we construct an instrument for the local change in the supply of immigrants using a shift-share approach (see Card, 2001), which exploits the fact that immigrants of a given nationality tend to settle in places where established communities of the same nationality exist (enclave effect). We discuss instrument validity in detail.

We find that the average effect of immigration on profits is positive but small. We estimate that increasing the local supply of low skilled immigrants by one thousand units – which corresponds to 8.5 percent of the mean value - raises profits by 0.39 to 0.52 percent, reduces average labour costs by 0.03 to 0.08 percent, increases the capital stock by 0.01 to 0.18 percent and has no effect on TFP. During the sample period, the stock of immigrants in a local labour market increased on average by a massive 83 percent (from 7.55 in 2007 to 13.86 in 2016), but the profits of firms rose on average by only 2.4 to 3.2 percent and average TFP remained unchanged.

Our results on the effects of immigration on TFP are sharply in contrast with the findings by Mitaritonna et al, 2017, who also use firm micro data to study the effect of immigration in the French economy. A key reason for this difference is that we focus on low skill immigration while they consider a period when the net inflow of immigrants in France was concentrated among the highly skilled.

¹ Previous research on Italy using more aggregate data has shown that an increase in the share of immigrants has contributed to raising value added in manufacturing with respect to services (see De Arcangelis, Di Porto and Santoni, 2015), without having any detectable effect on innovation activities (Bratti and Conti, 2018).

While average effects are small or non-existent, we find that the impact of low skill immigration varies with firm size and with the importance of low skilled employment in the local labour market. We estimate that adding one thousand immigrants to the local labour market would increase the profits of small firms by 0.86 percent, more than three times as much as the increase in the profits of larger firms (+0.24 percent). In addition, we find that the capital stock and TFP fall with immigration in the former group of firms but increase in the latter group.

Although we do not observe for individual firms the composition of employment by skill, we have this information for the local labour market, dated more than five years before the start of our sample period. When we distinguish between LLM with a median or higher than median share of low skilled labour and other LLM, we estimate that increasing by 8.5 percent the local stock of low skilled immigration would raise profits and reduce average wages by 5 and 3.1 percent in the former group and by 0.44 and 0.1 percent in the latter group, suggesting that low skilled immigration has a substantially higher impact in areas where low skilled employment is important. We also find some evidence that the impact of immigration on profits is higher in the LLM where credit supply is more abundant, in line with the fact that, when firms are allowed to freely adjust their capital, they rapidly move toward the efficient combination of inputs and benefit more from the inflow of cheap immigrant labour.

Many commentators suggest that reasons for the dismal performance of Italian productivity include the dominant presence of small firms, a relatively low supply of high skilled labour and an industrial specialization that still insists on low to medium tech productions (see for instance Bugamelli and Lotti, 2018). Our evidence suggests that the recent waves of low skilled immigration, by increasing the profits of small firms and the benefits from operating in local labour markets that specialize in the use of unskilled labour, may have reinforced these reasons rather than facilitated the transition to an economic structure characterized by high productivity and wage growth.

The paper is organized as follows. Section 1 briefly reviews the relevant literature. Section 2 describes the data and Section 3 introduces both the empirical model and the identification strategy. Section 4 presents our results. Instrument validity and robustness checks are discussed in Sections 5 and 6. Conclusions follow.

1. Literature Review

Compared to the abundant literature on the effects of immigration on native wages (see for instance Dustmann et al., 2016), less has been done so far to explore whether immigration affects firm – level variables, including profits. US studies exploiting the variation in H-1B visas for skilled workers include Ghosh, Mayda and Ortega, 2014, who find that relaxing the cap on these visas would increase the productivity, size and profits of US large and innovative firms. Similar findings are reported by Kerr and Lincoln, 2010 and Peri, Shih and Sparber, 2015. Conversely, Doran, Gelber and Isen, 2016, find that additional H-1B visas have insignificant and at most modest effects on firms' patenting, while reducing average earnings and increasing firm profits.

A few papers have investigated the effects of immigration on firm productivity. Paserman, 2013, exploits cross-firm industry variation in the concentration of skilled immigrants and finds evidence of a negative correlation between the immigrant share and output per worker in low-tech industries, whereas the relationship becomes positive for high-tech industries. Parrotta et al., 2014, study the effects of diversity within firms on total factor productivity, using a rich matched employer-employee dataset for Denmark. Their evidence points toward a negative association between ethnic diversity and firm-level productivity. Trax et al., 2015, use German establishment data to estimate the effect of cultural diversity on total factor productivity and find that higher immigrant concentration in a firm does not lead to higher TFP. However, they show that higher ethnic diversity in the firm or in the region where the firm is

located has positive effects on firm-level TFP, consistent with the findings in Ortega and Peri, 2014.

Recently, Mitaritonna, Orefice and Peri, 2017, have used micro data of French manufacturing firms to show that a supply-driven increase in the share of foreign-born high skilled workers in a French department have raised the total factor productivity of firms in that department. This positive productivity effect has been also associated with faster growth of capital and exports.

Focusing on the service sector, Ottaviano et al., 2018, investigate whether immigrants affect the labour productivity of firms (measured as gross value added per worker), their exports and imports of services. Exploiting differences in the distribution of immigrants across local labour markets, they find that immigration raises both value added per worker and exports, while imports decrease. They suggest that the key mechanism explaining productivity growth is cost reduction, rather than country-of-origin diversity. In contrast, Nicodemo, 2013, provides evidence that firm-level labour productivity decreased in Spain between 2004 and 2008 in response to immigration.

The effects of immigration on firm-level capital stock and choice of techniques has been discussed by Lewis, 2011, Ottaviano and Peri, 2012, Peri, 2016, Blau and Mackie, 2017. Dustmann and Glitz, 2015, use German administrative data to estimate the effect of changes in the local skill mix – due for instance to immigration – on local industries, distinguishing between the expansion of firms adopting technologies that are intensive in the more abundant skill and the adoption of new technologies to accommodate the abundant factor. They find that the latter effect prevails.²

2. The Data

² Firms can respond to immigration also by increasing the number of establishments (Olney, 2013).

