Offshoring, Wages, and Employment: Evidence from data matching imports, firms, and workers

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Abstract: How are wages and employment of manufacturing workers affected by globalization and, in particular, by the sourcing strategies of their employing firms ? What is the role of unions in this process ? I attempt to answer these questions using unique French data that matches firm-level information on imports, value-added, employment,..., firm-level data on unions and negotiations, with individual worker data; at a unique moment – the first years of implementation of the Single Market Program (SMP) within the European Community (1986-1992) when French manufacturing formerly protected and high-rents sectors, faced increased competition and outsourcing options. A simple bargaining model, particularly well-suited to the French institutional setup, allows me to capture the mechanisms by which outsourcing of final goods (offshoring) can directly affect wages: changes in the firm's ability to pay (as measured by the quasi-rent, the total pie shared between the workers and the firm), mostly by altering the firms' threat points. The model shows that, when there is imperfect competition on the product market, firms that face strong unions should outsource more of their production of final goods because such offshoring causes a decrease of their quasi-rent and disciplines workers. However, offshoring does not necessarily decrease wages. Then, estimation results show that, indeed, offshoring decreases the size of quasi-rents. A regression discontinuity approach shows that bargaining institutions affect outsourcing. Employment is also shown to decrease when offshoring increases. IV estimates of the structural wage function derived from the model show that firms that bargained on employment faced strong unions (the bargaining power being equal to 0.5, workers employed at these firms received in average 50% of the quasi-rent). All other firms faced weaker unions with virtually no bargaining power. Then, I show that the presence of such strong unions led these firms to increase offshoring with an associated decline in employment and rents, as predicted by the model. As a result, in those firms where rents were initially high, unions' strength appears to have backfired.

JEL codes: F3, F4, J30

1. Introduction

The media have expressed the popular feeling that global competition from low-wage countries has induced a race to the bottom: low-skilled manufacturing jobs should be compensated less or else disappear from OECD countries. The issue is well summarized by Richard Freeman: "Put crudely, to what extent has, or will, the pay of low-skilled Americans or French or Germans be set in Beijing, Delhi or Djakkarta rather than in New-York, Paris or Frankfurt ?" (Freeman, 1995, page 16).

Imports from developing countries into the United States or Western Europe were not huge at the end of the 80s. However, the Single Market Program (SMP, hereafter), an attempt to implement the European Community (EC, hereafter)'s internal market, was conceived in 1985, launched in 1988, with the hope of being achieved around 1992. It entailed decreased tariffs and barriers within the EC. Hence, imports from the EC increased at a very rapid pace in France during the second half of the 80s.[1] In this context, the mere existence of new sourcing options was a signal that foreign outsourcing was a potential threat, in particular for industries or firms in which high wages were due to the presence of strong unions and the absence of product market competition. At the same time, and for the same reasons, because European firms could export to France more easily, French firms faced increased market pressures, not from Beijing but from other European countries.

Hence, the two questions that I examine in this paper derive from the previous one: In a context of increased competitive pressures and expanded opportunities, was foreign outsourcing, in particular the outsourcing of final goods (**offshoring**, hereafter) a possible response to the high wages and strong unions, in particular in those years that followed the election of the French socialist government? And, indeed, what was the impact of increased outsourcing on wages and employment?[2]

Even though macro-economists have examined these questions both theoretically and

[1] French National accounts show that imports increased at a very fast rate over the years 1986 to 1992: above 6% per year in the first five years with a decrease to 3% in 1991 and 2% in the final year. In fact, whereas import growth was at best mild between 1981 and 1985, our sample period appears to be the beginning of a period of rapid growth of French imports, that continued most of the ensuing years. http://www.insee.fr/fr/indicateur/cnat_annu/Series/t_1501p_25_4.xls (accessed April 5, 2005). In addition, Biscourp and Kramarz (2007) show that imports from low-wage countries were – and remained – a minor, albeit increasing, component of imports of goods over the analysis period. However, when measuring imports of manufacturing goods as a fraction of GDP, the ratio was 14% in 1986 (as well as in the preceding years, 1981 to 1985). It increased to 17% in 1989-1990 and 16% in 1992. (http://www.insee.fr/fr/indicateur/cnat_annu/base_95/principaux_resultats/commerce_ext.htm/t_1501bis_95.xls and t_1105_95.xls (accessed February 26, 2008).

[2] In this text, I will equate *outsourcing* with *outsourcing from foreign origin*

empirically, at the country or the industry level, there is virtually no micro-econometric analysis, no empirical examination of the precise mechanisms at work using micro data sources. I will look at the effects that can be identified in the French context using differences across and within firms rather than across industries. More precisely, because I have access to administrative data on the nature (final good versus intermediates) as well as on the amount of imports and exports measured at the level of each French firm, I observe all firms that outsource intermediates or final goods and I can compute the firm's competitors importing behavior. Because I have access to administrative data on balance-sheets and employment, I can compute the firms' value-added or employment. Because, I have access to a survey on unions behavior, I can compute the strength of unions in most firms. Finally, because I use administrative matched employer-employee data on wages, I can measure the changes in individual, not aggregate, wages.

A clear answer to Richard Freeman's question (albeit, slightly transformed) as well as mine would contribute to at least two strands of the literature. First, it would inform the wage inequality debate.[3] Second, because product market competition is a potential underlying mechanism causing some of the changes affecting the labor market, an answer would also contribute to the literature that examines the relationship between wages, bargaining institutions, and profits.[4]

To understand the identification strategy that I pursue, the following thought experiment is helpful. French manufacturing was relatively protected from international competition at the beginning of the eighties. In addition, a relatively large fraction of firms (as compared to other similar western european countries) was State-owned, in particular after the election of president François Mitterrand. This lack of competition induced the creation of rents (a result documented in Abowd, Kramarz, Lengermann, and Roux, 2007). Because of these rents as well as because of the bargaining institutions, many French firms bargained with their workers, but not all. These bargaining regimes varied from firm to

[3] On one side, Lawrence (1994), Lawrence and Slaughter (1993), Krugman (1995) have argued that recent changes cannot be accounted for by increased trade with low-wage countries. On the other, Wood (1995) has accused trade of being responsible for the deteriorated position of unskilled workers while Leamer (1994) and (1996), and Freeman (1995) appear to stand in the middle. Unfortunately, evidence is not compelling and mostly relies on import penetration measured at the aggregate or at the sectoral level (see for instance Revenga, 1992, see however Bernard and Jensen, 1997 or the book edited by Robert Feenstra, 2000).

[4] Abowd and Lemieux (1993) examine the relation between product market competition and wages in a bargaining framework whereas Blanchflower, Oswald and Sanfey (1996) look at the more general relation between profits and wages. Goldberg and Tracy (2001) as well as Bertrand (2004) focus on recent changes induced by increased import competition and movements in exchange rates. Unfortunately, these last authors used industry-level measures of imports because of the lack of firm-level data.

firm. Some unions were in better position to seize the potential rents. However, all firms were hit by exogenous foreign competition shocks. In particular, all French firms were hit by the SMP at the end of the eighties, therefore faced increased foreign competition and increased opportunities for outsourcing. But, these increased competitors' imports or increased firm's sourcing strategies had the potential to affect the bargaining process because they were likely to change the firm's ability to pay the workers – the size of the quasi-rent – as well as the firm's and the workers' threat points. What happened to wages and employment in these different firms and under these different bargaining regimes? How did unions react?

The Road Map:

- – To capture the influence of outsourcing threats on bargaining, I start by presenting a simple *model*, particularly well-suited to the French institutional setup studied here, which will help me capture the mechanisms by which a firm's outsourcing of final goods can directly affect wages and employment. In particular, the model shows that, with imperfect competition in the product market, firms facing strong unions are likely to use offshoring more intensively than firms facing weaker unions because increased offshoring reduces the size of the rent that the union and the firm bargain over. Indeed, offshoring acts as a threat point in the bargaining process and disciplines workers. Furthermore, in this context, employment decreases when offshoring increases. But, wages do not necessarily decrease in the same situation.
  - – My empirical analysis starts by showing how foreign outsourcing and, more generally, trade competition are related to the size of the rents at the end of the eighties in French manufacturing. In particular, using a regression discontinuity strategy based on French institutions, I show that bargaining institutions are likely to *cause* the structure of this relation.
  - – Because bargaining institutions matter and, in particular, unions' strength, I identify which firms face strong unions, i.e. unions with a strong bargaining power, and which firms face weaker unions. To do this, I estimate a structural wage equation that directly identifies unions' bargaining power. I explain how matched employer-employee data sources allow me to directly

measure the various components of this structural equation. My estimates then demonstrate that there are essentially two types of firms, depending on their bargaining regime: firms facing strong unions in which workers capture half of the rents and firms facing weaker unions where workers are paid their opportunity wage.

– Finally, I show that the former group of firms indeed increased outsourcing and, simultaneously, reduced employment over the 1986-1992 period, as predicted by the model when the latter did exactly the opposite.

The article is organized as follows. Section 2 presents the theoretical model that I estimate in the following sections. In Section 3, I present the data that are used in the empirical analysis as well as the elements necessary for the empirical implementation of my model. In Section 4, estimation results are presented and potential interpretations are discussed. A brief conclusion ends the paper. Three Appendices end the paper. Appendix A derives elements for the theoretical model of Section 2. Appendix B describes the data sources in detail. Appendix C presents the instrumentation strategy in detail.

2. Wages, Employment, and Outsourcing: A Simple Bargaining Framework

Product market competition and wage bargaining are intimately related through the financial situation of the firms, their ability to pay their workers, as measured for example by rents (Abowd and Lemieux, 1993). In the remainder of this section, I briefly present a simplified representation of the bargaining process that takes place between a union and a firm, using an extension of a classic bargaining model (McDonald and Solow, 1981, Brown and Ashenfelter, 1986) when firms can outsource part of their production.

The model that I use articulates a stage of bargaining with a first stage where the firm decides its optimal level of outsourcing, through imports (of intermediates or of final goods). The bargaining model relies on the so-called strongly efficient bargaining, where workers and firms bargain over employment and wages,[5] because French institutions, as embedded in the French Labor Laws, and in particular the so-called Auroux Laws that I will describe below and use in my empirical analysis, clearly favor annual discussion of many issues including wages, hours of work, working conditions, and employment between

[5] Rather than the right-to-manage model, where negotiation is restricted to wages. See again Brown and Ashenfelter (1986) or Abowd and Lemieux (1993).

the firm and the workers' delegates or workers' union representatives. Let us study the second stage first:

Wages and Employment determination (second stage): In the strongly efficient bargaining framework, the union is rent-maximizing with objective function wl where w denotes workers' wage and l denotes the firm's employment (in France, all workers employed in the firm are represented by the unions or the personnel representatives). These representatives negotiate with a profit-maximizing firm with profit denoted by $\widetilde{\pi}$. The bargaining is over wages and employment. The threat points for the unions and for the firm are respectively $w_0 l$ and π_0.

To summarize, the Nash solution (w_N, l_N) to the bargaining problem solves the following equation:

$$\begin{aligned} (w_N, l_N) &= \arg\max_{w,l} \{(1-\theta)\ln[\widetilde{\pi} - \pi_0] + \theta \ln[(w - w_0)l]\} \\ \text{subject to } \widetilde{\pi} &= R(I,l) - wl \end{aligned} \tag{2.1}$$

where θ represents the workers' bargaining power, and, as before, I denotes firm's imports, and $R(I,l)$ denotes the firm's revenue function.

Outsourcing-Imports determination (first stage): I can now write the firm's profit conditional on the above levels of wage and employment (w_N, l_N). Therefore, if I define $G(I) = R(I, l_N) - w_N l_N$, firms determine their outsourcing level by finding

$$I_N = \arg\max_I G(I) - c(I) \tag{2.2}$$

in which $c(I)$ denotes the cost of outsourced production. Notice that the cost function, c, does not enter the second stage profit. Imports, being made in advance (first-stage), are subject to the usual hold-up problem (see Grout, among others). In addition, at this stage, I do not distinguish between imports of intermediates (outsourcing) and imports of final goods (offshoring).

