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## Trade, Wages, and Collective Bargaining

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*How are wages impacted by international trade? This article describes the empirical results of a study of French manufacturing firms. Both exports and offshoring have a positive effect on wages. Exports increase wages for all occupational categories, while offshoring has heterogeneous effects. In European countries, collective bargaining plays a key role in wage determination. The results show that it modifies the way trade affects wages: in firms with collective bargaining, the elasticity of wages with respect to exports and offshoring is higher than in firms with no collective bargaining. We find no evidence that collective bargaining reduces the wage inequalities generated by offshoring.*

This letter presents the findings of research carried out at the Banque de France. The views expressed in this post are those of the authors and do not necessarily reflect the position of the Banque de France. Any errors or omissions are the responsibility of the authors.

How are wages impacted by international trade? From a theoretical viewpoint, access to new export markets leads to an increase in revenues that might translate into higher wages. Theoretical studies highlight an a priori ambiguous effect of offshoring on wages. On the one hand, using cheaper goods produced abroad might improve the efficiency of the production process, which can then lead to higher wages. On the other hand, offshoring may allow firms to replace output previously produced by local workers, exerting downwards pressure on wages, especially those of unskilled workers whose production can be more easily substituted by offshoring.<sup>1</sup> Thus, offshoring can potentially have heterogeneous impacts across occupations. Empirical analyses of data for other developed economies such as the United States or Denmark (e.g. Hummels *et alii*, 2014) support these hypotheses. Detailed studies of the French case are scarce.

The case of France is of interest because, as in most countries in Continental Europe, the majority of French workers are covered by collective wage agreements, either at firm level or at industry level (or both). How does collective bargaining modify the impact of exports and imports on wages? In a seminal paper, Calmfors and Driffill (1988) show that, in firms covered by firm-level wage agreements, wages are better linked to productivity than in firms covered by industry-level agreements. Gürtzgen (2009) lends support to these predictions using data for German manufacturing firms.

Our study looks at data from individual French firms on wages, exports/imports and collective bargaining over the period 2005-2009. Our sample comprises more than 8,000 firms (among the largest French exporters/importers) which account for over two thirds of French exports and imports of manufactured goods. Using micro-econometric techniques, we examine two questions: (i) do exporting and

<sup>1</sup> See Harrison, McLaren et McMillan (2011) for a recent literature survey.

offshoring lead to higher wages and, if so, is the effect heterogeneous across workers? (ii) to what extent does wage bargaining shape the effect of trade on wages?

*Box 1 – Firm-level data*

We use a quasi-exhaustive sample that contains nearly the universe of French firms participating in international trade. Firm-level imports and exports come from the French Customs Office, and are broken down by firm and by year. We merge these data with several administrative sources (balance-sheet data, wages, and collective wage agreements). The wage data includes hourly wages for each firm with at least one employee in France. Wages are reported as an average both for the firm and for each of the following occupations: ‘Administrative and commercial executives (including engineers)’, ‘Technicians and supervisors’, ‘White-collar employees’, ‘Production (blue-collar) workers’. The Ministry of Labour data provide information on wage agreements signed at firm and industry levels for each firm and year. The balance sheet data provide information on the main sector of activity, the number of employees and the level of sales. We use these data to estimate total factor productivity.

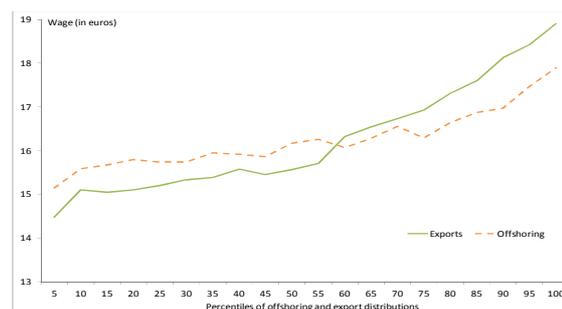
Statistical analyses reveal that trade participation is a firm-level characteristic that is quite stable over time: around 70% of French firms show zero values for exports or imports during the period 2005-2009, and around 20% report positive exports or imports each year. In addition, most exporters are also offshorers and vice-versa. In order to obtain a sample composed of firms with similar characteristics, in our analysis we keep only those firms that both export and import in each year that they appear in the sample. This allows us to study how a variation in the value of exports or imports (the “intensive margin”) relates to wages.