We draw our data from AIDA – Bureau van Dijk. A key advantage of these data is that they contain information on gross operating profits,³ labour costs, total employment and the capital stock for the universe of Italian incorporated enterprises. This comes at the price. First, as in the ORBIS database (see Andrews and Cingano, 2014), reporting employment is not mandatory. Therefore, close to 11 percent of the original records have either missing or zero employment. When employment is missing or zero for only a few years, as it happens in the vast majority of cases, we predict it by dividing current revenue by average productivity. Second, the composition of firm employment by skill or by immigrant status is not available.

We consider only incorporated manufacturing firms with at least 500 thousand euro of sales in 2007. This sub-sample consists of 40,034 firms in 2015, and accounts for 48.2 percent of total manufacturing value added in the relevant regions (see Table A1). We further select the sample by retaining firms located in Northern or Central Italy,⁴ with positive values of sales, employment, the capital stock and labour costs, which were always present between 2007 and 2016, ending up with 17,269 firms.⁵ We deflate all firm variables with the consumer price index and discard extreme values (below the 1st and above the 99th percentile).

We use the legal address to identify the local labour market (LLM, or travel to work area) where the firm is located.⁶ This assignment procedure is subject to measurement error, because multi-plant firms may have several plants located

³ Gross operating profits is total revenue - gross of taxes and of interest payments - minus operating expenses and the costs of running the business.

⁴ We exclude Southern Italy because of its different level of industrialization and because the share of immigrants is much lower than in the rest of the country. As discussed in Section 6, our key results are qualitatively unchanged by including Southern firms.

⁵ The sample of 40,034 firms is reduced to 37,759 by dropping anomalies, such as negative values of sales; to 29,235 firms by retaining only firms with at least three consecutive records; to 25,468 firms by dropping Southern regions; to 17,269 firms by retaining only firms with 10 records between 2007 to 2016. We show in Section 6 that our qualitative results hold also in the larger sample of firms with at least three consecutive records.

⁶ There are 300 local labour markets in our sample. We use the 2001 definition of local labour markets, as provided by the National Statistical Office (ISTAT).

in areas that do not correspond to the location of the headquarters. We believe that this error is attenuated in our data by the fact that many Italian firms are small and with a single production unit.⁷

As pointed out by Bratti and Conti, 2018, and Del Boca and Venturini, 2005, immigration to Italy is largely low skilled. The proportion of low skilled immigrants, defined as immigrants with high school education or less (see for example Peri and Sparber, 2009), is the highest among developed economies. As shown in Table 2, in 2010/11 as many as 86 percent of immigrants in Italy were low skilled, compared to 76 percent in France, 44 percent in the UK, 45 percent in Australia and 36 percent in Canada.⁸ According to Eurostat, this figure increased to 88.3 percent in 2016, the highest among the 28 EU countries.

The importance of low skilled immigration can be understood by considering that Italy specializes in traditional manufacturing goods that are intensive in low skilled labour, and that its ageing population increasingly demands personal and household services that are typically performed by low skilled workers. In addition, Italy's location makes it a natural place of arrival for immigrants from South-Eastern Europe and North Africa, who are typically low educated (Bratti and Conti, 2018).

Close to 92 percent of immigration to Italy originates from middle and low income countries (91.7 percent in 2016, up from 86.5 percent in 2006) and the top five countries by number of immigrants in 2016 were Romania (22.9

⁷ In our working sample, mean and median firm size are 37.12 and 16 respectively. In Italy, only 7 percent of multi-plant firms have plants outside the region, where local labour market conditions – including immigration - are presumably different. In the robustness section of this paper we run our regressions using only firms with less than 50 employees – which are unlikely to be multi-plant - and confirm our qualitative findings.

⁸ Contrary to Greece and Belgium, which have similar proportions of low skilled immigration, the percentage of highly educated in Italy is low also among natives. According to the OECD, the total share of individuals aged 25 to 64 with tertiary education in 2015 was 18 percent in Italy, 30 percent in Greece and 37 percent in Belgium. See OECD, *Education at a Glance*, 2016. Generally, Italian immigration policies are not skill-selective. Inflows of immigrants from outside the European Union are regulated by a quota system, which is fixed annually by a Decree. This quota is mainly employer driven and does not explicitly target high skilled workers (see Facchini and Lodigiani, 2014).

percent), Albania (9.3), Morocco (8.7), China (5.4) and Ukraine (4.6) (source: ISTAT, Demographic Portal). According to the database developed by Artuc, Docquier, Ozden and Parsons, 2015, the share of low skilled immigrants is close to 90% among Romanians and Albanians and equal to 94% among Moroccans and Chinese.

We compute the stock of regular immigrants using the Demographic Balance and Resident Population by Sex and Citizenship (ISTAT, *Bilancio demografico e popolazione residente per sesso e nazionalità*), which contains since 2002 information on regular resident foreigners (by citizenship and sex, but not by education) in each Italian municipality on January 1st of each year.

In the absence of data on individual education, we treat all immigrants as if they were unskilled, using the fact that the vast majority has less than tertiary education. The average stock of immigrants in a local labour market between 2007 and 2016 was equal to 11,726 individuals, corresponding to 8.64 percent of the local population. This share has increased from 6.02 in 2007 to 9.45 percent in 2016. The distributions of the stock and share across local labour markets in 2016 are shown in Figures 1 and A1.

The outcomes studied in this paper include total factor productivity, which we estimate using the procedure proposed by Akerberg, Caves and Frazer, 2015. Assuming a Cobb Douglas specification, we express log real sales in firm i at time t as function of the log real capital stock, the log of real intermediate goods, the log of total labour costs, the log of total factor productivity (TFP) and a residual. Following Ciani, Locatelli and Pagnini, 2018, we use total labour costs rather than employment because the former allows us to account for differences in labour quality. Since TFP is unobserved by the econometrician, we derive it by using as additional equations the intermediate goods and labour costs

functions.⁹ The summary statistics for the main variables used in this paper are presented in Table 1.