Threat points: Because the threat points are central to my problem, I discuss their exact interpretation now. First, notice that π_0 has often been set to 0 in previous empirical research (Abowd and Lemieux, 1993, for instance).[6] Malcomson (1997) suggests that π_0 should measure the profits when the negotiations are inconclusive due to a delay or a

[6] Their explicit introduction within my framework is a clear departure from virtually all of the previous empirical research.

breakdown. Hence, it should reflect market alternatives and pressures. In particular, the firm threat point may potentially vary with imports of competitors since they capture effective trade competition. This idea is explicitly incorporated in various theoretical papers relating trade and wages. Mezzetti and Dinopoulos (1991) or more recently Gaston (1998) explicitly interpret π_0 as the value of the option to switch production abroad. "That is, π_0 varies positively with a credible outsourcing alternative for the firm" (Gaston, 1998). Furthermore, "During any dispute, the domestic firm supplies the market from abroad" (id.). However, these papers provide no formal proof of these intuitions. Two papers, though, present game-theoretic justifications for this.

In Leach (1997), an infinitely repeated bargaining game is played between a union and a firm producing a storable good. The firm has the option of accumulating inventories. Hence, during a strike, the firm can sell these inventories. In equilibrium, this accumulation lowers wages by reducing the rents from further production. Unions can strike. They do so, also along the equilibrium path, in order to limit the firm's inventories and, therefore, raise wages.

Coles and Hildreth (2000) use a related framework, with a single episode of bargaining of potentially infinite duration between a firm and a union with random alternating wage offers. Again, inventories held by the firm during the negotiation process play a central strategic role. Furthermore, they show (Theorem 1, page 278) that their (dynamic) problem can be rewritten as a Nash bargaining problem in which the firm's expected discounted profits, using the optimal sales strategy should the strike never end, is exactly π_0. After identifying the optimal sales strategy during the strike, they demonstrate that inventories are used as a threat to "force lower wages" (Theorem 3, page 280).[7]

Outsourcing in my approach play the same role as inventories in Leach's or Coles and Hildreth's. Outsourcing is obviously a way to externalize the building of inventories, potentially without the need of any local worker. This strategy is all the more effective since outsourcing and, in particular, imports of finished goods are most often programmed in advance.[8] Because outsourced production has been put in place before bargaining, firms

[7] In addition, they show that, because the firm's threatpoint increases faster than expected discounted revenues in inventories, wages are decreasing in inventories (Theorem 3, id.). Finally, they use this model to evaluate empirically changes in bargaining institutions in the UK.

[8] For instance, in the clothing industry in France (and more generally in Europe), all sourcing strategies that involve delocalization of the production process imply defining the product at least one year before selling it. See the discussions in Linge (1991) or Sadler (1994) for examples of other industries. Competing strategies are more short-term and allow the firm to produce locally in the so-called Sentier area, within Paris i.e. close to the customers. However, such strategies are almost exclusively used for restocking of

are able to use a sales strategy that does not rely on local workers (or at least not on all local workers, a fraction of them being still be available for certain tasks). Such strategies can obviously be implemented in various manufacturing industries through either foreign direct investments (FDI) or by using producers in relatively low-wage countries.

I follow Coles and Hildreth in that I do not specify the exact mechanism that helps the firm build its "inventories of imports". I just adapt their results to my problem. And, based on their results and following the rest of the literature, I pose my problem in the form of a Nash bargaining problem in which the firm's and the workers' threat point potentially depend on the sourcing strategies. Consistent with the Coles and Hildreth' theoretical results, I model the firm's threatpoint, $\pi_0(I) = R(I, 0)$, as the profit function when no worker is employed (hence, the wage bill disappears). It is a function of outsourced goods, through imports.

The game is solved by backward induction. The bargaining problem (2.1) is solved first. Given imports I, at the solution, the marginal product of labor is given by

$$R_l(I, l_N) = w_0,$$

explaining why the bargaining is called "strongly efficient". And, the resulting wage is given by

$$w_N = w_0 + \frac{\theta}{1-\theta}\frac{\widetilde{\pi} - \pi_0(I)}{l_N}$$

or, equivalently,

$$w_N = w_0 + \theta\frac{\widetilde{\pi}^0 - \pi_0(I)}{l_N}, \tag{2.3}$$

with $\pi_0(I) = R(I, 0)$ and $\widetilde{\pi}^0$ the profit when the wage is evaluated at w_0:

$$\widetilde{\pi}^0 = R(I, l_N) - w_0 l_N.$$

Therefore,

$$\begin{array}{l} w_N = w(w_0, \theta, I, l) = w_0 + \theta\frac{R(I,l_N) - w_0 l_N - R(I,0)}{l_N} \\ l_N = l(w_0, I) = R_l^{-1}(I, w_0) \end{array} \tag{2.4}$$

are the first-order conditions for the bargaining game.

Then, the firm optimizes its outsourcing level I by maximizing $G(I) - c(I)$ with $G(I) = R(I, l_N) - w_N l_N$

small quantities based on the most recent information (Zara, a leading European clothing company, is another example of a firm using this constant restocking strategy).

To gain a better intuition of the effects at play, let us consider the following CES functional form for $R(I,l)$: $R(I,l) = \left[I^{\frac{\sigma-1}{\sigma}} + l^{\frac{\sigma-1}{\sigma}}\right]^{\alpha\frac{\sigma}{\sigma-1}}$ with σ the elasticity of substitution. Rewriting $R(I,l) = p(y)y$ with $y = \left[I^{\frac{\sigma-1}{\sigma}} + l^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}$, and $p(y) = y^{-\frac{1}{\eta}}$ with η the demand elasticity, the parameter α in the revenue function $R(I,l)$ is $\alpha = \frac{\eta-1}{\eta}$.

After some manipulation, the following result summarizes this section (see Appendix A for the general derivation):

Result: *Whenever* $\frac{\eta-1}{\eta} < \frac{\sigma-1}{\sigma}$, *i.e. the demand elasticity is strictly smaller than the elasticity of substitution between imports and labor, outsourcing (imports) is increasing in workers' bargaining power,* θ. *Under the same condition, employment is decreasing in the firm's imports. However, wages can be either increasing or decreasing in the firm's imports; on the one hand, decreased rents depress wages but the hold-up problem, on the other hand, may have the opposite effect.*

Proof: See Appendix A.

Therefore, under the above condition, a firm, facing a union with a large bargaining power, θ, will outsource a larger share of its production than a firm facing a relatively weak union.[9] Now, the CES functional form gives a clear intuition of how firms use outsourcing to manipulate the size of the pie that they bargain over with their unions. Increasing production essentially decreases the output price. Hence, offshoring creates a threat point that reduces the size of the rent to be shared after bargaining. This pushes firms facing strong unions to outsource. Through these changes of the quasi-rent, this effect depresses wages. But, because of the potential hold-up effect – outsourcing being decided at first-stage, the cost of outsourcing is subtracted from revenues to compute the first stage profit of the game, $G(I) - c(I)$, but does not enter the second stage profit $\widetilde{\pi} = R(I,l) - wl$ (bargaining) – the final effect of outsourcing on wages can be positive or negative (in contrast to Leach (1997), for instance in which there was no potential for hold-up). Finally, under similar conditions, outsourcing leads to lower employment.

Intuitively, **the elasticity of substitution σ should be larger for imports of final goods than for imports of intermediates**. Hence, all these effects should be **stronger** for the former (offshoring) than for the latter type of imports (pure foreign outsourcing of intermediates).

[9] To see this, notice that the first-order condition for the outsourcing problem is $c'(I) = (1-\theta)[R_I(I,l_N) - R_I(I,0)] + R_I(I,0)$. where $R_I(I,l_N) - R_I(I,0)$ is a measure in the change of the size of the rent, $(1-\theta)$ shows the hold-up effect, and $R_I(I,0)$ captures the change in the threat point. And a greater θ entails a larger outsourcing I if the cross-derivative $R_{I,l}(I,l)$ is negative.

Indeed, the above discussion shows that **offshoring acts as a worker's discipline device** when there is imperfect competition on the product market. Let us contrast the outcomes under autarky with those under opening of trade. Under autarky with imperfect competition, prices are above marginal costs and supply of goods is reduced. Employment, under efficient bargaining, is independent of the bargaining power θ. However, this bargaining power affects the sharing of the rent between workers and firms. Hence, consumer welfare is not affected by θ (but is clearly decreased because of imperfect competition). Now, when markets open in this context of imperfect competition, two effects will affect positively consumer welfare. First, because firms are able to import goods and intermediates, the set of potential technologies available to the firms expands, with the associated (likely) increase in production. Second, firms facing strong unions will "over-offshore" to discipline their employees, through an altered threat point. This effect also increases production and consumer surplus. Interestingly, opening is more beneficial to consumers when unions are strong than when unions are weak, in a context where employers have market power.[10]

In summary, we now have a structural model of employment and wage determination with clear game-theoretic foundations and clear predictions. And, I show in the remaining sections that it has strong empirical support.

3. Data and Empirical Implementation

In order to examine the relation between offshoring, foreign outsourcing of intermediates, employment, and the size of quasi-rents as well as structurally estimate the wage equation (2.3) as derived just above, it is useful to list all the components that are necessary to perform this task. It will help the reader understand the main differences between this paper and its predecessors as well as some of its contributions.

First, I need to relate a worker's wage with her employing firm measure of outsourcing, quasi-rents, employment, competitive environment, and union activity. To measure quasi-rent, I also need to measure each worker's opportunity wage. All these variables are **directly** measured in this article, in sharp contrast with the rest of the literature. To examine *wages*, I use person-level measures together with observable personal characteristics (in contrast with Abowd and Lemieux, 1993 or Blanchflower et al., 1996 who use firm-level

[10] I would like to thank Emmanuel Jessua and Cyril Nouveau for pointing out this consequence of my model.

sources). To measure workers's *opportunity wage*, I estimate for each individual her alternative wage on the market (taking stock of recent developments in the analysis of matched employer-employee data, used in my analysis). To measure *outsourcing* (offshoring of final goods and outsourcing of intermediates), I use firm-level measures of foreign outsourcing of the two kinds (in contrast with Bertrand, 2004, who only uses industry-level import data) and to measure the size of rents that workers and firms share, I construct firm-level measures of quasi-rent (because they do not measure workers' opportunity wage, Abowd and Lemieux, 1993 use an equivalent with potential measurement error whereas Blanchflower et al., 1996 use profits). In addition, I am the first to use exhaustive information on all imports (and exports) in France, measured both at the firm-level and at the product level (to directly measure trade competition). To measure *union activity* and *bargaining outcomes*, I use firm and establishment measures of bargaining agreements at the end of my sample period, 1992. Finally, because outsourcing decisions or quasi-rents are likely to be endogenous and OLS estimates biased when estimating my wage equation, I use a strategy similar to my predecessors and use instruments (Abowd and Lemieux, 1993 for the quasi-rent; Bertrand, 2004 for industry-level imports). Because measurement and endogeneity issues are directly related, I will show that by providing solutions to the former I solve (part of) the latter.

3.1. Measurement of the variables in the estimating equation

3.1.1. Data on workers' wages, and their firm's imports and other economic outcomes

The estimating equation relates a worker's wage to her employing firm's imports, quasi-rent, ... Obviously, employee-level data sources and firm-level data sources must be simultaneously accessible. And the individual-level source must contain the employer's identifier. Indeed, I use data from 4 different ongoing administrative data sources or statistical surveys that allow me to match workers to firms.[11] The first of these data sources is the DADS (Déclarations Annuelles de Données Sociales), which is an administrative file based on mandatory reports of employees' earnings by French employers to the Fiscal administration. Hence, it matches information on workers and on their employing firm. This dataset is longitudinal and covers the period 1976-1996 for all workers employed in the private and semi-public sector and born in October of an even year. In addition, for all

[11] These surveys were conducted by the Institut National de la Statistique et des Etudes Economiques (INSEE, the French national statistical agency), by the Ministry of Labor, or by the Customs.

workers born in the first four days of October of an even year, information from the EDP (Echantillon Démographique Permanent) (our second data source) is also available. The EDP comprises education and demographic information. These are my two worker-level sources. Using the firm identifier they can be directly matched to my firm-level sources, described now. The Customs data come from an administrative file based on mandatory declarations of all trade in goods. They are available for all years from 1986 to 1992.[12] Following Biscourp and Kramarz (2007), I contrast imports of finished goods and imports of intermediates. To define the two, I compare the 3-digit industry of the imported good with the 3-digit industry of the importing firm. If they match, I call this import a "finished good". If not, I call this import an "intermediary consumption". The first gives my measure of offshoring whereas the second gives my measure of outsourcing (of intermediates). The fourth data source is the BAL-SUSE file. It gives me balance-sheet information (value-added, sales, intermediary consumptions in particular) and employment. It includes most French firms, subject to the fiscal report called the Bénéfices Industriels et Commerciaux (BIC). All sectors, except the public sector, are covered. Data are available for the period 1984-1992. Matching all these sources together yields (approximately) 112,000 worker-level observations. These sources are described in more detail in Appendix B.

