Firm-Level Prices, Quality, and Markups: The Role of Immigrant Workers*

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Abstract

In this paper, I study export quality as a channel through which immigrant workers affect the export prices and markups of French manufacturing traders. I find that the share of immigrant workers in a local labor market is positively associated with firm-level export prices and quality and that this quality advantage translates to higher markups. I present evidence for the mechanism accounting for these relationships and find that the presence of immigrant workers is positively associated with firms importing higher-price (higher-quality) intermediate inputs, which are key to producing higher-price (higher-quality) exports. The hypothesized economic mechanism is that immigrant workers help firms overcome informational barriers to sourcing higher-price (higher-quality) inputs from abroad. I provide evidence consistent with immigrant workers having specialized knowledge of the upstream market.

Keywords: Exports; Intermediate Inputs; Immigrant workers; Quality; Markups; Prices

JEL Codes: F14, F16, F22, D22, D24

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1 Introduction

The connection between immigration and domestic firms outcomes is an avenue of research that is both important and longstanding. The salience of this connection, however, has recently risen as immigration has become a more central theme in public debates in many countries. Recent research, for example, finds that immigration is an important driver of populism (Eichengreen, 2018). In labor economics, there is a lively research effort investigating the impact of migrants on local labor market outcomes (Peri, 2016). In the trade literature, one focus has been on the impact of immigrants on trade patterns (see Hatzigeorgiou and Lodefalk (2021) for a recent survey, as well as the literature review below for a discussion).

My paper contributes a novel perspective to the debate on the impact that immigrant workers have in their host economies: I study quality upgrading as a channel through which immigrant workers affect firm-level export prices and markups. The novelty of my approach is twofold. First, to my knowledge, this is the first paper studying the causal link between immigrant workers and quality-related changes in firms' prices. Second, the paper maps those price changes to firm-level markups, ruling out alternative margins of adjustment.

To structure the empirical investigation and account for the findings, I posit an economic mechanism based on information frictions. Specifically, immigrant workers are hypothesized to lower upstream information frictions and thus the cost of acquiring information on foreign intermediate inputs. This facilitates firms' access to high-price (high-quality) imported intermediate inputs, which help them produce high-price (high-quality) exports, for which they can charge higher markups.

My hypothesized mechanism draws upon existing theoretical contributions. The proposed mechanism is derived from the literature on heterogeneous-firm trade models (Melitz, 2003) in which firms choose quality as well as price (Baldwin and Harrigan, 2011) and markups are endogenous (Melitz and Ottaviano, 2008; De Loecker and Warzynski, 2012). Of particular relevance are the studies in which quality is at the root of the markup premium for importers, allowing them to access higher-quality inputs than non-importers (Hornok and Muraközy, 2019; Liu et al., 2019). In turn, as demand for higher-quality goods is less elastic, these firms can charge higher prices and higher markups (Kneller and Yu, 2016; Bellone et al., 2016).

For the purpose of this study, I combine customs records, firms balance sheets and employer–employee data from France to characterize the labor composition and export

outcomes of manufacturing firms for the 2004-2015 period. I leverage a shift-share design to identify the sign and magnitude of the relationship between employment of immigrant workers and firm performance. France is a particularly suitable setting for this study since it is a large recipient of immigrants and its stock of immigrants has consistently grown over time, with immigrants with higher education amounting to approximately 20% of the total immigrant population. Finally, France relies heavily on imported intermediate inputs: imports of intermediate inputs accounted for approximately 60% of total imports in the period on which this paper focuses (2004-2015).[1]

Before turning to the identification strategy and main results of the paper, I establish a number of stylized facts consistent with consumers valuing quality and firms finding it optimal to charge higher prices for higher-quality goods. At the same time, these facts suggest that immigrant workers may be at the root of a quality advantage, as their presence is positively correlated with the share of differentiated exports, and that this quality advantage might then translate to higher markups because of higher prices.

I then formalize the analysis and I first show that the *département*-level share of immigrant workers is positively associated with firm-level export prices of narrowly defined varieties.[2] In the baseline, I exploit the within-variety dimension of the data to argue that the effect of immigrants on prices is due to an increase in export quality. I support this claim by showing that immigrant workers are positively associated with a firm-level measure of quality of each exported variety. Then, I show that the department-level share of immigrant workers is positively associated with an increase in firm-level markups and that the effect is attributable to price differences.

The main explanatory variable, the share of immigrant workers in each French *département*, may be subject to several endogeneity concerns, including time-varying *département*-level factors that affect both the employment of immigrant workers and the different firm-level outcomes. To counter these identification issues, I rely on a shift-share instrumental variable strategy. Shift-share instruments have a long tradition in the migration literature and are built by interacting the preexisting share of immigrant workers across departments by country of origin with the subsequent stock of immigrants from that origin.

Given the main results on the relationship between immigrant workers, prices and markups, I turn to explaining the mechanism that may account for these linkages. I

[1] See Figure A.1 in Appendix A.

[2] France is divided into 100 administrative units (including overseas territories), called *départements*. I focus on the French mainland territory.

find that the department-level share of immigrant workers is positively associated with the import prices of narrowly defined varieties, reflecting an increase in the quality of inputs. A key pillar of the hypothesized mechanism is that immigrant workers have better knowledge of foreign suppliers of intermediate inputs. Consistently, I find that the effect of the local presence of immigrant workers is stronger for firms that had already hired an immigrant worker in the past and might therefore be more receptive of the information these workers provide.

Short of observing firms' access to information, I offer three pieces of evidence supporting the interpretation that immigrants reduce upstream information frictions. The first approach exploits immigrant worker occupation data that allow me to distinguish between white-collar and blue-collar workers. Consistent with the information frictions mechanism, I find that the relationship between immigrants and input prices is driven by white-collar workers. That is, workers that are more likely to provide information to the employing firms. The second approach relies on the idea that immigrant workers should play a more important role when firms source inputs from countries where the quality ladder is longer. I therefore distinguish between inputs sourced from EU and those sourced from non-EU countries. The third approach builds upon the intuition that immigrant workers should be better informed about intermediate inputs sourced from their own country of origin. To pursue this idea, I use information on the country of origin of immigrants in the department where the firm is located. The findings show that the effect of immigrant workers on intermediate input prices (quality) is larger for intermediate inputs sourced from non-EU countries and from the workers' countries of origin. I then provide evidence ruling out alternative competing mechanisms.

Contribution to the Literature

This paper contributes to a number of literatures. First, the paper contributes to the empirical work on the determinants of output quality and, in particular, the strand that has identified input quality as its main driver (Kugler and Verhoogen, 2009, 2012; Manova and Zhang, 2012; Bas, 2012; Bas and Strauss-Kahn, 2014; Bastos et al., 2018). These studies have presented only limited evidence regarding the role played by the workforce in this respect. The few papers that have related quality to labor force characteristics have focused on workers skills (Verhoogen, 2008; Bas and Strauss-Kahn, 2015; Fieler et al., 2018). In this strand of the literature, quality upgrading is modeled as a skill-biased technological change, and skilled labor and high-quality inputs are complementary in producing high-quality goods. My paper departs from these studies

by focusing on a different channel through which workers, and in particular immigrant workers, affect quality, i.e., an informational channel.

This paper also contributes to the new and growing literature on the role of immigrant workers in helping firms integrate into the global value chain. The bulk of the literature concentrates on how immigrants foster trade on both the intensive and extensive margin by providing information on the destination country or by establishing buyer-supplier networks (Rauch, 2001; Rauch and Trindade, 2002; Hiller, 2013; Andrews et al., 2016; Bahar and Rapoport, 2018; Olney and Pozzoli, 2021).[3] However, little is known about the role of immigrants in the international organization of production. A relevant study is Egger et al. (2019), which shows that immigrant workers increase the number of buyer-supplier relationships, as well as their stability. Finally, the work by Ariu (2022) finds that thanks to better intermediate inputs sourced from the origin countries of cross-border workers, Swiss postal codes experiencing an increase in the number of these workers increase their export volume and quality. My paper builds on this study in several ways. First, it studies the relationship between immigrant workers, export price (quality) and input price (quality) at the firm level. Second, it examines how this relationship translates to higher markups by exploiting state-of-the-art techniques of production function estimation, thus liaising the strand of literature on the trade-migration nexus and the industrial organization one. Finally, it brings a different context that arguably improves the external validity of the results, as well as a different methodology that allows to estimate the elasticity of the different measures of firm-level performance to the presence of immigrant workers, while isolating supply-side effects.

The third literature where my results are relevant is the empirical work on the determinants of firm-level markups. In a framework where markups are variable and endogenous, the literature has devoted increasing attention to how trade policy affects them through factors related to marginal costs (and physical productivity) or through stronger competition and prices (Hornok and Muraközy, 2019; Liu et al., 2019). While output tariff liberalization decreases markups because of a procompetitive effect, a more relevant strand of literature for this study finds that input tariff liberalization (or importing status) increases markups because of access to cheaper or higher-quality inputs. My paper contributes to this literature by proposing a channel other than trade pol-

[3] Mitaritonna et al. (2017) use the same data and identification strategy to show that immigrant workers affect firm-level productivity and several related outcomes. My paper fundamentally differs from their work as it focuses on the informational advantage that immigrant workers bring on upstream markets and how this translates in several measures of downstream performance.

icy that can affect markups via quality upgrading, namely, employment of immigrant workers.

The remainder of the paper is structured as follows: Section 2 and Section 3 describe the data and the key stylized facts. Section 4 and Section 5 present the main empirical approach and results. Section 6 provides some robustness tests, and Section 7 concludes.

2 Data and Construction of Variables

I use three sources of confidential data from French manufacturing firms for the 2004-2015 period. The unique firm identifier, the *SIREN* (*Système d'Identification du Répertoire des Entreprises*) code, allows me to combine the different data sources. First, I use annual employee declarations by wage-paying establishments located in the French metropolitan territory (*Déclarations Annuelles des Données Sociales* or DADS postes). This dataset is at the individual contract-establishment-year level and includes information on worker characteristics such as the *département* of residence and work, wage, type of contract, occupation, place of birth (France or foreign country) and citizenship (French or foreign). Throughout the paper, an immigrant is defined as a foreign citizen. However, the origin countries of immigrant workers are not available in the data. To deal with workers who have more than one contract in the same year, I keep the contract of the main activity for each worker. I aggregate the data at both the *département*-year and the firm-year level to obtain the share of immigrant workers as follows:[4,5]

$$\text{Sh.Immig}_{dt} = \frac{\text{Immig}_{dt}}{\text{Immig}_{dt} + \text{Native}_{dt}} \text{ and } \text{Sh.Immig}_{ft} = \frac{\text{Immig}_{ft}}{\text{Immig}_{ft} + \text{Native}_{ft}} \quad (1)$$

Second, I use balance-sheet data consisting of tax reports (*Fichier de comptabilité unifié dans SUSE* or FICUS and *Fichier approché des résultats d'Esane* or FARE). This dataset is at the firm-year level and provides, among others, information on firm domestic sales, value added, capital stock, number of full-time equivalent workers, total assets, and main industry.[6] I keep only firms whose main activity is in the manufacturing sector for the whole period in which they appear in the dataset.[7,8] I use balance-sheet

[4]For multi establishment firms, I follow Mitaritonna et al. (2017) and use the *département* where the firm employs most of its employees.

[5]The main *département* of the firm is generally time invariant. When a firm changes its *département*, I keep the most frequent one.

[6]The main industry of the firm is generally time invariant. When a firm changes its industry of main activity over the time period, I keep the most frequent one.

[7]This trimming excludes 8% of the firm-year observations.