3. The Empirical Setup

Consider a competitive economy where prices are set in the international market and firm – level output y is given by

$$y_{iqt} = A_{iqt} k_{iqt}^\gamma n_{iqt}^\alpha m_{iqt}^\beta \quad (1)$$

where n and m are skilled (mainly natives) and unskilled labour (including immigrants) employed in the firm, k is the capital stock, A is total factor productivity and the indices i , q and t are for the firm, the local labour market and time. The technology exhibits decreasing returns to scale ($\alpha + \beta + \gamma < 1$) and factor prices are w_N for the wage of skilled labour, w_M for the wage of unskilled labour and r for capital, which we assume to be constant across firms and LLM. Letting φ be a constant and $\Delta = 1 - \alpha - \beta - \gamma$, profit maximization with respect to skilled and unskilled labour yields

$$\pi_{iqt} = \varphi A_{iqt}^{1/\Delta} K_{iqt}^{\gamma/\Delta} w_{Siqt}^{-\alpha/\Delta} w_{Uiqt}^{-\beta/\Delta} - r_t K_{iqt} = \pi_{iqt}(A_{iqt}, K_{iqt}, w_{Siqt}, w_{Uiqt}, r_t) \quad (2)$$

where φ is a constant term. Letting M be the stock of immigrants in the local labour market, profits can be written as

$$\pi_{iqt}(M_{qt}) = \pi_{iqt}(A_{iqt}(M_{qt}), K_{iqt}(M_{qt}), w_{Siqt}(M_{qt}), w_{Uiqt}(M_{qt}), r_t(M_{qt})) \quad (3)$$

Changes in the local supply of labour – due for instance to a higher inflow of low skill immigrants - affect the profits of firms located in the area by influencing: a) wages; b) the capital stock and the rental price of capital; c) total factor productivity; d) the adopted technology, which includes parameters α , β and γ .

⁹ Olley and Pakes, 1996, and Levinshon and Petrin, 2003, use instead the investment and the intermediate goods functions, respectively.

We posit the following empirical relationship between the profits of firm i and the local supply of immigrants

$$\pi_{iqt} = \mu_i + \mu_q + \mu_t + \delta_1 M_{qt} + \delta_2 N_{qt} + \tau_{iq} T + v_{iqt} \quad (4)$$

where N_{qt} is the local stocks of natives, T is a linear trend, specific to each locality and to selected firm characteristics, $\tau_{iq} = \beta X_i$, X being a vector including the age of the firm and its square, a dummy for firm size and a dummy for the level of technology (low versus medium to high), and μ_i , μ_q and μ_t are firm, local and time fixed effects.

Differently from most literature, which focuses on the share of immigrants, we follow Wozniack and Murray, 2012, and use the stocks of immigrant and native labour supply. In our view, this specification is preferable to the one using shares because, other things equal, wages depend both on the composition and the absolute level of labour supply, but typically the former effect is less important than the latter. Since Eq. (4) includes both local labour market time invariant effects and local trends, it is unlikely that the relationship between π_{iqt} and M_{qt} is driven by local labor market size.¹⁰

Assuming that the stock of natives in a LLM follows a local trend but varies also with the stock of immigrants because of endogenous migration patterns, Eq. (4) can be re-written as¹¹

$$\pi_{iqt} = \theta_i + \theta_q + \theta_t + \beta M_{qt} + \omega_{iq} T + \varepsilon_{iqt} \quad (5)$$

where $\omega_{iq} = \delta_2 z_q + \beta X_i$. Taking first differences of (5) we obtain

$$\Delta \pi_{iqt} = \omega_q + \beta X_i + \theta_t + \beta \Delta M_{qt} + \Delta \varepsilon_{iqt} \quad (6)$$

where $\omega_q = \delta_2 z_q$. Eq. (6) is the empirical version – in first differences - of Eq. (3): conditional on time invariant local fixed effects and on aggregate time

¹⁰ To dispel this concern, we estimate a specification which augments Eq. (4) with the local share of immigrants, and find that, conditional on the stock of immigrants, the share does not attract a statistically significant coefficient. See Section 4.

¹¹ We assume $N_{qt} = \rho_q + \rho_t + \sigma M_{qt} + z_q T + \omega_{qt}$. Placing this into (4) yields (5).

effects, changes in the local stock of immigrants affect firm profits by altering local labour supply. The potential mediators in the transmission of labour supply shocks to profits include changes in local wages, the capital stock, firm productivity and the production technology.

Since immigrants are not randomly distributed across localities, but self-select on local labour market characteristics, including the labour demand by local firms and the local supply of natives, OLS estimates of Eq. (6) are biased. We address the endogeneity of ΔM_{qt} using an instrumental variables strategy, and select the instrument by following the approach proposed - among others - by Card, 2001, and adopted by most of the relevant literature.

Define Z in local labour market q and at time t as

$$Z_{qt} = \sum_{c=1}^N \lambda_{qc91} IMM_{ct} \quad (7)$$

where λ_{qc91} is the share of immigrants from country c in locality q and year 1991, well before the beginning of our sample in 2007, and IMM_{ct} is the stock in the national number of immigrants from country c in year t . To compute Z_{qt} , we follow Barone et al., 2016, and combine data on the residence permits awarded in 1991 (source: Italian Ministry of Interior) by province and country of origin, with data on immigrants by municipality and region of origin (source: Italian Statistical Institute).¹² Finally, the corresponding first difference, ΔZ_{qt} , is used as instrument for ΔM_{qt} . Figure A2 shows the distribution of ΔZ_{qt} across local labour markets in 2016.

The instrument ΔZ exploits the fact that immigrants tend to locate in areas with a large share of immigrants of the same country of origin (enclave effect). The exclusion restriction requires that, conditional on local labour market and time dummies, local shocks that attracted immigrants at least fifteen years before the

¹² We use imputation methods to derive data by municipality and country of origin in 1991 from the data by province and country of origin. We aggregate municipalities to obtain immigration by country of origin at the local labour market level.

start of the sample period are uncorrelated with current local characteristics and shocks, which influence local firms.