**What is the impact of international trade on wages?**

Figure 1 plots firm-level average hourly wages against percentiles of the distribution of exports or offshoring per employee. The positive correlation is quite clear: firms that trade more intensively tend to pay higher wages. For

example, hourly wages are around EUR 15 for the lowest exporters (those in the bottom decile of the distribution) versus EUR 19 for the largest exporters (those in the top decile). The same phenomenon is observed in the case of offshoring: the more intensively a firm imports, the higher the average wages it pays.

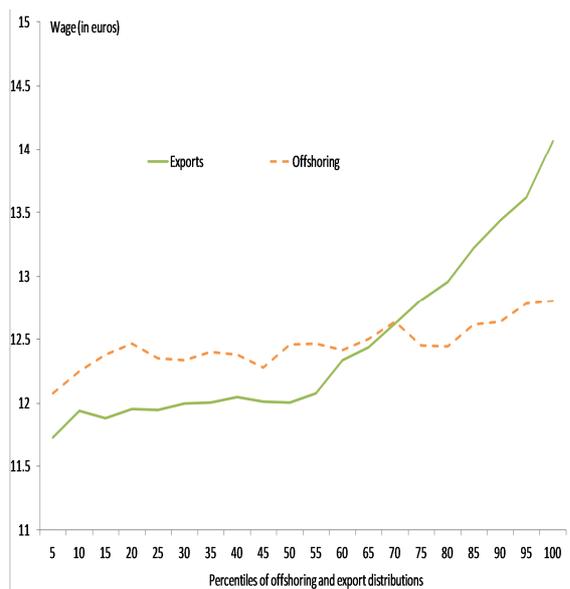
*F1: Average hourly wage (in euro) by export and offshoring volume per worker (percentile of the overall distribution)*



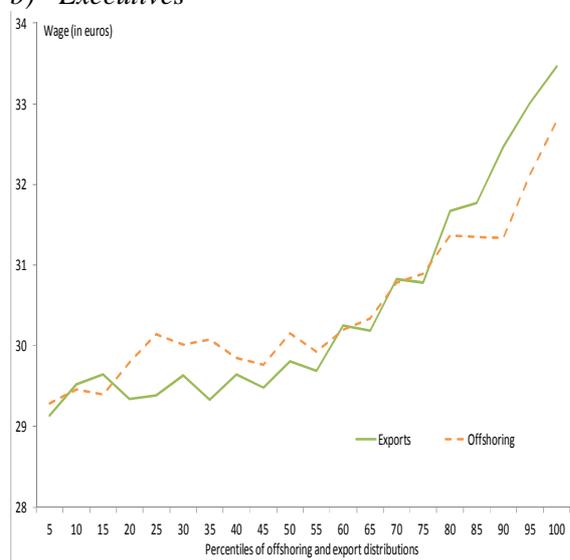
Note: The average hourly wage in euro is reported as a function of percentiles of the export and offshoring distributions. Exports and offshoring per employee are used to control for wage differences due to differences in firm size. Percentiles are computed over our sample distribution and the average hourly wage is calculated for each percentile of the export and import distributions.

The above relationship might be caused by hidden factors that are correlated with international trade. Therefore, it is important to conduct an “all other things being equal” analysis that takes into account the impact of other variables that can affect wages, independently of international trade (for example, the productivity and size of the firm, the local unemployment rate, etc.). This econometric analysis shows that the effect of exports and imports on average wages is indeed positive and statistically significant (see Carluccio, Fougère and Gautier, 2015).

*F2: Average hourly wage (in euro) by export and offshoring volumes per worker (percentile of the overall distribution)  
a) Blue-collar workers*



### b) Executives



Note: The average hourly wage in euro is reported as a function of percentiles of the export and offshoring distributions. Exports and offshoring per employee are used to control for wage differences due to differences in firm size. Percentiles are computed over our sample distribution and the average hourly wage is calculated for each percentile of the export and import distributions.

