EconPol
WORKING PAPER

19
2018

December
Vol. 2

International Competition and Rent Sharing in French Manufacturing: A Firm-Level Analysis

Lionel Nesta and Stefano Schiavo

EUROPE
econPOL
European Network for Economic
and Fiscal Policy Research

headed by

ifo INSTITUTE
Leibniz Institute for Economic Research
at the University of Munich

EconPol WORKING PAPER
A publication of EconPol Europe
European Network of Economic and Fiscal Policy Research

Publisher and distributor: ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 89 9224-0, Telefax +49 89 9224-1462, Email Dolls@ifo.de
Editors: Mathias Dolls, Clemens Fuest

EconPol Europe: www.econpol.eu

International Competition and Rent Sharing in French Manufacturing: A Firm-Level Analysis

Lionel Nesta* Stefano Schiavo†

Abstract

This paper investigates the impact of import competition on rent sharing between firms and employees using a large panel of French manufacturing firms. First, by applying recent advances in the estimation of price-costs margins, we are able to classify each firm into labour- and product-market regimes based on the presence/absence of market power and to estimate the degree of rent sharing among firms and workers. Second, we investigate the hypothesis that import penetration acts as a discipline device on the labour market, reducing workers' bargaining power. We find that competition from OECD countries has a negative effect on bargaining power, whereas imports from low-wage countries have a more muted impact. By providing firm-level evidence for the relationship between international trade and rent sharing, the paper sheds new light on the effect of trade liberalisation on the labour market.

Keywords: firm heterogeneity; import competition; markup; rent sharing; wage bargaining

JEL Classification: F14; F16; J50

The authors blame each other for any remaining mistakes. They thank Mauro Caselli, Michele Cascarano, Sabien Dobbelaere, Nazanin Behzadan, and seminar participants at the University of Verona, the Workshop on Markups and Misallocations (Trento), the 8th Rocky Mountain Empirical Trade Conference (Banff), the XVIII Conference in International Economics (La Rábida, Huelva), the 2016 ISGEP meeting in Pescara, and the XXXI AIEL National Conference (Trento) for useful discussion.

*GREDEG Université Nice Sophia-Antipolis and OFCE SciencesPo. E-mail: lionel.nesta@unice.fr

†University of Trento and OFCE SciencesPo. E-mail: stefano.schiavo@unitn.it

1 Introduction

The recent debate regarding the pros and cons of new trade agreements, exemplified by the US withdrawal from the Trans-Pacific Partnership, the re-negotiation of NAFTA and the difficult ratification of the EU-Canada Free Trade Agreement, has highlighted the existence of widespread concerns about the effects of trade liberalisation on labour markets. This echoes the need to protect domestic workers and jobs from foreign competition, which has been featured prominently in recent electoral campaigns, both in Europe and elsewhere. Hence, understanding how globalisation affects domestic firms and workers represents a crucial question both from academic and policy points of view.

In this paper, we investigate the role of import penetration as a discipline device on the labour market. In particular, we ask whether exposure to foreign competition affects the relative bargaining power between firms and workers. Our focus stems from the recognition that collective bargaining plays a key role in wage determination and in the transmission of firm performance into earnings. Moreover, since the extent to which productivity growth is reflected in wage increases determines the evolution of the labour income share, the analysis of the paper also speaks to the literature that has documented the decline in the share of income accruing to labour in many advanced economies (Karabarbounis & Neiman 2014) and has investigated its possible drivers and effects (e.g., OECD 2012, IMF 2017).[1]

Our analysis takes stock of recent advances in the estimation of market imperfections at the firm level to determine the product and labour market regimes in which firms operate and derive a measure of rent sharing for those firms classified as operating in an efficient bargaining framework.[2] More specifically, we combine the methodology developed by De Loecker & Warzynski (2012) to estimate firm-level productivity and markups with the approach used by Dobbelaere & Mairesse (2013) and Dobbelaere et al. (2015) to classify sectors according to the existence of product and labour market imperfections. Similarly to Dobbelaere & Kiyota (2017), we bring such methodological advances to the level of companies by classifying firms–not sectors–according to various combinations of product and factor market imperfections.

The empirical analysis is based on a large panel of French manufacturing firms between 1995 and 2007. It uncovers significant heterogeneity between companies; thus, industry-level analysis may hide significant differences among firms operating within the same sector. Our main finding is that imports from other OECD countries reduce French

[1] Analyzing the case of Finland, which features one of the largest decreases in the labour share among OECD countries, Böckerman & Maliranta (2012) find that this is indeed mainly due to stagnant wages in the face of substantial labour productivity growth.

[2] In the paper, we use *rent sharing* and *bargaining power* interchangeably even if the two concepts do not necessarily map one-to-one, and the division of the rent between firms and workers may be affected by factors, such as labour market institutions, that are independent of the actual bargaining power of the parties involved in the negotiations.

manufacturing workers' bargaining power, whereas the impact of imports from low-wage countries is more muted.

The rest of the paper is organised as follows. The next section provides a quick overview of recent contributions regarding the effect of import competition on bargaining power. Section 3 illustrates the theoretical setup that lies behind the estimation of the rent sharing parameter, whereas Section 4 describes the data and reports some descriptive statistics regarding the evolution of markups and bargaining power. The paper investigates the key research question in Section 5, namely, whether import penetration reduces workers' bargaining power. Section 6 concludes.

2 Literature Review

The impact of trade on the labour market, income inequality and the fall in the labour share is a long-lasting and important topic both in academic research and in the policy debate (Feenstra 2000). Various policy briefs and reports by international organization such as the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD) express this concern (IMF 2017, OECD 2012, Crozet & Orefice 2017). From an academic viewpoint, greater access to detailed, firm-level data has given rise to a substantial literature investigating the effects of international trade on wages and inequality (Harrison et al. 2011). The results are mixed and show that technical change is at least as important as globalisation in explaining rising inequality and job polarization. One channel through which trade may affect the distribution of income across factors of production is relative bargaining power. If import competition acts as a discipline device on the labour market, it may reduce the share of income accruing to labour.

Recent studies (Helpman et al. 2017) find that trade magnifies within-sector differences among firms, and this is reflected in workers' wages. Indeed, much of the increase in inequality occurs within sector and occupation, and it is driven mainly by between-firm dispersion. Works that use China's WTO accession as the trigger of trade-induced changes tend to support the notion that imports from low-wage countries have a hollowing-of-the-middle effect on labour markets, whereby jobs are increasingly polarised at the bottom and top of the distribution (see for instance Utar 2014, for a study concerning the Danish labour market).

The empirical strategy to unravel unobserved wage bargaining is to start from a structural model of wage determination where firms and workers decide on wages. Such wage determination may depend on a host of factors, such as *inter alia*, rent sharing, wage or employment preferences of unions, and wage elasticity of the labour supply. The reduced form is then applied to sector- and/or firm-level data to reveal such unobserved characteristics. Having then characterised the labour market, the impact of import competition

on wage bargaining is estimated. For example, Dumont et al. (2006) analyze evidence for five European countries during the period of 1994–1998. First, they estimate sector-level bargaining power from firm microdata, and then, they investigate its determinants, particularly focusing on labour composition, R&D intensity, outsourcing practices, market structure and imports from both OECD and emerging economies. Regarding trade variables, the results suggest that only imports from OECD countries have a significant effect on rent sharing.[3] A similar picture emerges from a study regarding the UK performed by Boulhol et al. (2011). The empirical approach is similar: the authors first estimate both markups and bargaining power (by sector, year and firm-size class) and then regress them on a series of covariates, including international competition computed as the share of imports from both industrial and developing countries in total demand. As previously found, only imports from high-income countries seem to matter.

Closer to our approach, Abraham et al. (2009) develop a structural model allowing for imperfections in both the product and labour markets and apply it to Belgian manufacturing firms in the period 1996–2004. Their model assumes that economic integration increases product market competition, thereby reducing firms' price-cost margins and decreasing the size of the rent to share with workers. As a result, workers' bargaining power is reduced. The authors then distinguish between import competition from four country groups, namely, EU-15, new EU members, other OECD countries, and the rest of the world. Their findings suggest that import competition puts pressure on both markups and bargaining power, especially when there is increased competition from low-wage countries. The authors conclude that trade integration is associated with wage moderation, which should then yield a positive effect on employment.

Moreno & Rodriguez (2011) address a similar question by investigating the hypothesis that imports reinforce market discipline on both product and labour markets. Using a small sample of approximately 2,000 Spanish firms over the period 1990–2005, they consider both markups and bargaining power, investigating whether import competition affects both the size of economic rents (measured by Lerner's index) and their distribution between firms and workers. They find a negative effect of import competition on Lerner's index, and show that such an effect is larger for firms that produce final goods. This result is consistent with the idea that imports of final goods compete directly with domestic products, thereby increasing the competition faced by domestic firms. From the point of view of rent sharing, Moreno & Rodriguez (2011) find that bargaining power is lower for producers of final and homogeneous goods.

[3] An interesting extension of the standard theoretical setup that assumes homogeneity among workers is offered by Dumont et al. (2012), who explicitly model bargaining between firms and two types of unions, representing highly skilled and low-skilled workers. The model's implications are then brought to the data using information about Belgian firms. The authors study the determinants of bargaining power at the sectoral level and find that only low-skilled workers are negatively affected by imports from non-OECD countries or offshoring activities.

Although the aforementioned contributions use firm-level data, all assume that markups and bargaining power are homogeneous among the set of observations used in the econometric exercise, i.e., within the same industry.[4]

The distinctive feature of our contribution is that it uses a method that allows for us to produce measures of product and labour market imperfections that vary both across firms and over time. Being able to classify firms into different labour market regimes based on their actual behavior provides us with firm-year measures characterizing the labour market, such as the elasticity of the labour supply with respect to wages and rent sharing. In turn, we are able to mobilise panel data techniques with instrumental variables to evaluate the impact of foreign competition on rent sharing.

Our work concerns firms active in French manufacturing between 1995 and 2007. As such, our analysis complements recent evidence from Carluccio et al. (2015), who use administrative information regarding the existence of firm- and industry-level wage agreements to study the impact of exports and offshoring on French manufacturing wages. Indeed, one could argue that bargaining institutions and bargaining power represent crucial transmission belts linking trade and labour market outcomes. However, empirical evidence regarding how bargaining influences the relationship between trade and wages is scarce due to the lack of precise data concerning bargaining arrangements (OECD 2012). The contribution by Carluccio et al. (2015) is an attempt to view wage determination as a product of bargaining institutions. The authors distinguish between firms for which collective bargain agreements are in place and those for which this is not the case; they find that firms with collective bargaining agreements exhibit higher elasticity of wages with respect to export and offshoring. At the same time, wage gains associated with collective bargaining are similar across worker categories, such that the between-firm dimension of wage inequality is confirmed to matter more than the within-firm component. With a firm-specific, time-varying measure of rent sharing between firms and workers, we are able to move beyond the binary classification used by Carluccio et al. (2015) based on the mere existence of a firm-level wage agreement with the workers.

All in all, our contribution stems from two key aspects. First, based on a structural model of firm profit maximization under imperfect markets, we produce measures of rent sharing. Unlike previous contributions, these unobserved characteristics are both firm-specific and time-varying. Second, the estimated rent-sharing measures are then used to study their sensitivity to measures of foreign competition, distinguishing among various groups of countries, namely, OECD countries, low-wage countries, and China. The next

[4]Interestingly, the contribution by Moreno & Rodriguez (2011) presents a first attempt to estimate markups at the firm level, applying the methodology developed by Roeger (1995) to each firm, amended to allow for labour market imperfections as in Crépon et al. 2005. Moreno & Rodriguez (2011) run firm-specific regressions that have between 9 and 15 observations each for a subsample of 885 firms. Yet, they do not relax the assumption that such market imperfections are constant for all observations used in the analysis.

section presents the structural model underlying the reduced form used in Section 5.

3 Market Imperfections

3.1 Modeling joint market imperfections

Similar to Dobbelaere & Kiyota (2017), we develop a production-function-based approach to measure firm-year specific market imperfections.[5] Let Q be the firm output as follows: $Q_{it} = Q_{it}(K_{it}, L_{it}, M_{it})$, where the subscripts i and t stand for firm i at time t, K is capital, and L and M represent labour and materials, respectively. The capital K is assumed to be dynamic, whereas all remaining production factors are static. In this framework, we assume the following: (i) $Q(\cdot)$ is twice differentiable and continuous, (ii) firms produce homogeneous goods by industry and compete in quantities as in an oligopolistic Cournot setting, (iii) firms are price takers on the market for materials M, (iv) the competitive regime characterizing the labour market is firm-specific, and (v) firms maximise short-run profits π. The short-run profit maximization problem reads

$$\pi_{it}(Q_{it}, L_{it}, M_{it}) = P_t Q_{it} - w_{it} L_{it} - p_{it}^M M_{it} \tag{1}$$

The maximization of eq. (1) with respect to Q yields the following first-order condition:

$$\frac{P_t}{(C_Q)_{it}} = \left(1 + \frac{s_{it}}{\epsilon_t}\right)^{-1} = \mu_{it} \tag{2}$$

where $(C_Q)_{it}$ represents the marginal costs ($\frac{\partial C}{\partial Q} = w\frac{\partial L}{\partial Q} + p^M \frac{\partial M}{\partial Q}$), s_{it} represents firm i's market share, and ϵ represents the price elasticity of demand. The parameter μ represents the price cost margin (markup).