We believe that this requirement is likely to hold in our data for at least two reasons. First, we include in Eq. (6) local labour market dummies, which capture local characteristics and correspond to local linear trends in Eq. (5). These trends proxy for evolving local employment opportunities and productivity (see Barone and Mocetti, 2011). Second, in the construction of Z we predict the change in the stock of immigrants in a given local labour market q and time t by redistributing immigrants across localities as of their distribution in 1991. Importantly, 1991 is the year before the signing of the Maastricht Treaty, which established the principle of freedom of movement and residence in Europe for the European citizens. It also predates by far the Eastern enlargements in 2004 and 2007, which brought some former communist countries, including Poland, Bulgaria and Romania, into the EU. These important historical changes indicate that past and current local shocks are unlikely to be correlated, which supports the validity of the exclusion restriction. To further corroborate our identification strategy, we submit it to a battery of empirical tests in Section 5 below.

4. Results

4.1 Baseline findings

Table 3 presents our baseline results. In column (1) we report the first stage effect of the instrument Z on the local stock of immigrants, which is positive and statistically significant.¹³ Since the F-test associated to the exclusion of the instrument from the first stage equation is much larger than the threshold value of 10, the selected instrument is not weak.

Columns (2) to (5) show the estimated effect of changes in the local stock of immigrants on real operating profits, the real average labour cost, the real capital stock and total factor productivity. We also report in the table the estimated

¹³ In all our regressions, standard errors are clustered at the local labour market level.

percent change in each outcome when the local stock of immigrants M increases by 1 thousand units, or 8.5 percent of the sample mean (11,726).

We estimate that adding 1 thousand units to local M raises real operating profits by 0.39 percent, reduces real per capita labour costs by 0.08 percent and has no statistically significant effect on the capital stock and total factor productivity.¹⁴ These effects are quite small: although the average increase in the stock of immigrants in the local labour markets of Northern and Central Italy was substantial during the period 2007 to 2016, and equal to 6.3 thousand (+83%), the real profits of firms increased only by 2.4 percent and real average labour costs declined by 0.5 percent.

In a recent paper, Jaeger et al., 2018, have argued that the short-run negative effect of an inflow of new immigrants on local wages is countered by the positive effect of the *ongoing* additional investments in physical capital induced by *past* inflows of immigrants, that are required to restore the steady state capital / labour ratio. Generally, the short-run effect of immigration is partly offset by this adjustment. When the flows of new immigrants are serially correlated over time, a regression of wage changes on the (contemporaneous) flow of immigrants that omits lagged flows produces attenuated (i.e. biased towards zero) estimates that have the correct sign but are severely distorted downwards (in absolute terms), independently of whether the current flow of immigrants is instrumented by ΔZ . This happens because the instrument is almost mechanically correlated with the omitted lagged flows.

Jaeger et al.'s argument applies to operating profits as well, since wages and profits typically move in opposite directions. In order to address the attenuation bias, Jaeger et al. recommend adding lagged immigration flows to Eq. (6), and instrumenting the lag with the lagged instrument. We follow this suggestion by

¹⁴ We also find that total labour costs are unaffected by changes in M . Since average labour costs slightly decline, this implies that employment marginally increases. The results for productivity are confirmed when we use the measures proposed by Olley and Pakes and Levinsohn and Petrin.

adding the first lag of the stock ΔM to our baseline regression. We find that the estimated percent change in operating profits and the capital stock when ΔM increases by one thousand units is slightly higher (0.52 and 0.18 percent respectively), and that the change in average wages is slightly lower (-0.03 percent) (see Table 4).

Our finding that low skill immigration does not affect TFP does not confirm for Italy the results obtained for France by Mitaritonna et al., 2017, who present evidence of a statistically significant positive effect. We believe that these differences could be explained with the fact that we consider low skilled immigration, whereas they focus instead on an inflow of highly skilled immigrants. The fact that total factor productivity is not altered by changes in the stock of immigrants suggests that in Italy the estimated increase in real profits when local unskilled immigration rises is driven mainly by lower average wages.

4.2 Heterogeneous effects

Our baseline results assume that the effect of immigration on profits, wages and productivity are homogeneous across firms. Yet Eq. (2) suggests that the wage changes induced by a local inflow of low skill immigrants have larger effects on profits in firms that use unskilled labour more intensively. These could be small or low-tech firms.

Starting with firm size, we replace the change in the stock of immigrants in Eq. (6) with the interaction of this variable with two dummies, one for small firms (equal to 1 if the value of firm revenues in 2007 was below 10 million euro and to 0 otherwise) and the other for medium to large firms.¹⁵ The estimates in Table 5 indicate that the positive effect of adding one thousand local immigrants on operating profits is about three times as large in small than in medium to large

¹⁵ This definition is close to the one adopted by the European Union, which classifies firms as micro or small when turnover is at most 2 or 10 million euro. The interactions between ΔM and the firm size dummies are instrumented with the interactions of ΔZ with the dummies.

firms (0.846 versus by 0.237 percent, with the difference being statistically significant at the 1 percent level of confidence (p-value of the test = 0.00)).

We also find that a higher local stock of immigrants has a somewhat larger negative effect on real average labour costs for small than for larger firms (-0.091 versus -0.060), although the difference is not statistically significant. The effects on the capital stock and on total factor productivity are always very small, but negative for small firms and positive for larger firms. With a Cobb Douglas technology, the larger impact of immigration on the profits of smaller firms in the presence of rather similar effects on average labour costs is consistent with these firms having a higher share of labour on value added (0.71 versus 0.65 in larger firms).

We also interact the stock of immigrants with binary indicators for small low tech firms, larger low tech firms, small medium to high tech firms and larger medium to high tech firms. Following the EU classification, we define as low tech the following industries: manufacture of food products, beverages, tobacco products, textiles, apparel, leather and related products, wood and of products of wood and cork, except furniture, articles of straw and plaiting materials, paper and paper products, printing and reproduction of recorded media, furniture and other manufacturing, and as medium to high tech the remaining manufacturing sectors.