3.1.2. Data on unions activity and bargaining agreements

To measure firm and establishment level bargaining activity, I use the so-called Enquête Structure des Salaires (ESS, hereafter) for year 1992 (final year of my analysis period). This survey collects information on firm or establishment level bargaining under the Lois Auroux. The Lois Auroux stipulate that bargaining must take place every year in an establishment or a firm above 50 employees. But, crucial for the analysis, even though bargaining is mandatory, firms can refuse to bargain on some subjects, employment for instance, and firms are not forced to sign an agreement at the end of the bargaining process.[13] The data tell me if a round of bargaining took place in that year. In addition, I know the topic of the negotiation: wages, employment, other. Finally, for each topic of the negotiation, I know if an agreement was signed in that year. Unfortunately, because the ESS samples establishments using a frame based on establishment or firm size, I lose a

[12] After 1992, data are less exhaustive: small transactions are not recorded any more.

[13] Even though bargaining is supposedly mandatory, some establishments do no start a round of negotiation every year.

fraction of my observations, mostly in smaller units. The resulting file has 37,698 (worker-firm-year) observations, a third of the original file.

3.1.3. Measuring workers' opportunity wage and firms' quasi-rent

Opportunity wage: Workers' alternative wage captures what workers can receive in case of a strike, i.e. their value outside the firm. I first rewrite this alternative wage, w_0, as the sum of two components: $w_0 = w^a + w_0(\overline{I})$. The first component, w^a, captures the unconditional opportunity cost of time, which only depends on workers' characteristics, both observed and unobserved, with value in every industry. The second component, $w_0(\overline{I})$, tries to capture workers' value in firms' that produce the same product as the original workers' employing firm.[14]

To directly measure each worker's opportunity wage, w^a, I *first estimate* the following basic statistical model

$$\ln w_{it} = x_{it}\beta + \alpha_i + \psi_{\mathrm{J}(i,t)} + \varepsilon_{it} \tag{3.1}$$

in which w_{it} is the measured annualized earnings for the individual $i = 1, \ldots, N$ at date $t = 1, \ldots T$; x_{it} is a vector of P time-varying exogenous characteristics of individual i; α_i is a pure person effect; $\psi_{\mathrm{J}(i,t)}$ is a pure firm effect for the firm $\mathrm{J}(i,t)$ at which worker i is employed at date t, and ε_{it} is a statistical residual. For this, I use the full DADS sample over the 1976-1996 period, as described above (13 millions observations, 1 million individuals, more than 500,000 firms).[15]

Based on equation (3.1) and its estimation results, I now explain how to derive each worker's opportunity wage. Assume that a simple random sample of N individuals is observed for T years. The external (opportunity) wage rate for person i is the expected value of her wage conditional on her characteristics and identity, i.e. not knowing the employer's identity. In my estimating framework, the above equation gives a measure of

[14] $w_0(\overline{I})$ is directly related to the declining employment opportunities in the worker's industry due to import substitution away from the labor input. To measure this component, I use various statistics on imports of the **same good** made by the firm's competitors and made by the wholesale or retail trade industry (see Appendix B). Potential effects of unemployment are captured directly by introducing the local unemployment rate in the control variables.

[15] Identification and estimation of this type of equation is discussed at length in Abowd, Kramarz, and Margolis (1999) as well as in Abowd, Creecy, and Kramarz (2002). In the latter, the full least-squares solution is implemented. These papers show that estimation of the person and firm-effects requires very large data sets and a sufficient number of years for the person-effects to be precisely estimated. So, I estimate the previous equation using the full DADS data set (13 millions observations for the period 1976-1996).

this external (opportunity) wage rate, defined as $w^a_{it} = E\left(w_{it}\,|x_{it}, i\right)$.[16] Hence:

$$\ln w^a_{it} \approx x_{it}\beta + \alpha_i \tag{3.2}$$

in words, the (log of) worker's opportunity wage is the sum of returns to her observed, time-varying, personal characteristics with her observed and unobserved time-invariant personal characteristics. Hence, $\psi_{\mathrm{J}(i,t)}$ is a measure of the systematic premium paid to worker i by firm $\mathrm{J}(i,t)$ over her opportunity wage.

Quasi-rent: To measure the firm's quasi-rent, I use the following strategy. First, as explained just above, I posit that the workers' threat point (see 2.3) can be decomposed in $w_0 = w^a + w_0(\overline{I})$. This allows me to rewrite wage equation (2.3) as

$$w_N = w^a + \theta\frac{\widetilde{\pi}^a - \pi_0(I_N)}{l_N} + (1-\theta)w_0(\overline{I}) \tag{3.3}$$

where $\widetilde{\pi}^a$ is the quasi-rent evaluated at worker's alternative wage, w^a:

$$\widetilde{\pi}^a = R(I_N, l_N) - w^a l_N$$

Now, assuming for simplicity that all workers have the same alternative wage w^a, we see that $w_N = w^a \exp\psi \exp\varepsilon$ (using both 3.1 and 3.2). Hence,

$$\widetilde{\pi}^a = R(I_N, l_N) - E[\frac{w_N}{\exp\psi \times \exp\varepsilon} l_N]$$

where E denotes the expectation taken in the firm of the relevant random variable. First, note that the firm effect is constant in the firm. Then, by the same reasoning as above, the equation can be rewritten as:[17]

$$\widetilde{\pi}^a = R(I_N, l_N) - \frac{w_N l_N}{\exp\psi} \tag{3.4}$$

Therefore, to measure the quasi-rent $\widetilde{\pi}^a$, I use a measure of labor costs, $\frac{w_N l_N}{\exp\psi}$, that eliminates the costs due to the pure firm-effects. Finally, to measure $\pi_0(I_N)$, I use a function of the firm's own imports.

[16] Notice that $\ln w^a_{it} = \ln E\left(w_{it}\,|x_{it}, i\right) = (x_{it}\beta + \alpha_i) + \ln E(\exp(\psi_{\mathrm{J}(i,t)} + \varepsilon_{it}\,|x_{it}, i)$. Then, because the pure firm effect $\psi_{\mathrm{J}(i,t)}$ and ε both have mean 0, and variance σ^2_ψ and σ^2_ε respectively, we have $E[\exp(\psi+\varepsilon)] = \exp\frac{\sigma^2_\psi + \sigma^2_\varepsilon}{2} \approx 1$, assuming that both ψ and ε are normal as they appear to be, and because, in the economy, σ^2_ψ and σ^2_ε are small (0.08 and 0.04 respectively, for all these results see Abowd, Creecy, and Kramarz, 2002) and can be taken as independent of the person observed or unobserved characteristics.

[17] Assuming that ε is normal with mean 0, and variance σ^2_ε, we have $E[\exp\varepsilon] = \exp\frac{\sigma^2_\varepsilon}{2} \approx 1$, since σ^2_ε is small (0.04, see Abowd, Creecy, and Kramarz, 2002) and is independent of the person and the firm observed or unobserved characteristics, as derived previously.

To summarize, in equation (3.3) I am now in position to directly measure each worker's *opportunity wage* w^a (from previous estimation), each manufacturing firm's *quasi-rent* $\widetilde{\pi}^a$ (from balance-sheet data, see data description above, and previous estimation for an estimate of ψ), l_N (from balance sheet-data), $\pi_0(I_N)$ (from Customs data at the firm level), and $w_0(\overline{I})$ (from import data of competitors).

3.2. Endogeneity and other potential econometric problems

Apart from measurement problems discussed in the previous subsection, there are multiple potential econometric pitfalls in estimating equation (3.3):

(i) When the splitting parameter θ varies by firm, and when this parameter is correlated with the size of the quasi-rent, estimates of θ will be biased upward (downward) if this correlation is positive (resp. negative) (see Abowd and Lemieux, 1993). Our discussion of Section 2 suggests that the correlation should be positive because large rents are likely to induce strong unions.

(ii) When the contract is not strongly efficient, then wages, quasi-rent, and employment are determined jointly. This standard endogeneity bias makes OLS estimates inconsistent. Abowd and Lemieux (1993) as well as Abowd and Kramarz (1993) show that proper estimates of (3.3), using instrumental variables, yield a lower bound for the bargaining parameter when the contract is not strongly efficient (see in particular the discussion in Abowd and Lemieux from page 988 to page 990).

(iii) Because I want to separately identify the bargaining parameter θ from the threat point $\pi_0(I_N) = R(I_N, 0)$ and from import competition that affects $w_0(\overline{I})$, I must assume that θ does not depend on imports of the firm nor on imports of competitors. Put differently, $\theta(I_N, \overline{I})$ **is not separately identifiable from** $\pi_0(I_N)$ **and** $w_0(\overline{I})$ **in equation (3.3)**. **Hence, I assume that** θ **is fixed over the analysis period**.

In all cases, *in order to identify this bargaining parameter* θ, movements reflecting changes in product market competition should translate into movements of the quasi-rent. To understand the issue, Appendix C of Kramarz (2007) presents a model that explains the various problems. A first consequence of his model is the following. If the measure of the workers' opportunity wage is precise enough, the quasi-rent should not be endogenous in a **person-level** wage equation, as is estimated here.

However, an empirical strategy still has to be set-up **if** the quasi-rent is found to be endogenous despite all measurement efforts. I follow the literature in using instrumental

variables. My choice of instruments is discussed later when I present estimates of equation (3.3).

4. Offshoring, Quasi-rent, and Employment

For years, many French firms enjoyed the protection of various regulations, subsidies, tariffs, and entry restrictions. In addition, because of collective agreements (first signed by large firms and then extended in the 1970s by the Ministry of Labor to virtually every firm and every worker in the manufacturing sector), firms faced unions with strong power and minimum wages were high. Small firms, which typically depend on lower labor costs, were in a difficult position to compete against larger companies. Entry and growth of potential competitors was reduced. In addition, the first years of the Mitterrand presidency witnessed a thorough nationalization process of large private companies. All these facts generated rents in many industries, most particularly manufacturing. These rents were directly reflected into wages, particularly in large firms.[18]. In addition, the Lois Auroux were introduced in 1981 just after François Mitterrand's presidential election. These laws enhanced workers' bargaining power at the level of the firm.[19]

However, in the ensuing years, market reforms were implemented (see Bertrand, Schoar, and Thesmar, forthcoming for the financial side of the reforms in the mid-eighties) and foreign competitors entered the French scene. Simultaneously, new markets opened. In response, some of those large French firms increased their imports of intermediates and launched offshoring strategies. And, indeed, competition became fiercer. The early "equilibrium" started to unravel. More precisely, in the so-called White Paper from the Commission, the Single Market Program was announced in 1985.[20] The SMP was launched in 1988 with the stated goal of achieving a single internal market for goods in 1992. This program included lowering of tariffs and trade barriers within the EC. As already explained in Hoeller and Louppe (1994), the goal took more time to be reached than initially thought. However, the period under study is one of great changes in trade. European firms could both import and export more easily, at least within the EC. And numbers show that,

[18] See Abowd, Kramarz, and Margolis (1999) for evidence on France. More recently Abowd, Kramarz, Lengermann, and Roux (2007) analyze inter-industry wage differences in France and in the United States and show that the firm-specific component of these differentials is associated both with monopoly power on the firms side and union power on the workers side, in France and during the seventies and eighties, at least.

[19] The Lois Auroux explicitly include the obligation to negotiate for establishment or firms meeting certain conditions (size, among others). See Cahuc and Kramarz, 1997 for a description of their principles, see also Abowd and Allain, 1996 who provide some evidence supporting this claim. See below my analysis.

[20] See the text in http://aei.pitt.edu/archive/00001113/, accessed November 21, 2005.

indeed, trade increased dramatically.