[8]Divisions 10-33 of the NACE Rév. 2 classification, excluding divisions 12 and 19.

data to compute firm-level markups following the standard method in the literature (De Loecker and Warzynski, 2012) as follows:

$$\mu_{ft} = \theta^L_{ft} \times (\alpha^L_{ft})^{-1} \tag{2}$$

where θ^L_{ft} is the gross output elasticity of labor and α^L_{ft} is the wage bill as a fraction of total revenues. The elasticity of labor is estimated separately for all firms in each sector from a (revenue) gross output production function that is Cobb-Douglas in labor, material inputs and capital. The works by Stiebale and Szücs (2019) and by Caselli et al. (2021) have a discussion on the bias induced in the production function estimation when using revenues rather than quantities. This bias is reduced when firm-level output prices deviation from the industries deflators are reflected in higher input prices. As I show in Table 1, there is a positive correlation between firm output prices and input prices, thus reducing concerns relative to biased estimates. Additionally, the price bias arising from the use of revenues rather than quantities, is reduced when a Cobb-Douglas functional form is employed. That is because the bias induced by the use of monetary values is constant across firms and time since the variation in markup is due to the variation across firms and time, within industry, of the revenue share of wages while the production function parameters are constant within industries (Stiebale and Szücs, 2019). However, I follow Caselli et al. (2021) and build a price index at the firm-year level based on the prices that the firms charge for their exports.[9] I then use this price index in two ways. First, I deflate firm sales with this price index and obtain a measure of quasi-quantity. Second, I add a control function for input prices that includes the output price index and its interaction with the production inputs for which I do not have price information, that is capital and material inputs as in Caselli et al. (2021), De Loecker et al. (2016) and Mertens and Mottironi (2023). I treat labor as a flexible (or quasi-flexible) production input. As explained in Caselli et al. (2021), it is sufficient to treat labor as a variable cost by the firm that can be adjusted every period via the number of hours or the type of contract, before the productivity shocks arrives. This is consistent with the assumption in Ackerberg et al. (2015) according to which labor is chosen some time between $t-1$, when capital is chosen, and t, when the productivity shock arrives. In this setting, labor is assumed to be more flexible than capital, but

[9]The firm-level price index is computed by running a weighted regression of (log) unit values by product-destination-firm-year on product-destination fixed effects and firm-year fixed effects. The latter can be interpreted as the change compared to the firm-year pair used as base. The main assumption is that the firm-level output prices index computed based on firm-product-destination export unit values from the French customs reflects domestic prices. See Caselli et al. (2021) for a more detailed discussion.

less flexible than material inputs, which can be fully adjusted at time t. Since in the baseline analysis, I am using full-time equivalent workers, by definition I am accounting for differences in the hours worked. However, in a robustness test I also estimate markups using the number of hours worked as flexible input.[10,11] Then, I address the critique by Gandhi et al. (2020), in two different robustness tests. First, I compute markups using a value added specification, where therefore the problem of identifying the output elasticity to material inputs when these also enter the control function, does not apply.[12] Second, I include the (log) average wage, and the interactions with the other inputs, in the control function when computing the output elasticities to the different inputs. Stiebale and Szücs (2019) and De Loecker and Scott (2016) have a discussion on why including the average wage in the control function avoids the Gandhi et al. (2020)'s non-identification critique.[13] Finally, I compute markups using the accounting profits approach as in Baqaee and Farhi (2020), where markups are computed as sales over costs (sales-profits). The advantage of this approach with respect to more sophisticated ones is that it does not require any manipulation of the data as all the required information comes from the balance sheet.[14] Results are qualitative unchanged. All the details on markup estimation are in Appendix B.1.

Third, I use French customs data on monthly shipments (imports and exports) in value and in volume by firm-NC8 product-origin/destination country. During the period of the analysis, several changes in the product classification occurred. To harmonize the product classification, I use the procedure developed by Bergounhon et al. (2018).[15]

[10] Caselli et al. (2021) explains how it is more plausible to assume that labor is partially flexible, rather than not flexible at all. This is because treating labor as endogenous in the production function estimation, is consistent with the presence of frictions in the labor market and worker-side labor market power.

[11] In Section 4.2.3 and Section 5, I am interested in studying the relationship between markups and the employment of immigrant workers as well as the relationship between immigrant workers and intermediate input prices. If I were to estimate markups using material inputs as the flexible input, then I would mechanically create a relationship between firms markups and immigrant workers. This is because the denominator in Equation 2 would include the material input expenditure, which I posit (and show) is affected by immigrant employment.

[12] This specification can be interpreted as a gross production function that is Leontief in intermediate inputs.

[13] In practice, I run a first stage of gross output on a third order polynomial in labor,capital,materials, and average wage. Then, I include the lagged average wage in the control function., i.e. in the third-order polynomial in lagged labor, capital, and materials.

[14] Following Baqaee and Farhi (2020), I use operating income as a measure of profits.

[15] While there were minor early updates of the NC8 classification, the main ones aligned with those of the HS6 classification in 2007 and 2012.

The customs data are used to compute different outcome variables, such as prices and quality. Prices and quality are computed by exploiting the information provided by the customs data on both quantity (kg) and value (euros) at the firm (f)-NC8 product (p)-destination (c)/origin (o)-year (t) level. Prices are calculated as follows:

$$P_{fpct} = \frac{\text{Export Value}_{fpct}}{\text{kgs}_{fpct}} \text{ and } P_{fpot} = \frac{\text{Import Value}_{fpot}}{\text{kgs}_{fpot}} \tag{3}$$

Moreover, export quality is computed as in Khandelwal et al. (2013) as follows:

$$\hat{\lambda}_{fpct} = \frac{\eta_{fpct}}{(\sigma_p - 1)} \tag{4}$$

where η_{fpct} is the residual from an OLS regression relating demand for a variety (physical quantity) to its price, scaled by the elasticity of substitution σ_p, and including product and country-year fixed effects. The intuition is that conditional on price and market conditions, a higher demanded quantity reflects higher quality. All the details on quality estimation are in Appendix B.2. Given that it is possible to compute the measures of firm-level prices and quality only for firms included in the customs data, the empirical analysis focuses on the sample of two-way traders, i.e., firms that both import and export in the same year.[16] In addition to firm-level data, I use the population census (*Recensement de la Population* or RP). The census is an annual data collection covering 20% of municipalities with fewer than 10,000 inhabitants and 8% of households in municipalities with more than 10,000 inhabitants. Thus, over a period of five years, the census covers all municipalities with fewer than 10,000 inhabitants and 40% of the population in larger municipalities. Thanks to the population census, I obtain an imputed share of immigrant workers by country of origin o at the *département*-level d and at the national level (FR) in each year t as follows:

$$\text{M}^{RP}_{odt} = \frac{\text{Immig}^{RP}_{o,d,t}}{\text{Immig}^{RP}_{d,t}} \text{ and } \text{M}^{RP}_{ot} = \frac{\text{Immig}^{RP}_{o,FR,t}}{\text{Immig}^{RP}_{FR,t}} \tag{5}$$

Finally, I use several publicly available sources of information. I use the Rauch (1999) classification to identify homogeneous and differentiated goods and data on the elasticities of substitution from Fontagné et al. (2019). Then, I exploit the UNCTAD BEC classification for product categories to identify intermediate inputs.[17] The final sample includes 24,190 firms and accounts for $\sim$ 55% of total manufacturing revenues. The sample accounts for 51% (30%) of French manufacturing exports (imports), and

[16] 68% of the unique firm identifiers correspond to exporters that are also importers.
[17] I exclude products that belong to the category of capital and consumption goods.

$\sim$ 85% ($\sim$ 65%) of the firm-year exports are in differentiated products (imports). On average, firms export (import) 50 (26) varieties, that is product-country combinations, and 13 (17) products, to (from) 14 (7) countries.[18] Finally, there is significant variation in employment of immigrant workers by industry and by department. The manufacture of wearing apparel (division 14 in the NACE Rév. 2 classification) is the sector that displays the largest share of immigrant workers across departments ($\sim$ 14%), while the manufacture of wood (division 16 in the NACE Rév. 2 classification) displays the smallest immigrant worker share ($\sim$ 8%). From a geographical perspective, the Île-de-France region (region 11) displays the highest share of immigrant workers ($\sim$ 18%). The regions that display the lowest immigrant worker share ($\sim$ 5%) are Bretagne (region 53) and Poitou-Charentes (region 54).In Figure B.3, I provide the detailed distribution of immigrant workers across regions and industries. I report a number of additional summary statistics in Table B.2 in Appendix B.3.

3 Stylized Facts

To guide and motivate the empirical analysis, I present a number of stylized facts based on the sample of French firms under analysis.[19]

Fact 1 The first stylized fact confirms the correlation between prices and quality for French manufacturers: firms producing products of higher quality charge higher prices because consumers value quality and are willing to pay for it. Following Manova and Zhang (2012), I show in columns (1)-(2) of Table 1 the results of the following equation:

$$\ln P_{fpct} = \beta_0 + \beta_1 \ln(\text{Revenues})_{fpct} + \beta_2 \ln(\text{Revenues})_{fpct} \times \text{Diff.Dummy}_p + \theta_{pct} + \varepsilon_{fpct} \tag{6}$$

The left-hand side is the (log) price that firm f charges for product p in destination c at time t. On the right-hand side, the explanatory variables include the total revenues of the firm in market pc and a dummy taking value 1 if product p is differentiated according to the Rauch (1999) classification (Diff.Dummy_p). The results show that firms charging higher prices earn higher revenues and that this result is driven by differentiated

[18] 10% (11%) of the observations export (import) one variety only. 14% (12%) of the observations export (import) one product only. 16% (16%) of the observations export (import) to (from) one country only.

[19] In Appendix C, I present the theoretical framework conceptualizing my empirical analysis.

products—i.e., products for which there is scope for quality differentiation (Bastos and Silva, 2010). Additionally, columns (3)-(5) of Table 1 present the results of the three specifications below, which follow the approach of Manova and Zhang (2012):

$$\ln P_{fpot} = \beta_0 + \beta_1 \text{Average Export price}_{ft} + \theta_p + \theta_t + \varepsilon_{fpot} \tag{7}$$

$$\ln P_{fpot} = \beta_0 + \beta_1 \ln(\text{Exports})_{ft} + \theta_p + \theta_t + \varepsilon_{fpot} \tag{8}$$

$$\eta_{fpct} = \beta_0 + \beta_1 \text{Average Import price}_{ft} + \theta_p + \theta_t + \varepsilon_{fpct} \tag{9}$$

The left-hand side is either the (log) price that firm f pays for product p sourced from country o at time t, or the quality of the product p that firm f sells in destination c. On the right-hand side, the explanatory variable Average Export price$_{ft}$ (Average Import price$_{ft}$) represents the weighted average of all the (log) firm-product-destination (origin) prices, which have been demeaned by their product-specific average, while ln(Exports)$_{ft}$ is the total export revenues. The results suggest that firms using higher-quality inputs produce more expensive, higher-quality products and enjoy better export performance.[20]

Table 1: Prices and export performance.

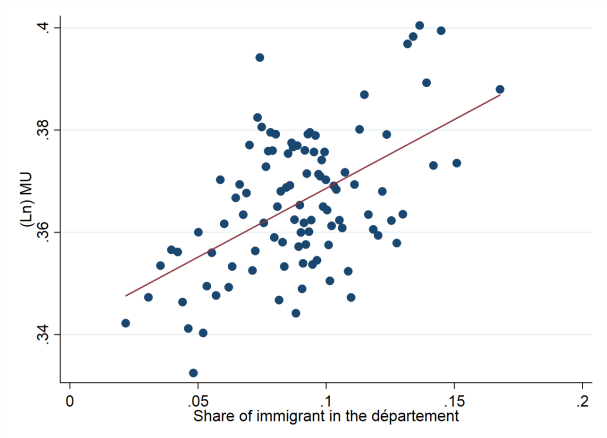
	ln(Price)$_{fpct}$		ln(Price)$_{fpot}$		η_{fpct}
	(1)	(2)	(3)	(4)	(5)
ln(Revenues)$_{fpct}$	0.040***	-0.006***			
	(0.001)	(0.001)			
ln(Revenues)$_{fpct}$ × Diff.Dummy$_p$		0.057***			
		(0.001)			
Average Export price$_{ft}$			0.291***		
			(0.012)		
ln(Exports)$_{ft}$				0.026***	
				(0.003)	
Average Import price$_{ft}$					0.424***
					(0.017)
Observations	5,276,192	5,276,192	3,272,946	3,272,946	4,951,248
R-squared	0.665	0.666	0.592	0.609	-
FE	PCT	PCT	P-T	P-T	P-T

Notes: The sample includes only firms that both import and export at time t. Errors are clustered at the product-destination level in columns (1)-(2) and at the firm-level in columns (3)-(5).

[20] I replicate the results of Column (5) with the sample of firms that in one year only export one product, where therefore the price (quality) of the inputs used necessarily refer to the production of that one single exported product. The results are confirmed and available upon request.

Fact 2 Figure 1 shows that there is a positive correlation between the firm-level (log) markup and the *département*-level share of immigrant employment.

Figure 1: Relationship between firm-level (log) markup and the *département*-level share of immigrant workers.



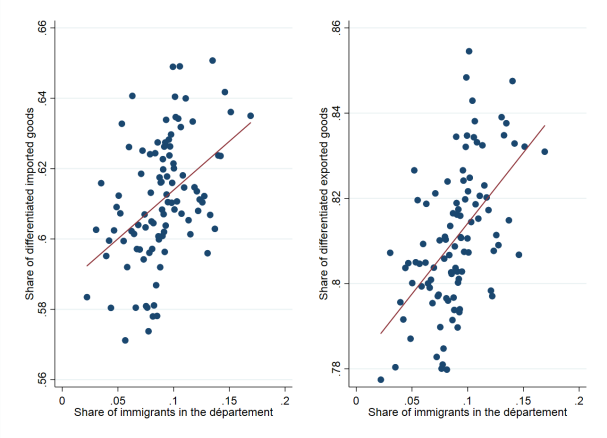
Notes: Controls include region-by-period and sector-by-period fixed effects.