Results are reported in Table 6. We find that the estimated positive impact of low skilled immigration on real operating profits is highest for small firms in low tech sectors and lowest in larger firms in medium and high tech sectors (1.35 versus 0.26 percent, difference statistically significant at the 1 percent level of confidence). There is also evidence that average labour costs fall more in small low tech firms than in large medium and high firms. Combining these findings with those in Table 5, we conclude that firm size appears to be more important than the level of technology as source of heterogeneity in the response of firms to changes in local immigration.

We expect that, *ceteris paribus*, firms with a higher intensity of unskilled labour benefit more than other firms – in terms of lower labour costs and higher profits – from low skilled immigration. Unfortunately, our firm data do not include the composition of employment by skill, education or immigrant status. This information is available, however, at the local labour market level from the 2001 Census.

For each locality, we compute the average share of low skilled employees as the share of individuals not employed in managerial, professional or technical jobs. In order to avoid that this share captures other local labour market factors, such as the level of income or wealth, we regress it on local real labour income, real housing wealth and regional dummies, take the residuals and define two binary indicators, one for LLM with values of these residuals below the median and the other for LLM with values at or above the median. Figure 2 shows that the distribution of local labour markets with a relatively high share of unskilled labour is fairly dispersed, with no particular concentration in any specific region of the country.

We interact these dummies with the change in the local stock of immigrants and report results in Table 7. We find that the percent change in operating profits induced by adding one thousand immigrants to the local labour market is more than ten times larger (5.09 versus 0.44 percent) in areas with a median or higher than median share of low skilled workers than in the other areas. The gap is even larger for average labour costs, that fall by 3.15 percent in the former and by 0.10 percent in the latter. Finally, total factor productivity falls in all LLM, but especially in those with a high share of unskilled labour. These estimates suggest that the inflows of low-skilled immigrants in areas that specialize in productions intensive in low-skilled labour increase profits and employment significantly, mainly by reducing average labour costs.¹⁶

¹⁶ We also estimate that the percent increase in employment in areas with a higher than median share of unskilled labour is 3.67 percent. The share of low tech firms operating in local areas with a high share of low skill labour is equal to 41%, compared to 30% in the other areas.

One reason why profits increase with immigration is that firms facing lower labour costs – especially those located in areas that use intensively low skilled labour - have an incentive to expand their production using the current technology. This expansion is likely to be facilitated where access to credit is easier. We measure financial access with the number of bank branches in the local area (see Popov, 2014). As for the share of low skilled jobs, we regress this indicator on regional dummies, local income and housing wealth, take the residuals and define two binary indicators, one for areas with lower than median values and the other for areas with median or above median values. We study the effects on operating profits by interacting these dummies with the local change of immigrants. Results reported in Table 8 show that profits and the capital stock increase more with immigration in areas with higher financial development, although the difference in the effects across areas is not statistically distinguishable from zero.¹⁷

5. Instrument validity

In this Section, we further defend our choice of Z as the instrument for M , the stock of local low skilled immigration. If local labour market shocks affecting local profits were persistent over time, they could correlate with λ_{qc91} , the share of immigrants from country c in LLM q and year 1991, invalidating the instrument. Mitaritonna et al., 2017, propose to verify whether this is a serious threat to identification by splitting the study period into two sub-periods and regressing the trend in the outcome variables during the former sub-period on the trend in the instrument during the latter sub- period. Statistically significant effects would be problematic, but we find none (see Table A2 in the Appendix).

Our identification strategy could also fail because the instrument ΔZ in Eq. (6) is correlated with un-observables, which include current local labour market

¹⁷ We have also explored whether the impact of immigration on profits varies across areas with different levels of social capital, measured with blood donations per capita, and across local areas with and without industrial districts, but found no evidence that this is the case.

shocks. We investigate this possibility by applying the method recently developed by Oster, 2016, both to the first stage and to the reduced form estimates associated to (6). The test establishes bounds to the true value of the first stage and the reduced form parameters under two polar cases. In the first case, there are no un-observables and both the first stage and the reduced form model associated to Equation (6) are correctly specified. We denote as $\hat{R}$ the estimated R squared in this case. In the second case, there are un-observables but observables and un-observables are equally related to the treatment ($\delta=1$). When un-observables are included, we conservatively assume that the R squared is equal to $R_{max} = \min(1.3\hat{R}, 1)$. If zero can be excluded from the bounding set, then accounting for un-observables would not change the direction of our estimates. Table A3 shows that this is the case both for the first stage (column 1) and for the reduced form (columns 2 to 5).

Following the local-to-zero approach by Conley et al., 2012, we verify that our baseline estimates are robust to small deviations from the excludability condition of the instrument by assuming that the direct effect of ΔZ on firm outcomes is normally distributed with mean zero and standard deviation equal to one twentieth of the effect of ΔM estimated in Table 3. We show in Table A4 that the 95 percent confidence intervals associated to operating profits and average labour costs do not include zero, supporting the view that small deviations from excludability do not alter the sign of the estimated effects.¹⁸

Instrument ΔZ depends on the distribution of immigrants across local labour markets in the baseline year, by country of origin. As pointed out by Goldsmith-Pinkham et al., 2018, the validity of the instrument rests on the assumption that, for each source country, the baseline distribution across LLM is exogenous. To address this concern, we perform two robustness exercises.

¹⁸ Reported confidence intervals include zero for the capital stock and TFP, in line with our finding that the coefficients associated to these variables are imprecisely estimated in Table 3.

First, as in Wozniack and Murray, 2012, and Faggio and Overman, 2014, we construct an alternative version of the instrument which treats all immigrants as if they were of the same origin, and therefore remove origin as a potential source of endogeneity. Denoting as λ_{q91} the proportion of immigrants residing in the q th LLM in the baseline year, and as IMM_t the stock of immigrants in Italy at time t , we define the alternative instrument as $\Delta Z_{2,qt} = \lambda_{q91} \Delta IMM_t$. Table A5 shows that results are qualitative similar to those in Table 3, suggesting that distinguishing by country of origin plays a minor role in our identification strategy. Therefore, if any bias arises from the endogenous distribution of immigrants by country of origin, it is likely to be negligible.