In the rest of this section, and before turning to more structural results, I want to present simple evidence describing the consequences of the above facts.

My first piece of evidence is presented in Table 1. The table shows the results of the following regression of quasi-rent (per employee), $\frac{QR_{j,t}}{l_{j,t}}$, on measures of imports by firm j at date t:[21]

$$\frac{QR_{j,t}}{l_{j,t}} = \delta \frac{I_{j,t}}{R(I_{j,t}, l_{j,t})} + \alpha_j + \varepsilon_{j,t}$$

where α_j is a firm-fixed effect and $\varepsilon_{j,t}$ is a statistical residual. The measures of imports distinguish between imports of finished goods (my measure of offshoring) and imports of intermediates (outsourcing). The regression controls for firm-fixed effects.[22] Hence, I capture the impact of within-firm variations over the sample period (1986-1992) of the import measures on the size of the rent.

Results in the first column show that more intense offshoring as a fraction of sales (imports of goods divided by total sales) deteriorates the size of the quasi-rent (per worker) that the workers and the firm will have to divide if they bargain. Imports of intermediates (divided by total purchases) have no such effect. Interestingly, results in the next two columns show that offshoring affects the size of the rent only in relatively large firms (above 50 employees; the Auroux laws threshold) and does not have an impact on smaller firms where quasi-rents appear to be much smaller (see the coefficient on the constant).[23]

Now, this last fact might just be a reflection of size: larger firms might behave differently. To see if this threshold really matters, I perform two tests based on this *discontinuity*. The first one, presented in the last two columns of Table 1, examines the same regression as before restricting attention in the first of the two columns to firms with 31 to 50 employees and, in the second of the two columns to firms with 51 to 80 employees. Results show a clear and sharp difference in the association between quasi-rents and imports of finished goods (offshoring) on the two sides of the threshold.[24] To further confirm that

[21] The observations are individuals matched to their firm. Larger firms have more individual observations, in proportion to their size. Hence, these regressions are identical to doing firm level regressions weighted by employment.

[22] Most regressions discussed in the following paragraphs include firm fixed effects. If firm effects are not included, this will be explicitly mentioned in the text.

[23] In unreported regressions, I checked that, **as predicted by the theory**, quasi-rent per person is positively related to offshoring (results can be obtained from the author). Here, the negative relation comes from measuring offshoring as a fraction of sales.

[24] Importantly, the 50 employees discontinuity is not as sharp as in other economic examples. First, there are different ways to count the number of employees. For the Law, the exact limit is 50, but all employees

the 50 employees threshold is indeed doing something, I look at how imports of goods and imports of intermediates change *within* firms when the firm moves below and above the 50 employees threshold. To test the role of the threshold, I keep all observations for firms with more than 30 employees. Then, I regress imports on a full set of firm fixed effects and indicators for firms with 51 to 80 employees, for firms with 81 to 250 employees, and for firms with more than 250 employees (the reference being firms below the Auroux Laws threshold). Results are presented in Table 2. Again, the discontinuity matters. Firms changing size, from *just below* the threshold to *just above* the threshold, increase their imports of finished goods (by 0.4% of their sales in France; based on the intercept (7.5%), the ratio increases by roughly 5%). Nothing similar appears to happen when firms change size above 80 or even more for firms that go above 250 employees. Hence, offshoring increases when firms are at, or just above, the threshold. To give a sense of the magnitude of the effects, a one point increase in the share of offshoring in sales converts into a decrease of the quasi-rent of 350 French Francs per worker (or of 0.5 points of the QR per employee, see Table B.1).

Now, we may ask whether outsourcing also affects firms' employment or not. Table 3 helps answer this question. And the simple answer is positive, at least in large firms. But the smaller firms are not affected by more intense offshoring (see the next two columns). And, in line with these results and with the model, imports of intermediates have no clear impact on employment nor on quasi-rent (see Table 1). In addition, to assess robustness of these results, I introduced measures of trade competition (imports of finished goods by competitors). None of these results were affected.[25] To further assess robustness, results in the last column of Table 3 show that exports are not associated with movements in employment.[26] Hence, there is something specific to the firms' offshoring (imports of finished goods).[27] Large firms decrease employment when their own offshoring increases; in the mean time, the relative size of the rent to share with workers decreases. Again, to give a sense of the magnitude of the effects, a 10 points increase in the share of offshoring

are not "equal" in the computation (part-time part-year vs full-time full-year, for instance). Hence, I use 51 rather than 50 (results are unchanged if I use 31-49 and 50-80 groupings). In addition, the presence of unions delegates or personnel delegates is another central element in the precise application of the Auroux Laws. To simplify the analysis, I will focus on the size threshold as measured above.

[25] Estimates are available from the author.

[26] All these results are in full agreement with those of Biscourp and Kramarz (2007), based on a larger set of firms.

[27] As a further test of robustness, the joint inclusion of the import competition variables (imports of competitors, of finished goods and of intermediates) and the firms' import variables does not alter any result of Tables 1 and 3.

in sales is associated with a 1.3 points decrease in employment.

To conclude this Section, offshoring seems to be a strategy that affect quasi-rent and employment, for reasons that appear to be caused by French bargaining institutions (Auroux laws). In the next Section I focus on these bargaining institutions. More precisely, and in line with the theoretical model, I try to measure the strength of unions across firms and bargaining regimes and relate this strength to firms' importing behavior.

5. Estimating Unions Bargaining Power

5.1. The Estimating Equation

To understand the role of unions in the bargaining process and its connection with outsourcing, I use the ESS survey for year 1992. Because the Auroux Laws (Lois Auroux) stipulate that bargaining should take place every year in an establishment or a firm with more than 50 employees, the data tell me if a round of bargaining took place in that year. In addition, I know the topic of the negotiation: wages, employment, other. Finally, for each topic of the negotiation, I know if an agreement was signed in that year. Because the ESS samples establishments using a frame based on establishment or firm size, I lose a fraction of my observations, mostly in smaller units in comparison with results in Tables 1, 2, and 3 (or those contained in Kramarz, 2007). The resulting file has 37,698 (worker-firm-year) observations.

Descriptive statistics show that 26% of workers were employed in a firm where negotiations on employment took place in 1992. For most of them, 82%, an agreement was signed after the negotiation. Virtually all these firms also negotiated wages with their employees. Only 4% of the workers are employed in firms that negotiated on employment without negotiating on wages. Furthermore, 81% of the workers were employed in firms that negotiated on wages; with 65% among them eventually signing an agreement. Even though the different bargaining regimes are not perfectly aligned with the theory, I focus on a limited number of bargaining regimes. Hence, for each individual observation, I classify the employing firm as:

i) bargained with unions (or personnel delegates) on employment (and wages);

ii) bargained with unions (or personnel delegates) on wages;

iii) did not bargain with unions or personnel delegates.

In what follows, in line with the efficient bargaining model with imports that I adopted, I mostly constrast these three types of firms. I also show that results are robust to different

groupings. In particular, the first category widely differs from the rest of the firms. To distinguish between firms with heterogeneous bargaining regimes, I estimate a variant of (2.3) in which θ can take three values, θ_e, θ_w, θ_n depending on the bargaining regime:

$$w_N = w^a + \theta_i \frac{\widetilde{\pi}^a - R(I_N, 0)}{l_N} + (1-\theta_i) w_0(\overline{I}) \quad \text{where } i = e,\ w,\ n \text{ and } \widetilde{\pi}^a = R(I_N, l_N) - w^a l_N \tag{5.1}$$

My goal is to estimate the θ_i, the bargaining parameters. They will allow me to assess which firms face strong unions and which firms do not. Then, the next Section will check how unions' bargaining power is related to outsourcing and employment.

As explained in the previous Section, there are many reasons to believe that quasi-rent, $\widetilde{\pi}^a$, is endogenous in equation 5.1). Hence, I must use, if necessary, an instrumental variable strategy. It is described in the next subsection.

5.2. Instruments: Export Prices of US Firms to Measure French Product Market Conditions

Valid instruments must reflect changes in product market conditions inducing movements in the *quasi-rent* or in the *offshoring and outsourcing (import)* decisions of the firms, but they must be uncorrelated with the error terms in the wage equation.

Product market conditions are determined by local conditions as well as by global factors. Many among these local factors can be affected by the local firms' behavior. But, most often, the global factors are beyond the reach of the French firms that I examine. Among these global factors, exchange rates naturally come to the mind. Business conditions, costs and productivity shocks that take place in any countries that trade in the World market are likely to affect many local decisions of French firms. For instance, a positive productivity shock in the textile industries of some Asian economies might affect outsourcing decisions of French firms, hence their imports and their employment. An increase in the price of oil might have an impact on the ability to consume and to import of Middle Eastern countries. A positive productivity shock in the American steel industry willl affect negatively the French steel producers but they will affect positively the French automobile industry, a heavy user of steel. These shocks in different countries will have a differentiated impact on the different firms depending in particular on their exposures to these various global markets since some export whereas some do not, some import whereas some do not, some are global competitors whereas some are not.

In addition, as explained earlier, the period under consideration is one of implementation of the Single Market Program (SMP) within the European Community. Competition increased drastically in virtually all manufacturing industries; accordingly the reaction of firms to shocks should also be easier to identify during this period.

To summarize, valid instruments should be correlated with the quasi-rent, seniority, and other endogenous variables such as firm's imports. In line with Abowd and Lemieux (1993), Abowd and Allain (1996), and Bertrand (2004), I am trying to capture variations in the firms' *ability to pay*, as measured by the $\frac{R(I_N,l_N)}{l_N}$. This ability to pay is in particular determined by supply conditions on the product market. And, to trace the supply (of goods) curve, I must find measures of exogenous demand shocks affecting product market competition. Therefore, I use international market prices, in US Dollars, to instrument both firm- and person-level variables. More precisely I use industry-specific export prices of United-States manufacturing firms in four destinations. These variables meet the various requirements presented above. Because they are export prices, they are determined on the world market and are therefore likely to be relatively unaffected by French producers. In addition, because they are export prices as set by US firms, they reflect world competition as perceived by a large player. In particular, *they may incorporate the shocks induced by the SMP*. Furthermore, as these price indices are in fact unit value indices computed in US dollars, they also reflect exogenous variations in the exchange rate of the US dollar vis à vis different destination countries. These prices are measured at the 3-digit industry level. Therefore, I should be able to capture multiple variations, affecting *differently* firms according to their *specific exposures* to the various markets.[28]

Evidence that these export prices represent pure demand shocks is presented in Appendix C, first paragraph. One can conclude from this exercise that past variations in US export prices reflect *demand* shocks affecting French firms. These prices allow me to estimate valid *supply* equations: when prices go up, production increases. Hence, there are good economic reasons to believe that such instruments are well-suited to the present needs of my statistical analysis. More evidence is presented below.

[28] Abowd and Lemieux (1993) used ideas related to this procedure when studying Canadian firms, Abowd and Allain (1996) also used a similar idea when instrumenting French firms' quasi-rents, Bertrand (2004) used a related strategy when instrumenting industry-level import penetration ratios by source-weighted industry exchange rates, and Gourinchas (1999) shows how exchange rates affect job flows.

5.3. Estimation Results

Following my previous discussion, and Kramarz (2007), I estimate the following equation for worker i, employed at date t by firm $j = \mathrm{J}(i,t)$ where J is a function that associates a firm j to a worker date pair (i,t):

$$w_{i,t} = \theta_{b(j)} \frac{\widetilde{\pi}^{a}_{j,t}}{l_{j,t}} + \phi_{b(j)} \frac{I_{j,t}}{S_{j,t}} + \tau_{b(j)} \frac{IC_{j,t}}{P_{j,t}} + \lambda_{b(j)} f(\overline{I}_{j,t}) + h(x_{i,t}, \alpha_i) + \upsilon_{i,t}$$

where

- $w_{i,t}$ is worker i's total labor costs for year t, in levels (not in logs);
- $\frac{\widetilde{\pi}^{a}_{j,t}}{l_{j,t}}$ is firm j quasi-rent at date t, measured using equation (3.4) described in the Measurement Subsection of the Data Section;
- $\frac{I_{j,t}}{S_{j,t}}$ is my measure of offshoring at firm j at date t. It is the share of imports of goods in sales;
- $\frac{IC_{j,t}}{P_{j,t}}$ is my measure of foreign outsourcing at firm j at date t. It is the share of imports of intermediates in total purchases;
- $f(\overline{I}_{j,t})$ is a control function capturing the imports of competitors of firm j, $\overline{I}$. It includes measures of imports of goods, of intermediates by firms from the same industry as j; measures of imports of goods similar to those produced by firm j made by wholesale firms. These measures are both in levels and expressed as shares of respectively sales (for imports of goods) and purchases (for imports of intermediates). For the shares, the 99th percentiles of the respective distributions within each 4-digit industry are used in the preferred specification (see Appendix B for a detailed description);
- $h(x_{i,t}, \alpha_i)$ is a control function of observables, $x_{i,t}$, and unobservables, α_i, of worker i for year t. It is estimated as a second-order polynomial of these variables. α_i is estimated using equation (3.1) based on the full data with 13 millions observations, as described in the measurement section. in levels (not in logs). Because the estimated person-effect is included, the equation controls for person effects;
- $b(j)$ is the bargaining regime of firm j (bargaining on both employment and wages, on wages, no bargaining). Because of the data and because of my identification assumption, it is time-invariant;

- finally, $\upsilon_{i,t}$ is a statistical residual.