Since firms are price takers on the market for materials, their optimal input choice for M_{it} satisfies the first-order condition $\frac{\partial \pi_{it}}{\partial M_{it}}$:

$$p_{it}^M = (Q_M)_{it}\, P_t \left(1 + \frac{s_{it}}{\epsilon_t}\right) \tag{3}$$

The term on the left-hand side of eq. (3) represents the marginal cost of material, which must be equal to the right-hand term, the marginal revenue, that is, the marginal output of materials $\frac{\partial Q_{it}}{\partial M_{it}} = (Q_M)_{it}$ multiplied by the non-competitive price $P_t \left(1 + \frac{s_{it}}{\eta_t}\right)$. Inserting eq. (2) into eq. (3), multiplying both sides by $\frac{M_{it}}{Q_{it}}$ and rearranging terms yields

$$\mu_{it} = \frac{\theta_{it}^M}{\alpha_{it}^M} \tag{4}$$

[5] The methodology that we use is based on Dobbelaere & Mairesse (2013) and Dobbelaere et al. (2015), and its presentation draws heavily on Dobbelaere & Kiyota (2017).

where the numerator $\theta_{it}^M = \frac{\partial Q_{it}(M_{it})}{\partial M_{it}} \frac{M_{it}}{Q_{it}}$ represents the output elasticity of materials M_{it} and the denominator $\alpha_{it}^M = \frac{p_{it}^M M_{it}}{P_t Q_{it}}$ is the share of materials M_{it} in total revenues. If the product and factor markets are perfect, the price-to-marginal-cost ratio equals unity. Conversely, if only the product market is imperfect, then $\frac{\theta_{it}^M}{\alpha_{it}^M} \neq 1$.

A firm's optimal demand for labour depends on the regime of its labour market. Dobbelaere & Mairesse (2013) distinguish among three regimes: perfect-competition or right-to-manage bargaining (PR), efficient bargaining (EB), and static partial-equilibrium monopsony power (MO).

Under the PR regime, firms and workers behave as price takers on the labour market. As in the market for materials, the firm's short-run maximization problem leads to the following equality:

$$\mu_{it} = \frac{\theta_{it}^L}{\alpha_{it}^L} \tag{5}$$

where the numerator θ_{it}^L represents the output elasticity of labour L_{it} and the denominator α_{it}^L is the labour share L_{it} of total revenues.

An important implication is that if all factor markets are perfect, the markup derived from materials must yield the same value as the markup derived from labour: $\frac{\theta_{it}^L}{\alpha_{it}^L} = \frac{\theta_{it}^M}{\alpha_{it}^M}$. However, imperfections in the labour market will yield $\frac{\theta_{it}^L}{\alpha_{it}^L} \neq \frac{\theta_{it}^M}{\alpha_{it}^M}$. Hence, under assumptions (iii) and (iv), the wedge between the two ratios will be used to infer the existence of labour market imperfections.

Under efficient bargaining EB, risk-neutral firms and workers negotiate simultaneously over the wage w and employment L in order to maximise their joint surplus. Following McDonald & Solow (1981) and leaving out subscripts i and t for clarity, the generalised product is written as

$$\Omega_{EB} = \Big[wL + (\bar{L} - L)\bar{w} - \bar{w}\bar{L}\Big]^{\phi} \Big[PQ - wL - p^M M\Big]^{1-\phi} \tag{6}$$

where $\bar{w}$ and $\bar{L}$ are the competitive levels of wages and employment ($0 < L < \bar{L}$), respectively, and ϕ is the degree of bargaining power of the trade unions (the workers) during the yearly negotiations, also called the absolute extent of rent sharing. The maximization of eq. (6) with respect to w and L leads to the following equality (see Appendix A for details):

$$\theta^L = \mu\Big(\alpha^L - \gamma(1 - \alpha^L - \alpha^M)\Big) \tag{7}$$

where $\gamma = \frac{\phi}{1-\phi}$. An important implication of eq. (7) is that provided that we can measure the output elasticities of labour θ^L and materials θ^M, together with their shares in total revenues α^L and α^M, it is then possible to retrieve a measure of γ and thereby a measure of the unions' bargaining power ϕ that is firm-year specific. ϕ represents the main dependent

variable in the empirical analysis described in Section 5.

Under monopsony power MO, labour supply may be less than perfectly elastic and increasing in the wage w. Such elasticity may stem from various factors, such as idiosyncratic heterogenous preferences of workers regarding their professional environment, implying that workers view firms as imperfect substitutes. Under MO, firms act as price makers and are constrained to set a single wage that applies to all workers. The monopsonist firm's maximization program leads to the following equality:

$$\frac{\theta^L}{\alpha^L} = \mu\Big(1 + \frac{1}{\epsilon_w^L}\Big) \tag{8}$$

where ϵ_w^L represent the wage elasticity of the labour supply. Eq. (8) implies that the ratio of the output elasticity of labour θ_L to the labour share of total sales must be equal to the firm's markup on the product market μ augmented by its monopsony power on the labour market $\frac{1}{\epsilon_w^L}$. Eq. (8) implies that knowing θ^L and α^L, it is possible to estimate the wage elasticity of the labour supply.

Taking stock of the above, the theoretical setup allows for us to characterise imperfections in the product and labour markets. The strongest working assumption is to assume that on the market for intermediate inputs, firms are price takers. If the assumption holds, the wedge between the output elasticity of material (θ^M) and the share of materials in revenue (α^M) is due to imperfections in the product market. In other words, the ratio $\frac{\theta^M}{\alpha^M}$ provides information about the price-marginal cost ratio, i.e., about the unobservable markups.

Now, if only the product market is imperfect, but the two factor markets are perfectly competitive, then we should observe strictly the same value for the computed markups on labour and materials ($\mu^L = \mu^M$). Any wedge between the two ratios $\frac{\theta^M}{\alpha^M}$ and $\frac{\theta^L}{\alpha^L}$ thus provides us with information about the degree of imperfection in the labour market. In particular, Dobbelaere & Mairesse (2013) define a parameter $\psi_{it} = \frac{\theta_{it}^M}{\alpha_{it}^M} - \frac{\theta_{it}^L}{\alpha_{it}^L}$, whose sign provides us with information about the presence of labour market imperfections:

1. *Efficient bargaining* (EB, $\psi > 0$). Firms and risk-neutral workers bargain over wages and employment level. It is straightforward to show that $\psi = \mu\gamma\Big[\frac{1-\alpha^L-\alpha^M}{\alpha^L}\Big]$

2. *Perfect competition - Right-to-manage* (PR, $\psi = 0$). The labour market operates under perfect competition.

3. *Monopsony* (MO, $\psi < 0$). Firms enjoy *monopsony* power and set wages by choosing the number of employees, in which case $\psi = -\mu\frac{1}{\epsilon_w^L}$

Based on the joint market imperfection parameter ψ, Dobbelaere & Mairesse (2013) identify six different regimes–each being a combination of the types of competition in both

the product and labour markets–in which they classify each industry. Table (1) presents the various combinations of joint market imperfections. In the rest of the paper, we bring the same logic to the level of the firm and classify each firm-year observation in one of the six regimes.

[Table 1 about here.]

3.2 Estimating joint market imperfections

To compute the markup μ_{it}, we need to compute both θ_{it}^X and α_{it}^X, with $(X = L, M)$, per firm and per time period. Although computing α_{it}^X is straightforward, the estimation of θ_{it}^X is more demanding.

A key choice involves the functional form of $Q(\cdot)$. The most common candidate is the Cobb-Douglas framework. This functional form would yield an estimate of the output elasticity of labour that would be common to the set of firms to which the estimation pertains: $\hat{\theta}_{it}^L = \hat{\theta}^L$. It follows that any heterogeneity in firm markups would simply reflect heterogeneity in the revenue share of, say, labour: $\mu_{it}^L = \frac{\theta^L}{\alpha_{it}^L}$. Therefore, we opt for a translog production function because it features heterogeneity in factor elasticities and thus yields markups whose distribution is not fully determined by heterogeneity in the revenue share of labour.

To obtain consistent estimates of the output elasticity of labour θ_{it}^L, we restrict our attention to production functions with a scalar Hicks-neutral productivity term and with technology parameters that are common across firms. Thus, we have the following expression for the production function:

$$Q_{it} = F(K_{it}, L_{it}, M_{it}; \mathbf{B}), \tag{9}$$

where $\mathbf{B}$ is a set of technology parameters to be estimated. The translog production function reads as

$$\begin{aligned} q_{it} = {} & \beta_K k_{it} + \beta_L l_{it} + \beta_M m_{it} \\ & + \beta_{KL} k_{it} l_{it} + \beta_{KM} k_{it} m_{it} + \beta_{LM} l_{it} m_{it} \\ & + \beta_{KK} k^2 + \beta_{LL} l^2 + \beta_{MM} m^2 + \omega_{it} + \varepsilon_{it} \end{aligned} \tag{10}$$

where smaller cases indicate the log transform, ω is a measure of the productivity, and ϵ is true noise.[6]

[6]Note that we recover the Cobb-Douglas (CD) production function in logs when omitting higher-order terms ($\beta_{KK} k^2, \beta_{LL} l^2, \beta_{MM} m^2$) and the interaction terms.

The proper estimation of vector **B** is complicated by the correlation of variable inputs L and M with the productivity term ω_{it}, which is known by the entrepreneur but not by the econometrician. The resulting endogeneity of inputs would yield inconsistent estimates for the coefficients in **B**. To overcome the problem of endogeneity, we use the control function approach originally developed by Olley & Pakes (1996) and extended by Levinsohn & Petrin (2003) and Ackerberg et al. (2015). Among the different estimators that are available, we follow the procedure derived by Wooldridge (2009) and implemented by Petrin & Levinsohn (2012). This approach uses intermediate inputs to control for unobserved productivity shocks (as in Levinsohn & Petrin 2003) and addresses potential endogeneity by introducing lagged values of specific inputs as proxies for productivity. Moreover, this estimator does not assume constant returns to scale, it is robust to the Ackerberg et al. (2015) criticism of the Levinsohn & Petrin (2003) methodology (related to the proper identification of the parameters in the first stage of the estimation), and it has been routinely applied in the empirical literature to estimate production functions (e.g., De Loecker et al. 2016).

We assume that productivity is a function of a second-order polynomial in the logarithms of lagged capital and materials. In addition, following De Loecker (2013), we include in the productivity process a dummy for export status to control for the potential effects of international trade on productivity.

4 Data and Descriptive Statistics

We use data regarding a panel of French firms covering the period of 1994–2007. Information comes from an annual survey of companies (EAE) led by the statistical department of the French Ministry of Industry. The survey covers all French firms with at least 20 employees in the manufacturing sectors (excluding food and beverages). The EAE data provide information about the income statement and the balance sheet, from which we retrieve data regarding sales (corrected for stock variations), value added, labour costs, number of employees, capital stock, and intermediate inputs. Appendix B provides more information about the data and the series of deflators used in the analysis.

The EAE also reports some details about the different activities performed by firms; more specifically, it provides us with a list of the 4-digit code of activities in which each firm is active, together with the corresponding number of employees, sales and exports. We use this information to derive the relative importance of each activity within the firm, and by linking these weights to data on imports retrieved from the BACI dataset maintained by CEPII (Gaulier & Zignago 2010), we obtain a firm-specific measure of competition from low-wage countries, from China, and from OECD members. In this manner, we can exploit firm-specific heterogeneity in import competition, which would otherwise be masked by the use of sector-level measures of imports.

Low-wage countries are defined following Bernard et al. (2006): a country is classified as low-wage if its per capita GDP is less than 5% of the US value; our import competition measure is the ratio of French imports (from any specific country or group of countries) to apparent consumption in the same sector, i.e., total sales plus imports minus exports. Since trade data are reported according to the HS classification, whereas the EAE is based on the French industrial classification system (NAF), we developed a concordance between HS and NAF codes.

[Table 2 about here.]