Second, to further check whether our results are driven by the baseline distributions of immigrants, we re-estimate our main regressions by excluding one country of origin at the time from the definition of the instrument Z . However, the results in Table A6 are only marginally sensitive to the exclusion of any specific nationality.

6. Robustness

While our baseline results refer to a working sample of manufacturing firms which have been always present in the sample during the period 2007 to 2016, they do not change qualitatively were we to consider a broader sample of firms which have at least three consecutive valid records during in the same period (see Table A7).

If immigration affects profits, it could also impact on firm net turnover, measured as the difference between firm entries and firm exits. Using provincial data from *Movimprese*, a database of the local Chambers of Commerce, which provides population-level information on the number of firms that enter and exit the register in each province and year, we find that a higher stock of local low skilled immigrants reduces both firm exits and firm entries. However, since

exits decline more than entries, net turnover increases (Table A8).¹⁹ The finding that firm exits decline when the local stock of low skilled immigrants increases are consistent with our baseline results, showing that the profits of surviving firms marginally increase.

Our baseline specification uses the stock rather than the share of immigrants. Does the share also matter? We investigate this by including in the empirical specification both the stock and the share of immigrants, where the latter is measured as the ratio of local immigrants to local population, and by instrumenting the former with ΔZ and the latter with a version of the instrument that uses the national change in the share rather than in the stock of immigrants. We find – see Table A9 - that the former attracts a statistically significant and virtually unchanged coefficient, but the latter is not statistically different from zero.²⁰ We believe that this result is due to the fact that the variation of local population is well captured by LLM dummies.²¹

In our baseline estimates, we have used the change in the local stock of immigrants, independently of their age. When we restrict our estimates to immigrants aged 15 to 64, however, results are very similar (see Table A10). Our findings are also confirmed when we add to the sample the firms located in Southern Italy (Table A11).

By assigning firms to the local labor market where they have their legal residence, we disregard that medium and large firms may have more than one plant located in different local labor market. To attenuate this concern, we

¹⁹ These findings are only apparently in contrast with those by Bettin et al, 2019, who find that immigration increases firm entry. Were we to estimate the relationship between immigration and firm entry using OLS, as they do, we would also find a small positive effect, which could be driven, however, by the endogeneity of immigration.

²⁰ This result is not due to weak instruments, as the first stage F statistic is always greater than 10.

²¹ In unreported experiments, we have included as an additional regressor a measure of immigration diversity, constructed as one minus the Herfindahl Index across areas of origin. This indicator, however, is never statistically significant, in line with the view that immigration diversity may be relevant only when considering high skilled immigrants.

restrict our sample to firms with less than 50 employees, about 76 percent of the original sample, which are less likely to be multi-plant. As shown in Table A12, our results are qualitatively unchanged.

Finally, we replace year fixed effects with region by year fixed effects, in order to capture policy and technological shocks that are region-specific, with marginal effects on our baseline results (see Table A13).

Conclusions

Contributing to a small literature, this paper has investigated the (causal) effects of low skill immigration on the performance of Italian manufacturing firms. We have found that a higher local stock of immigrants raises profits and reduces average labour costs, especially among small firms and among firms located in areas with a relatively high share of unskilled labour.

We have not confirmed for Italy the results by Mitaritonna et al. 2017, who report that higher immigration increases TFP in France. Our evidence suggests instead no effects on average, and negative effects for small firms and for firms operating in areas specializing in low skill activities. We therefore conclude that the small increase in profits observed in our data when immigration rises is mainly due to lower average wages. In support of this view, we have found that average wages decline much more in areas with a higher share of low skilled employment.

The poor recent performance of Italian productivity has been attributed – among other things - to the dominant presence of small firms, a relatively low supply of high skilled labour and an industrial specialization that still insists on low to medium tech productions. Our results suggest that the recent waves of low skilled immigration may be reinforcing these weaknesses, by increasing the profits especially of small (low tech) firms and by reducing both their average labour costs and the pressure to invest and innovate.

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Table 1. Summary statistics

Variable	Mean	Standard Deviation	Number of observations
Real operating profits	0.568	1.208	155,422
Real average labour costs	0.039	0.023	155,422
Real capital stock	9.912	16.331	155,422
Number of employees	39.189	56.651	155,422
Total factor productivity	0.221	0.044	153,219
Number of firms	17,269		
Stock of immigrants in LLM 2016	11.726	32.523	300
Share of immigrants in LLM 2016	8.640	2.908	300
Instrument Z 2016	10.572	59.375	

Notes: LLM is for local labour market. All values are expressed in million euro, with the exception of the number of employees and firms (units), the stock of immigrants (thousands) and the share of immigrants (percent).

Table 2. Share of immigrants by level of education in Italy and in selected OECD countries. 2010/11

Country	Primary/lower secondary	Upper Secondary	Tertiary
Italy	0.47	0.39	0.14
Australia	0.12	0.33	0.48
Belgium	0.23	0.11	0.14
Canada	0.11	0.25	0.64
Germany	0.43	0.35	0.21
Denmark	0.17	0.24	0.21
Spain	0.45	0.31	0.24
Finland	0.58	0.21	0.21
France	0.51	0.24	0.24
UK	0.21	0.22	0.58
Greece	0.47	0.39	0.14
Ireland	0.12	0.41	0.41
Luxembourg	0.30	0.20	0.27
Netherlands	0.41	0.29	0.30
Norway	0.22	0.23	0.34
Sweden	0.18	0.30	0.36
USA	0.40	0.33	0.27

Source: OECD DIOC database.