For the reasons discussed above (endogeneity, measurement error,...), this equation is estimated by IV, with quasi-rent (interacted with the bargaining regime $b(j)$, seniority and its square instrumented using my measures of product market conditions - export prices (industry-level unit values measured in US dollars of American firms to 4 destinations) - and the other control variables, duly interacted with the bargaining regime as required. Appendix C presents a fairly detailed presentation of the various elements of the estimation methodology.[29] Estimation results are presented in Table 4. For each estimated coefficient, I provide two sets of standard errors. Robust standard errors are given between parentheses. Standard errors that, in addition, account for clustering at the 3-digit industry level are given between brackets. These results tell a clear story.

In firms that did not negotiate on employment with their unions, $\theta_w = 0$ and $\theta_n = 0$ (hence, for those firms that bargained on wages and for those that did not bargain at all, respectively). Because workers' bargaining power is essentially zero, workers receive their opportunity cost of time, w^a, plus their negotiation threat point, $w_0(\overline{I})$. In other words, in firms where unions were too weak to impose negotiations on employment, workers were compensated at the market rate. More precisely, estimates show that, in firms that negotiated on wages but not on employment, the threat point is marginally increasing with the firms' own imports of finished goods (offshoring). But, in those firms, import competition – as measured by the 99th percentile of competitors imports of finished goods – slightly deteriorates workers' threat point.[30] In firms in which no negotiation took place, be they on wages or employment, we see that w_0 is essentially equal to the opportunity cost of time, w^a.

Now, if negotiating on employment with their unions, firms have to share half of their quasi-rents with their workers. In other words, in those firms, unions were strong enough to extract half of the quasi-rent. Hence, because $\theta_e = 1/2$, wages should also depend equally on $\frac{R(I_N,0)}{l_N}$ and $w_0(\overline{I})$ (see 5.1) First, there is no significant impact from firm's own imports. But, the most striking result is the strong and robust negative impact of the firm's competitors imports of finished goods, and (not significantly so) competitors

[29] Kramarz (2007) gives an even fuller account of these details.

[30] Hence, it seems that w_0 is also a function of the firm's own imports and should be noted $w_0(I, \overline{I})$. This result can be seen either as a simple extension of the theoretical model and just makes the optimal level of employment dependent on the firm's own imports, complexifying the ensuing computations, without changing the main conclusions. It can also be interpreted as a manifestation of a hold-up problem, because imports are made in advance (first-stage of the game).

imports of intermediates on workers' wages. Hence, workers benefit from the sharing of the rent, even though this quasi-rent appears to be under attack because of increased competition (see Table 1 and Table 3), but import competition strongly decreases wages in firms that negotiated (or were forced to negotiate) on employment.

We checked these results by regrouping the two categories of firms for which $\theta_w = 0$ and $\theta_n = 0$. Estimates are given in Table C.4. No previous conclusion is altered by this grouping. Other robustness tests were performed, including exports at the firm-level, estimated firm-effects, using the 95th percentile of the competitors imports distribution rather than the 99th. None of the conclusions is altered. It is important at this point to remind the reader that, as shown by Abowd, Kramarz, Lengermann, and Roux (2007), France was, in those years, a country where high-wages often came from the lack of product market competition (virtual monopoly rents), giving unions incentives to bargain hard. Indeed, large firms mostly benefited from these rents. As stated above, the Lois Auroux force firms with above 50 employees to negotiate with their workers but the topic is left to the parties. Indeed, most firms negotiate on something. However, not all firms agree to bargain on wages and even fewer bargain on employment (and wages, in fact). In that respect, because firms must negotiate but need not sign an agreement, signature of an agreement, on wages for instance, is is also a proof of strong unions, as (unreported) results show: in firms that sign an agreement, the bargaining power is $\theta_s = 0.37$.

6. Union Bargaining Power, Offshoring, and Employment

To complete the story and test my model, it is useful to understand why some firms negotiated on employment or wages and why other firms did not. Or, put differently, what happened in firms with strong union power that did not happen in firms with weaker union power ? At this point, it is crucial to remember my *maintained identification hypothesis* that the estimated firm bargaining power is fixed over the analysis period (see Subsection 3.2). Hence, I may ask and answer the above questions in two different ways. First, I can focus on the initial union strength and bargaining regime to ask: how did firms respond when faced with strong unions (at the start of the analysis period) ? But, I can also focus on the final union strength and bargaining regime to ask: what were the changes that took place in firms between 1986 and 1992 that led them to negotiate on employment with their unions (at the end of the analysis period, in 1992) ? In the first interpretation, workers' bargaining power **causes** firm's reaction. Indeed, the model implies that firm

facing strong unions should increase their outsourcing and decrease employment. In the second interpretation, the firms' behavior causes (or reinforces) workers' bargaining power. Indeed, I cannot sort between the two stories given my data. Furthermore, I can only estimate the second version since I observe negotiations in 1992. But, *consistent with my theoretical model* and its prediction that **a stronger union power causes increased imports, most likely imports of finished goods (offshoring)**, I will try to interpret the results using the first phrasing, relying on my maintained hypothesis of a fixed firm-level bargaining power over the analysis period.

To do this, in parallel with my wage analysis of the previous Section, I analyze (using a "multinomial logit" specification) the likelihood of a negotiation on employment, a negotiation on wages alone, or no negotiation (in 1992) conditional on various firm-level observables as measured from their growth rates over the analysis period.

Results are presented in Table 5. Firms that agreed (or were forced) to negotiate on employment with their unions at the end of the sample period had lower employment growth (in contrast with those firms that negotiated only on wages, the reference group, and much lower than those that did not negotiate). In complete opposition, these firms increased strikingly more their offshoring (measured by imports of finished goods) than firms that negotiated only on wages and even more so with firms that did not negotiate (the opposite holds for imports of intermediates, outsourcing). They also faced tougher competition, a higher growth in labor costs per person, and a higher growth of the quasi-rent per person over the sample period.

Using the model to give an interpretation, those firms facing strong unions improved their bargaining position (threat point) over the period by increasing offshoring before or while bargaining. Hence, these firms appear to have been substituting imports of finished goods for employment because of strong unions that forced them to share a very large fraction, $\theta_e = 1/2$, of their quasi-rent. The mere fact that unions were able to force firms to negotiate on employment suggests that they have been able to resist some changes, a reflection of their very strong bargaining power. As predicted by the model, strong unions' strength was associated with increased outsourcing of finished goods, eventually leading to further declines in their employing firms' employment in this increasingly competitive environment.

7. Conclusion

In this paper, I present the first direct micro-econometric evidence of the relation between unions bargaining power, firms' response by outsourcing (of finished goods or intermediates) and the impact on workers' wages and employment (see Bertrand, 2004 and Goldberg and Tracy, 2001 for evidence on trade and wages, in the United States, based on industry-level measures of import competition). The story that I evaluate relates firms' outsourcing strategies with their wages and employment behavior in an imperfectly competitive labor market where unions and firms have to bargain. To accomplish this task, I first derived employment and wage equations from a bargaining model that allows the analyst to examine outsourcing and its impact on workers' outcomes. The model shows that firms facing strong unions should use offshoring more intensively in order to squeeze the size of the quasi-rent that is bargained over, and to discipline workers. To estimate this model, I have used a unique matched employer-employee data source that contains information on firms' inputs, including imports by type of product, unions presence in those firms, as well as individual characteristics of a representative sample of workers employed at those firms. I show that the size of the quasi-rent is directly affected – decreased – by outsourcing, because of French bargaining institutions, in often formerly protected industries. Employment in these firms also decreased (see also Biscourp and Kramarz, 2007). When I estimate the structural person-level equation induced by the bargaining model, I show that for firms that bargained on both employment and wages with their unions, workers captured half of the quasi-rent. Workers in other firms were not able to capture a significant share of the rents. As predicted by the model, the firms that faced strong unions increased offshoring and decreased employment over the analysis period when the rest of firms saw their relative employment increase and appeared to have used outsourcing much less intensively. Unions' strength may well have backfired.

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Appendix A: Proof

Let us denote by $\phi^{\ell}(I,l)=0$ the first-order condition on employment $R'_{\ell}(I,l)=\omega_0$; by $\phi^{\omega}(I,l,\theta,\omega)=0$, the condition on wage: $\omega=\omega_0+\theta\left[\frac{R(I,l)-\omega_0 l-\pi_0(I)}{l}\right]$

Finally, let us denote by $\phi^{R}(I,l,\theta,\omega)=0$, the first stage condition that maximizes revenue as a function of imports:

$\frac{\partial R}{\partial I}-c'(I)-\theta\left[\frac{\partial R}{\partial I}-\pi'_0(I)\right]=0.$

From these three sets of equations, total derivation yields:

$\phi'^{l}_{I}(I,l)dI+\phi'^{l}_{\ell}(I,l)dl=0$

$\phi'^{\omega}_{\omega}d\omega+\phi'^{\omega}_{I}+\phi'^{\omega}_{l}dl+\phi'^{\omega}_{\theta}d\theta=0$

$\phi'^{R}_{\omega}d\omega+\phi'^{R}_{I}dI+\phi'^{R}_{l}dl+\phi'^{R}_{\theta}d\theta=0$

The first equation yields $\frac{dl}{dI}=-\frac{\phi'^{l}_{I}(I,l)}{\phi'^{l}_{\ell}(I,l)}=-\frac{\frac{\partial^2 R}{\partial I\partial l}}{\frac{\partial^2 R}{\partial l^2}}$

$\frac{dl}{dI}$ is of the sign of $\frac{\partial^2 R}{\partial I\partial l}$ since $\frac{\partial^2 R}{\partial l^2}<0$. Now, using the above expression:

$\phi'^{\omega}_{\omega}d\omega+\left(\phi'^{\omega}_{I}-\phi'^{\omega}_{l}\frac{\phi'^{l}_{I}}{\phi'^{l}_{l}}\right)dI+\phi'^{\omega}_{\theta}d\theta=0$

$\phi'^{R}_{\omega}d\omega+\left(\phi'^{R}_{I}-\phi'^{R}_{\ell}\frac{\phi'^{l}_{I}}{\phi'^{l}_{l}}\right)dI+\phi'^{R}_{\theta}d\theta=0.$

We can directly compute the different elements of these expressions:

$\phi'^{\omega}_{\omega}=-1$

$\phi'^{\omega}_{\theta}=\left(\frac{R(I,l)-\omega_0 l-\pi_0(I)}{l}\right)$

$\phi'^{R}_{\omega}=0$

$\phi'^{R}_{\theta}=-\frac{\partial R}{\partial I}+\pi'_0(I)$. Taken together, this yields

$\frac{dI}{d\theta}=-\left(\pi'_0(I)-\frac{\partial R}{\partial I}\right)/\left(\phi'^{R}_{I}+\phi'^{R}_{l}\times\frac{\partial^2 R/\partial I\partial l}{\frac{\partial^2 R}{\partial l^2}}\right)$

But, $\phi'^{R}_{I}=(1-\theta)\frac{\partial^2 R}{\partial I^2}-c''(I)+\theta\pi''_0(I)<0$ given the concavity of R and π_0 in I and the convexity of c in I .