Table (2) presents the factor shares in total sales of labour L and materials M. It also reports the results of the Wooldridge (2009) industry-specific estimation for both the translog and the Cobb-Douglas estimations, for all manufacturing and by industry. The sample contains more than 180,000 observations pertaining to more 21,526 manufacturing firms with at least 20 employees. The factor shares conform to the usual manufacturing characteristic that materials represent most of the costs (61% of total sales for all manufacturing), whereas labour costs represent on average one-third of the total sales (33% for all manufacturing). The translog factor elasticities θ^M and θ^L amount to .630 and .268, respectively. The overall manufacturing firms operate near constant returns to scale $\lambda = .967$, although λ appears to be significantly below unity. Taking average shares α^M and α^L, it immediately follows that there are, on average, product markups above unity μ^M and that the dominant labour regime should be efficient bargaining.

These preliminary remarks should not conceal the fact that there is substantial heterogeneity across industries in the parameter estimates. The capital output elasticities θ^K are negative in *Electric and electronic equipment* and in *Printing and publishing*. Concerning the functional form of the production function, the Cobb-Douglas estimates corroborate our preliminary remarks. One major difference is that under a Cobb-Douglas setting, returns to scale are systematically less than those of the translog specification, except in *Pharmaceuticals* and in *Printing and publishing*.

Having obtained firm-year specific output elasticities, we can now compute the various parameters characterizing product and labour market imperfections. Table (3) reports the average values of the price markup μ, parameters ψ and γ, rent sharing ϕ and elasticity of labour supply with respect to wages ϵ_w^L. Because ϕ is computed exclusively for firms belonging to the efficient bargaining regime and ϵ_w^L is computed only for firms belonging to the monopsony regime, the observations underlying the two statistics do not overlap. Focusing on the translog estimates, the markup across all industries and over the time period is 11%, a value that is similar in magnitude to that reported by Bellone et al. (2016), which amounts to 14.8%. The computed markups are significantly smaller, however, than the average of 29% provided by Dobbelaere et al. (2015) for French companies.[7] Not

[7] Although the data source is the same (EAE), the difference comes from essentially two effects. First,

surprisingly, economic markups are also of a smaller magnitude than accounting markups (measured as the ratio of operating income to value added), whose average values is 23%. Finally, the overall computed means conceal substantial cross-industry heterogeneity. For example, sectors such as *Automobile*, *Metallurgy*, *Mineral industries* and *Textile* seem to operate in very competitive markets, whereas sectors such as *Electronics* enjoy significant markups.

Turning to labour market imperfections, a positive ψ parameter implies that, on average, labour markets operate under the efficient bargaining regime. We observe that the absolute extent of rent sharing ϕ amounts to 0.553. Hence, under EB, profits are shared almost equally between shareholders and workers, with the latter obtaining 55% of the overall profit.[8] The elasticity of the labour supply with respect to wages ϵ_w^L reaches 3.7, implying that a one-percent increase in wages entails a 3.7-percent increase in labour supply. Table (3) exhibits substantial cross-industry variations in both ϕ and ϵ_w^L. The Cobb-Douglas estimates produce a higher level of rent sharing for workers and a lower elasticity of labour supply.

[Table 3 about here.]

To classify each firm-year observation into a specific regime, we proceed as follows. Let $\mu^L = \frac{\theta^L}{\alpha^L}$. First, we compute the confidence intervals (CI) at the 90% level for each firm-level measure of μ^M and μ^L in a classical fashion ($\mu_{it}^X < \hat{\mu}_{it}^X \pm z \times \sigma_{\mu_X,it}$), where X stands for either M or L, $z = 1.64$, and $\sigma_{\mu_X,it}$ is given by

$$(\sigma_{\mu_X,it})^2 = (\alpha_{it}^X)^{-2} \cdot \left[\sum_w w_{it}^2 \cdot (\sigma_x)^2 + 2 \cdot \sum_{x,z,x \neq z} x_{it} \cdot z_{it} \cdot cov_{xz} \right] \tag{11}$$

where $w = \{1, l, k, lk\}$ and $x, z = \{m, lm, mk\}$ when $X = M$, and $w = \{1, m, k, mk\}$ and $x, z = \{l, lm, lk\}$ when $X = L$, where lower cases denote the log transformed variables of capital K, labour L and materials M. Second, and consistent with the above classification, a comparison of the two confidence intervals allows for us to classify the labour market in which each firm operates:

1. EB: *Efficient bargaining*. If the lower bound of the 90% CI μ_{it}^M exceeds the upper bound of the 90% CI for μ_{it}^L, then μ_{it}^M is significantly greater than μ_{it}^L: $\mu_{it}^M > \mu_{it}^L \Rightarrow \psi_{it} > 0$ at the 90% confidence level.

the time periods considered are different: 1986 to 2001 for Dobbelaere et al. (2015) and 1995 to 2007 in our case. The former period includes years before the establishment of the single market in 1993, which has had a significant pro-competition effect, driving down markups significantly (see Bellone et al. 2009). Second, we use the WLP estimator, whereas Dobbelaere et al. (2015) rely on system GMM estimators developed by Blundell & Bond (1998).

[8] This ratio is greater than the one found in Dobbelaere et al. (2015) for France, reaching 0.423.

2. PR: *Perfect competition – right-to-manage.* If the two confidence intervals overlap, then μ_{it}^M is not significantly different from μ_{it}^L: $\mu_{it}^M = \mu_{it}^L \Rightarrow \psi_{it} = 0$ at the 90% confidence level.

3. MO: *Monopsony.* If the lower bound of the 90% CI μ_{it}^L exceeds the upper bound of the 90% CI for μ_{it}^M, then μ_{it}^M is significantly less than μ_{it}^L: $\mu_{it}^M < \mu_{it}^L \Rightarrow \psi_{it} < 0$ at the 90% confidence level.

Classifying firms as operating under perfect or imperfect product markets is now straightforward. Using the confidence interval for μ^M, firms are coined as operating in perfect markets if the lower bound of the 90% CI is below unity. Based on eq. (11), Table (4) presents the distribution of firm-year observations across the six regimes.

[Table 4 about here.]

We see that there is substantial heterogeneity both across and within different sectors. Considering the whole economy, approximately 41% of firm-year observations operate under imperfect competition in the product market, implying price-to-marginal cost ratios significantly greater than unity. This fraction varies from a lower bound of 1% for *Textiles* to a higher bound of almost 100% for *Electric and electronic equipment* and *Printing and publishing*. As for the labour market, efficient bargaining represents nearly 54% of firm-year observations, followed by right to manage (37%). Firms that enjoy monopsony power on the labour market represent less than 10% of observations. The single most common joint regime is the IC-EB combination, whereby firms enjoy some degree of market power on the product market, and this extra rent is shared with workers. This regime accounts for 36% of the sample, closely followed by perfect competition in both markets (the PC-PR regime, amounting to 34%).

It is worth noting that the relatively large standard errors associated with the fixed-effects IV estimations of the translog production function result in wide confidence intervals for the the markups μ and the joint market imperfection parameter Ψ. This tends to inflate participation in the PC-PR regime. In fact, unreported OLS results characterised by lower standard errors–albeit plagued by a possible endogeneity bias–produce a significantly smaller faction of firms operating under perfect competition in both markets.

Table (4) also suggests the presence of widespread variations within each sector. In fact, whereas in most of the sectors, it is possible to identify a prominent regime, in several cases, there is at least a second, and often a third, relevant regime that covers a significant fraction of firm-year observations. For instance, 57% of observations within *Clothing and footwear* are classified as PC-PR, whereas 17% belong to the IC-EB regime and another 19% to PC-EB. Likewise, in *Metallurgy, iron and steel*, the most common regime (PC-PR) covers 45% of observations, 32% are classified as PC-EB, and 15% are classified as PC-MO. Hence, characterizing all firms within a sector as belonging to the same regime

(as customarily done in the empirical literature so far) would imply a significant loss of information and conceal substantial heterogeneity across firms operating in the same sector.

[Figure 1 about here.]

Finally, Figure (1) displays the the evolution of rent sharing $\hat{\phi}$ (top panel), price cost margins $\hat{\mu}$ (middle panel) and total factor productivity $\hat{\omega}$ (bottom panel) over the sample period. Solid lines indicate arithmetic averages, and dashed lines denote weighted averages using employment shares for $\hat{\phi}$ and market shares for $\hat{\phi}$ and $\hat{\mu}$. Concerning rent sharing $\hat{\phi}$, we observe a sharp change in the early 2000s. This must reflect the business cycle, when the burst of the dot-com bubble resulted in a slowdown of economic growth, mechanically increasing the labour share in sales. The weighted average is less than the arithmetic mean, implying that bigger firms redistribute less of their rent to workers. In the same vein, the evolution of markups exhibits an upward trend when focusing on the arithmetic mean but is lower and dynamically flatter for the weighted average. This is in line with the findings of De Loecker & Eeckhout (2017), although this contradicts various models of imperfect competition, in which firms with larger market shares have higher markups. Finally, the productivity trend is positive for both the unweighted and weighted means. The fact that the weighted average exceeds the unweighted mean is due to the fact that more-productive firms enjoy larger market shares. This implies the presence of allocative efficiency (Olley & Pakes 1996), the idea that the market selects the more efficient companies. Finally, the bottom panel of Figure (1) shows a positive evolution of total factor productivity, which grows by approximately 5–7% over the sample period.

[Table 5 about here.]

In Table 5, we present the dynamic decomposition of bargaining power based on the methodology put forward by Melitz & Polanec (2015). The latter decomposes the variation in the weighted average value of ϕ–where weights are employment shares–into four components: (i) the *within* component, measuring the change in the unweighted average of ϕ for firms that are present over the whole period of analysis; (ii) the *between* component, capturing the extent to which firms with ϕ above (resp. below) average increase (resp. decrease) their employment share; (iii) firm entry, whose contribution is positive (negative) if entrants have higher (lower) than the average value of ϕ for incumbents; and (iv) firm exit, whose contribution is positive (negative) if exiting firms have lower (higher) than the average value of ϕ for incumbents.[9]

[9]More precisely, the decomposition reads as follows: $\Delta\phi = \Delta\bar{\phi} + \Delta cov_S + s_{E2}(\phi_{E2} - \phi_{S2}) + s_{X1}(\phi_{S1} - \phi_{X1})$, where $\Delta\phi$ represents the change in the weighted average rent sharing between the initial and the final year of the period, the first term on the right-hand side represents the unweighted average of rent sharing ϕ for surviving companies, the second term represents the change in rent sharing that is driven by the correlation between ϕ and the employments share of firms surviving over the period, and the third and fourth terms represent the contributions of entrants and exiting firms, respectively.

The analysis is performed both for the entire sample period (1995–2007) and for the two sub-periods that emerge from the top panel of Figure 1, namely, 1995–2000, in which bargaining power decreases sharply, and 2000–2007, in which instead it rebounds and substantially increases. The results indicate that the within component always yields a positive contribution to the variation in rent sharing. In particular, when workers' bargaining power increases (as in the period of 2000–2007), this is mainly due to within-firm variations, i.e., re-negotiations within the group of firms that continue operating. On the other hand, firm exit always yields a negative effect on ϕ, meaning that firms that drop out of the sample feature, on average, a higher share of the rent accruing to workers. The opposite holds for entrants: in these firms, workers typically enjoy lower bargaining power relative to incumbent firms, and this is true in all periods under consideration.

5 Rent Sharing and International Trade

5.1 Econometric Setting

We now focus on the estimation of the effect of international competition on rent sharing. Our intuition is that foreign competition may act as a discipline device in the labour market, encouraging firms to retain part of the rent–for example, in order to invest in new production tools–at the expense of wages. This in turn would reduce rent sharing as defined in this paper.

The choice to focus on rent sharing implies that we only consider firms operating in the efficient bargaining labour market regime. Unlike previous work, in which all firms are assumed to engage in rent sharing (e.g. Crépon et al. 2005, Abraham et al. 2009, Boulhol et al. 2011, Dumont et al. 2012), the methodology illustrated in Section **??** allows for us to identify firms that do so and to distinguish them from others, who are either price takers on the labour market or enjoy some degree of monopsony power. Moreover, working with a continuous measure of rent sharing implies that we are able to move beyond the binary classification used by Carluccio et al. (2015), who distinguish between firms for which collective bargain agreements are in place and those for which this is not the case.

However, this more precise identification of the relevant firms to analyze comes at a potential cost: since the measures of market imperfections that stand behind the classification into different regimes are firm-year-specific, it is possible that our estimation produces labour-market regimes that change frequently from one year to the next. From an economic point of view, this should not be the case, simply because firms need to be able to ensure the workers' collabouration in the long run. From an econometric viewpoint, the danger is to select observations randomly interrupting the time series of companies. Table (6) presents the short- (from $t-1$ to t), middle- (from year $t-5$ to year t) and long-run (from year $t-10$ to year t) transition matrices across the three labour-market

regimes, EB, PR and MO. Focusing on all panels, we observe that the diagonal elements of the matrix dominate all matrices, implying that firms tend to remain in the same regime: 90% of firms remain in EB from one year to the following, 86% from year $t-5$ to year t and a substantial 84% from year $t-10$ to year t. Hence, when focusing on rent sharing exclusively, we are essentially selecting panels (i.e., firms), not observations.