Table 3. First stage and IV estimates of the effects of changes in the local stock of immigrants (M). Dependent variables: changes in firm outcomes

	First stage	Δ Real operating profits	Δ Real average labour costs	Δ Real Capital Stock	Δ TFP
ΔZ	0.2380*** (0.006)				
ΔM		2.213*** (0.240)	-0.032** (0.015)	1.344 (1.413)	-0.001 (0.001)
Percent change when M increases by 1 thousand units		0.390*** (0.042)	-0.080** (0.038)	0.0136 (0.0143)	-0.005 (0.006)
Observations	155,422	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes
F first stage	1,385				

Notes: Real operating profits, average and total labour cost, capital stock, value added and TFP are measured in thousand euro. M: stock of immigrants in the local labour market (thousands). Z: selected instrument. Standard errors clustered by LLM within parentheses. The sample includes only firms always present in the data during the period 2007-2016. Firm-level controls include dummies for firm size and level of technology and firm age and its square.

Table 4. First stage and IV estimates of the effects of changes in the current and lagged stock of immigrants (M). Dependent variables: changes in firm outcomes.

	First stage current ΔM	First stage lagged ΔM	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔZ	0.238*** (0.006)	-0.057*** (0.019)				
$\Delta Z(-1)$	-0.005 (0.010)	0.201*** (0.012)				
ΔM			2.382*** (0.280)	-0.028* (0.015)	5.266*** (1.521)	-0.001 (0.001)
$\Delta M(-1)$			0.554 (0.507)	0.015 (0.026)	12.949*** (2.235)	0.001 (0.003)
Percent change when M increases by 1 thousand units (long run effect)			0.517*** (0.121)	-0.033 (0.086)	0.184*** (0.034)	0.001 (0.018)
Observations	155,422	155,422	155,422	155,422	155,422	155,132
LLM dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
F first stage	1,205	8,865				

Notes: see Table 3

Table 5. IV estimates of the percent change in firm outcomes with respect to changes in the local stock of immigrants. By firm size.

	Δ Real operating profits	Δ Real average labour cost	Δ Real capital stock	Δ TFP
Percent change when M increases by 1 thousand units – smaller firms	0.846*** (0.117)	-0.091** (0.036)	-0.021 (0.050)	-0.008 (0.006)
Percent change when M increases by 1 thousand units – larger firms	0.237*** (0.023)	-0.060 (0.047)	0.027*** (0.006)	0.001 (0.006)
P-value test differences	0.00	0.19	0.30	0.00
Observations	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Notes: see Table 3

Table 6. IV estimates of the percent change in firm outcomes with respect to changes in the local stock of immigrants. By firm size and sector (low vs high and medium tech)

	Δ Real operating profits	Δ Real average labour cost	Δ Real capital stock	Δ TFP
Percent change when M increases by 1 thousand units – small low tech firms	1.350*** (0.237)	-0.100* (0.056)	0.065 (0.059)	-0.009 (0.007)
Percent change when M increases by 1 thousand units – small medium and high tech firms	1.080*** (0.166)	-0.105*** (0.026)	-0.131 (0.095)	-0.009 (0.007)
Percent change when M increases by 1 thousand units – large low tech firms	0.368*** (0.037)	-0.057 (0.047)	0.054*** (0.008)	-0.002 (0.005)
Percent change when M increases by 1 thousand units – large medium and high tech firms	0.262*** (0.027)	-0.061 (0.045)	0.014** (0.006)	-0.001 (0.006)
Observations	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Notes: see Table 3

Table 7. IV estimates of the percent change in firm outcomes with respect to changes in the local stock of immigrants. By LLM skill intensity.

	Δ Real operating profits	Δ Real average labour cost	Δ Real capital stock	Δ TFP
Percent change when M increases by 1 thousand units – firms in LLM with a lower than median share of low skilled labour in 2001	0.447*** (0.042)	-0.103** (0.042)	0.014 (0.014)	-0.007 (0.006)
Percent change when M increases by 1 thousand units – firms in LLM with a median or higher than median share of low skilled labour in 2001	5.090** (2.050)	-3.150* (1.790)	0.064 (0.436)	-0.209 (0.239)
P-value test differences	0.062	0.087	0.910	0.098
Observations	155,422	155,422	155,422	152,141
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Notes: see Table 3

Table 8. IV estimates of the percent change in firm operating profits with respect to changes in the local stock of immigrants. By LLM density of bank branches.

	Δ Real operating profits	Δ Real average labour cost	Δ Real capital stock	Δ TFP
Percent change when M increases by one thousand units – firms in LLM with a lower than median share of local bank branches in 2001	0.405*** (0.044)	-0.077** (0.038)	0.022* (0.013)	-0.005 (0.006)
Percent change when M increases by 1 thousand units – firms in LLM with a median or higher than median share of local bank branches in 2001	1.250* (0.687)	0.063 (0.566)	0.528* (0.274)	0.039 (0.149)
P-value test differences	0.205	0.803	0.062	0.763
Observations	155,422	155,422	155,422	152,141
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Figure 1.

Standardized stock of immigrants in LLMs. 2016

Figure 2.

Importance of low skilled employment in LLMs - 2001

Table A1. Value added of the firms in our baseline sample and total value added. Manufacturing 2015

Regions	Value added - 40,034 incorporated manufacturing firms. 2015	Total value added manufacturing 2015	Share (1)/(2)
Emilia-Romagna	14803.4	31791.2	0.465
Friuli-Venezia Giulia	2812.3	6700.3	0.419
Lazio	4057.8	9892.2	0.410
Liguria	1267.8	4256.4	0.297
Lombardia	37939.6	65485.2	0.579
Marche	2542.2	8289.6	0.306
Piemonte	12220.4	24046.2	0.508
Toscana	6739.4	17167.1	0.392
Trentino-Alto Adige	1675.5	4502.2	0.372
Umbria	1198.3	3165.1	0.378
Veneto	15027.3	32621.4	0.460
Total	100284.4	207916.9	0.482

Source: AIDA data and territorial accounts (ISTAT)

Table A2. OLS regressions of the change in the instrument during the period 2013-16 on the change of firm variables during the period 2008-2011.

	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
Coefficient of lagged firm variables *100	0.016 (0.016)	-0.0307 (0.0553)	0.004 (0.003)	1.160 (1.860)
Observations	68,255	68,740	68,732	68,048
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Notes: see Table 3

Table A3. Oster (2017)'s test applied to the first stage and the reduced-form regressions associated with Eq. (6).