In addition, $\phi'^{R}_{l}=(1-\theta)\frac{\partial^2 R}{\partial l\partial I}$ then $\phi'^{R}_{I}+\phi'^{R}_{l}\times\frac{\frac{\partial^2 R}{\partial I\partial l}}{\frac{\partial^2 R}{\partial l^2}}=\phi'^{R}_{I}+(1-\theta)\frac{\left(\frac{\partial^2 R}{\partial l\partial I}\right)^2}{\frac{\partial^2 R}{\partial l^2}}<0$. Therefore, this shows that $\frac{dI}{d\theta}$ is always of the sign of $\left[\pi'_0(I)-\frac{\partial R}{\partial I}\right]$.■

Now, $\frac{d\omega}{dI}=\left(\phi'^{\omega}_{I}-\phi'^{\omega}_{l}\frac{\frac{\partial^2 R}{\partial l\partial I}}{\frac{\partial^2 R}{\partial l^2}}\right)+\frac{\phi'^{\omega}_{\theta}}{\left[\frac{\partial R}{\partial I}-\pi_0(I)\right]}\times\left[\phi'^{R}_{I}+\phi'^{R}_{l}\frac{\partial^2 R/\partial I\partial l}{\frac{\partial^2 R}{\partial l^2}}\right]$ with:

$\phi'^{\omega}_{I}=\frac{\theta}{l}\left[\frac{\partial R}{\partial I}-\pi'_0(I)\right]$

$\phi'^{\omega}_{l}=-\frac{\theta}{l^2}\left[R(I,l)-\omega_0 l-\pi_0(I)\right]+\frac{\theta}{l}\left[\frac{\partial R}{\partial l}-\omega_0\right]=-\frac{\theta}{l^2}\left[R(I,l)-\pi_0(I)-l\frac{\partial R}{\partial l}\right]$

$=-\frac{\theta}{l^2}\left[R(I,l)-\omega_0 l-\pi_0(I)\right]<0.$

Assuming that $\pi'_0(I)-\frac{\partial R}{\partial I}>0$, we deduce that $\phi'^{\omega}_{I}<0$. Since $\phi'^{\omega}_{l}<0$ there are two cases.

a) If $\frac{\partial^2 R}{\partial l\partial I}>0$ then the first part of $\frac{d\omega}{dI}$ is negative and the second part is of the sign of ϕ'^{ω}_{θ} but $\phi'^{\omega}_{\theta}>0$ and the sign of

then the sign of $\frac{d\omega}{dI}$ is not determined.

b) If $\frac{\partial^2 R}{\partial l\partial I}<0$ the sign of $\frac{d\omega}{dI}$ is also undetermined since $\phi'^{\omega}_{I}<0$ but $-\phi'^{\omega}_{\ell}\frac{\frac{\partial^2 R}{\partial l\partial I}}{\frac{\partial^2 \ell}{\partial l^2}}>0$.■

Now, if one writes $R(y)=p(y)y$ and y being a CES production function, $p(y)=y^{-\frac{1}{\eta}}$ (see main text), it is straightforward to show that $\pi'_0(I)-\frac{\partial R}{\partial I}>0$ with $\pi_0(I)=R(I,0)$ is equivalent

to $\frac{\eta-1}{\eta} < \frac{\sigma-1}{\sigma}$.It suffices to note that $\frac{\partial R}{\partial I} = \alpha \left[1 + (\frac{l}{I})^{\frac{\sigma}{\sigma-1}}\right]^{\frac{\alpha\sigma-\sigma+1}{\sigma-1}} I^{\alpha-1}$. Furthermore, because $\frac{dl}{dI}$ is of the sign of $\frac{\partial^2 R}{\partial I \partial l}$ (see above), employment decreases in I whenever $\frac{\eta-1}{\eta} < \frac{\sigma-1}{\sigma}$.

Appendix B: Data Description

The Customs File: All movements of traded goods that enter or leave France are declared to the customs either by their owner or by the authorized customs commissioners. These declarations constitute the basis of all French trade statistics. Each movement - an operation - generates a record. All records are aggregated first at the monthly level. In the analysis file, these records are only available on an annual basis. They were aggregated at the firm-level using the firm identification number, the SIREN. Even though, each individual movement is present in the base files, the resulting files are not tractable. Hence, the analysis file contains for all exporting or importing firms and for all years, the amount of their total transactions in each year between 1986 and 1992 for each product of the NAP 100 classification (3-digit equivalent of the SIC code). Transactions are recorded in French Francs and measure the amount paid by the firm (i.e. including discounts, rebates,...). Even though our file is exhaustive - all export or import of goods are present - direct aggregation of all movements differ from published trade statistics, the latter being based on list prices. Furthermore, amounts are disaggregated by destinations for the exports and origins for the imports and by products (at the 3-digit classification level). The geographic classification is the most detailed possible since we know the exact country of origin or destination. In a previous analysis, I aggregated the data up to the following country classification:

(a) Germany (b) Spain, and Portugal (c) United Kingdom, Ireland (d) Italy (e) Benelux (f) Other EC countries (g) Switzerland (h) Eastern Europe countries (i) Turkey (j) Maghreb countries (k) Middle East countries (l) Other African countries (m) United States of America and Canada (n) Other American contries (o) India (p) China (q) Asian "Tigers" (Malaysia, Thailand, Taiwan,...) (r) Japan (s) Other countries. These groups of countries have been further aggregated for this particular study in 4 categories: European Community, Other OECD countries, Low-wage countries close to France (Eastern Europe and Maghreb), Other low-wage countries (referred in the tables as far-away low-wage countries) such as India, China,...

In addition, I define two groups of imported products. I compare the 3-digit industry of the imported good with the 3-digit industry of the importing firm. If they match, I call this import a "good". It gives my measure of offshoring. If not, I call this import an "intermediary consumption" (IC, as already defined).

The original file has 4,159,208 observations for the period 1986-1992. An observation contains the firm identifier, the year, the transaction value, the product, the origin or the destination. However, I do not know the price of the transaction. To deflate our measures of firm-level trade, I use 4-digit import and export prices computed for three geographic zones (EC, OECD outside EC, outside OECD) by the statisticians from the French National Accounts.

OECD export prices: I also use export prices of US manufacturing firms. These price indices are based on OECD computations based on US customs declarations. They are unitary values indices computed as a weighted average of the ratio of either transaction values or list values to quantities declared by American exporters. All these values are expressed in US dollars. These indices were aggregated at INSEE from the CTCI classification to the 3-digit level used in the French NAP (nomenclature d'activités et de produits, 1973) and are available for four destinations: developed countries including in particular OECD countries; countries from eastern

Europe; countries from OPEC; and developing countries. These series are available for the years 1961 to 1992 even though I will restrict to the years 1981 to 1986 (INSEE, 1993).

BAL-SUSE: The BAL-SUSE database is constructed from the mandatory reports of French firms to the fiscal administration. These reports are then transmitted to INSEE where controls and confrontation with various other data sources (such as the EAE, Enquête Annuelle d'Entreprises) are made. All firms subject to the Bénéfices Industriels et Commerciaux regime (a fiscal regime mandatory for all firms with a turnover above 3,000,000FF in 1990 and 1,000,000FF in 1990 in the service industries) are included. Roughly 2,000,000 firms are present each year in the database. In 1990, these firms comprised more than 60% of the total number of firms in France whereas their turnover comprised more than 94% of total turnover of firms in France. The analysis period is 1984 to 1992. Hence, the BAL-SUSE is dynamically representative of French enterprises in all sectors except the public sector. From this source, we use balance sheet information (total sales, total labor costs, total wage-bill, sales,value-added, total purchases, total assets, full-time employment, and, finally, the dates of creation and of death, if any). The total number of observations is greater than 13,000,000. To deflate those variables, I use various industry-level prices, production, value-added, and wages. All these prices come from French National Accounts using a 2-digit level of aggregation (24 manufacturing industries, in the NAP classification).

Since the Customs file contains only information on the trade of goods – nothing on services – we will essentially focus on firms from the manufacturing sectors as well as on firms of the trade (retail or wholesale) sectors that may import goods in place of manufacturing firms and, therefore, act as competitors of these manufacturing firms.

The data on workers come from two data sources, the Déclarations Annuelles de Données Sociales (DADS) and the Echantillon Démographique Permanent (EDP) that are matched. The DADS is a longitudinal dataset based on firm declarations of individual wages to the fiscal administration. An extract of the original information is sent to the French statistical institute (INSEE) for statistical purposes. It consists of a 1/25th sample of the individuals based on their date of birth (october of an even year). Information is available whenever these individuals are employed by a firm of the private or the semi-public sector in any given year. Our sample period goes from 1976 to 1996. Data were not computerized both in 1981, 1983, and 1990. The EDP is a collection of sociodemographic information on individuals and their families. It comes from the various Censuses (1968, 1975, 1982, and 1990) and from the registers of the Civil Status which collect data on births, deaths, marriages.

The DADS data set: Our main data source is the DADS, a large collection of matched employer-employee information collected by INSEE (Institut National de la Statistique et des Etudes Economiques) and maintained in the Division des revenus. The data are based upon mandatory employer reports of the gross earnings of each employee subject to French payroll taxes. These taxes apply to all "declared" employees and to all self-employed persons, essentially all employed persons in the economy.

The Division des revenus prepares an extract of the DADS for scientific analysis, covering all individuals employed in French enterprises who were born in October of even-numbered years, with

civil servants excluded.[31] Our extract runs from 1976 through 1996, with 1981, 1983, and 1990 excluded because the underlying administrative data were not sampled in those years. Starting in 1976, the division revenus kept information on the employing firm using the newly created SIREN number from the SIRENE system. However, before this date, there was no available identifier of the employing firm. Each observation of the initial dataset corresponds to a unique individual-year-establishment combination. The observation in this initial DADS file includes an identifier that corresponds to the employee (called ID below) and an identifier that corresponds to the establishment (SIRET) and an identifier that corresponds to the parent enterprise of the establishment (SIREN). For each observation, we have information on the number of days during the calendar year the individual worked in the establishment and the full-time/part-time status of the employee. For each observation, in addition to the variables mentioned above, we have information on the individual's sex, date and place of birth, occupation, total net nominal earnings during the year and annualized net nominal earnings during the year for the individual, as well as the location and industry of the employing establishment. The resulting data set has 13,770,082 observations.

The Echantillon Démographique Permanent: The division of Etudes Démographiques at INSEE maintains a large longitudinal dataset containing information on many sociodemographic variables of all French individual. All individuals born in the first four days of the month of October of an even year are included in this sample. All questionaires for these individuals from the 1968, 1975, 1982, and 1990 Censuses are gathered into the EDP. Since the exhaustive long-forms of the various Censuses were entered under electronic form only for a fraction of the population leaving in France (1/4 or 1/5 depending on the date), the division des Etudes Démographiques had to find all the Censuses questionaires for these individuals. The INSEE regional agencies were in charge of this task. But, not all information from these forms were entered. The most important sociodemographic variables are however available.[32]

For every individual, education measured as the highest diploma and the age at the end of school are collected. Since the categories differ in the three Censuses, we first created eight education groups (identical to those used in Abowd, Kramarz, and Margolis, 1999) that are later aggregated in three education groups, labelled low-, medium-, and high-education. The following other variables are collected: nationality (including possible naturalization to French citizenship), country of birth, year of arrival in France, marital status, number of kids, employment status (wage-earner in the private sector, civil servant, self-employed, unemployed, inactive, apprentice), spouse's employment status, information on the equipment of the house or appartment, type of city, location of the residence (region and department). At some of the Censuses, data on the parents education or social status are collected.

In addition to the Census information, all French town-halls in charge of Civil Status registers and ceremonies transmit information to INSEE for the same individuals. Indeed, any birth, death, wedding, and divorce involving an individual of the EDP is recorded. For each of the above events,

[31] Meron (1988) shows that individuals employed in the civil service move almost exclusively to other positions within the civil service. Thus the exclusion of civil servants should not affect our estimation of a worker's market wage equation.

[32] Notice that no earnings or income variables have ever been asked in the French Censuses.

additional information on the date as well as the occupation of the persons concerned by the events are collected.

Finally, both Censuses and Civil Status information contain the person identifier (ID) of the individual.