Fact 3 The left-hand side of Figure 2 shows that the firm-level export share of differentiated goods is positively correlated with the *département*-level share of immigrant workers. As these are the goods for which there is scope for quality differentiation, this piece of evidence suggests that immigrant workers foster product quality. The right-hand side of Figure 2 shows that the firm-level import share of differentiated goods is also positively correlated with the *département*-level share of immigrant workers. This last correlation suggests that immigrant workers may help firms produce higher-quality exports through imports of higher-quality inputs.

4 Immigrant Workers, Export Performance, and Markups

The stylized facts in Section 3 suggest that firms producing more expensive goods for the export market enjoy higher export revenues. At the same time, both the firm-level export share of differentiated goods and markups are positively correlated with the share of immigrant workers. This suggests that immigrant workers may be at the root of a quality advantage for firms that translates to higher markups via higher prices. In this section, I advance this narrative by formalizing and combining these correlations. First, I show that firm-level export prices and quality are positively associated with the

Figure 2: Export and import share of differentiated products and *département*-level share of immigrant workers.



Notes: Controls include region-by-period fixed effects.

département-level share of immigrant workers. Second, I demonstrate that the share of immigrant workers is positively associated with firm-level markups and that the effect is attributable to higher prices. These results are consistent with the idea that consumers are willing to pay for final goods of higher quality (and higher price). Following the theoretical discussion in Appendix C, this is rationalized by a steeper demand for a variety that is, a decreasing elasticity of substitution.

4.1 Econometric Approach

The econometric approach involves examining the response of different measures of firm export performance to changes in the share of immigrant workers in each French *département*. The baseline model is the following:

$$y_{fpct} = \beta_0 + \beta_1 \text{Sh.Immig}_{dt} + X'_{ft}\Gamma + X'_{dt}\Delta + \theta_{pct} + \theta_{rT} + \varepsilon_{fpct} \tag{10}$$

For the first part of the analysis, the left-hand side variable is $\ln \text{Price}_{fpct}$, the price that firm f charges for product p (defined at the 8-digit level) in destination c at time t. The fixed effects θ_{pct} allow comparing two firms selling the same narrowly defined product in the same destination in the same year.[21] Arguably, exploiting this type of variation allows me to capture differences in export prices due to quality differences. To lend

[21] These fixed effects control for demand and competition shocks in the export market for a specific product and for specific trade costs. Additionally, they control for product-country-specific inflation.

support to this interpretation, I present a second set of results where the left-hand side of Equation (10) is the firm-level quality for each variety, $\hat{\lambda}_{fpct}$. In the baseline specification, I use the share of immigrant workers in each French *département* (Sh.Immig$_{dt}$). Immigrant workers affect the different measures of firm-level performance by providing information on the upstream market. Therefore, the main economic rationale behind the choice of using immigrant workers at the *département*-level is that information is local labor market specific and not necessarily firm-level specific.[22] The term θ_{rT} is region-by-period fixed effects that allow comparison of the pricing strategies of two firms located in the same region and capture time-varying factors that are region specific.[23] The vector of firm-level controls X'_{ft} includes the capital intensity of the firm and its (log) productivity.[24,25] I use this set of controls to attenuate concerns regarding firm-level confounding factors related to productivity and marginal cost. The vector of département-level controls X'_{dt} includes the (log) average number of employees and the average skill intensity. This last control aims at attenuating concerns regarding alternative explanations, where the share of immigrant workers is in fact picking up a more general skill effect.

4.1.1 Identification Strategy

Despite the rich set of fixed effects that should already reduce concerns over omitted variable bias, there might still be time-varying *département*-level factors that affect both firms' pricing strategy (quality) and local labor market employment decisions. The overall direction of the bias of the OLS estimates then depends on the correlation between the price/quality-decreasing (increasing) omitted variables and the share of immigrant workers. An intuitive source of endogeneity would be a common technological shock that is *département*-year specific and thus affects all firms located there, such that both firms' quality and price and the local employment of immigrant workers would increase. This would cause the OLS estimates to be upward biased. Then, even though

[22] Additionally, the instrument presented below, is at the *département*-level and therefore the type of variation exploited for identification would be the same, even when the main explanatory variable is at the firm-level. In Section 6, I replicate all the main results using the share of immigrant workers at the firm-level.

[23] T=2. As Mitaritonna et al. (2017) point out, defining the period over two years allows the fixed effects to control for changes in labor market legislation as well as technology shocks that evolve slowly over time.

[24] Total factor productivity is computed as described in Appendix B.1.1.

[25] I add the controls progressively in order to attenuate concerns related to the inconsistency of productivity estimates carrying over with the consistency of the other estimates in the paper.

Equation (10) includes the share of immigrant workers at the *département*-level and the left-hand side variable is at the firm level, there might still be problems related to reverse causality. Since the sample includes the largest firms, different measures of firm-level performance might affect the local demand for immigrant workers. To deal with these endogeneity concerns, I use a shift-share instrument based on the past distribution of immigrants by country of origin across departments.[26] Shift-share instruments have a long tradition in the migration literature, starting with the seminal work by Card (2001).[27] The instrument is constructed as follows:

$$\text{IV}_{dt} = \frac{\widehat{\text{M}}_{dt}}{\widehat{\text{M}}_{dt} + \text{N}_{d1999}} \tag{11}$$

$\widehat{\text{M}}_{dt}$ is the imputed share of immigrant workers in *département* d at time t. It is computed by allocating immigrant workers from origin country o and present in France at time t ($\overline{\text{Immig}}_{o,t}$) across *départements* d according to the national group distribution in 1999, which is obtained from the *Recensement de la Population* $\left(\frac{\text{Immig}^{RP}_{d,o,1999}}{\text{Immig}^{RP}_{FR,o,1999}}\right)$. By summing across origin countries o, the following expression is obtained:

$$\widehat{\text{M}}_{dt} = \sum_{o} \frac{\text{Immig}^{RP}_{d,o,1999}}{\text{Immig}^{RP}_{FR,o,1999}} \overline{\text{Immig}}_{o,t} \tag{12}$$

Following Mitaritonna et al. (2017), I compute the number of immigrant workers present in France by country of origin $\overline{\text{Immig}}_{o,t}$ as follows:

$$\overline{\text{Immig}}_{o,t} = \frac{\text{Immig}^{RP}_{FR,o,t}}{\text{Immig}^{RP}_{FR,t}} \times \text{Immig}^{DADS}_{FR,t} \tag{13}$$

The first term in Equation (13) is the share of immigrant workers in France from origin country o from the *Recensement de la Population*, and the second term is the total number of immigrants working in France at time t in all sectors but agriculture from the DADS. As explained by Mitaritonna et al. (2017), the rationale behind Equation (13) is to use the DADS to obtain a very precise measure of total immigrants employed in year t, combined with the RP, to safely approximate only the *share* of immigrant workers by country of origin. Finally, I follow the existing literature and in Equation (11) use the number of native workers in 1999, the base year. I do so to avoid endogeneity concerns related to the internal mobility of the nonmigrant population due to local demand shocks

[26] In Section 6 I investigate further the issue of reverse causality, beyond the baseline instrumental variable strategy.

[27] See, for example, the work by Mitaritonna et al. (2017), Moriconi et al. (2020), Cattaneo et al. (2013) and Foged and Peri (2016).

(Mitaritonna et al., 2017). The underlying assumption for the instrument presented in Equation (11) is that new immigrant workers tend to locate where previous immigrant workers were located due to network effects rather than local economic conditions, which could be endogenous. A commonly highlighted threat to the validity of this instrument is the persistence of local economic conditions that are correlated with both the distribution of immigrant workers across *départements* in 1999 and subsequent changes in the outcome variables of interest, as well as the employment of immigrant workers. To mitigate concerns regarding this type of violation of the exclusion restriction, Table 2 shows that changes in the instrument over the sample period (2004-2015) are uncorrelated with the pre-sample (2002-2004) trends in the outcome variables of interest. Finally, the instrument in Equation (11) depends on the share of immigrants across departments in 1999, by country of origin. The distribution of immigrants across departments for each country is assumed to be exogenous (Goldsmith-Pinkham et al., 2020). Following Moriconi et al. (2020), one way to test whether the initial shares are likely to be exogenous, is to check whether they are correlated with potential confounders in the initial year. I do so in Table 3. In Column 1, I report all the origin countries in the sample, while in column 2 I include the origin countries that have a bilateral share larger than the sample median of the distribution in 1999, since these are the shares that contribute the most to the identifying variation. In Column 3 (4) I include only developed (developing) countries. This is to tackle concerns related to the co-agglomeration of firms and workers. Because there is self-selection of immigrant workers, it could be possible that the share of immigrant workers from developed countries, in particular, is correlated with department characteristics that accommodate their preferences and the needs of potential employers (e.g. skilled workers to produce high-quality products). Table 3 shows that the initial bilateral share of immigrant workers has no significant correlation with several department-level characteristics in 1999.

4.2 Results

4.2.1 Export Prices

Table 4 presents the estimated effect of an increase in the local labor market share of immigrant workers on the firm-level price of each variety. The preferred specification in column (2) shows that there is a positive and significant relationship between the export price and the share of immigrant workers within each variety: a 1 p.p. increase in the share of immigrant workers in the *département* where the firm is located is asso-

Table 2: Correlation between the IV and pretrends in the main outcomes.

	$\Delta \ln \text{MU}_d$	$\Delta \ln$ Av. Price_d^{II}	$\Delta \ln$ Av. Price_d^{EX}
	(1)	(2)	(3)
$IV_{d,2015} - IV_{d,2004}$	-0.007	-0.000	0.001
	(0.014)	(0.003)	(0.002)
R-squared	0.002	0.000	0.003
Observations	95	95	95

Notes: $\Delta \ln \text{MU}_d$ is the difference in the average (log) markup between 2002 and 2004. $\Delta \ln$ Av. Price_d^{II} is the difference in the average (log) price of intermediate inputs between 2002 and 2004. $\Delta \ln$ Av. Price_d^{EX} is the difference in the average (log) price of exports between 2002 and 2004. Averages are computed across firms in the same French *département*.

Table 3: Base-year shares and department characteristics.

	$\text{Share}_{od,1999}$			
	(1)	(2)	(3)	(4)
$\ln \text{FTE}_{d,1999}$	0.065	0.123	0.051	0.073
	(0.046)	(0.080)	(0.038)	(0.051)
$\ln$ labor $\text{Productivity}_{d,1999}$	0.269	0.443	0.211	0.300
	(0.165)	(0.275)	(0.135)	(0.182)
$\ln \text{Capital Intensity}_{d,1999}$	0.009	0.009	0.014	0.006
	(0.025)	(0.028)	(0.022)	(0.027)
$\ln \text{Sales}_{d,1999}$	-0.039	-0.104	-0.031	-0.044
	(0.036)	(0.075)	(0.029)	(0.041)
Sample	All	Median	Developed	Developing
Observations	8,904	1,935	2,906	5,751
R-squared	0.448	0.519	0.426	0.464

Note: Column 1 reports all the origins in the sample, and Column 2 reports the origin countries with a bilateral share larger than the sample median.Column 3 (4) includes the sample of developed (developing) countries only. All specifications include origin country fixed-effects. Errors are clustered at the department level.

Table 4: Export prices and share of immigrant workers.

	$\ln \text{Price}_{fpct}$			
	(1)	(2)	(3)	(4)
Sh.Immig_{dt}	0.758*	0.935***	2.046***	1.088***
	(0.393)	(0.311)	(0.273)	(0.279)
Observations	5,276,192	5,276,192	5,276,192	5,276,192
Controls	NO	YES	NO	YES
FE	PCT-RT	PCT-RT	PCT-RT	PCT-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	245.93	267.77	-	-
1st-stage coeff.	0.678***	0.647***	-	-
	(0.043)	(0.040)	-	-

Notes: Fixed effects are at the product-destination-year level and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficient refers to the endogenous variable (immigrant share). Errors are clustered at the *département*-year level.

ciated with a 0.9% price increase. The first-stage coefficients and the Kleibergen-Paap F statistics suggest that the instrument is, respectively, relevant and not weak. A comparison between columns (2) and (4) confirms the presence of an upward bias of the OLS estimates. I complement the baseline results by exploiting the within-firm dimension of the data. I modify Equation (10) by replacing the first set of fixed effects (θ_{pct}) with fixed effects at the firm f-product p-destination c level (θ_{fpc}) and augmenting the specification with an interaction term between the share of immigrant workers and a dummy that takes values 1 if the product is differentiated according to Rauch (1999)'s classification.[28] In doing so, I identify how changes in a firm's price depend on the local immigrant supply, and whether the effect is different across product category (homogeneous *vs* differentiated goods), i.e. across goods with a different scope for quality differentiation. I distinguish between these two product categories because this last set of fixed effects does not reflect differences in quality as straightforwardly as the set

[28] On the left-hand side, the price of exports is deflated using industry-specific output deflators from the OECD STAN database. The interpretation is thus slightly modified into changes in price with respect to the domestic deflator.