	First Stage		Reduced Form		
	ΔM	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔZ	[0.238,0.450]	[0.527,0.541]	[-0.0076, -0.0077]	[0.312,0.319]	[-0.00029,-0.00028]
Observations	155,422	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes

Notes: Real operating profits, value added, wage bill, average labour cost and capital stock are measured in thousand euro. The sample includes only firms always present in the data during the period 2007-2016.

Table A4. Confidence intervals in the presence of small violations of the exclusion restriction, as in Conley et al., 2012.

	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔM	[1.185,3.219]	[-0.064,-0.001]	[-1.483, 4.111]	[-0.004, 0.001]
Observations	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Notes: Real operating profits, , wage bill, average labour cost and capital stock are measured in thousand euro. The sample includes only firms always present in the data during the period 2007-2016. The hypothetical direct effect of DZ on firm outcomes is assumed to be normally distributed, with zero mean and standard deviation set at one twentieth of the effect of ΔM as reported in Table 3.

Table. A5: IV estimates of the effects of changes in the local stock of immigrants (M). Dependent variables: changes in firm outcomes. Alternative Instrument: $\Delta Z_{2,qt} = \lambda_{q91} \Delta IMM_t$

	First stage	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔZ_2	0.1769*** (0.055)				
ΔM		2.9259*** (0.736)	-0.0452** (0.022)	2.1098 (1.835)	-0.0016 (0.002)
Percent change when M increases by 1 thousand units		0.515*** (0.129)	-0.113** (0.055)	0.021 (0.019)	-0.007 (0.008)
Observations	155,422	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes
F first stage	10.48				

Table A6: IV estimates ([min,max]) when one country of origin at the time is excluded from the definition of Z.

	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔM	[1.449,2.345]	[-0.034,-0.031]	[-0.288,1.837]	[-0.0019,-0.001]
Observations	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Note: Estimates in column 1 and 2 are always statistically significant at 1 and 5 percent respectively, while estimates in column 3 and 4 are never statistically significant at the conventional levels.

Table A7. IV estimates of the effects of changes in the local stock of immigrants (M). Dependent variables: changes in firm outcomes. Firms with at least three consecutive records within the sample period

	First stage	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔZ	0.245*** (0.005)				
ΔM		1.708*** (0.195)	-0.006 (0.007)	0.158 (1.602)	-0.001 (0.001)
Percent change when M increases by 1 thousand units		0.366*** (0.042)	-0.017 (0.019)	0.002 (0.020)	-0.002 (0.004)
Observations	210,364	210,364	210,364	210,364	205,742
LLM dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes
F first stage	2,456				

Notes: see Table 3. Firms with at least seven records within the sample period.

Table A8. IV estimates of the effects of changes in the local stock of immigrants (M) on firm turnover.

	Δ firm entries (in thousands)	Δ firm exits (in thousand)	Δ net turnover
Percent change for one thousand immigrants	-0.695*** (0.234)	-1.850*** (0.050)	11.800*** (3.010)
Observations	670	670	670
province dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes

Notes: standard errors clustered at the province level within parentheses.

Table A9. IV estimates of the effects of changes in the local stock of immigrants (M) and the local share of immigrants (SM).
Dependent variable: annual change in real operating profits

	Δ Real Operating Profits	Δ Real Operating Profits
ΔM	0.390***	0.395***
ΔSM		-1.160
Observations	155,422	155,422
LLM dummies	Yes	Yes
Year dummies	Yes	Yes
Firm-level controls	Yes	Yes

Notes: see Table 3. SM: share of immigrants

Table A10. IV Estimated percent changes when M increases by 1 thousand units. Immigrants aged 15 to 64. Dependent variables: changes in firm outcomes.

	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
Immigrants aged 15 to 64	0.539*** (0.074)	-0.111* (0.062)	0.019 (0.018)	-0.007 (0.008)
Observations	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes

Notes: see Table 3

Table A11. IV estimates of the effects of changes in the local stock of immigrants (M). Dependent variables: changes in firm outcomes. Including the South of Italy.

	First stage	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔZ	0.2169*** (0.023)				
ΔM		2.270*** (0.237)	-0.0315** (0.015)	1.6087 (1.389)	-0.0023 (0.002)
Percent change when M increases by 1 thousand units		0.406*** (0.043)	-0.080** (0.022)	0.016 (0.014)	-0.010 (0.009)
Observations	168,831	168,831	168,831	168,831	164,890
LLM dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes
F first stage	89.13				

Notes: see Table 3

Table A12. IV estimates of the effects of changes in the local stock of immigrants (M). Dependent variables: changes in firm outcomes. Firms with less than 50 employees in 2007.

	First stage	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔZ	0.2380*** (0.006)				
ΔM		1.0232*** (0.222)	-0.0161** (0.007)	1.3767 (0.849)	-0.0019 (0.001)
Percent change when M increases by 1 thousand units		0.324*** (0.070)	-0.042** (0.019)	0.027 (0.017)	-0.009 (0.007)
Observations	121,142	121,142	121,142	121,142	118,323
LLM dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes
F first stage	1666				

Notes: see Table 3.

Table A13. IV estimates of the effects of changes in the local stock of immigrants (M). Dependent variables: changes in firm outcomes. With region by year effects

	First stage	Δ Real operating profits	Δ Real average labour cost	Δ Real Capital Stock	Δ TFP
ΔZ	0.246*** (0.008)				
ΔM		2.524*** (0.195)	-0.031 (0.020)	-0.839 (1.924)	-0.044 (0.003)
Percent change when M increases by 1 thousand units		0.444*** (0.011)	-0.077 (0.049)	-0.008 (0.019)	-0.020 (0.012)
Observations	155,422	155,422	155,422	155,422	152,132
LLM dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes
F first stage	1,031				

Notes: see Table 3. Firms with at least seven records within the sample period.

Figure A1.

Share of immigrants in LLMs. 2016

Figure A2

Standardized value of instrument Z in LLMs. 2016