Creation of the Matched Data File: Based on the person identifier, identical in the two datasets (EDP and DADS), it is possible to create a file containing approximately one tenth of the original 1/25th of the population born in october of an even year, i.e. those born in the first four days of the month. Notice that we do not have wages of the civil-servants (even though Census information allows us to know if someone has been or has become one), or the income of self-employed individuals. Then, this individual-level information is matched with the firm-level information. Because we focus on the imports of various goods, we keep all observations of individuals employed in a manufacturing firm at some point during the period 1986 to 1992. The resulting and final number of observations is 112,682 (when the first measure of quasi-rent is used) and 111,380 (when the quasi-rent with assets discounted) for whom all time-varying person and firm-level characteristics are non-missing.[33] Descriptive statistics are given in Table A.1.

Creation of Competition Statistics: More precisely, for each firm, I compute a ratio of imports of intermediates over local purchases and a ratio of imports of finished goods over total production. To measure the import competition that each firm faces in its industry, I aggregate the imports using the 3-digit classification of the imported good. To measure the import behavior of the industry competitors, for each firm I compute the ratio of imports of finished goods over production and the ratio of imports of intermediates over local purchases. Then, I compute percentiles of the resulting statistics by industry affiliation of the importing firm (4-digit). These percentiles measure the extent of import competition in each industry.[34][35] I use the 99th percentiles of the distributions of these statistics within each manufacturing industry.[36] I also compute total imports of intermediates and total imports of finished goods for each manufacturing industry. Finally, I compute total imports of each good by trade firms (using the industry classification of the importing firm). Hence, any particular imported good that might affect directly a firm's competitive environment is accounted for. However, because of a lack of adequate data, I cannot keep track of the behavior of those firm's suppliers that do not belong to the firm's industry.

[33] And outliers eliminated. Notice that less than a hundred observations have missing information on education. All programs are available from the author.

[34] Because the initial data sources are virtually exhaustive (since they are of administrative origins), most firms within each 4-digit industry are small and do not import. The resulting distributions are therefore very skewed. To reflect the amount of imports in any given industry, one needs to use the 95th or the 99th percentiles of these distributions (see Biscourp and Kramarz, 2007 who give a full description all these facts).

[35] Black and Brainerd (2004) has a somewhat similar setting but their focus is inequality and discrimination.

[36] To assess robustness of my results, I also compute the 90th and the 95th percentiles of these distributions. As mentioned previously, the use of such extreme percentiles is justified by the extreme skewness of the distribution. The median, for instance, is almost always zero.

Appendix C: Endogeneity and Instruments

US export prices as pure demand shocks: I exactly follow Abowd and Lemieux (1993) in estimating a supply equation. Hence, I regress the sales of French firms on industry-level ouput prices and industry-level wages. First, I estimate the relation between firm-level sales (deflated by industry-level output prices) and industry-level value-added prices, industry-level wages and time indicators in the cross-section dimension. Then, I control for firm fixed effects. Finally, I instrument value-added prices using lagged US export prices (from 1981 to 1986, when my estimation period is 1986 to 1992). The results are presented in Table C.1. In column 1, the relation between industry-level prices is estimated by OLS. The least squares estimate is negative reflecting the fact that, in the cross-section, supply shocks dominate demand shocks. However, when firm fixed effects are introduced the coefficient becomes positive and is marginally significant (column 2). Finally, when value-added prices are instrumented by US export prices the relation becomes strongly positive (column 3).[37] The elasticity is equal to 0.458, slightly above the one estimated by Abowd and Lemieux for Canada whereas the impact of wage on sales is very comparable to theirs.

The instrumentation strategy (principle and tests): To understand the results of Table 4, several points must be discussed. First, all my regressions control for the person-specific unobserved heterogeneity using the estimated person effect. More precisely, all estimates, in this table as well as in those that follow, include an estimated person effect that results from estimating (3.1) using OLS in which log-earnings are regressed on a quartic in experience, a time-varying indicator for living in the Paris Region, an indicator for working full-time, these three variables being fully interacted with sex indicators, and, more importantly here, a person fixed effect and a firm fixed effect. The full least squares solution for equation (3.1) is obtained using the full sample of more than 13 millions observations and a conjugate gradient algorithm.[38] These last two effects are then used in the restricted sample that is analyzed here. The estimated person effect is directly used in the regression as an additional control variable whereas the firm effect is used to compute the quasi-rent using equation (3.4). More precisely, each regression includes the following variables: experience(quartic), marital status, indicators for having children below 3, children between 3 and 6, for living in Ile de France, for working part-time, year dummies, experience in France (for the immigrants), the local unemployment rate, 3-digit industry indicators, the estimated person-effect, and a full interaction of the estimated person-effect with all previous variables (except seniority and the industry indicators). Most of these variables are not available in the full DADS sample but only in the match between DADS and EDP.

In Table 4, I use a measure of the quasi-rent that subtracts a measure of the real opportunity cost of capital of 3% per annum from the measure presented in the theory section (as in Abowd and Allain, 1996; wages are expressed in 1,000 French Francs). As argued in Section 3, because OLS estimates are likely to be affected by endogeneity biases, I tested for endogeneity of the main variables of my wage model: firm-level quasi-rent, firm-level imports of goods (as a fraction of pro-

[37] The estimation is done in first difference as in Abowd and Lemieux (1993).

[38] See Abowd, Creecy, and Kramarz (2002). Notice that I do not correct for the fact that this person effect is estimated. Since I know the asymptotic variance of this effect as well as the covariance with other explanatory variables, I could push in this direction. However, first attempts at doing so show that this correction would be trivial.

duction), firm-level imports of intermediates (as a ratio of local purchases), the competitors import behavior (the 99th percentile of the distribution of imports of goods as a fraction of production in the same 4-digit sector and the 99th percentile of the distribution of imports of intermediates as a fraction of local purchases in the same 4-digit sector), worker's seniority, and seniority-square. The test strategy that I use is very simple. I regress each potentially endogenous variable on the set of instruments (lagged export price indices of US firms to 4 destinations by 3-digit industries) and the wage equation exogenous variables. I compute the residuals of these regressions and augment the wage equation with these residuals. The exogeneity test amounts to a zero coefficient on the residual in this last equation for the variable of interest. For robustness purposes, I used the two measures of the quasi-rent. Results point to similar conclusions. All variables but quasi-rent and seniority are exogenous in this person-level wage equation. This result is presented in Kramarz (2007, Appendix C, Table C.4).. In addition, treating seniority as exogenous does not affect any of the results presented in this paper.[39]. Quasi-rent and seniority are the only variables that have to be instrumented. As explained previously, this quasi-rent is instrumented with lagged export prices of US firms to 4 destinations: OECD countries, eastern European countries, oil producers, developing countries by manufacturing industry (by 3-digit industry). The detailed estimates for each instrumenting regression are available from the author, but those for the quasi-rent variable in firms where negotiation on employment takes place are summarized in Table C.2. In Table C.3, for each instrumenting regression, I present the F-statistics of the nullity of the instruments (the export prices). Because export prices should be set on the global market, export prices for US firms should be correlated with export prices for French firms. Abowd and Allain (1996) provide such evidence although the correlation is not perfect. If it were, most coefficients should be positive in this regression: an increase in price for American firms means better profit conditions for French firms. As can be seen in Table C.2, this is not always so. When export prices of US firms to OECD countries increase, the quasi-rent in French firms that negotiate on employment with their unions indeed increases most of the time; French firms apparently benefit from these higher prices. On the other hand, when export prices to Eastern European countries increase, quasi-rent of these French firms often decreases; possibly indicating increased import competition between French and American firms. An increase in export prices to oil-producing countries is likely to reflect an increase in oil prices. Two effects are at play, a direct one affecting (negatively) profits in France, a positive one due to increased imports from oil producers. Finally, Table C.3 presents F-tests for the nullity of the instruments – exports prices of U.S. firms – and provides a measure of the quality of the four instrumenting regressions: quasi-rent in the three regimes and seniority.

[39] I also estimated wage equations with competitors behavior treated as endogenous variables with no impact on my results. All these results are available from the author.

Table 1: Rents and Outsourcing

	Quasi-Rent	Quasi-Rent (>50)	Quasi-Rent (<=50)	Quasi-Rent (80>=emp>50)	Quasi-Rent (30<emp<=50)
(Imports of goods)/production	-35.2563	-39.0082	3.7053	-31.8886	-7.7315
	(1.6400)	(1.6880)	(5.8838)	(6.7691)	(9.5802)
	[8.2040]	[8.9514]	[11.2350]	[11.9582]	[9.5981]
(Imports of IC)/(Local purchases)	7.2746	8.7769	-2.4706	-0.0820	-2.9929
	(0.8318)	(0.8906)	(2.2513)	(3.1878)	(2.9235)
	[7.0055]	[8.0317]	[3.4125]	[3.8067]	[2.9396]
Intercept	74.0972	82.4073	47.7757	47.7891	55.6862
	(0.1435)	(0.1745)	(0.2144)	(1.6362)	(1.6756)
	[0.6004]	[0.8081]	[0.2374]	[2.1056]	[1.9794]
R-Square	0.8435	0.8533	0.7855	0.9104	0.9174
Number of Observations	119,860	91,070	28,790	6,282	8,920

Notes: Sources: DADS-EDP matched with BAL-SUSE (BRN). Each regression includes firm indicators (16,078, for the regression with 119,860 observations). One observation is a person-firm-year. Standard errors between parentheses. Standard errors adjusting for clustering at the firm level between brackets. The quasi-rent is measured per employee. Regressions include time indicators and controls for import competition at the industry (3-digit) level.

Table 2: The Auroux Laws Threshold and Imports

	(Imports of goods) / production	(Imports of IC) / (Local purchases)
Employment between 51 and 80	0.0037	-0.0024
	(0.0019)	(0.0037)
	[0.0020]	[0.0061]
Employment between 81 and 250	0.0009	-0.0044
	(0.0024)	(0.0046)
	[0.0035]	[0.0071]
Employment above 250	-0.0064	-0.0183
	(0.0029)	(0.0057)
	[0.0063]	[0.0283]
Intercept	0.0753	0.1396
	(0.0024)	(0.0047)
	[0.0052]	[0.0198]
R-Square	0.8206	0.7659
Number of Observations	101,130	101,130

Notes: Sources: DADS-EDP matched with BAL-SUSE (BRN). Each regression include firm indicators (9,950). One observation is a person-firm-year. Standard errors between parentheses. Standard errors adjusting for clustering at the firm level between brackets. Regressions also include time indicators. Only firms with more than 30 employees are included in the regression.

Table 3: Employment and Outsourcing

	Employment (in logs)	Employment (in logs, >50)	Employment (in logs, <=50)	Employment (in logs)
(Imports of goods)/production	-0.1286	-0.1333	-0.0660	-0.1286
	(0.0110)	(0.0099)	(0.0464)	(0.0110)
	[0.0509]	[0.0545]	[0.0732]	[0.0509]
(Imports of IC)/(Local purchases)	-0.0796	-0.0923	0.0286	-0.0796
	(0.0056)	(0.0052)	(0.0176)	(0.0056)
	[0.0829]	[0.0962]	[0.0293]	[0.0829]
(Total Exports)/(Sales in France)				0.0017
				(0.0217)
				[0.0204]
Intercept	5.9291	6.9529	2.7385	5.9291
	(0.0010)	(0.0010)	(0.0017)	(0.0010)
	[0.0096]	[0.0130]	[0.0017]	[0.0096]
R-Square	0.9943	0.9930	0.9421	0.9943
Number of Observations	121,260	91,808	29,452	121,260

Notes: Sources: DADS-EDP matched with BAL-SUSE (BRN). Each regression includes firm indicators (16,078, for the regression with 119,860 observations). One observation is a person-firm-year. Standard errors between parentheses. Standard errors adjusting for clustering at the firm level between brackets. Regressions include time indicators and controls for import competition at the industry (3-digit) level.