[Table 6 about here.]

Our baseline regression model reads as

$$\hat{\phi_{it}} = \beta_0 + \beta_1 IMP_{it-\tau} + \mathbf{BX} + \nu_i + \rho_t + e_{it}, \tag{12}$$

where subscripts i and t stand for firm i at year t. Parameters ν and ρ represent the firm and year fixed effects to account for idiosyncratic differences across firms in their relationship with workers and for temporal shocks common to all companies in the sample. Variable IMP_{it} is import penetration. It is firm-year-specific because we make use of firm sales by industry at the four-digit level:

$$IMP_{it} = \sum_k \left(\frac{S^d_{ikt_0}}{S^d_{it_0}} \cdot \frac{M^o_{kt}}{Y_{kt} - X_{kt} + M_{kt}} \right) \tag{13}$$

where k identifies all the different industrial sectors in which firm i is active, $S^d_{ikt_0}$ represents their individual domestic sales in 1994 (the year before our analysis starts, or in the first year in which the firm enters the sample), $S^d_{it_0}$ are the total domestic sales of firm i in the same year (across all sectors), M^o_{kt} denotes imports in sector k at time t from origin country o, and the denominator corresponds to domestic absorption, i.e., total production minus exports plus imports ($Y_{kt} - X_{kt} + M_{kt}$). Hence, the import competition measure features a firm-level heterogeneity that comes from the portfolio of activities of each firm (defined before the analysis starts), whereas its variation over time depends on industry-level import penetration. Two further remarks are worth making here. First, one could argue that lumping together imports of intermediate and final goods may provide an inaccurate picture of foreign competition. Importing intermediate goods may actually be beneficial to French firms since they can source inputs at lower prices. Hence, we only consider final goods (as identified in the BEC classification, plus passenger cars) in our measure of imports, even if this may imply that we are missing the impact of foreign competition on French producers of intermediate inputs. Second, in equation (12), we set parameter $\tau = (0; 1; 3)$ to estimate the impact of import penetration at three different lags to account for inter-temporal adjustments by firms in their labour relations.

Vector $\mathbf{X}$ contains a series of control variables. First, we include total factor productivity ω, defined as the translog residual. We also control for size, defined as the number of employees. We introduce two variables characterizing the tightness of the local labour

market, which are employment growth at the level of the employment area and a measure of firm's relative size, that is, the share of employees working for firm i in the employment area, and we expect their effects on rent sharing to be positive and negative, respectively. Finally, we introduce a measure of capital intensity to control for the production technology, hypothesizing that workers in more capital-intensive companies have less bargaining power. Tables (7) and (8) present the summary statistics together with the correlation matrix of the 55,524 observations representing firms operating under the EB regime.

[Table 7 about here.]

[Table 8 about here.]

The estimation of eq. (12) raises three difficulties. The first challenge is that of selection bias. Whereas we only observe $\hat{\phi}$ for companies operating under the EB regime, we can expect such selection not to be random.

The second challenge is the potential endogeneity of imports. Following a common strategy in the recent literature (see, for instance, Autor et al. 2013, Hummels et al. 2014, Ashournia et al. 2014), we instrument import competition to account for a possible omitted variable bias stemming from factors that simultaneously affect both French imports and a firm's bargaining power vis-a-vis its workers. In eq. (13), French imports from origin o in any given 4-digit sector k are substituted with country o exports to all other counties except France.[10]

To simultaneously address the issues of endogeneity and selection in a panel data setting, we follow Semykina & Wooldridge (2010) and adapt their methodology to a case of an unbalanced panel. Their approach entails a first step where, for each time t, a probit model in which time means of all endogenous variables are included (à la Mundlak 1978) is estimated.[11] Form the results of the probit model, we retrieve the inverse Mill's ratio (IMR). The second step in the Semykina & Wooldridge's (2010) procedure requires estimation of a fixed-effect two-stage least squares model augmented with the inverse Mill's ratio (FE-2SLS). A standard t-test on the coefficient of the IMR can be used to test for selection bias: if the IMR is not significant, then there is no selection bias and the FE-2SLS is consistent. Otherwise, Semykina & Wooldridge (2010) show that a pooled-OLS augmented with the time means of all exogenous variables following Mundlak (1978) delivers consistent results, as long as the time means are computed on the entire sample, not only on the "selected observations" (in our case, firms classified under the EB regime). Semykina & Wooldridge (2010) also suggest an alternative specification whereby the IMR

[10] Similar results are obtained using a limited number of non-EU countries, as done by Dauth et al. (2014).

[11] In the selection equation, we augment the right-hand side of eq. (12) with (the log of) average variable production costs and a measure of product market concentration (the Herfindhal-Hirschmann index at the industry level).

is interacted with time dummies in order to allow for a richer (time-varying) correlation structure. Standard errors can then either be adjusted analytically or obtained by means of block-bootstrapping; we adopt this second route because it allows for us to address a third econometric concern.

The third econometric challenge lies in the fact that we do not directly observe some of the variables. In particular, the variable on the left-hand side is an estimate of rent sharing $\hat{\phi}$. As argued by Ashraf & Galor (2013), a least squares estimator would yield inconsistent standard errors because it fails to account for the presence of a generated dependent variable. This causes incorrect inferences in favor of rejecting the null hypothesis. To overcome this issue, we rely on a two-step block-bootstrapping algorithm to estimate the standard errors.[12] A random sample of firms (not observations) is drawn with replacement from the original dataset (181,901 observations). The Wooldridge (2009) estimator of the translog production function is then applied on the block-bootstrapped sample, allowing for us to compute a new measure of rent sharing ($\hat{\phi}$) for the companies that are originally classified under EB, in addition to a new measure of productivity ($\hat{\omega}$). Eq. (12) is then estimated on firms belonging to the EB regime. The process is performed 1,000 times, and the standard deviations of the estimated coefficients represent the bootstrap standard errors. Block-bootstrapping allows for us to hit two birds with one stone, as it also yields corrected standard errors in presence of selection and endogeneity (Semykina & Wooldridge 2010).

Altogether, we report three sets of results: the fixed-effects two-stage estimator (FE-2SLS), the Semykina & Wooldridge (2010) estimator (SW-POOL-1) and the Semykina & Wooldridge (2010) estimator with the IMR interacted with time dummies (SW-POOL-2).

5.2 Results

Table (9) reports the results from a specification that includes imports of consumption goods from all countries in the world (lagged one year). For each specification, we run the three estimators, FE-2SLS, SW-POOL-1 and SW-POOL-2, on 1,000 bootstrapped samples to estimate the simulated standard errors. As a general comment, the strong significance of the inverse Mill's ratio in the FE-2SLS estimation suggests that selection into the efficient bargaining regime is indeed not random: hence, the FE-2SLS estimator is not consistent, and we should primarily rely on the pooled OLS estimator.

We find a negative relationship between total imports of consumption goods and rent sharing in all three specifications. However, significance is found only for the FE-2SLS specification, whereas the Semykina & Wooldridge (2010) estimator substantially inflates

[12] Lewis & Linzer (2005) advocate the use of feasible generalised least squares to compute an estimate of the variance of the estimated variable. Although we did rely on the FGLS estimator, this solution proved unfeasible due to the fact the estimated variance is negative. This is a common pitfall of the proposed method.

the standard errors, leading us to reject the hypothesis that foreign competition significantly affects workers' bargaining power.

[Table 9 about here.]

We now turn to the other control variables. The features of the local employment area behave as expected when significant: employment growth increases workers' bargaining power across all estimators, whereas the firm's share of employment in the local labour markets lowers ϕ (FE-2SLS estimator) or has no significant effect. Capital intensity conforms to our intuition: more capital-intensive companies are less exposed to workers' bargaining power. Moreover, workers in larger firms do not seem to enjoy higher bargaining power. Although the sign is positive, lack of significance indicates that the effect of size on bargaining power is not very strong. This comes as a surprise, since data about unionization in France indicate that the share of workers belonging to a union is strongly correlated with size, being as low as 5% within small private firms with less than 50 employees, whereas it reaches 14.4% among large enterprises with more than 200 employees (Pignoni 2016). Finally, higher productivity is associated with a lower degree of rent sharing.[13] This is consistent with the evidence regarding the fall in the labour share, which is ultimately determined by wage growth falling short of productivity gains.

To further investigate the potential impact of import penetration on bargaining power, we take stock of the existing literature, which has suggested that such an effect may depend on the countries from which imports are sourced.

To explore the heterogeneous effect of imports on French workers, in Table (10), we introduce two additional specifications: the first distinguishes between imports from OECD and low-wage countries (lagged one year); the second singles out imports from China (as opposed to imports from other low-wage countries and OECD members) to check whether such country has a specific effect on workers' bargaining power. Since other regressors behave consistently with the results noted in Table (9), we focus exclusively on the import penetration variables.

Looking at the left panel first, we observe a negative relationship between import penetration from OECD countries and rent sharing, which is consistent across the three different estimators. On the contrary, competition from low-wage countries does not seem to have a significant impact on workers' bargaining power. One possible explanation is that French firms whose competitors are mainly located in other OECD countries are likely to confront with imported goods featuring similar levels of quality and technology and produced with similar cost structures. As a result, it is more difficult to escape competition by upgrading quality, and containing (labour) costs becomes imperative. Conversely,

[13] This negative effect does not stem from a mechanical algebraic relationship between ω and ϕ. In fact, it can be shown that $\frac{\partial \omega}{\partial \theta^X} < 0$, with $X = (K, L, M)$, whereas $\frac{\partial \phi}{\partial \theta^L} < 0$ and $\frac{\partial \phi}{\partial \theta^M} > 0$. We conclude that the direction of the relationship between productivity and bargaining power is undetermined: $\frac{\partial \omega}{\partial \phi} \lessgtr 0$.

consumption goods imported from low-wage countries are likely to target a lower-quality segment of the market and not to be in direct competition with French production.

Hence, our results confirm that import penetration has a differential effect based on where competition comes from: the negative effect of imports from OECD countries on bargaining power is in line with the existing (sector-level) evidence presented, for instance, by Dumont et al. (2006) or Boulhol et al. (2011).

The absence of any effect of competition stemming from low-wage countries is somewhat surprising. One would expect firms to respond to price competition by lowering their production costs, including wages. Additionally, workers' and unions' fear about the impact of import competition on jobs may put downward pressure on rent sharing. Yet, an alternative explanation could be that firms choose to escape competition by improving quality, innovating, and moving upscale. In this attempt, they hire more skilled labour, which typically enjoys a stronger bargaining power. This interpretation is supported by the empirical evidence put forward by Monfort et al. (2008) regarding restructuring in the Belgian textile sector, by Bugamelli et al. (2010) regarding Italian firms following the introduction of the euro, and by Bloom et al. (2016) regarding twelve European countries after China's accession to the WTO. The absence of a strong impact of imports from low-wage countries on ϕ, as evident from Table (10), suggests that the two strategies–entering into price competition or escaping it by raising quality–coexist in French manufacturing.

[Table 10 about here.]

The magnitude of the coefficient associated with OECD competition (ranging from -0.953 to -1.408) suggests a sizable effect of import penetration on bargaining power. Yet, we need to consider that the coefficient reflects the possible impact of a shift from a complete absence of imports to a situation in which all domestic consumption is served by foreign goods. This benchmark is clearly unrealistic and not particularly informative. On the other hand, a one-percentage-point increase in import penetration is associated with a reduction of 0.0095–0.0141 percentage points in rent sharing. Although statistically significant, this is an economically minor effect.

To better grasp an idea of the effect of foreign competition, we compute the marginal effect on rent sharing of increasing import penetration from zero to its mean value.[14] Focusing on the SW-POOL-1 estimator, this implies that OECD import penetration moves from zero to 5.3%, and such a change reduces rent sharing by 7.5 percentage points. At the mean, this represents a drop in ϕ from 0.55 to 0.475. Other estimators deliver results that range between -5% to -6.9% and still represent a substantial fall in the degree of rent sharing enjoyed by workers. The effect of competition from low-wage countries is not

[14] The large degree of heterogeneity and skewness in the distribution of import penetration implies that a one-standard-deviation change around the mean value would push import penetration into negative territory (the standard deviation is greater than the mean, as documented in Table 7). Hence, we rely on a change from zero to the mean value.

only statistically less significant (apart from the case of the FE-2SLS estimator, whose consistency is however not guaranteed since the IMR is significant and thus suggests the presence of nonrandom selection) but also economically much weaker given the smaller amount of imports coming from those countries. Altogether, these results suggest that French workers and firms are particularly sensitive to competition from other advanced countries.