Table 5: Export prices and share of immigrant workers.

	$\ln \text{Price}_{fpct}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Sh.Immig_{dt}	0.127	-1.201***	-1.226***	0.224*	-1.060***	-1.088***
	(0.159)	(0.136)	(0.138)	(0.122)	(0.100)	(0.101)
$\text{Sh.Immig}_{dt} \times \text{Diff.Dummy}_{p}$		1.546***	1.535***		1.517***	1.505***
		(0.140)	(0.137)		(0.117)	(0.115)
Observations	4,198,345	4,198,345	4,198,345	4,198,345	4,198,345	4,198,345
Controls	NO	NO	YES	NO	NO	YES
FE	FCP-RT	FCP-RT	FCP-RT	FCP-RT	FCP-RT	FCP-RT
Method	2SLS	2SLS	2SLS	OLS	OLS	OLS
K-Paap stat.	536.86	285.25	283.39	-	-	-
1st-stage coeff. Sh.Immig_{dt}	1.315***	1.366***	1.357***	-	-	-
	(0.057)	(0.049)	(0.049)	-	-	-
1st-stage coeff. $\text{Sh.Immig}_{dt} \times \text{Diff.Dummy}_{p}$	-	1.442***	1.443***	-	-	-
	-	(0.043)	(0.043)	-	-	-

Notes: Fixed effects are at the firm-product-destination and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Diff.Dummy_{p} is a dummy that takes value 1 if the product is differentiated according to Rauch (1999)'s classification. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficient refers to the two endogenous variables (immigrant employment and its interaction with the differentiation dummy). Errors are clustered at the *département*-year level.

of fixed effects used in the baseline specification. The results in Table 5 confirm that there is a positive and significant relationship between the local supply of immigrant workers and changes in the price that a firm charges for differentiated products. The results in Table 5 reconcile with those in Table 4 as they show that immigrant workers are positively associated with the price of products for which there is scope for quality differentiation. That is, immigrant workers are positively associated to price differences that are likely to reflect quality differences, which are captured by the fixed effects (θ_{pct}) in Table 4 and by the positive interaction in Table 5. The suggested mechanism in this paper is that these workers improve quality via improved access to better intermediate inputs. Consistently, immigrant workers do not have such positive effect on homogeneous products, for which such mechanism is not at play.

4.2.2 Export Quality

Table 6 shows the results of Equation (10) when the left-hand side is $\hat{\lambda}_{fpct}$, the firm-level quality of each exported variety, rather that the price. The IV estimates in the preferred specification in column (2) show that there is a positive and significant relationship between the share of immigrant workers and the quality of the exported products within

Table 6: Export quality and share of immigrant workers.

	$\hat{\lambda}_{fpct}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.823**	0.983***	1.715***	0.790***
	(0.359)	(0.334)	(0.263)	(0.279)
Observations	4,232,656	4,232,656	4,232,656	4,232,656
Controls	NO	YES	NO	YES
FE	PCT-RT	PCT-RT	PCT-RT	PCT-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	253.23	279.56	-	-
1st-stage coeff.	0.680***	0.651***	-	-
	(0.043)	(0.039)	-	-

Notes: Fixed effects are at the product-destination-year and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficient refers to the endogenous variable (immigrant share). Errors are clustered at the *département*-year level.

narrowly defined varieties. Firms therefore produce higher-quality goods when exposed to a larger supply of immigrant workers. These results lend support to the idea that the effect of the immigrants worker share on export prices reflects mainly quality differences.

4.2.3 Firm-Level Markups

This section studies whether the effect that immigrant workers have on firm-level prices translates into higher firm-level markups. The baseline model is modified as follows:

$$\ln \mathrm{MU}_{ft} = \beta_0 + \beta_1 \mathrm{Sh.Immig}_{dt} + \beta_2 \ln \mathrm{TFP}_{ft} + X'_{ft}\Gamma + X'_{dt}\Delta + \theta_f + \theta_{rT} + \theta_{sT} + \varepsilon_{ft} \quad (14)$$

In Equation (14), the left-hand side is the firm-level markup, computed as described in Section 2. As explained in De Loecker and Warzynski (2012), once firm (log) productivity is included, the coefficient β_1 should reflect differences in average prices between firms exposed to a different supply of immigrant workers. However, β_2 potentially picks up price differences, as well, i.e., demand conditions, not only efficiency differences. Nevertheless, if β_1 remains positive and significant, it means that price differences still play

a role in explaining markup differences.[29] Finally, Equation (14) controls for firm-level and *département*-level characteristics, such as the firm capital intensity, (log) average number of employees and the average skill intensity. Sector-by-period (θ_{sT}) and region-by-period (θ_{rT}) fixed effects account for the fact that firms located in different regions or operating in different industries may consistently charge different markups. Firm-level fixed effects (θ_f) capture any time-invariant omitted variables that might affect markups.[30] The endogeneity problems that the OLS estimates of Equation (14) may suffer from are akin to those affecting Equation (10), and therefore, I instrument the immigrant share with the shift-share instrument. The results from estimating Equation (14) are presented in Table 7. Columns (1)-(2) show that there is a positive and significant relationship between the (log) markup and the local supply of immigrant workers, conditional on the inclusion of the set of controls and fixed effects: a 1 p.p. increase in the share of immigrant workers increases firm-level markups by 0.24% across firms (column 1) and by 0.49% within firms (column 2). The IV estimates are both relevant, as suggested by the first-stage coefficient, and not weak, as suggested by the Kleibergen-Paap F statistics. The OLS estimates are biased downward, thus pointing to a negative correlation between the markup-decreasing (markup-increasing) omitted variables and the share of immigrant workers. In Appendix E, I report the results of Equation 14 where the markup estimates are computed, in turn, using the number of hours as flexible input, a value added production function, adding the average wage in the control function, to address the critique by Gandhi et al. (2020) and adding a control function to address the potential input price bias. Finally, in In Appendix E, I report the results of Equation 14 where the markup estimates are computed using the accounting profits approach as in Baqaee and Farhi (2020).

5 Mechanism

In Section 1, I advance the hypothesis that thanks to immigrants, firms can produce higher-quality goods (and charge higher export prices) by using higher-quality inputs (and paying higher input prices). The results presented so far indicate that the share of immigrant workers is positively associated with both export prices and quality. In this section, I provide direct evidence of the immigrant–upstream market nexus. I do

[29] I show the results both with and without firm fixed effects for consistency with the results in Section 4.2.1.

[30] Since the firm location and sector are time-invariant, the firm fixed effects control for sector and region time-invariant factors as well.

Table 7: Firm-level markups and immigrant employment.

	$\ln(\text{MU})_{ft}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.236***	0.492***	0.318***	0.484***
	(0.069)	(0.050)	(0.054)	(0.039)
Observations	131,014	125,674	131,014	125,674
Controls	YES	YES	YES	YES
FE	ST-RT	F-ST-RT	ST-RT	F-ST-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	702.05	777.58	-	-
1st-stage coeff.	1.056***	1.388***	-	-
	(0.040)	(0.050)		

Notes: Markup estimates based on a Cobb-Douglas production function. Fixed effects are at the firm and region-by-period and sector-by-period level. The sample includes only the firms that both export and import in year *t*. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. Errors are clustered at the *département*-year level. First-stage coefficient refers to the endogenous variable (immigrant share).

so by studying two related questions. First, I examine whether immigrant workers facilitate access to high-price (high-quality) imported intermediate inputs. Second, I explore whether the improved access to better inputs is due to better knowledge of the upstream market. Finally, I discuss potential alternative explanations.

5.1 Immigrant Workers and Imported Input Prices

To study whether immigrant workers help firms access better imported intermediate inputs, I exploit the following econometric model:

$$\ln \text{Price}_{fpot} = \beta_0 + \beta_1 \text{Sh.Immig}_{dt} + X'_{ft}\Gamma + X'_{dt}\Delta + \theta_{pot} + \theta_{rT} + \varepsilon_{fpot} \tag{15}$$

The left-hand side of Equation (15) is the price that firm f pays for intermediate input p from source country o at time t. The fixed effects θ_{pot} allow comparison of two firms buying the same narrowly defined product from the same source country in the same year. Exploiting this type of variation allows capturing differences in import prices due to quality differences.[31] Equation (15) is analogous to Equation (10) for the remaining terms. The results of Equation (15) are presented in Table 8. The preferred specification in column (2) shows that there is a positive and significant relationship between the import price and the share of immigrant workers within each variety: a 1 p.p. increase in the share of immigrant workers in the *département* where the firm is located increases the price paid for the variety by 0.55%.[32] Similarly to Section 4.2.1, I complement the baseline results by exploiting the within-firm dimension of the data thanks to firm f-intermediate input p-source country o fixed effects and adding an interaction term between the share of immigrants and a dummy variable taking value one if the intermediate input is differentiated according to Rauch (1999)'s classification. The results in Table 9 confirm that there is a positive and significant relationship between the local supply of immigrant workers and changes in the price that a firm pays for its differentiated intermediate inputs.The results in Table 9 reconcile with those in Table 8 as they show that immigrant workers are positively associated with the price of intermediate inputs for which there is scope for quality differentiation. Consistent with the information friction mechanisms proposed in this paper, immigrant workers do not

[31] Additionally, these fixed effects allow controlling for potential concentration of suppliers in the upstream market to ensure that the observed price is not due to upstream market power.

[32] This effect is present after controlling for the average skill intensity of the department, thus indicating that the effect of immigrant workers is not channeled through a more general skill effect.)

Table 8: Import prices and share of immigrant workers.

	$\ln \text{Price}_{fpot}$			
	(1)	(2)	(3)	(4)
Sh.Immig_{dt}	0.918***	0.551*	1.440***	0.583***
	(0.337)	(0.287)	(0.191)	(0.188)
Observations	3,065,266	3,065,266	3,065,266	3,065,266
Controls	NO	YES	NO	YES
FE	POT-RT	POT-RT	POT-RT	POT-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	310.89	319.35	-	-
1st-stage coeff.	0.640***	0.607***	-	-
	(0.036)	(0.034)		

Notes: Fixed effects are at the product-source country-year level and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficient refers to the endogenous variable (immigrant share). Errors are clustered at the *département*-year level.

Table 9: Import prices and share of immigrant workers.

	$\ln \text{Price}_{fpot}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Sh.Immig_{dt}	-0.269***	-1.132***	-1.143***	-0.204***	-1.110***	-1.118***
	(0.068)	(0.091)	(0.094)	(0.052)	(0.076)	(0.078)
Sh.Immig_{dt}*Diff.Dummy_{p}		1.330***	1.329***		1.397***	1.398***
		(0.089)	(0.089)		(0.076)	(0.076)
Observations	2,412,305	2,412,305	2,412,305	2,412,305	2,412,305	2,412,305
Controls	NO	NO	YES	NO	NO	YES
FE	FOP-RT	FOP-RT	FOP-RT	FOP-RT	FOP-RT	FOP-RT
Method	2SLS	2SLS	2SLS	OLS	OLS	OLS
K-Paap stats.	834.40	411.21	412.20	-	-	-
1st-stage coeff. Sh.Immig_{dt}	1.411***	1.426***	1.416***	-	-	-
	(0.049)	(0.047)	(0.047)	-	-	-
1st-stage coeff. Sh.Immig_{dt}*Diff.Dummy_{p}	-	1.495***	1.494***	-	-	-
	-	(0.040)	(0.040)	-	-	-

Notes: Fixed effects are at the firm-product-source country and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficient refers to the two endogenous variables (immigrant employment and its interaction with the differentiation dummy). Errors are clustered at the *département*-year level.

have such positive effect on homogeneous products, for which immigrant workers cannot provide information on better suppliers.[33]

I then explore whether the effect of immigrant workers on firm-level input prices is larger when the firm had at least one (white-collar) immigrant worker in 2002, two years before the start of the sample. The inclusion of firm fixed effects in some specifications, and the employment dummy in the pre-sample are aimed at attenuating concerns related to the endogeneity of the firm-level employment of immigrant workers.[34] The idea is that firms that have hired at least one immigrant in the past, might be more receptive of the information provided by the immigrant workers in the department, and more likely to collaborate with other immigrant workers. In Table 10, I present the results supporting this hypothesis.

[33] As mentioned above, the specification in Equation (15) arguably reflects differences in prices that are due to differences in input quality. However, unlike in the export case, a theoretically founded measure of quality is not available for imported goods. To partly circumvent this problem, I follow Bas and Strauss-Kahn (2015) and adapt the measure of Khandelwal et al. (2013) to the import case. I present results where I relate the import quality measure with the share of immigrant workers in Appendix D.1. The results are presented in Table D.3 and show that there is a positive and significant relationship between the share of immigrant workers and the estimated measure of input quality.