Table 4: Workers' Wages: Workers' Bargaining Power and Firm-Level Imports, Controlling for Competitors' Imports

The Role of Negotiations

(Firms' Quasi-Rent and Workers' Seniority Instrumented)

		Wage Level
Quasi-Rent	(neg. on employment)	0.5387
		(0.0533)
		[0.0660]
Quasi-Rent	(neg. on wages, not emp.)	0.0570
		(0.0455)
		[0.0528]
Quasi-Rent	(no neg. on emp. or wages)	-0.1241
		(0.0702)
		[0.0848]
(Imports of goods)/production	(neg. on employment)	23.3080
		(17.5078)
		[31.5429]
(Imports of goods)/production	(neg. on wages, not emp.)	30.5606
		(7.0047)
		[16.9916]
(Imports of goods)/production	(no neg. on emp. or wages)	15.2063
		(5.3680)
		[17.9875]
(Imports of IC)/(Local purchases)	(neg. on employment)	-55.2317
		(16.2249)
		[42.3125]
(Imports of IC)/(Local purchases)	(neg. on wages, not emp.)	4.3660
		(5.3503)
		[13.9650]
(Imports of IC)/(Local purchases)	(no neg. on emp. or wages)	4.9110
		(6.1353)
		[13.7938]
Competitors imports of goods (99th perc.,sh. of production)	(neg. on employment)	-46.1815
		(7.7865)
		[11.9360]
Competitors imports of goods (99th perc.,sh. of production)	(neg. on wages, not emp.)	-8.9339
		(2.5897)
		[4.5533]
Competitors imports of goods (99th perc.,sh. of production)	(no neg. on emp. or wages)	7.1101
		(3.2461)
		[4.9006]
Competitors imports of IC (99th perc., sh. of local purchases)	(neg. on employment)	-20.6279
		(5.0507)
		[17.7138]
Competitors imports of IC (99th perc., sh. of local purchases)	(neg. on wages, not emp.)	3.0865
		(1.7133)
		[3.0757]
Competitors imports of IC (99th perc., sh. of local purchases)	(no neg. on emp. or wages)	9.5122
		(2.9748)
		[5.4238]
Chi-square (df=37)		40.5432
Over-identification test (p-value)		0.3169

Notes: 37,698 person-year observations. The sample period is 1986-1992. The regression uses a measure of quasi-rent that discounts assets. The regression includes the following variables (coefficients unreported): Competitors imports of goods (99th perc., in level), Competitors imports of IC (99th perc., in level) both interacted with 3 negotiations levels, Imports of goods from the trade ind. (sh. of total purchases), Imports of goods from the trade ind. (total purchases), seniority and seniority-squared, experience(quartic), marital status, indicators for having children below 3, children between 3 and 6, for living in Ile de France, for working part-time, year dummies, experience in France (for the immigrants), the local unemployment rate, 3-digit industry indicators, the estimated person-effect, and a full interaction of the person-effect with all previous variables (except seniority and industry indicators).

The Quasi-rent, Seniority and Seniority-squared are instrumented by lagged export price indices of US firms to 4 destinations in US $ of the same industry as the employing firm. The chi-square tests the validity of the instruments. Robust standard errors are between parentheses. Robust standard errors allowing for clustering at the industry-level are between brackets. Sources: BAL-SUSE for firm-level variables, DADS-EDP for individual variables, Customs file for import measures, OECD for the export prices. ESS for bargaining outcomes.

Table 5: Negotiation in 1992 and Firm-Level Changes in the Preceding Period (1986-92)

	No Negotiation, either on Wages or Employment		Negotiation on Employment and Wages	
	Coef.	Std. Err.	Coef.	Std. Err.
Change in Labor Costs (per person, in logs)	1.2803	0.3207	2.9370	0.3430
Change in Employment (in logs)	0.5041	0.1351	-0.7447	0.1556
Change in Imports of Goods (as a fraction of production)	-1.4728	0.3077	1.7646	0.3230
Change in Imports of IC (as a fraction of local purchases)	0.1312	0.1183	-0.6472	0.1273
Change in the Quasi-rent (per person)	0.0007	0.0005	0.0023	0.0004
Change in the Competitors Imports of IC (99th perc., sh. of local purchases)	0.4842	0.1093	-0.4260	0.1209
Change in the Competitors Imports of Goods (99th perc., sh. of production)	0.7731	0.1742	0.5312	0.1754
Pseudo-R2	0.1818			
Number of Observations	7,210			

Sources: BAL-SUSE for firm-level variables, DADS-EDP for individual variables, Customs file for import measures, OECD for the export prices. ESS for bargaining outcomes. Estimated by Maximum Likelihood. The reference group comprises firms that only negotiated on wages.

Table B.1: Descriptive Statistics

	Mean	Std Dev
Earnings	94.9813	94.8287
Quasi-Rent	83.1629	76.7386
Quasi-Rent (assets discounted)	72.9103	71.5158
(Imports of goods)/production	0.0559	0.1213
(Imports of IC)/(Local purchases)	0.1090	0.2058
(Imports of goods from Europe)/production	0.0412	0.0979
(Imports of goods from other OECD)/production	0.0069	0.0331
(Imports of goods from close low-wage countries)/production	0.0035	0.0253
(Imports of goods from far-away low-wage countries)/production	0.0043	0.0253
(Imports of IC from Europe)/local purchases	0.0842	0.1699
(Imports of IC from other OECD)/local purchases	0.0133	0.0556
(Imports of IC from close low-wage countries)/local purchases	0.0044	0.0311
(Imports of IC from far-away low-wage countries)/local purchases	0.0072	0.0379
Competitors imports of goods (99th perc.,sh. of production)	0.4180	0.2972
Competitors imports of IC (99th perc., sh. of local purchases)	0.4806	0.3003
Competitors imports of goods (99th perc., in level)	442594.4	1555874.0
Competitors imports of IC (99th perc., in level)	147449.3	442278.9
Imports of goods from the trade ind. (sh. of total purchases)	6.3927	5.5426
Imports of goods from the trade industry (total level)	2.4014	10.8722
Person-effect	0.8119	0.4610
Firm-effect	1.5363	1.1317
Experience	19.5901	11.4992
Seniority	8.3349	8.3874
Experience in France	0.6552	4.0437
Married	0.6010	0.4897
Leaves in couple	0.0628	0.2427
A child between 0 and 3	0.0957	0.2942
A child between 3 and 6	0.0877	0.2829
Leaves in Paris region	0.1228	0.3283
Part-time	0.0822	0.2747
Local unemployment rate	9.7351	2.2694
Male	0.6842	0.4649

Notes: Sources: DADS, EDP, Customs file and BAL. 1986-1992. Number of observations: 112,682 for quasi-rent; 111,380 for quasi-rent with assets discounted and other firm-level variables; 112,682 for person-level variables.

Table C.1: Using U.S. Export Prices to Instrument the Price of Value-Added in French Manufacturing

	Firm-Level Real Sales		
	(1)	(2)	(3)
	OLS	Firm Fixed Effects	IV (in 1st difference)
Price of Value-Added (Industry-level)	-0.5015	0.1555	0.4580
	(0.1046)	(0.0443)	(0.1756)
Wage (Industry-level)	2.3416	0.1664	0.4714
	(0.0535)	(0.0772)	(0.0811)
R-Square	0.0377	0.9673	0.0077
Number of Observations	60,197	60,197	42,402

Notes: Each observation is a firm-year. The prices and wages are measured at the 2-digit level (40 industries). The sample period is 1986-1992. Instruments for the industry-level price of value-added are export prices in US $ for the years 1981-1986 of US firms to 4 destinations.

Sources: BAL-SUSE, French National Accounts, OECD

Table C.2: Summary of the Signs and Significance of the Coefficients in the Regression of Quasi-Rent (for Firms Negotiating on Employment) on U.S. Export Prices to Various Destinations

	Destination			
	Eastern Countries	OECD Countries	Petroleum Producers	Developing Countries
Year 1985	Always Negative	Always Positive	Always Negative	Always Negative
Year 1986	Most Negative Once Positive	Most Positive, Once Negative	Most Positive, Once Negative	Most Positive, Once Negative
Year 1987	Always Negative	Always Positive	Most Negative Once Positive	n.s.
Year 1988	Always Positive	Always Positive	n.s.	n.s.
Year 1989	n.s.	Positive	Positive	Negative

This Table reports the signs and significance of the instrumenting regression of quasi-rent, in firms negotiating on employment, on US export prices. n.s. means that the coefficients in that cell (country-year) are never significantly different from zero in the regression. Similarly for the other cells country-year. Always Positive means that the coefficients for that cell are often positive, significantly so, and sometimes not significantly different from zero. Positive means that they are sometimes positive, significantly so, and often not significantly different from zero. Similarly for negative signs. The regression also includes measures of the workers' employing firms imports, of the competitors imports, and experience(quartic), marital status, indicators for having children below 3, children between 3 and 6, for living in Ile de France, for working part-time, year dummies, experience in France (for the immigrants), the local unemployment rate, the estimated person-effect, industry indicators (3-digit), and a full interaction of the person-effect with all previous variables (except seniority, import variables, and industry indicators).
37,698 person-year observations. The sample period is 1986-1992.

Table C.3: Strength of the Instrumenting Regressions

	F-Statistics
Quasi-rent for Firms Negotiating on Employment	32.79
Quasi-rent for Firms Negotiating on Wages, not Employment	23.99
Quasi-rent for Firms Not Negotiating on Employment or Wages	16.92
Seniority	10.82

This Table reports the strength of the instrumenting regression of quasi-rent, for firms in various bargaining regimes, and of seniority, on US export prices. The regression also includes measures of the workers' employing firms imports, of the competitors imports (both interacted with the negotiation regime), and experience (quartic), marital status, indicators for having children below 3, children between 3 and 6, for living in Ile de France, for working part-time, year dummies, experience in France (for the immigrants), the local unemployment rate, the estimated person-effect, industry indicators (3-digit), and a full interaction of the person-effect with all previous variables (except seniority, import variables, and industry indicators).
37,698 person-year observations. The sample period is 1986-1992.

Table C.4: Workers' Wages: Workers' Bargaining Power and Firm-Level Imports, Controlling for Competitors' Imports

The Role of Negotiations on Employment

(Firms' Quasi-Rent and Workers' Seniority Instrumented)

		Wage Level
Quasi-Rent	(neg. on employment)	0.5211
		(0.0521)
		[0.0853]
Quasi-Rent	(no neg. on employment)	0.0185
		(0.0384)
		[0.0406]
(Imports of goods)/production	(neg. on employment)	21.8944
		(17.1492)
		[34.2176]
(Imports of goods)/production	(no neg. on employment)	24.6543
		(4.7628)
		[10.5556]
(Imports of IC)/(Local purchases)	(neg. on employment)	-47.6270
		(15.7203)
		[46.5176]
(Imports of IC)/(Local purchases)	(no neg. on employment)	6.9186
		(4.9157)
		[12.7914]
Competitors imports of goods (99th perc.,sh. of production)	(neg. on employment)	-41.5820
		(7.5401)
		[13.9573]
Competitors imports of goods (99th perc.,sh. of production)	(no neg. on employment)	-3.1373
		(1.5790)
		[2.7383]
Competitors imports of IC (99th perc., sh. of local purchases)	(neg. on employment)	-20.2981
		(4.9574)
		[16.3141]
Competitors imports of IC (99th perc., sh. of local purchases)	(no neg. on employment)	5.1224
		(0.9143)
		[2.3842]
Chi-square (df=38)		47.0476
Over-identification test (p-value)		0.1491

Notes: 37,698 person-year observations. The sample period is 1986-1992. The regression uses a measure of quasi-rent that discounts assets. The regression includes the following variables (coefficients unreported): Competitors imports of goods (99th perc., in level), Competitors imports of IC (99th perc., in level), Imports of goods from the trade ind. (sh. of total purchases), Imports of goods from the trade ind. (total purchases), seniority and seniority-squared, experience(quartic), marital status, indicators for having children below 3, children between 3 and 6, for living in Ile de France, for working part-time, year dummies, experience in France (for the immigrants), the local unemployment rate, 3-digit industry indicators, the estimated person-effect, and a full interaction of the person-effect with all previous variables (except seniority and industry indicators).

The Quasi-rent, Seniority and Seniority-squared are instrumented by lagged export price indices of US firms to 4 destinations in US $ of the same industry as the employing firm. The chi-square tests the validity of the instruments. Robust standard errors are between parentheses. Robust standard errors allowing for clustering at the industry-level are between brackets. Sources: BAL-SUSE for firm-level variables, DADS-EDP for individual variables, Customs file for import measures, OECD for the export prices. ESS for bargaining outcomes.