The right panel of Table (10) singles out China from other low-wage countries in order to see whether such a large country has any specific effect on rent sharing. We find that although the effect of Chinese imports is negative across the various estimators, it is not significant in two out of three cases (FE-2SLS and SW-POOL-1), and the value of the estimated coefficient appears to be rather volatile. The same holds for the positive effect of imports from low-wage countries other than China, which is significant in the last column of Table (10). This difference in sign between Chinese and other low-wage countries suggests that competition stemming from China may be different in nature. Overall, once we distinguish imports from three different sources, estimates of the import penetration coefficients become much less precise. The effect of imports from OECD countries remains the most stable in magnitude, although it fails to be significant at the 10% level when using the SW-POOL-2 estimator (the p-value equals 0.136). The impact of moving from zero to the mean value of import penetration from OECD countries remains in the same range as before, i.e., it entails a fall in rent sharing of approximately 5–7%.

[Table 11 about here.]

As a last robustness check, Table (11) presents the results with contemporaneous imports (left panel) and imports lagged 3 years (right panel). Looking at contemporaneous imports, we again find a negative and significant effect of OECD imports when using Semykina & Wooldridge's estimators but with a lower magnitude with respect to Table (10). Looking at the SW-POOL-1 estimator, the coefficient is half as big (in absolute value) as the corresponding value when imports are lagged one year. This is not surprising, since wage negotiations between unions and firms occur once a year in France, and the median duration of wage agreements is approximately 10-12 months (Avouyi-Dovi et al. 2013). Hence, we should expect a lag in the response of the French labour market to a change in foreign competition. Moreover, the effect fades away rather quickly, for we observe no effect when OECD imports are lagged three years.

The effect of imports from low-wage countries on rent sharing is again more volatile across lags and across estimators. It is positive and significant for contemporaneous imports in the SW-POOL-2 estimator, whereas it is negative and significant for imports lagged three years in the FE-2SLS estimator. More than a time effect per se, our intuition is that competition from low-wage countries has a differentiated effect on firms. As previously mentioned, firms' responses to increased price competition from low-wage countries

may lead some firms to compress wages to re-gain some degree of price competitiveness, whereas others may have opted for climbing up the quality ladder in order to escape competition. Firms' reactions are likely to depend not only on firm-specific factors but also on industry characteristics; for example, firms operating in high-technology sectors may react differently than those engaged in low-tech activities.

6 Conclusion

The paper has exploited recent advances in the estimation of firm-level markups to classify firms into different market regimes based on the presence of imperfections in both the product and labour markets. In particular, we have been able to distinguish between firms that take the wage rate as given, those enjoying monopsony power, and companies engaging in rent sharing with their workers. Using a large sample of French manufacturing firms, we have shown that there is substantial heterogeneity in firm behavior both across and within industries, such that being able to properly account for firm-level differences provides us with relevant information and allows for us to move one step further with respect to the existing literature based on industry-level data or using administrative information about the presence of firm-level wage agreements.

Focusing on firms classified into an *efficient bargaining* regime, the methodology adopted in the paper allows for the estimation of rent sharing between firms and workers. We have then related this index to a firm-level measure of import competition from different countries to investigate how globalisation has affected the bargaining power of workers in an industrial economy such as France. In so doing, we shed new light on the role played by collective bargaining as a mechanism that links firm performance to earnings and, as a consequence, on the relationship between trade, wages (for which evidence is still very scarce, as noted by Carluccio et al. 2015) and the labour share of income.

We have found that controlling for a number of firm-level characteristics, such as productivity and size, import competition has a heterogeneous effect on workers' bargaining power, depending on both the source of imports and the characteristics of the firm. In more detail, imports from OECD countries are negatively correlated with rent sharing, whereas competition from low-wage countries (and China) does not significantly affect the bargaining power of French workers, at least in the period under investigation (1995–2007). Obviously, these results do not necessarily carry over to the post-financial-crisis period. Additional research concerning the most recent years would shed light on the actual impact of China and other low-wage countries on rent sharing in France.

The approach followed in the paper, which provides us with a firm-level measure of rent sharing, can be used in several different applications: in particular, the possibility to link firm-level results with detailed information about employees (e.g., their composition in terms of occupations, skills, and educational attainment) represents an ideal extension

of the work that would further contribute to our understanding of the (within-firm) effects of import competition on different types of workers.

References

Abraham, F., Konings, J. & Vanormelingen, S. (2009), 'The effect of globalization on union bargaining and price-cost margins of firms', *Review of World Economics (Weltwirtschaftliches Archiv)* **145**(1), 13–36.

Ackerberg, D. A., Caves, K. & Frazer, G. (2015), 'Identification properties of recent production function estimators', *Econometrica* **83**(6), 2411–2451.

Ashournia, D., Munch, J. & Nguyen, D. (2014), The Impact of Chinese Import Penetration on Danish Firms and Workers, Economics Series Working Papers 703, University of Oxford, Department of Economics.

Ashraf, Q. & Galor, O. (2013), 'The 'out of africa' hypothesis, human genetic diversity, and comparative economic development', *American Economic Review* **103**(1), 1–46.
URL: *http://www.aeaweb.org/articles?id=10.1257/aer.103.1.1*

Autor, D. H., Dorn, D. & Hanson, G. H. (2013), 'The China Syndrome: Local Labor Market Effects of Import Competition in the United States', *American Economic Review* **103**(6), 2121–2168.

Avouyi-Dovi, S., Fougère, D. & Gautier, E. (2013), 'Wage Rigidity, Collective Bargaining, and the Minimum Wage: Evidence from French Agreement Data', *Review of Economics and Statistics* **95**(4), 1337–1351.

Bellone, F., Musso, P., Nesta, L. & Warzynski, F. (2009), 'L'effet pro-concurrentiel de l'intégration européenne. une analyse de l'évolution des taux de marge dans les industries manufacturières françaises', *Revue de l'OFCE* **108**, 139–163.

Bellone, F., Musso, P., Nesta, L. & Warzynski, F. (2016), 'International trade and firm-level markups when location and quality matter', *Journal of Economic Geography* **16**(1), 67–91.

Bernard, A. B., Jensen, J. B. & Schott, P. K. (2006), 'Survival of the best fit: Exposure to low-wage countries and the (uneven) growth of U.S. manufacturing plants', *Journal of International Economics* **68**(1), 219–237.
URL: *https://ideas.repec.org/a/eee/inecon/v68y2006i1p219-237.html*

Bloom, N., Draca, M. & Reenen, J. V. (2016), 'Trade Induced Technical Change? The Impact of Chinese Imports on Innovation, IT and Productivity', *Review of Economic Studies* **83**(1), 87–117.

Blundell, R. & Bond, S. (1998), 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics* **87**(1), 115–143.

Böckerman, P. & Maliranta, M. (2012), 'Globalization, creative destruction, and labour share change: evidence on the determinants and mechanisms from longitudinal plant-level data', *Oxford Economic Papers* **64**(2), 259–280.

Boulhol, H., Dobbelaere, S. & Maioli, S. (2011), 'Imports as Product and Labour Market Discipline', *British Journal of Industrial Relations* **49**(2), 331–361.

Bugamelli, M., Schivardi, F. & Zizza, R. (2010), The Euro and Firm Restructuring, *in* A. Alesina & F. Giavazzi, eds, 'Europe and the Euro', NBER Chapters, National Bureau of Economic Research, pp. 99–138.

Carluccio, J., Fougère, D. & Gautier, E. (2015), 'Trade, wages and collective bargaining: Evidence from France', *Economic Journal* **125**(584), 803–837.

Crépon, B., Desplatz, R. & Mairesse, J. (2005), 'Price-Cost Margins and Rent Sharing: Evidence from a Panel of French Manufacturing Firms', *Annals of Economics and Statistics* **79-80**, 583–610.

Crozet, M. & Orefice, G. (2017), Trade and labor market: What do we know?, Policy Brief 2017-15, CEPII.

Dauth, W., Findeisen, S. & Suedekum, J. (2014), 'The Rise Of The East And The Far East: German Labor Markets And Trade Integration', *Journal of the European Economic Association* **12**(6), 1643–1675.

De Loecker, J. (2013), 'Detecting learning by exporting', *American Economic Journal: Microeconomics* **5**(3), 1–21.

De Loecker, J. & Eeckhout, J. (2017), 'The rise of market power and the macroeconomic implications', *NBER Working Paper No. 23687* .

De Loecker, J., Goldberg, P. K., Khandelwal, A. K. & Pavcnik, N. (2016), 'Prices, markups and trade reform', *Econometrica* **84**(2), 445–510.

De Loecker, J. & Warzynski, F. (2012), 'Markups and Firm-Level Export Status', *American Economic Review* **102**(6), 2437–71.
URL: *https://ideas.repec.org/a/aea/aecrev/v102y2012i6p2437-71.html*

Dobbelaere, S. & Kiyota, K. (2017), Labor market imperfections, markups and productivity in multinationals and exporters, Discussion Paper 2017-113/V, Tinbergen Institute.

Dobbelaere, S., Kiyota, K. & Mairesse, J. (2015), 'Product and labor market imperfections and scale economies: Micro-evidence on France, Japan and the Netherlands', *Journal of Comparative Economics* **43**(2), 290–322.
URL: *https://ideas.repec.org/a/eee/jcecon/v43y2015i2p290-322.html*

Dobbelaere, S. & Mairesse, J. (2013), 'Panel data estimates of the production function and product and labor market imperfections', *Journal of Applied Econometrics* **28**(1), 1–46.
URL: *https://ideas.repec.org/a/wly/japmet/v28y2013i1p1-46.html*

Dumont, M., Rayp, G. & Willemé, P. (2006), 'Does internationalization affect union bargaining power? An empirical study for five EU countries', *Oxford Economic Papers* **58**(1), 77–102.

Dumont, M., Rayp, G. & Willemé, P. (2012), 'The bargaining position of low-skilled and high-skilled workers in a globalising world', *Labour Economics* **19**(3), 312–319.

Feenstra, R. C. (2000), *The Impact of International Trade on Wages*, University of Chicago Press, Chicago, USA.

Gaulier, G. & Zignago, S. (2010), BACI: International trade database at the product-level. the 1994-2007 version, Working Paper 2010-23, CEPII.

Harrison, A., McLaren, J. & McMillan, M. (2011), 'Recent Perspectives on Trade and Inequality', *Annual Review of Economics* **3**(1), 261–289.
URL: *https://ideas.repec.org/a/anr/reveco/v3y2011p261-289.html*

Helpman, E., Itskhoki, O., Muendler, M.-A. & Redding, S. J. (2017), 'Trade and inequality: From theory to estimation', *Review of Economic Studies* **84**(1), 357–405.

Hummels, D., Jørgensen, R., Munch, J. R. & Xiang, C. (2014), 'The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data', *American Economic Review* **104**(6), 1597–1629.

IMF (2017), World Economic Outlook, April 2017: Gaining Momentum?, Technical report, International Monetary Fund.

Karabarbounis, L. & Neiman, B. (2014), 'The global decline of the labor share', *Quarterly Journal of Economics* **129**(1), 61–103.

Levinsohn, J. & Petrin, A. (2003), 'Estimating Production Functions Using Inputs to Control for Unobservables', *Review of Economic Studies* **70**(2), 317–341.
URL: *https://ideas.repec.org/a/oup/restud/v70y2003i2p317-341.html*

Lewis, J. B. & Linzer, D. A. (2005), 'Estimating regression models in which the dependent variable is based on estimates', *Political Analysis* **13**, 345–354.

McDonald, I. & Solow, R. M. (1981), 'Wage bargaining and employment', *American Economic Review* **71**, 896–908.

Melitz, M. J. & Polanec, S. (2015), 'Dynamic Olley-Pakes productivity decomposition with entry and exit', *RAND Journal of Economics* **46**(2), 362–375.

Monfort, P., Vandenbussche, H. & Forlani, E. (2008), Chinese Competition and Skill-Upgrading in European Textiles: Firm-level Evidence, Discussion Papers 19808, LICOS - Centre for Institutions and Economic Performance, KU Leuven.

Moreno, L. & Rodriguez, D. (2011), 'Markups, bargaining power and offshoring: An empirical assessment1', *The World Economy* **34**(9), 1593–1627.

Mundlak, Y. (1978), 'On the pooling of time series and cross section data', *Econometrica* **46**(1), 69–85.

OECD (2004), Employment outlook 2004, Technical report, OECD, Paris.

OECD (2012), Employment outlook 2012, Technical report, OECD.