[34] I replicate the results by choosing 1999 as a pre-sample year and by using a dummy variable for firms employing at least one immigrant worker. Results are qualitatively unchanged.

Table 10: Heterogeneity across firms.

	$\ln \text{Price}_{fpot}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Sh.Immig_{dt}	1.098***	-	-	1.183***	-	-
	(0.297)	-	-	(0.189)	-	-
$\text{Sh.Immig}_{dt} \times \mathbb{D}[1 = \text{Immig}]_{f,2002}$	0.360***	0.314***	0.370***	0.435***	0.314***	0.370***
	(0.098)	(0.098)	(0.063)	(0.083)	(0.098)	(0.063)
$\mathbb{D}[1 = \text{Immig}]_{f,2002}$	0.046***	0.050***	-	0.039***	0.050***	-
	(0.010)	(0.009)	-	(0.008)	(0.009)	-
Observations	2,525,037	2,525,037	2,523,488	2,525,037	2,525,037	2,523,488
Controls	YES	YES	YES	YES	YES	YES
FE	POT-RT	POT-DT	F-POT-DT	POT-RT	POT-DT	F-POT-DT
Method	2SLS	2SLS	2SLS	OLS	OLS	OLS
K-Paap stat.	140.31	2015.50	1756.10	-	-	-
1st-stage coeff. Sh.Immig_{dt}	0.650***	-	-	-	-	-
	(0.038)	-	-	-	-	-
1st-stage coeff. $\text{Sh.Immig}_{dt} \times \mathbb{D}[1 = \text{Immig}]_{f,2002}$	0.966***	0.976***	1.555***	-	-	-
	(0.021)	(0.022)	(0.037)	-	-	-

Notes: Fixed effects are at the product-destination-year level and region-by-period level in columns (1) and (4), at product-destination-year, and department-year level in columns (2) and (5) and at the firm, product-destination-year level, and department-year in columns (3) and (6). The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees. First-stage coefficients refers to the two endogenous variables (immigrant share and its interaction with the pre-sample employment dummy). Errors are clustered at the *département*-year level.

5.2 Immigrant Workers as Information Channel

A key pillar of the mechanism presented in Section 5 is that immigrant workers reduce the cost of acquiring information on the quality of intermediate inputs (Ariu, 2022). I provide evidence for this in different ways. First, I exploit the different occupations of immigrant workers, distinguishing the shares of white- and blue-collar workers. Second, I capitalize on the information on the source countries of the intermediate inputs and distinguish between products imported from EU countries—where, arguably, the quality ladder is longer, e.g., because of different standards—vs. non-EU countries. Third, I rely on the (imputed) share of immigrant workers by country of origin in the *département* where the firm is located to show that information is origin country-specific.

White- vs. Blue-Collar Immigrant Workers

In this section, I study whether the effect of immigrant workers on imported intermediate input prices is driven by a specific occupational group: namely, white-collar workers.[35] The idea is that only workers in white-collar occupations can provide relevant infor-

[35] In Appendix D.2, I present the classification of occupations.

mation on the supply chain of the source country. Accordingly, I modify the baseline specification in Equation (15) by replacing the share of immigrant workers with the shares of immigrant workers in the two different occupational groups. I instrument the share of white- and blue-collar immigrant workers by building a shift-share instrument analogous to the one described in Equation 11:

$$\text{IV}_{dt}^{g} = \frac{\widehat{\text{M}}_{dt}^{g}}{\widehat{\text{M}}_{dt}^{g} + \text{N}_{d1999}} \tag{16}$$

where $g \in \{\text{white,blue}\}$. Since the census data in the base year do not allow computing the distribution of workers across a *département* by country of origin separately for the two skill groups, I circumvent this problem by computing $\widehat{\text{M}}_{dt}^{g}$ as follows:

$$\widehat{\text{M}}_{dt}^{g} = \frac{\text{Immig}_{d,1999}^{g}}{\text{Immig}_{FR,1999}^{g}} \text{Immig}_{FR,t}^{g} \tag{17}$$

The results in Table 11 show that only immigrant workers in white-collar positions positively and significantly affect input prices. Moreover, the coefficient associated with the share of white-collar immigrants does not change in magnitude and significance when the share of blue-collar workers is added in column (1) and when the share of white-collar workers in the firm is added in column (2). These results lend support to the hypothesis that employment of immigrants influences quality in situations where the immigrant workers have both information about the supplier network and have the possibility to influence the importing decision.

Group of Origin of the Intermediate Inputs

In a second exercise, I exploit the richness of the customs data to distinguish between intermediate inputs sourced from countries inside and outside the European Union. The underlying assumption is that for intermediate inputs sourced from outside the European Union, the quality ladder is longer, as other countries do not share the set of harmonized standards of European countries, including France. For this reason, immigrant workers should play a more important role for intermediates sourced from non-EU countries. To test this, I augment Equation (15) with an interaction term between the share of immigrants and a dummy that takes value one if the source country of the intermediate inputs is not in the European Union. Table 12 confirms that the effect of immigrant workers on inputs' price (quality) is larger when the intermediate is source from outside the European Union.

Table 11: Import prices and share of immigrant workers: White- vs. blue collar.

	$\ln \text{Price}_{fpot}$			
	(1)	(2)	(3)	(4)
Sh.Immig. White$_{dt}$	3.429***	1.807***	4.182***	2.987***
	(0.502)	(0.513)	(0.444)	(0.432)
Sh.Immig. Blue$_{dt}$	0.269	0.209	0.345	0.214
	(0.280)	(0.272)	(0.255)	(0.241)
Observations	3,065,118	3,065,118	3,065,118	3,065,118
Controls	NO	YES	NO	YES
FE	POT-RT	POT-RT	POT-RT	POT-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stats.	291.87	299.87	-	-
1st stage coeff. Sh.Immig. White$_{dt}$	1.161***	1.108***	-	-
	(0.049)		(0.050)	- -
1st stage coeff. Sh.Immig. Blue$_{dt}$	0.0778***	0.764***	-	-
	(0.085)	(0.027)	-	-

Notes: Fixed effects are at the product-source country-year level and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's skill intensity, (log) productivity, and capital intesity. *Département*-level controls include the (log) average number of employees. Errors are clustered at the *département*-year level.

Table 12: Import prices and share of immigrant workers: EU vs. non-EU source countries.

	$\ln \text{Price}_{fpot}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.679**	0.300	1.195***	0.341*
	(0.333)	(0.282)	(0.189)	(0.188)
Sh.Immig$_{dt} \times \mathbb{D}[\mathbb{1} = \text{NonEU}]_{ot}$	1.073***	1.111***	1.254***	1.261***
	(0.192)	(0.193)	(0.182)	(0.183)
Observations	3,065,266	3,065,266	3,065,266	3,065,266
Controls	NO	YES	NO	YES
FE	POT-RT	POT-RT	POT-RT	POT-RT
Method	2SLS	2SLS	NO	NO
K-Paap stat.	155.54	159.79	-	-
1st-stage coeff. Sh.Immig$_{dt}$	0.644***	0.610***	-	-
	(0.037)	(0.034)	-	-
1st-stage coeff. Sh.Immig$_{dt} \times \mathbb{D}[\mathbb{1} = \text{NonEU}]_{ot}$	0.815***	0.815***	-	-
	(0.016)	(0.016)	-	-

Notes: Fixed effects are at the product-source country-year and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficients refer to the two endogenous variables (immigrant employment and its interaction with the Non-EU dummy). Errors are clustered at the *département*-year level.

Immigrant Workers' Country of Origin: Population Census

The employer–employee data do not allow identification of immigrant workers' exact country of origin. To partly circumvent this problem and provide more direct evidence that immigrant workers provide more valuable information for intermediate inputs source from their own origin country, I exploit the population census and a more aggregated level of analysis. Thanks to the population census, it is possible to compute an imputed share of immigrant workers by country of origin in each *département* as follows:

$$\text{Sh.Immig}^{o}_{dt} = \frac{\widetilde{\text{Immig}}^{o}_{dt}}{\text{Immig}_{dt} + \text{Natives}_{dt}} \tag{18}$$

$$\text{where } \widetilde{\text{Immig}}^{o}_{dt} = \frac{\text{Immig}^{RP}_{o,d,t}}{\text{Immig}^{RP}_{d,t}} \times \text{Immig}^{DADS}_{dt} \tag{19}$$

Similarly, the imputed share of immigrant workers by all the other origin countries is computed as follows:

$$\text{Sh.Immig}^{other}_{dt} = \frac{\widetilde{\text{Immig}}^{other}_{dt}}{\text{Immig}_{dt} + \text{Natives}_{dt}} \tag{20}$$

$$\text{where } \widetilde{\text{Immig}}^{other}_{dt} = \left(\sum_{o} \frac{\text{Immig}^{RP}_{o,d,t}}{\text{Immig}^{RP}_{d,t}} \times \text{Immig}^{DADS}_{dt} \right) - \widetilde{\text{Immig}}^{o}_{dt} \tag{21}$$

Endowed with the imputed share of immigrant workers by country of origin in each *département*, I modify the specification as follows:

$$\ln \text{Av.P}_{dpot} = \beta_0 + \beta_1 \text{Sh.Immig}^{o}_{dt} + \beta_2 \text{Sh.Immig}^{other}_{dt} + X'_{dt}\Gamma + \theta_{pot} + \theta_{rT} + \varepsilon_{dpot} \tag{22}$$

The left-hand side is the weighted average of the price of intermediate inputs p across firms located in *département* d at time t from origin o.[36,37] On the right-hand side, Sh.Immig^{o}_{dt} is the share of immigrant workers in *département* d at time t from origin o, while $\text{Sh.Immig}^{other}_{dt}$ is the share of immigrant workers in *département* d at time t from all other origins besides o. Fixed effects are at the product-origin-year and region-by-period level. Controls include the (log) averages of firms' size, productivity, employment, and skill intensity in the *département*. Both shares on the right-hand side are instrumented

[36] The weights are given by $\frac{I_{f(d)pot}}{\sum_{f \in d} I_{fopt}}$, where $I_{f(d)pot}$ is the import value.

[37] I aggregate the left-hand side to improve the level of precision of the estimates while still allowing the inclusion of the same set of fixed effects as the specification in Equation (15).

with a slight modification of the shift-share instrument presented in Equation (11). The two instruments are computed as follows:

$$\text{IV}^{o}_{dt} = \frac{\widehat{\text{M}}^{o}_{dt}}{\widehat{\text{M}}^{o}_{dt} + \widehat{\text{M}}^{other}_{dt} + \text{N}_{d1999}} \tag{23}$$

$$\text{IV}^{other}_{dt} = \frac{\widehat{\text{M}}^{other}_{dt}}{\widehat{\text{M}}^{o}_{dt} + \widehat{\text{M}}^{other}_{dt} + \text{N}_{d1999}} \tag{24}$$

where:

$$\widehat{\text{M}}^{o}_{dt} = \frac{\text{Immig}^{RP}_{d,o,1999}}{\text{Immig}^{RP}_{FR,o,1999}} \times \overline{\text{Immig}}_{o,t} \tag{25}$$

$$\widehat{\text{M}}^{other}_{dt} = \left(\sum_{o} \frac{\text{Immig}^{RP}_{d,o,1999}}{\text{Immig}^{RP}_{FR,o,1999}} \times \overline{\text{Immig}}_{o,t} \right) - \widehat{\text{M}}^{o}_{dt} \tag{26}$$

The results are presented in Table 13. In the preferred specification in column (2), the results highlight how the share of immigrant workers from the same origin country as the intermediate inputs have a much larger effect on their price (and therefore their quality). A 1 p.p. increase in the share of immigrants from the same origin of the intermediate inputs, increases the average price paid in the district by 1.5%, while the share of immigrants from all the other origins does not have an effect.

5.3 Competing Mechanisms

The purpose of this section is to discuss potential alternative drivers of the relationship between immigrants and firm performance described in Section 4.2. Immigrant workers could, for example, help firms become more productive thanks to better production technology. This would translate into higher prices (quality) for the exported products. Concerns related to this alternative explanation should be attenuated by two considerations. First, the relationship between immigrant workers and export prices and quality holds with the inclusion of controls for the firm productivity level. These account for the fact that more productive firms may have better technology to produce higher-quality products and therefore charge higher prices. Second, arguably, information externalities are more local labor market-specific than are productivity externalities. Therefore, the use of the share of immigrant workers at the *département*-level should be more informative about the former type of spillover.[38] A second alternative, although not mutually

[38] Mitaritonna et al. (2017) find that the local labor supply of immigrant workers increases firm-level productivity; however, they identify the increase in the firm's employment of immigrant workers as one of the factors through which this effect is channeled.