Olley, S. G. & Pakes, A. (1996), 'The dynamics of productivity in the telecommunications equipment industry', *Econometrica* **64**, 1263–1297.

Petrin, A. & Levinsohn, J. (2012), 'Measuring aggregate productivity growth using plant-level data', *RAND Journal of Economics* **43**(4), 705–725.

Pignoni, M. T. (2016), La syndicalisation en france, DARES analyses 2016-025, Ministère du travail, de l'emploi, de la formation professionnelle et du dialogue social.

Roeger, W. (1995), 'Can imperfect competition explain the difference between primal and dual productivity measures ? estimates for U.S. manufacturing', *Journal of Political Economy* **103**, 316–330.

Semykina, A. & Wooldridge, J. M. (2010), 'Estimating panel data models in the presence of endogeneity and selection', *Journal of Econometrics* **157**(2), 375 – 380.
URL: *http://www.sciencedirect.com/science/article/pii/S0304407610000825*

Utar, H. (2014), 'When the Floodgates Open: "Northern" Firms' Response to Removal of Trade Quotas on Chinese Goods', *American Economic Journal: Applied Economics* **6**(4), 226–250.
URL: *https://ideas.repec.org/a/aea/aejapp/v6y2014i4p226-50.html*

Visser, J. (2016), Ictwss data base. version 5.1, Technical report, Amsterdam Institute for Advanced Labour Studies (AIAS).

Wooldridge, J. M. (2009), 'On estimating firm-level production functions using proxy variables to control for unobservables', *Economics Letters* **104**(3), 112–114.
URL: *https://ideas.repec.org/a/eee/ecolet/v104y2009i3p112-114.html*

Appendix A. Measures of market imperfections

Similar to Dobbelaere & Kiyota (2017), we develop a production-function-based approach to measure firm-year specific market imperfections. Let Q be firm output as follows: $Q_{it} = Q_{it}(K_{it}, L_{it}, M_{it})$, where the subscripts i and t stand for firm i at time t, K is capital, and L and M represent labour and materials, respectively. The capital K is assumed to be dynamic, whereas all remaining production factors are static. In this framework, we assume the following: (i) $Q(\cdot)$ is twice differentiable and continuous, (ii) firms produce homogeneous good industry and compete in quantities as in an oligopolistic Cournot, (iii) firms are price takers on the market for materials M, (iv) the competitive regime characterizing the labour market is firm-specific, and (v) firms maximise short-run profits π. The short-run profit maximization problem reads

$$\pi_{it}(Q_{it}, L_{it}, M_{it}) = P_t Q_{it} - w_{it} L_{it} - p_{it}^M M_{it} \tag{A1}$$

where P_t is the price of the homogenous goods, w represents the cost of labour, and p^M represents the price of material. Firms decide on optimal quantities of output Q, material M and labour L.

The optimal output choice for Q_{it} satisfies the first-order condition $\frac{\partial \pi_{it}}{\partial Q_{it}} = 0$:

$$\frac{P_t}{(C_Q)_{it}} = \left(1 + \frac{s_{it}}{\epsilon_t}\right)^{-1} = \mu_{it} \tag{A2}$$

where $(C_Q)_{it}$ represents the marginal costs ($\frac{\partial C}{\partial Q} = w\frac{\partial L}{\partial Q} + p^M \frac{\partial M}{\partial Q}$), s_{it} represents firm i's market share, and ϵ represents the price elasticity of demand.

Firms are price takers on the market for materials. The optimal output choice for M_{it} satisfies the first-order condition $\frac{\partial \pi_{it}}{\partial M_{it}}$:

$$p_{it}^M = (Q_M)_{it}\, P_t \left(1 + \frac{s_{it}}{\epsilon_t}\right) \tag{A3}$$

The term on the left-hand side of eq. (A3) represents the marginal cost of materials, which must equal the left-hand term, the marginal revenue, that is, the marginal output of materials $\frac{\partial Q_{it}}{\partial M_{it}}$, denoted $(Q_M)_{it}$, multiplied by the non-competitive price $P_t \left(1 + \frac{s_{it}}{\eta_t}\right)$.

Inserting eq. (A2) into eq. (A3), multiplying both sides by $\frac{M_{it}}{Q_{it}}$ and rearranging terms yields

$$\theta_{it}^M = \mu_{it} \alpha_{it}^M \tag{A4}$$

where $\theta_{it}^M = \frac{\partial Q_{it}(M_{it})}{\partial M_{it}} \frac{M_{it}}{Q_{it}}$ represents the output elasticity of material M_{it}, and $\alpha_{it}^M = \frac{p_{it}^M M_{it}}{P_t Q_{it}}$ is the share of material M_{it} of total sales. If product and factor markets are perfect, the

price to marginal cost ratio equals unity. Conversely, if only product markets are imperfect, then $\frac{\theta_{it}^M}{\alpha_{it}^M} \neq 1$.

A firm's optimal demand for labour depends on the regime of its labour market. We distinguish three regimes: perfect-competition right-to-manage bargaining (PR), efficient bargaining (EB), and static partial-equilibrium monopsony power (MO). Under the PR regime, firms and workers all behave as price takers on the labour market. The firm's short-run maximization problem satisfies the first-order condition $\frac{\partial \pi_{it}}{\partial L_{it}} = 0$. :

$$w = (Q_L)_{it}\ P_t \left(1 + \frac{s_{it}}{\epsilon_t}\right) \tag{A5}$$

Inserting eq. (A2) into eq. (A5), multiplying both sides by $\frac{L_{it}}{Q_{it}}$ and rearranging terms yields

$$\theta_{it}^L = \mu_{it}\alpha_{it}^L \tag{A6}$$

where, again, θ_{it}^L represents the output elasticity of labour L_{it} and α_{it}^L is the labour share L_{it} of total sales. An important implication is that if all factor markets are perfect, the markup derived from material must yield the same value as the markup derived from labour: $\frac{\theta_{it}^L}{\alpha_{it}^L} = \frac{\theta_{it}^M}{\alpha_{it}^M}$. However, imperfections in the labour market will yield $\frac{\theta_{it}^L}{\alpha_{it}^L} \neq \frac{\theta_{it}^M}{\alpha_{it}^M}$. Hence, under assumptions (iii) and (iv), the wedge between the two ratios will be used to infer imperfections.

Under efficient bargaining EB, risk-neutral firms and workers negotiate simultaneously about optimal wage w and employment L in order to maximise their joint surplus. Following McDonald & Solow (1981), and omitting subscripts i and t for clarity, the generalised product is written as

$$\Omega_{EB} = \Big[wL + (\bar{L} - L)\bar{w} - \bar{w}\bar{L}\Big]^{\phi}\Big[PQ - wL - p^M M\Big]^{1-\phi} \tag{A7}$$

where $\bar{w}$ and $\bar{L}$ are the competitive levels of wages and unemployment ($0 < L < \bar{L}$), respectively, and ϕ is the degree of bargaining power of the trade unions (the workers) during the yearly negotiations, also called the absolute extent of rent sharing. Eq. (A7) simply states that under EB, part of the profit is captured by the unions as a result of their bargaining power. The maximization of eq. (A7) with respect to w and L yields, respectively,

$$w = \bar{w} + \gamma\Big[\frac{PQ - wL - p^M M}{N}\Big] \tag{A8}$$

where $\gamma = \frac{\phi}{1-\phi}$, and

$$w = R_L + \phi\Big[\frac{PQ - R_L L - p^M M}{N}\Big] \tag{A9}$$

where R_L represents the marginal revenue of labour $\frac{\partial PQ(L)}{\partial L}$.

Efficient bargaining is achieved by simultaneously solving eq. (A8) and eq. (A9). The equilibrium condition is given by

$$R_L = \bar{w} \tag{A10}$$

Eq. (A10) provides us with all wage-employment pairs, known as the contract curve. It states that a firm's decision about the firm hire workers until the marginal revenue R_L equals the non-bargaining marginal cost w. In other words, the firm hires workers until the marginal revenue product of labour equals the alternative wage of the worker that is fired.

Let R_Q and Q_L denote marginal revenue and marginal product of labour, respectively. Provided that $R_Q = C_Q$, one can write the markup $\mu = \frac{P}{R_Q}$ in equilibrium, where P is the output price. The marginal revenue of labour reads $R_L = R_Q \times Q_L = \frac{PQ_L}{\mu}$. Observe that output elasticity of labour $\theta^L = Q_L \times \frac{Q}{L}$. Combining this with eq. (A10), under EB, the output elasticity of labour is

$$\theta^L = \mu \frac{\bar{w}L}{PQ} = \mu \bar{\alpha}^L \tag{A11}$$

where $\bar{\alpha}^L$ represents the labour share evaluated at the reservation wage. Multiplying eq. (A8) by L and dividing through by PQ yields $\alpha^L = \bar{\alpha}^L + \gamma(1 - \alpha^L - \alpha^M)$. This equation can be combined with eq. (A11) to obtain an expression for the output elasticity of labour under EB:

$$\theta^L = \mu \left[\alpha^L - \gamma(1 - \alpha^L - \alpha^M)\right] \tag{A12}$$

An important implication of eq. (A12) is that provided that we can measure the output elasticities of labour θ^L and material θ^M, together with their shares of total sales α^L and α^M, it is then possible to retrieve a measure of γ and thereby a measure of the unions' bargaining power ϕ that is firm-year specific.

As Dobbelaere & Kiyota (2017) write, the above model assumes that the supply of labour is infinite, such that a a marginal reduction in wages would result in an immediate withdrawal of all workers from the markets. However, under monopsony power MO, the labour supply may be less than perfectly elastic and is increasing with wages w. Such elasticity may stem from various factors, including idiosyncratic heterogenous preferences regarding work environment, thus implying that workers view firms as imperfect substitutes. Under MO, then, firms are constrained to set a single wage that applies to all workers. The monopsonist firm's objective is then to maximise the following short-run profit:

$$\pi(Q, L, M) = PQ - w(L)L - p^M M \tag{A13}$$

The maximization of eq. (A13) with respect to labour gives the following first-order condition:

$$\frac{\partial Q}{\partial L} P\Big(1 + \frac{s_{it}}{\epsilon_t}\Big) = w\Big(1 + \frac{1}{\epsilon_w^L}\Big) \tag{A14}$$

where ϵ_w^L represents the wage elasticity of the labour supply. Eq. (A14) states that the marginal revenue valued at the non-competitive price must equal the marginal cost wage valued at the marginal employee. Because $(1 + \frac{1}{\epsilon_w^L})$ is greater than unity, eq. (A14) implies that the marginal wage applies to all workers already hired by the company. Inserting eq. (A2) into eq. (A14), multiplying both sides by $\frac{L_{it}}{Q_{it}}$ and rearranging terms yields

$$\theta^L = \mu\alpha^L \left(1 + \frac{1}{\epsilon_w^L}\right). \tag{A15}$$

Appendix B. Data Appendix

All nominal output and inputs variables are available at the firm level. Industry-level information is used for price indexes, number of hours worked and depreciation rates of capital.

Output. Our output variable, Q, is revenue corrected by variation in inventories. Nominal values are deflated by sector-specific price indexes that are available at the 2-digit level from INSEE (the French National Statistical Office).

Labor. We define our labour variable, L, as the number of effective workers multiplied by the the number of hours worked in a year. The annual series for worked hours are available at the 2-digit industry level and provided by *GGDC Groningen Growth Development Center*. This choice was made because there are no data about hours worked in the EAE datasets.

Capital input Capital stocks, K, are computed using information about investment and book value of tangible assets (we rely on book value reported at the end of the accounting exercise), following the traditional permanent inventory methodology:

$$K_t = (1 - \delta_{t-1})\, K_{t-1} + I_t \tag{B1}$$

where δ_t is the depreciation rate and I_t is real investment (deflated nominal investment). Both investment price indexes and depreciation rates are available at the 2-digit industrial classification level from the INSEE data series.

Intermediate inputs. Intermediate inputs, M, are defined as purchases of materials and merchandise, transport and travel, and miscellaneous expenses. They are deflated using sectoral price indexes for intermediate inputs published by INSEE.

Revenue shares. To compute the revenue share of labour, we rely on the variable *wages and compensation*. This value includes total wages paid as salaries plus social contributions and income tax withholding.

Appendix C. Wage Bargaining in France

The French labour market features some specific institutions and principles that make it both an interesting case study (Avouyi-Dovi et al. 2013, Carluccio et al. 2015) and one that is consistent with our assumptions. First, regarding the relevance of firm-level heterogeneity, OECD (2004) classifies France as a system featuring a "*combination of industry- and firm/plant- level bargaining with an important share covered by company bargaining*", whereas the 2012 version of the Employment Outlook (OECD 2012) reports a shift from a sectoral to a more local level of wage bargaining in France since the 1990s. This picture is consistent with the data collected by Visser (2016), who suggests that wage-bargaining has undergone a significant decentralization process in the last 25 years.

Moreover, in France, wage agreements do not cover only unionised workers, whose number is small but increases sharply with firm size, especially in the private sector (Pignoni 2016), but rather are often extended to all employees within the firm or the industry (depending on the level of the agreement); this explains the gap between the low rate of unionization and the wide coverage of collective agreements.

From an institutional point of view, a 1982 law (Law Auroux) stipulates a legal obligation for firms to negotiate wages with unions every year, even if an agreement cannot be reached. In fact, the average duration of negotiated wages ranges between 10 and 12 months Avouyi-Dovi et al. (2013), Visser (2016), such that an empirical framework based on within-firm annual variations is well-placed to capture changes in rent sharing.

Figure 1: Evolution of rent sharing $\hat{\phi}$ (top panel), price cost margins $\hat{\mu}$ (middle panel) and total factor productivity $\hat{\omega}$ (bottom panel). Solid lines indicates arithmetic averages, and dashed lines denote weighted averages using employment shares for $\hat{\phi}$ and market shares for $\hat{\phi}$ and $\hat{\mu}$

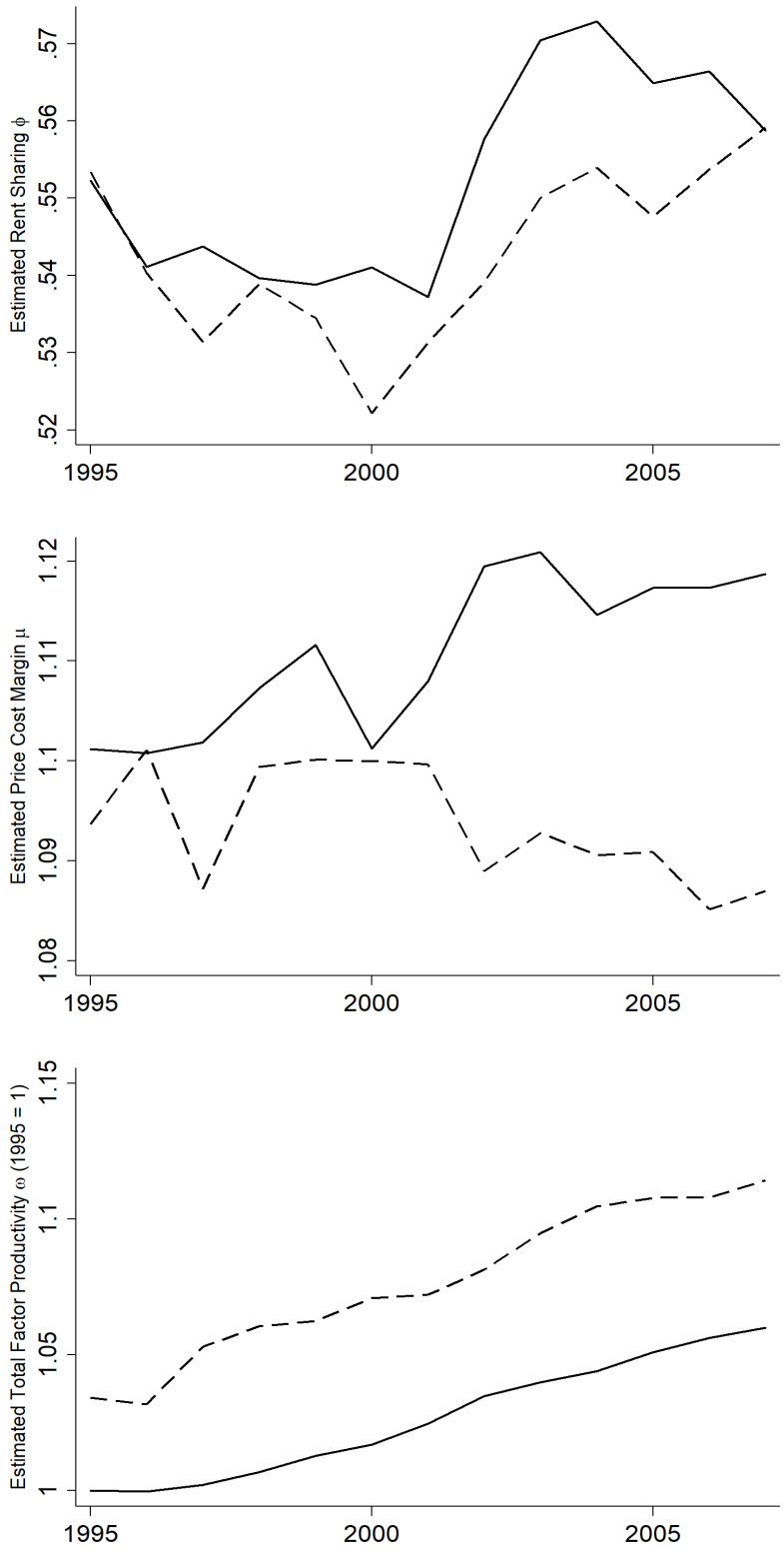

Table 1: Product and labour market regimes

	product market	
labour market	perfect competition	imperfect competition
perfect competition	PC-PR	IC-PR
efficient bargaining	PC-EB	IC-EB
monopsony	PC-MO	IC-MO

Table 2: Output Elasticities $\hat{\theta}$ for K, L and M and the corresponding scale economies $\hat{\lambda}$.
translog and Cobb-Douglas specifications using the Wooldridge estimator.

			Shares		translog estimates				Cobb-Douglas estimates			
Industry	♯ Obs.	♯ firms	α^L	α^M	$\hat{\theta}^K$	$\hat{\theta}^L$	$\hat{\theta}^M$	$\hat{\lambda}$	$\hat{\theta}^K$	$\hat{\theta}^L$	$\hat{\theta}^M$	$\hat{\lambda}$
All manufacturing	181,901	21,526	0.331	0.613	0.071	0.268	0.630	0.967	0.068	0.228	0.632	0.928
Automobile	5,085	597	0.262	0.703	0.066	0.201	0.684	0.946	0.071	0.165	0.674	0.910
Chemicals	19,301	2,212	0.264	0.681	0.065	0.195	0.720	0.977	0.084	0.161	0.690	0.934
Clothing and footwear	11,062	1,527	0.450	0.512	0.098	0.405	0.537	1.025	-0.010	0.272	0.777	1.039
Electric and electronic components	7,754	960	0.327	0.617	0.022	0.229	0.711	0.952	0.050	0.216	0.641	0.907
Electric and electronic equipment	9,240	1,198	0.372	0.585	-0.037	0.243	0.837	1.081	-0.028	0.227	0.862	1.061
House equipment and furnishings	11,622	1,457	0.337	0.635	0.076	0.246	0.682	0.997	0.086	0.226	0.610	0.922
Machinery and mechanical equipment	31,744	3,694	0.335	0.616	0.056	0.282	0.643	0.977	0.058	0.263	0.605	0.926
Metallurgy, iron and steel	34,666	3,881	0.353	0.574	0.120	0.294	0.496	0.902	0.118	0.236	0.515	0.869
Mineral industries	7,981	904	0.314	0.637	0.114	0.256	0.594	0.946	0.094	0.232	0.591	0.918
Pharmaceuticals	4,459	555	0.239	0.677	0.067	0.148	0.746	0.957	0.047	0.097	0.873	1.017
Printing and publishing	14,346	1,629	0.345	0.576	-0.008	0.275	0.773	1.070	-0.005	0.253	0.768	1.017
Textile	10,278	1,254	0.332	0.612	0.137	0.295	0.486	0.900	0.146	0.221	0.425	0.792
Transportation machinery	2,782	332	0.337	0.616	0.089	0.296	0.654	1.033	0.084	0.278	0.589	0.951
Wood and paper	11,581	1,326	0.276	0.671	0.067	0.260	0.626	0.933	0.066	0.224	0.602	0.892

Superscript *tl* stands for the translog specification. Supercript *cd* stands for the Cobb-Douglas specification. All estimations were executed by industry.

Table 3: Joint market imperfection estimates, by industry

Industry	♯ Obs.	♯ firms	translog estimates					Cobb-Douglas estimates				
			$\hat{\mu}$	$\hat{\psi}$	$\hat{\gamma}$	$\hat{\phi}$	$\hat{\epsilon}_w^L$	$\hat{\mu}$	$\hat{\psi}$	$\hat{\gamma}$	$\hat{\phi}$	$\hat{\epsilon}_w^L$
All manufacturing	181,901	21,526	1.110	0.311	2.085	0.553	3.761	1.171	0.389	3.037	0.636	1.943
Automobile	5,085	597	1.018	0.222	2.395	0.591	2.305	1.035	0.307	3.244	0.668	1.095
Chemicals	19,301	2,212	1.096	0.336	1.693	0.505	3.583	1.089	0.375	2.338	0.573	2.176
Clothing and footwear	11,062	1,527	1.192	0.396	2.808	0.619	2.672	1.350	0.176	5.737	0.774	1.178
Electric and electronic components	7,754	960	1.205	0.530	2.475	0.600	2.592	1.136	0.384	3.069	0.641	1.607
Electric and electronic equipment	9,240	1,198	1.642	0.955	3.409	0.684	2.321	1.530	0.785	3.389	0.666	1.783
House equipment and furnishings	11,622	1,457	1.127	0.403	2.387	0.592	2.690	1.084	0.351	3.309	0.664	1.576
Machinery and mechanical equipment	31,744	3,694	1.078	0.244	1.818	0.527	5.348	1.094	0.249	2.828	0.622	2.762
Metallurgy, iron and steel	34,666	3,881	0.933	0.091	1.471	0.484	4.084	1.095	0.460	2.720	0.621	2.075
Mineral industries	7,981	904	0.994	0.179	1.707	0.507	2.845	1.106	0.299	3.353	0.668	1.210
Pharmaceuticals	4,459	555	1.159	0.498	2.104	0.559	1.411	1.355	0.777	2.391	0.592	0.703
Printing and publishing	14,346	1,629	1.454	0.621	2.514	0.602	3.168	1.407	0.496	2.883	0.628	2.243
Textile	10,278	1,254	0.899	-0.018	2.092	0.522	2.231	1.154	0.654	3.907	0.701	0.893
Transportation machinery	2,782	332	1.119	0.238	2.079	0.587	1.466	1.100	0.227	3.898	0.723	1.077
Wood and paper	11,581	1,326	0.976	0.087	1.531	0.493	2.462	1.020	0.164	2.887	0.636	1.610

Superscript *tl* stands for the translog specification. Superscript *cd* stands for the Cobb-Douglas specification. All estimations were executed by industry. Average values for $\hat{\psi}$, $\hat{\gamma}$ and $\hat{\phi}$ were computed for companies belonging to the efficient bargaining regime (EB) only. Average values for $\hat{\epsilon}_w^L$ were computed for companies belonging to the monopsony regime (MO) only.