Table 13: Input prices and country of origin.

	$\ln$ Av.Price$_{dpot}$			
	(1)	(2)	(3)	(4)
Sh.Immig$^{o}_{dt}$	1.398***	1.508***	1.515***	1.647***
	(0.507)	(0.535)	(0.457)	(0.456)
Sh.Immig$^{other}_{dt}$		0.209		0.334***
		(0.175)		(0.074)
Observations	2,183,911	2,183,911	2,183,911	2,183,911
Controls	YES	YES	YES	YES
FE	POT-RT	POT-RT	POT-RT	POT-RT
2SLS	YES	YES	NO	NO
K-Paap stat.	3394.32	644.79	-	-
1st-stage coeff. Sh.Immig$^{o}_{dt}$	1.047***	1.046***	-	-
	(0.018)	(0.018)	-	-
1st-stage coeff. Sh.Immig$^{other}_{dt}$	-	0.838***	-	
	-	(0.023)	-	-

Notes: $\ln$ Av.Price$_{dopt}$ is the weighted average of the price of intermediate inputs across firms within the same *département*-origin-year. The weights are given by $\frac{I_{f(d)opt}}{\sum_{f\in d} I_{fopt}}$. Fixed effects are at the product-origin-year and region-by-period level. The sample includes only firm-year observations for which the firm both imports and exports at time t. Controls include the (log) averages of firms' assets, employment and skill intensity. First-stage coefficients refer to the two endogenous variables (Sh.Immig$^{o}_{dt}$ and Sh.Immig$^{other}_{dt}$). Errors are clustered at the *département*-year level.

exclusive, explanation is that immigrant workers might help firms customize their product for destination markets. This would increase exports' appeal and price. It is not possible to rule out that this could be part of the overall effect that immigrant workers have on export prices. However, if the effect of immigrant workers on exported goods were entirely due to downstream customization, this would not be consistent with the finding that these workers play a larger role for intermediate inputs from outside the European Union. The effect in such a case, in fact, should be the same as for sourcing countries within the European Union. Additionally, this alternative explanation would not be consistent with the finding that only the share of immigrant workers with the same country of origin as the intermediate inputs affect their price (quality). Finally, Table 14 shows that the relationship between the share of immigrant workers from a specific origin country and the average price of exports in that country is not as clear cut as in the case of the average price of imports.

6 Robustness

I conduct a number of robustness checks to validate the results presented in Sections 4 and 5. The respective tables are presented in Appendix E.

The first robustness test concerns the validity of the instrument. As explained in Section 4.1.1, the distribution of immigrants across *département* in 1999, for each source country, should be exogenous (Goldsmith-Pinkham et al., 2020). The results in Table 3 suggest that the initial shares are likely to be exogenous. In this section, I investigate further this issue by following Brunello et al. (2020) and using an alternative shift-share instrument computed as below:

$$\text{IV}_{dt} = \frac{\overline{\text{M}}_{dt}}{\overline{\text{M}}_{dt} + \text{N}_{d1999}} \tag{27}$$

where $\overline{\text{M}}_{dt}$ is built by treating all the immigrants as if they were coming from the same origin country:

$$\overline{\text{M}}_{dt} = \frac{\text{Immig}^{DADS}_{d,1999}}{\text{Immig}^{DADS}_{FR,1999}} \text{Immig}^{DADS}_{FR,t} \tag{28}$$

In doing so, I remove the origin country as a potential source of endogeneity (Brunello et al., 2020). In Table E.10 in Appendix E.2, the results are similar to those obtained when using the baseline instrument, therefore suggesting that the potential endogeneity of the country of origin plays a minor role in the identification strategy and that any

Table 14: Export prices and destination countries.

	$\ln$ Av.Price$_{dpct}$			
	(1)	(2)	(3)	(4)
Sh.Immig$^{o}_{dt}$	-1.931***	-1.847***	-0.637*	-0.491
	(0.380)	(0.416)	(0.359)	(0.358)
Sh.Immig$^{other}_{dt}$		0.115		0.276***
		(0.104)		(0.043)
Observations	4,327,459	4,327,459	4,327,459	4,327,459
Controls	YES	YES	YES	YES
FE	PCT-RT	PCT-RT	PCT-RT	PCT-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	2118.23	1321.93	-	-
1st-stage coeff. Sh.Immig$^{o}_{dt}$	0.942***	0.941***	-	-
	(0.020)	(0.020)	-	-
1st-stage coeff. Sh.Immig$^{other}_{dt}$	-	0.985***	-	
	-	(0.018)	-	-

Notes: $\ln$ Av.Price$_{dcpt}$ is the weighted average of the price of final goods across firms within the same *département*-destination-year. Weights are given by $\frac{E_{f(d)cpt}}{\sum_{f\in d} E_{fcpt}}$. Fixed effects are at the product-destination-year and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Controls include the (log) averages of firms' assets, employment and skill intensity. First-stage coefficients refer to the two endogenous variables (Sh.Immig$^{o}_{dt}$ and Sh.Immig$^{other}_{dt}$). Errors are clustered at the *département* level.

bias arising from the endogenous distribution of immigrants by country of origin is likely to be minimal. The second robustness test further investigates the problem of reverse causality, beyond the instrumental variable strategy performed throughout the main analysis. The baseline sample includes only the firms that in a given year both import and export. Since these are the biggest firms, a problem of reverse causality might arise, as firm-level outcomes might influence the demand for immigrant employment in the local labor market. I, therefore, exclude from the analysis all the firm-year observations that are in the top 5th percentile of the department-year specific distribution for the employment of immigrant workers. Table E.11 in Appendix E.3 confirms all the results of the main analysis.[39] The third robustness check concerns the specification of the main explanatory variable, the share of immigrant workers. I complement the analysis presented thus far by replicating all the main results with the share of immigrant workers employed in the firm. Throughout the empirical analysis, the main explanatory variable is the share of immigrant workers at the *département* level. The main economic rationale behind this choice is that information is local labor market specific and not necessarily firm-level specific. However, in Table E.12 I show that firms exposed to a larger supply of immigrant workers are more likely to hire at least one immigrant. Then, I provide evidence in Table E.13 in Appendix E.4 that the results presented in the main analysis are qualitatively unchanged when I use the share of immigrant workers employed in the firm.

7 Conclusions

This paper contributes to the debate on the consequences of the presence of immigrant workers for host economies and firms by taking a novel perspective that looks at firm-level quality. It represents a first attempt to study how immigrant workers can help firms stay competitive in international markets via quality upgrades related to immigrants' ability to overcome informational frictions. Information frictions might constitute a major impediment to producing higher-quality goods, and it is therefore important to lower them, as quality upgrading constitutes a source of competitive advantage for firms in international markets. The results of this paper therefore hint towards the encouragement of policies that facilitate immigration to produce more sophisticated goods.

[39] Table E.11 does not report the results on quality because quality is measured in terms of deviation from the mean given the full sample of firms.

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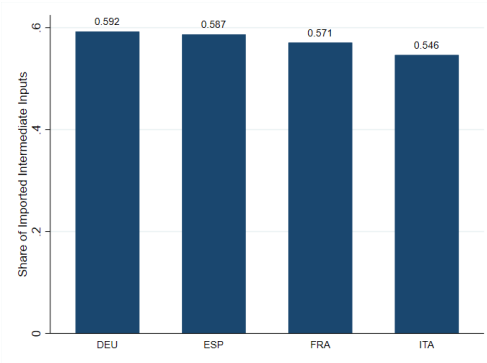
Appendix

A Macro Facts

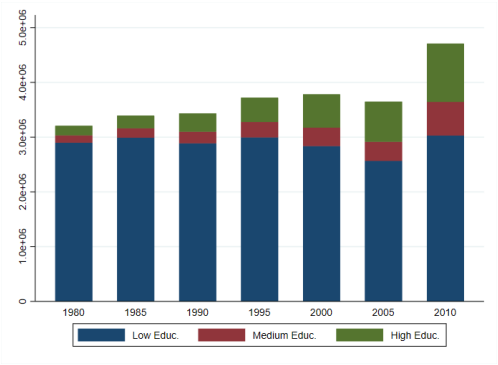
In Figure A.1, I report the share of intermediate inputs in total trade in 2005, in the middle of the sample in the analysis, as well as the immigrant stock by educational attainment.

Figure A.1: Aggregate Facts.

(a) Share of intermediate inputs in total trade in 2005 (Comtrade).



(b) Immigrant stock by educational attainment (IAB Dataset).



B Data and Variables Construction

B.1 Markup Estimation

To estimate markups, I rely on the framework developed by De Loecker and Warzynski (2012). Starting from the cost-minimization problem of a producer, an expression for markups is obtained as the ratio between the output elasticity with respect to a flexible input and that input's revenue share.[40] I choose labor as the flexible input, so that the markup is equal to:

$$\mu_{ft} = \theta^L_{ft} \times (\alpha^L_{ft})^{-1} \tag{B.1}$$

where θ^L_{ft} is the output elasticity of labor and α^L_{ft} is the wage bill as a fraction of total revenue.[41] In the baseline, I use a (gross-output) Cobb-Douglas production function in capital, labor and intermediate inputs of the following form:

$$y_{ft} = \beta_l l_{ft} + \beta_k k_{ft} + \beta_m m_{ft}$$

Therefore, the elasticity of labor is obtained as follows:

$$\hat{\theta}^L_{ft} = \hat{\beta}_l$$

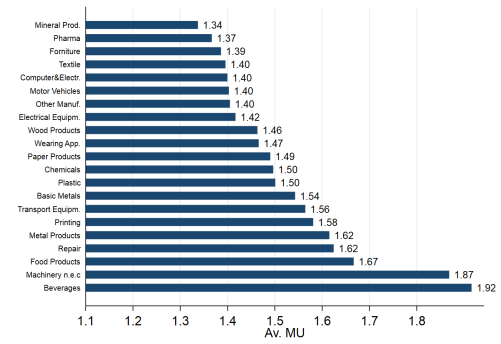
Figure B.2 show the average firm-level markups across industries, as well as their distribution across firms.

[40] The authors show that the two are the same only in perfect competition.

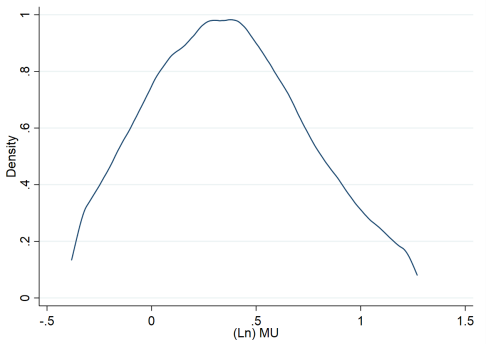
[41] The ratio is corrected for measurement error in output as follows: $\alpha^L_{ft} = \frac{w_{ft} L_{ft}}{\frac{P_{ft} Q_{ft}}{exp(\hat{\varepsilon}_{ft})}}$.

Figure B.2: Markups: Descriptive statistics.

(a) Average firm-level MU in the industry



(b) Distribution of firm-level MU



B.1.1 Production Function Estimation

To consistently estimate productivity and production function elasticities, one needs to account for simultaneity bias arising from the fact that unobserved productivity shocks are potentially correlated with input choices. I follow the literature and use the method developed by Wooldridge (2009) and implemented by Petrin and Levinsohn (2012), which is robust to the critique of Ackerberg et al. (2015). This method consists mainly of approximating productivity with a function of lagged capital and material inputs and implementing an instrumental variable procedure where the endogenous variables are instrumented with their first lags. To estimate productivity, I use balance-sheet data on revenues (y_{ft}), the number of full-time equivalent workers (l_{ft}), book value of tangible assets (k_{ft}) and expenditure in material intermediate inputs (m_{ft}). I follow Caselli et al. (2021) and estimate a sector-specific production function in two steps. First, I obtain a measure of expected output ($\hat{y}_{ft}$) and measurement error ($\hat{\varepsilon}_{ft}$) by regressing the firm gross output on a third-degree polynomial in inputs:

$$y_{ft} = \delta_0 + \sum_{i=0}^{3} \sum_{j=0}^{3-i} \sum_{n=0}^{3-i-j} \delta_{ijn} l_{ft}^i k_{ft}^j m_{ft}^n + \varepsilon_{ft}$$

Then, I estimate by two-digit sector a production function of the type:

$$\hat{y}_{ft} = f_s(l_{ft}, k_{ft}, m_{ft}, \mathbf{B}) + \omega_{ft} + \eta_{ft}$$

where $f_s = \beta + \beta_l l + \beta_k k + \beta_m m_{ft}$, ω_{ft} is the productivity term observed by the firm but not by the econometrician, and $\mathbf{B}$ is the vector of input elasticities to be estimated. The main issue with estimating $\mathbf{B}$ is the simultaneity bias given by the correlation

between unobserved productivity shocks and inputs choice. Therefore, I follow the method developed by Wooldridge (2009) and implemented by Petrin and Levinsohn (2012) and approximate the unobserved productivity term by a third-order polynomial in lagged capital and material inputs and then implement an instrumental variable estimation where the endogenous variables, labor and material inputs, are instrumented with their first and second lags, respectively. In Table B.1 I report the output elasticities of the different inputs by industry.

Table B.1: Output elasticities.

	β_l	β_k	β_m		β_l	β_k	β_m
Nace Rev.2				Nace Rev.2			
10	0.233	0.0357	0.524	23	0.284	0.127	0.475
11	0.239	0.129	0.451	24	0.314	0.052	0.508
13	0.281	0.054	0.419	25	0.418	0.061	0.339
14	0.242	0.079	0.589	26	0.370	0.122	0.407
16	0.272	0.059	0.680	27	0.342	0.115	0.309
28	0.471	0.039	0.339	29	0.265	0.115	0.511
18	0.400	0.033	0513	30	0.460	0.177	0.220
20	0.250	0.089	0.417	31	0.343	0.034	0.532
21	0.282	0.065	0.490	32	0.327	0.087	0.477
22	0.311	0.065	0.490	33	0.553	0.084	0.177

B.2 Quality Estimation

To compute the quality of each exported variety at the firm level, I exploit the measure of quality proposed by Khandelwal et al. (2013), i.e., quality as it enters a consumer's CES utility function:

$$x_{fpct} = p_{fpct}^{-\sigma_p} q_{fpct}^{\sigma_p - 1} P_{ct}^{\sigma_p - 1} Y_{ct} \tag{B.2}$$

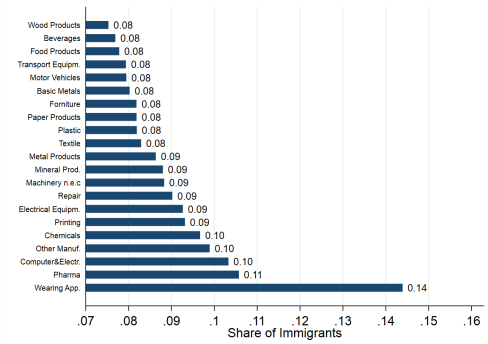
In Equation (B.2), the quantity demanded by a consumer for a specific variety (x_{fpct}) inversely depends on its price ($p_{fpct}^{-\sigma_p}$) and on specific market conditions, such as aggregated demand (Y_{ct}) and the price index ($P_{ct}^{\sigma_p - 1}$). Quality ($q_{fpct}^{\sigma_p - 1}$) then enters as a demand shifter. After log-linearizing the expression in Equation (B.2) and taking its empirical counterpart, quality enters the error term η_{fpct} as follows:

$$x_{fpct} + \sigma_p p_{fpct} = \alpha_p + \alpha_{ct} + \eta_{fpct} \tag{B.3}$$

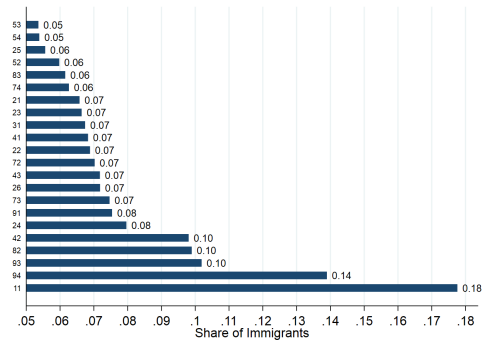
By rescaling the error term in Equation (B.3), the quality measure is given by:

Figure B.3: Immigrants Distribution.

(a) Distribution of immigrants across industries



(b) Distribution of immigrants across regions



$$\hat{\lambda}_{fpct} = \frac{\eta_{fpct}}{(\sigma_p - 1)} \tag{B.4}$$

B.3 Descriptive Statistics

In Table B.2, I provide some descriptive statistics on the main variables of interest. In Figure B.3, I provide the detailed distribution of immigrant workers across regions and industries.

Table B.2: Summary statistics: Firms that import and export at time t.

	Obs.	Mean	Std. Dev.
Sh.Immig$_{ft}$	130,892	0.063	0.143
White-Collar Share	130,981	0.326	0.199
(Ln) MU (CD)	131,014	0.366	0.376
(Ln) TFP (CD)	131,014	1.914	0.261
FTE	131,014	132.571	420.658
Tangible Assets	131,014	1.88e+07	1.43e+08
Total Sales	131,014	3.59e+07	1.46e+08
Wage Bill	131,014	6.88e+06	2.65e+07
Total Imports	131,014	7.27e+06	3.99e+07
Total Exports	131,014	1.18e+07	7.76e+07
(Ln) P^{II}	3,295,323	2.522	1.979
(Ln) P^{EX}	6,293,625	3.017	1.847

C Theoretical Framework

This paper advances the idea that firms learn about high-quality (high-price) input suppliers, upgrade the quality of their exported products, and can therefore optimally charge higher export prices, and markups. The introduction of quality –intended as any product characteristic that consumers are willing to pay for– in models of international trade has several implications on the pricing strategy of firms and their competitiveness. According to earlier models of international trade, the most productive firms charge a lower price, gain a larger market share and earn higher revenues. Since participating in the international market is characterized by the presence of fixed costs, only the high-productive (high-revenues) firms, can afford it.[42] The literature has been referring to this mechanism as efficiency sorting. However, a setting where firms sort only according to their efficiency cannot explain several empirical regularities, such as a large number of zero trade flows, higher export prices towards distant markets, or "pricing-to-market" behavior (Baldwin and Harrigan, 2011; Manova and Zhang, 2012). Models in international trade have therefore started incorporating a quality term in consumers' utility function and firms competing both on prices and quality. Since producing higher quality goods is expensive, higher-quality products are sold at a higher price. Baldwin and Harrigan (2011) propose a theoretical framework featuring a C.E.S. utility function including a quality term, with firms incurring a higher marginal cost to produce quality in the following way:[43]

$$U = \left(\int_{\in \Theta} (c_i q_i)^{1-1/\sigma} \, di \right)^{1/(1-1/\sigma)} \tag{C.5}$$
$$q_i = a_i^{1+\theta}$$

When marginal cost (a_i) raises sufficiently quickly with quality ($\theta > 0$), then the quality-adjusted price decreases with marginal cost. This makes the high-price (high-quality) firms the most competitive ones, which find it worthwhile to export to distant markets. How high-price (high-quality) final goods relate to high-price (high-quality) intermediate inputs has been shown both theoretically and empirically by, among others, Kugler and Verhoogen (2012). This is of particular interest given the focus of this paper. In their model, firms pay higher input prices for higher quality inputs, thus increasing their marginal costs of production. Since they incur higher production costs, they charge higher prices for higher-quality final goods. However, these high-price firms earn higher

[42] This is the underlying mechanism in the Melitz (2003) model.

[43] The specification between the quality and marginal cost is present also in Kneller and Yu (2016), where preferences are represented by linear demand function.

revenues because the consumers are willing to pay more for higher quality goods. Consumers are willing to pay higher prices because their demand becomes steeper, i.e. it displays a lower elasticity of substitution. Firms, therefore, find it optimal to charge an higher price.This paper studies empirically whether improved access to higher quality inputs translates into higher markups. The theoretical foundation rationalizing this relationship relies on the literature on variable markups. In an early work by Melitz and Ottaviano (2008), firms are monopolistically competitive but face linear preferences, rather than a C.E.S utility function. In their work, trade and market size interact to affect the "toughness" of the market and consequently the endogenous distribution of markups through the selection of firms.[44] This framework has been extended by adding quality differentiation, thus allowing to study how trade and firm characteristics affect markups through factors related to prices, i.e. demand, rather than marginal cost. Increasing the scope for quality differentiation has a price-increasing effect, as the demand elasticity for each variety decreases. Whenever quality upgrading makes demand less elastic, firms can charge higher prices and higher markups (De Loecker and Warzynski, 2012; Kneller and Yu, 2016; Bellone et al., 2016; Hornok and Muraközy, 2019).

D Mechanisms

D.1 Immigrant Workers and Imported Input Quality

Equation (D.6) studies whether the quality of imported intermediate inputs is positively associated with the share of immigrant workers in the local labor market. I adapt the measure of Khandelwal et al. (2013) to the imports of intermediate inputs as in Bas and Strauss-Kahn (2015).

$$\hat{\lambda}_{fpot} = \beta_0 + \beta_1 \text{Sh.Immig}_{dt} + X'_{ft}\Gamma + X'_{dt}\Delta + \theta_{pot} + \theta_{rT} + \varepsilon_{fpot} \tag{D.6}$$

The IV estimates in columns (1)-(2) show that there is a positive and significant relationship between the share of immigrant workers and the quality of the imported intermediate inputs within narrowly defined varieties. This lends support to the idea that the effect of the share of immigrant workers on imported intermediate input prices is mainly due to quality upgrading.

[44] In particular, lower costs (high productive) firms charge higher markups as they do not pass completely onto consumers their cost advantage. However, average markups are lower in bigger and more competitive markets because firms are forced to lower their prices.

Table D.3: Import quality and share of immigrant workers.

	$\hat{\lambda}_{fpot}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	1.209***	0.799***	1.532***	0.707***
	(0.328)	(0.283)	(0.206)	(0.203)
Observations	2,433,001	2,433,001	2,433,001	2,433,001
Controls	NO	YES	NO	YES
FE	POT-RT	POT-RT	POT-RT	POT-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	309.45	317.70	-	-
1st-stage coeff.	0.634***	0.601***	-	-
	(0.036)	(0.037)	-	-

Notes: Fixed effects are at the product-source country-year level and region-by-period level. The sample includes only the firm-year observations in which the firm both imports and exports at time t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficient refers to the endogenous variable (immigrant share). Errors are clustered at the *département*-year level.

D.2 White- vs. Blue-Collar Immigrant Workers

Table D.4: French classification of occupations.

CS code	Occupation (French)	Occupation (English)	
1	**Agriculteurs exploitants**	**Farmers**	
11	Agriculteurs sur petite exploitation	Farmers on small farms	-
12	Agriculteurs sur moyenne exploitation	Farmers on medium-sized farms	-
13	Agriculteurs sur grande exploitation	Farmers on large farms	-
2	**Artisans, commerçants et chefs d'entreprise**	**Craftsmen, traders and business leaders**	
21	Artisans	Craftsmen	-
22	Commerçants et assimilés	Traders and similar persons	-
23	Chefs d'entreprise de 10 salariés ou plus	Entrepreneurs with 10 or more employees	-
3	**Cadres et professions intellectuelles supérieures**	**Executives and higher intellectual professions**	
31	Professions libérales	Liberal professions	W
33	Cadres de la fonction publique	Public service executives	W
34	Professeurs, professions scientifiques	Professors, scientific professions	W
35	Professions de l'information, des arts et des spectacles	Information, arts and entertainment occupations	W
37	Cadres administratifs et commerciaux d'entreprise	Corporate administrative and commercial executives	W
38	Ingénieurs et cadres techniques d'entreprise	Engineers and business technical executives	W
4	**Professions Intermédiaires**	**Intermediate occupations**	
42	Professeurs des écoles, instituteurs et assimilés	Teachers of schools, teachers and assimilated	W
43	Professions intermédiaires de la santé et du travail social	Intermediate health and social work occupations	W
44	Clergé, religieux	Clergy, religious	W
45	Professions intermédiaires administratives de la fonction publique	Intermediate administrative professions in public service	W
46	Professions intermédiaires administratives et commerciales des entreprises	Intermediate administrative and commercial professions in companies	W
47	Techniciens	Technicians	W
48	Contremaîtres, agents de maîtrise	Foremen, supervisors	W
5	**Employés**	**Clerical workers**	
52	Employés civils et agents de service de la fonction publique	Civilian employees and public service employees	B
53	Policiers et militaires	Police and military	B
54	Employés administratifs d'entreprise	Corporate administrative employees	B
55	Employés de commerce	Commercial employees	B
56	Personnels des services directs aux particuliers	Direct service personnel to individuals	B
6	**Ouvriers**	**Labourers**	
62	Ouvriers qualifiés de type industriel	Industrial skilled workers	B
63	Ouvriers qualifiés de type artisanal	Skilled craft workers	B
64	Chauffeurs	Drivers	B
65	Ouvriers qualifiés de la manutention, du magasinage et du transport	Skilled workers in handling, storage and transport	B
67	Ouvriers non qualifiés de type industriel	Unskilled industrial workers	B
68	Ouvriers non qualifiés de type artisanal	Unskilled craft workers	B
69	Ouvriers agricoles	Agricultural workers	B

Column (1) classifies occupations into blue- or white-collar occupations (respectively denoted B and W).