Table 4: Regime classification, by industry

Industry	♯ Obs.	PC-PR	PC-EB	PC-MO	IC-PR	IC-EB	IC-MO
All Manufacturing	181,901	33.8	17.2	7.8	3.1	36.3	1.7
Automobile	5,085	61.5	22.4	5.3	1.1	9.2	0.4
Chemicals	19,301	19.6	19.6	3.2	4.3	51.4	1.8
Clothing and footwear	11,062	57.3	19.3	2.7	1.5	17.1	2.1
Electric and electronic components	7,754	11.4	11.6	2.1	2.6	67.8	4.5
Electric and electronic equipment	9,240	0.4	0.0	0.1	2.2	97.2	0.04
House equipment and furnishings	11,622	23.0	25.3	2.0	2.7	44.5	2.4
Machinery and mechanical equipment	31,744	17.5	10.2	8.0	5.5	56.2	2.6
Metallurgy, iron and steel	34,666	44.8	31.6	15.3	0.9	6.7	0.7
Mineral industries	7,981	63.3	18.4	7.9	3.2	5.6	1.6
Pharmaceuticals	4,459	41.8	32.0	7.0	2.6	14.9	1.6
Printing and publishing	14,346	0.8	0.0	0.1	7.6	91.0	0.5
Textile	10,278	75.8	4.1	19.2	0.4	0.2	0.4
Transportation machinery	2,782	74.7	8.8	3.3	2.8	9.9	0.4
Wood and paper	11,581	57.9	15.6	16.3	1.3	5.8	3.1

Table 5: Decomposition of the change in rent sharing ($\phi_i t$)

period	$\Delta\phi_{it}$	within component	between component	entry	exit
1995–2007	-0.003	0.026	-0.004	-0.012	-0.012
		-1023%	153%	481%	488%
1995–2000	-0.034	0.002	0.004	-0.017	-0.023
		(-7%)	(-12%)	(51%)	(69%)
2000–2007	0.031	0.044	0.010	-0.010	-0.012
		139%	33%	-32%	-40%

Table 6: Transition matrices for labour market regimes

		EB	PR	MO	Total
EB	$(t-1)$	79,379	7,234	1,411	88,024
		90.18	8.220	1.600	100
PR	$(t-1)$	8,244	40,033	3,722	51,999
		15.85	76.99	7.160	100
MO	$(t-1)$	1,191	3,784	11,700	16,675
		7.140	22.69	70.16	100
Total		88,814	51,051	16,833	156,698
		56.68	32.58	10.74	100
EB	$(t-5)$	39,995	4,641	1,473	46,109
		86.74	10.07	3.190	100
PR	$(t-5)$	8,906	17,874	2,690	29,470
		30.22	60.65	9.130	100
MO	$(t-5)$	1,293	3,414	4,641	9,348
		13.83	36.52	49.65	100
Total		50,194	25,929	8,804	84,927
		59.10	30.53	10.37	100
EB	$(t-10)$	10,504	1,326	550	12,380
		84.85	10.71	4.440	100
PR	$(t-10)$	3,155	4,427	895	8,477
		37.22	52.22	10.56	100
MO	$(t-10)$	432	975	952	2,359
		18.31	41.33	40.36	100
Total		14,091	6,728	2,397	23,216
		60.70	28.98	10.32	100

[a] EB: Efficient bargaining; PR: Perfect competition right-to-manage; MO: Monopsony power

Table 7: Summary statistics

	Obs	Mean	S.D.	Min	Max
Rent sharing $\hat{\phi}_{it}$	55,524	0.550	0.197	0.001	0.950
Price cost margins $\hat{\mu}_{it}$	55,233	1.241	0.275	0.813	3.000
Import penetration (all countries)$^{(a)}$	55,498	0.077	0.173	0.000	1.000
Import penetration from LWC$^{(b)}$ (incl. China)	55,498	0.014	0.046	0.000	0.503
Import penetration from China	55,498	0.008	0.029	0.000	0.319
Import penetration from OECD	55,498	0.053	0.113	0.000	0.814
Import penetration from LWC (excl. China)	55,498	0.006	0.024	0.000	0.351
Size (log of employees)	55,524	4.121	0.922	1.609	10.260
Translog residual ω (TFP)	55,524	1.573	0.754	0.087	3.746
Employment growth in EA	55,524	0.007	0.125	-1.942	1.704
Firm share of employment in EA	55,524	0.355	0.368	0.000	1.000
Capital intensity	55,524	-4.294	0.974	-14.282	-0.327

[a] Import penetration is weighted using the firm-specific share of sales at the 4-digit level in 1994, the year before the beginning of the sample period.
[b] Acronyms. LWC: Low-wage countries. EA: Employment area.

Table 8: Correlation matrix. N = 54,498

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Rent sharing $\hat{\phi}_{it}$	1.000											
(2)	Price cost margins $\hat{\mu}_{it}$	0.106	1.000										
(3)	Import penetration (all countries)$^{(a)}$	0.072	0.069	1.000									
(4)	Import penetration from LWC$^{(b)}$ (incl. China)	0.071	0.025	0.854	1.000								
(5)	Import penetration from China	0.058	0.012	0.798	0.901	1.000							
(6)	Import penetration from OECD	0.063	0.085	0.959	0.689	0.687	1.000						
(7)	Import penetration from LWC$^{(b)}$ (excl. China)	0.066	0.034	0.686	0.843	0.527	0.498	1.000					
(8)	Size (log of employees)	-0.091	0.005	0.025	0.005	-0.001	0.031	0.011	1.000				
(9)	Translog residual ω (TFP)	-0.160	-0.321	-0.207	-0.155	-0.141	-0.207	-0.129	-0.076	1.000			
(10)	Employment growth in EA	-0.022	0.003	-0.006	-0.009	-0.010	-0.004	-0.006	-0.002	-0.021	1.000		
(11)	Firm share of employment in EA	-0.030	-0.013	0.035	0.015	0.040	0.043	-0.020	0.229	0.011	0.025	1.000	
(12)	Capital intensity	-0.345	-0.222	-0.190	-0.184	-0.134	-0.166	-0.195	0.228	-0.005	-0.010	0.026	1.000

[a] Import penetration is weighted using the firm-specific share of sales at the 4-digit level in 1994, the year before the beginning of the sample period.
[b] Acronyms. LWC: Low-wage countries. EA: Employment area.

Table 9: Import penetration and bargaining power in France. Dependent variable. Rent sharing $\hat{\phi}_{it}$

	Total imports		
	FE-2SLS	SW-POOL-1	SW-POOL-2
Import penetration (all countries, $t-1$)$^{(b)}$	-0.723**	-1.123	-0.952
	(0.314)	(1.937)	(1.345)
Size (log of employees)	0.026	0.005	0.021
	(0.021)	(0.054)	(0.041)
Translog residual $\hat{\omega}_{it}$ (TFP)	-0.362***	-0.283***	-0.306***
	(0.080)	(0.086)	(0.082)
Employment growth in EA$^{(a)}$	0.015***	0.018**	0.019***
	(0.004)	(0.009)	(0.007)
Firm share of employment in EA	-0.020**	0.009	0.011
	(0.008)	(0.028)	(0.023)
Capital intensity	-0.012	-0.027**	-0.017
	(0.009)	(0.014)	(0.015)
Inverse Mill's ratio	-0.288***	-0.216	YES
	(0.062)	(0.174)	
Observations	45,315	47,745	47,745
R-squared	0.121	-0.225	-0.055

Block-bootstrapped standard errors in parenthesis (1,000 replications). *** p<0.01, ** p<0.05, * p<0.1. All regressions include a full vector of unreported year-fixed effects. Number of companies: 8,917.
FE-2SLS uses the fixed effects two-stage least square estimator with selection. SW-POOL 1 uses the Semykina & Wooldridge (2010) estimator. SW-POOL-2 uses the Semykina & Wooldridge (2010) estimator with the inverse Mill's ratio interacted with time dummies. Instruments are import variables using imports to all OECD countries except France for consumption goods.
(a) EA: Employment area.
(b) Import penetration is weighted using the firm-specific share of sales at the 4-digit level in 1994, the year before the beginning of the sample period.

Table 10: Import penetration and bargaining power in France. Dependent variable. Rent sharing $\hat{\phi}_{it}$

	Imp. from OECD & LWC$^{(a)}$			Imp. from OECD, LWC & China		
	FE-2SLS	SW-POOL-1	SW-POOL-2	FE-2SLS	SW-POOL-1	SW-POOL-2
Import penetration from OECD ($t-1$)	-0.953**	-1.408*	-1.307*	-0.920**	-1.372*	-1.113
	(0.405)	(0.769)	(0.747)	(0.39)	(0.764)	(0.75)
Import penetration from LWC (incl. China, $t-1$)	-0.624**	-0.189	0.180			
	(0.297)	(0.316)	(0.283)			
Import penetration from China ($t-1$)				-1.331	-0.259	-4.963*
				(4.132)	(2.527)	(2.968)
Import penetration from LWC (excl. China, $t-1$)				0.176	0.181	9.915*
				(7.817)	(4.949)	(5.879)
Size (log of employees)	0.032	0.025	0.035	0.024	0.020	0.017
	(0.020)	(0.032)	(0.033)	(0.019)	(0.029)	(0.029)
Translog residual $\hat{\omega}_{it}$ (TFP)	-0.364***	-0.291***	-0.307***	-0.360***	-0.286***	-0.277***
	(0.081)	(0.076)	(0.078)	(0.078)	(0.07)	(0.068)
Employment growth in EA$^{(a)}$	0.016***	0.019***	0.020***	0.015***	0.019***	0.017***
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
Firm share of employment in EA	-0.023***	-0.003	-0.002	-0.022***	-0.005	0.009
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)
Capital intensity	-0.012	-0.026***	-0.019*	-0.013	-0.026***	-0.019*
	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)
Inverse Mill's ratio	-0.304***	-0.238***	YES	-0.279***	-0.219***	YES
	(0.058)	(0.090)		(0.056)	(0.08)	
Observations	45,315	47,745	47,745	45,315	47,745	47,745
R-squared	0.121	-0.027	0.061	0.117	0.018	-0.352

Block-bootstrapped standard errors in parenthesis (1,000 replications). *** p<0.01, ** p<0.05, * p<0.1. All regressions include a full vector of unreported year-fixed effects. Number of companies: 8,917.
FE-2SLS uses the fixed effects two-stage least square estimator with selection. SW-POOL 1 uses the Semykina & Wooldridge (2010) estimator. SW-POOL-2 uses the Semykina & Wooldridge (2010) estimator with inverse Mill's ratio interacted with time dummies. Instruments are import variables using imports toward all OECD countries except France for consumption goods.
(a) Acronyms. LWC: Low-wage countries. EA: Employment area.
(b) Import penetration is weighted using the firm-specific share of sales at the 4-digit level in 1994, the year before the beginning of the sample period.

Table 11: Robustness checks: experimenting with different lags for import variables. Dependent variable. Rent sharing $\hat{\phi}_{it}$

	Contemporaneous imports			Imports lagged 3 years		
	FE-2SLS	SW-POOL-1	SW-POOL-2	FE-2SLS	SW-POOL-1	SW-POOL-2
Import penetration from OECD	-0.420	-0.704*	-0.629*	-1.345	-1.184	-0.965
	(0.271)	(0.379)	(0.377)	(1.213)	(6.124)	(5.477)
Import penetration from LWC$^{(a)}$ (incl. China)	-0.080	0.269	0.507*	-1.981**	-1.410	-0.833
	(0.285)	(0.266)	(0.264)	(0.915)	(4.815)	(3.99)
Size (log of employees)	-0.008	0.015	0.022	0.066**	0.001	0.012
	(0.017)	(0.024)	(0.024)	(0.029)	(0.133)	(0.115)
Translog residual $\hat{\omega}_{it}$ (TFP)	-0.321***	-0.273***	-0.287***	-0.399***	-0.292**	-0.307**
	(0.073)	(0.068)	(0.07)	(0.087)	(0.13)	(0.125)
Employment growth in EA$^{(a)}$	0.009**	0.013***	0.013***	0.001	0.026	0.025
	(0.004)	(0.005)	(0.005)	(0.004)	(0.025)	(0.02)
Firm share of employment in EA	-0.021***	-0.011	-0.008	-0.022**	0.018	0.016
	(0.007)	(0.007)	(0.007)	(0.009)	(0.081)	(0.071)
Capital intensity	-0.016*	-0.026***	-0.020**	0.012	-0.030	-0.023
	(0.009)	(0.008)	(0.009)	(0.01)	(0.045)	(0.039)
Inverse Mill's ratio	-0.211***	-0.177**	YES	-0.303***	-0.211	YES
	(0.062)	(0.083)		(0.065)	(0.381)	
Observations	52,964	55,496	55,496	31,529	33,675	33,675
R-squared	0.115	0.273	0.301	0.143	-0.030	0.134
Number of companies		9,857			7,146	

Block-bootstrapped standard errors in parenthesis (1,000 replications). *** p<0.01, ** p<0.05, * p<0.1. All regressions include a full vector of unreported year-fixed effects.
FE-2SLS uses the fixed effect two-stage least square estimator with selection. SW-POOL 1 uses the Semykina & Wooldridge (2010) estimator. SW-POOL-2 uses the Semykina & Wooldridge (2010) estimator with the inverse Mill's ratio interacted with time dummies. The instruments are import variables using imports toward all OECD countries except France for consumption goods.
(a) Acronyms. LWC: Low-wage countries. EA: Employment area.
(b) All regressors on import penetration are instrumented using imports towards all OECD countries except France for consumption goods. Import penetration is weighted using the firm-specific share of sales at the 4-digit level in 1994, the year before the beginning of the sample period.

EconPol Europe

EconPol Europe - The European Network for Economic and Fiscal Policy Research is a unique collaboration of policy-oriented university and non-university research institutes that will contribute their scientific expertise to the discussion of the future design of the European Union. In spring 2017, the network was founded by the ifo Institute together with eight other renowned European research institutes as a new voice for research in Europe.

The mission of EconPol Europe is to contribute its research findings to help solve the pressing economic and fiscal policy issues facing the European Union, and thus to anchor more deeply the European idea in the member states. Its tasks consist of joint interdisciplinary research in the following areas

1) sustainable growth and 'best practice',

2) reform of EU policies and the EU budget,

3) capital markets and the regulation of the financial sector and

4) governance and macroeconomic policy in the European Monetary Union.

Its task is also to transfer its research results to the relevant target groups in government, business and research as well as to the general public.