E Robustness

E.1 Alternative markup estimation

In this section, I report the results of Equation 14, where I use alternative estimation methods for firm-level markups. First, I estimate markups using the number of hours worked rather than the number of full-time equivalent workers. This is because the number of hours worked might be adjusted more flexibly, some time between $t-1$, when capital is chosen, and t when material inputs are chosen and the productivity shock arrives. The results are presented in Table E.5, and are consistent with those presented in Table 7.

Table E.5: Firm-level markups and immigrant employment: Nr of hours.

	$\ln(\text{MU})_{ft}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.238***	0.596***	0.363***	0.578***
	(0.082)	(0.054)	(0.061)	(0.044)
Observations	131,013	125,673	131,013	125,673
Controls	YES	YES	YES	YES
FE	ST-RT	F-ST-RT	ST-RT	F-ST-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	701.93	777.78	-	-
1st-stage coeff.	1.056***	1.389***	-	-
	(0.040)	(0.050)		

Notes: Markup estimates based on a Cobb-Douglas production function. Fixed effects are at the firm and region-by-period and sector-by-period level. The sample includes only the firms that both export and import in year *t*. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. Errors are clustered at the *département*-year level. First-stage coefficient refers to the endogenous variable (immigrant share).

Table E.6: Firm-level markups and immigrant employment: Value Added.

	$\ln(\text{MU})_{ft}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.087	0.389***	0.195***	0.402***
	(0.060)	(0.037)	(0.044)	(0.029)
Observations	116,537	111,488	116,537	111,488
Controls	YES	YES	YES	YES
FE	ST-RT	F-ST-RT	ST-RT	F-ST-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	703.45	832.77	-	-
1st-stage coeff.	1.059***	1.399***	-	-
	(0.040)	(0.049)		

Notes: Markup estimates based on a Cobb-Douglas production function. Fixed effects are at the firm and region-by-period and sector-by-period level. The sample includes only the firms that both export and import in year *t*. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. Errors are clustered at the *département*-year level. First-stage coefficient refers to the endogenous variable (immigrant share).

Then, I address the critique by Gandhi et al. (2020) in two different ways. First, I estimate markups using a value added production function. Gandhi et al. (2020) show that gross output production function estimation is subject to an identification problem when the output elasticity of material inputs has to be estimated and materials also enter the control function. Value added production functions can be interpreted as gross value production functions that are Leontief in material inputs. With this specification, the critique by Gandhi et al. (2020) does not apply as material inputs only enter the control function, and therefore the output elasticity to material inputs does not have to be estimated. I estimate the production function using the methodology by (Ackerberg et al., 2015), which is more suitable for estimating value added production functions, rather than gross output ones Ackerberg et al. (2015). The results are presented in Table E.6 and are consistent with to those presented in the baseline specification.

Table E.7: Firm-level markups and immigrant employment: Average Wage.

	$\ln(\text{MU})_{ft}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.149***	0.551***	0.238***	0.544***
	(0.050)	(0.045)	(0.040)	(0.034)
Observations	115,742	110,697	115,742	110,697
Controls	YES	YES	YES	YES
FE	ST-RT	F-ST-RT	ST-RT	F-ST-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	715.65	803.58	-	-
1st-stage coeff.	1.056***	1.388***	-	-
	(0.040)	(0.050)		

Notes: Markup estimates based on a Cobb-Douglas production function. Fixed effects are at the firm and region-by-period and sector-by-period level. The sample includes only the firms that both export and import in year *t*. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. Errors are clustered at the *département*-year level. First-stage coefficient refers to the endogenous variable (immigrant share).

Second, following De Loecker and Scott (2016) and Stiebale and Szücs (2019), I include the (log of) average wage in the control function. The results are presented in Table E.6 and are consistent with those presented in the baseline specification.

Next, I address the possible bias introduced by the use of revenues instead of quantity in the production function estimation as well as the potential additional bias due to unobserved firm-level inputs prices by building a firm-level price index used to deflate sales as well as in the control function for input prices. The results are presented in Table E.8 and are consistent with those presented in the baseline specification.

Finally, I compute markups using the accounting profits approach suggested by Baqaee and Farhi (2020). The results are presented in Table E.9 and are consistent with those presented in the baseline specification.

Table E.8: Firm-level markups and immigrant employment: Output Price Index.

	$\ln(\text{MU})_{ft}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.325***	0.508***	0.405***	0.507***
	(0.071)	(0.045)	(0.050)	(0.035)
Observations	115,208	110,811	115,208	110,811
Controls	YES	YES	YES	YES
FE	ST-RT	F-ST-RT	ST-RT	F-ST-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	694.10	813.61	-	-
1st-stage coeff.	1.056***	1.396***	-	-
	(0.040)	(0.049)		

Notes: Markup estimates based on a Cobb-Douglas production function. Fixed effects are at the firm and region-by-period and sector-by-period level. The sample includes only the firms that both export and import in year *t*. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. Errors are clustered at the *département*-year level. First-stage coefficient refers to the endogenous variable (immigrant share).

Table E.9: Firm-level markups and immigrant employment: Accounting Markups.

	$\ln(\text{MU})_{ft}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.028**	0.026***	0.027***	0.024***
	(0.010)	(0.011)	(0.009)	(0.009)
Observations	117,914	112,606	117,914	112,606
Controls	YES	YES	YES	YES
FE	ST-RT	F-ST-RT	ST-RT	F-ST-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	686.98	769.56	-	-
1st-stage coeff.	1.055***	1.394***	-	-
	(0.040)	(0.050)		

Notes: Markup estimates based on the ratio between sales and costs $\frac{Sales_{it}}{(Sales_{it} - Operating\ Income_{it})}$. Fixed effects are at the firm and region-by-period and sector-by-period level. The sample includes only the firms that both export and import in year t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. Errors are clustered at the *département*-year level. First-stage coefficient refers to the endogenous variable (immigrant share).

Table E.10: Alternative shift-share instrument.

	$\ln \text{Price}_{fpct}$	$\hat{\lambda}_{fpct}$	$\ln \text{MU}_{ft}$		$\ln \text{Price}_{fpot}$
	(1)	(2)	(3)	(4)	(5)
Sh.Immig_{dt}	0.603**	0.509*	0.250***	0.487***	0.168
	(0.290)	(0.308)	(0.069)	(0.049)	(0.255)
Observations	5,276,192	4,232,656	131,014	125,674	3,065,266
Controls	YES	YES	YES	YES	YES
FE	PCT-RT	PCT-RT	ST-RT	F-ST-RT	POT-RT
Method	2SLS	2SLS	2SLS	2SLS	2SLS
K-Paap Stat.	490.40	490.91	964.99	680.05	490.40
1st-stage coeff.	0.653***	0.654***	1.018***	1.389***	0.610***
	(0.032)	(0.031)	(0.033)	(0.053)	(0.028)

Notes: Markup estimates in columns (3)-(4) are based on a Cobb-Douglas production function. The sample includes only the firms that both export and import in year t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficients refer to the endogenous variable (immigrant share). Errors are clustered at the department-year level.

E.2 Alternative shift-share instrument

In this section, I report the main results by using the alternative instrument in Equation (27). Table E.10 confirms all the main results.

E.3 More on Reverse Causality

In this section, I report the main results after excluding all the biggest firms in the sample. Specifically, I exclude the firms that are in the upper 5th percentile of the distribution of employment of immigrant workers in a department-year. Table E.11 confirms all the main results, thus attenuating remaining concerns on reverse causality.

Table E.11: Excluding the biggest firms.

	$\ln \text{Price}_{fpct}$	$\ln \text{MU}_{ft}$		$\ln \text{Price}_{fpot}$
	(1)	(2)	(3)	(4)
Sh.Immig_{dt}	0.649**	0.232***	0.489***	0.984***
	(0.305)	(0.070)	(0.305)	(0.262)
Observations	4,804,531	128,986	123,611	2,848,922
Controls	YES	YES	YES	YES
FE	PCT-RT	ST-RT	F-ST-RT	POT-RT
Method	2SLS	2SLS	2SLS	2SLS
K-Paap stat.	255.01	700.00	780.06	309.94
1st-stage coeff.	0.637***	1.057***	1.390***	0.603***
	(0.040)	(0.040)	(0.050)	(0.034)

Notes: Markup estimates in columns (3)-(4) are based on a Cobb-Douglas production function. The sample includes only the firms that both export and import in year t. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficients refer to the endogenous variable (immigrant share). Errors are clustered at the *département*-year level.

E.4 Firm-Level Analysis

This section complements the analysis presented in the main text by modifying the baseline regression models to include the share of immigrant workers employed in the firm. The identification strategy relies on the same instrument presented in Equation (11).[45] I follow Mitaritonna et al. (2017) and start by formalizing the correlation presented in Fact 1 in Section 3 by studying whether firms exposed to a larger supply of immigrant workers in the local labor market are more likely to hire an immigrant worker. I do so by means of the following specification:

$$\text{Hiring}_{ft} = \beta_0 + \beta_1 \text{Sh.Immig}_{dt} + X'_{ft}\Gamma + X'_{dt}\Delta + \theta_f + \theta_{rT} + \theta_{sT} + \varepsilon_{ft} \tag{E.7}$$

On the left-hand side, the variable Hiring_{ft} is a dummy equal to one if the firm goes from zero to a positive number of immigrant workers. The vector of firm-level controls includes the (log) wage bill, (log) productivity and (log) size. The vector of département-level controls X'_{dt} includes the (log) average number of employees and the (log) average total assets. The set of fixed effects includes firm fixed effects, to account for all unobservable firm-level characteristics that might affect the propensity of a firm to hire immigrant workers, and region-by-period and sector-by-period fixed effects, to account for the fact that firms located in different regions and operating in different industries are consistently more (or less) likely to hire immigrant workers. Results are presented in Table E.12. From Table E.12, it emerges that both across and within firms, higher exposure to immigrant workers in the local labor market increases the firm-level probability of hiring at least one immigrant worker. Then, the results in Table E.13 show that the results presented in the main analysis are qualitatively unchanged when I use the share of immigrant workers employed in the firm.

[45] An analogous identification strategy is used in Moriconi et al. (2020).

Table E.12: Firm-Level immigrant employment and local supply of immigrants.

	Hiring$_{ft}$			
	(1)	(2)	(3)	(4)
Sh.Immig$_{dt}$	0.149**	0.182***	0.176***	0.189***
	(0.063)	(0.042)	(0.041)	(0.040)
Observations	97,768	94,645	97,768	94,645
Controls	YES	YES	YES	YES
FE	ST-RT	F-ST-RT	ST-RT	F-ST-RT
Method	2SLS	2SLS	OLS	OLS
K-Paap stat.	506.56	746.79	-	-
1st-stage coeff.	0.981***	1.419***	-	-
	(0.044)	(0.052)	-	-

Notes: The variable Hiring$_{ft}$ is a dummy equal to one if the firm goes from zero to a positive number of immigrant workers. Fixed effects are at the firm and region-by-period and sector-by-period level. The sample includes only the firms that both export and import in year *t*. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficient refers to the endogenous variable (immigrant share). Errors are clustered at the *département* level.

Table E.13: Firm-level immigrant employment.

	$\ln \text{Price}_{fpct}$		$\hat{\lambda}_{fpct}$	$\ln \text{MU}_{ft}$		$\ln \text{Price}_{fpot}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sh.Immig_{ft}	1.315**	-2.845***	1.410***	0.380***	1.471***	0.668*	-2.845***
	(0.465)	(0.358)	(0.507)	(0.113)	(0.160)	(0.346)	(0.340)
Sh.Immig_{ft}*Diff.Dummy_{p}		1.667***					1.212***
		(0.155)					(0.174)
Observations	5,274,268	2,411,355	4,231,235	130,892	125,546	3,064,137	2,432,097
Controls	YES	YES	YES	YES	YES	YES	YES
FE	PCT-RT	FCT-RT	PCT-RT	ST-RT	F-ST-RT	POT-RT	FCT-RT
Method	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
K-Paap stat.	45.45	39.39	45.31	333.90	153.70	80.19	36.71
1st-stage coeff. Sh.Immig_{dt}	0.459***	0.560***	0.452***	0.630***	0.464***	0.501***	0.764***
	(0.068)	(0.065)	(0.067)	(0.034)	(0.037)	(0.056)	(0.090)
1st-stage coeff. Sh.Immig_{dt}*Diff.Dummy_{p}	-	1.495***	-	-	-	-	1.442***
	-	(0.400)	-	-	-	-	(0.429)

Notes: Markup estimates in columns (3)-(4) are based on a Cobb-Douglas production function. The sample includes only the firms that both export and import in year *t*. Firm-level controls include the firm's capital intensity and (log) productivity. *Département*-level controls include the (log) average number of employees and the average skill intensity. First-stage coefficients refer to the endogenous variable (immigrant share). Errors are clustered at the *département*-year level.