The effect of exports and offshoring on wages varies across worker categories. Figure 2 plots the firm-level average hourly wages of blue-collar workers and executives against percentiles of the distribution of exports or offshoring per employee. The average hourly wage of blue-collar workers ranges from EUR 12 for the least intensive exporters (bottom decile) to more than EUR 14 for the most intensive exporters (top decile - a wage premium close to 20%). Blue-collar workers'

wages vary much less with offshoring, rising from EUR 12.1 to EUR 12.8, or by 5%. The results of an "all other things being equal" econometric analysis confirm these results: for blue-collar workers, the wage gain associated with exports is positive and statistically significant, while the gain associated with offshoring is nil or slightly negative.

Both exports and offshoring positively affect the wages of executives. The average hourly wage of executives ranges from about EUR 29 for those firms that export or offshore the least, to over EUR 33 for those with the highest levels of exports or offshoring (a 14% increase). These results are confirmed by "all other things being equal" econometric analyses: for executives, the wage gain associated with exports is positive and similar to that of blue-collar workers, whereas wage gains due to offshoring are positive and higher than those for blue-collar workers.

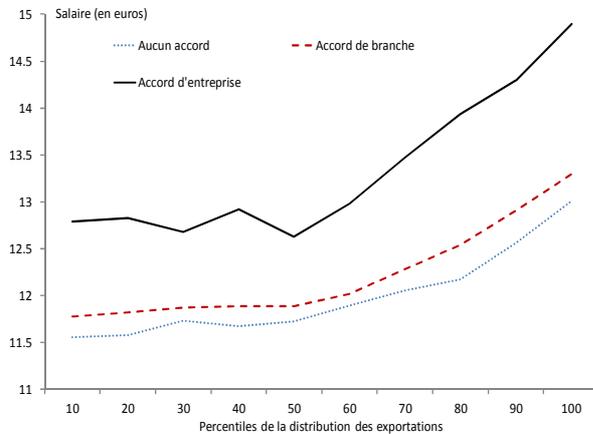
Overall, trade has a positive impact on the wages paid by French firms that export and import. Wage gains from exporting are similar across worker categories, whereas offshoring results in wage gains that are unevenly distributed across worker types.

### Does collective bargaining shape the impact of trade on wages?

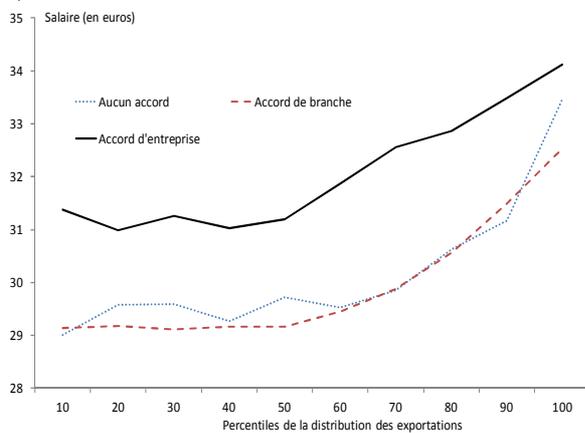
As in many European countries, most French wages are set through, or influenced by, collective bargaining at industry or firm level (see Avouyi-Dovi, Fougère and Gautier, 2013). In France, wages can be set at three different bargaining levels: (i) at national level, a binding minimum wage is set by the government according to a specific formula; (ii) at industry level, employers' organisations and workers' unions bargain over wage scales for specific occupations; (iii) at firm level, employers and unions usually bargain over wage increases. There is a strict hierarchy between the different levels of wage bargaining: a collective agreement must set forth, broaden or enhance an agreement which has previously been signed at a higher bargaining level. Over the period from 2005 to 2009, about 75% of the firms in our sample were covered by an industry agreement each year, and about 20% were covered by a firm-level agreement.

F3: Average hourly wage (in euro) by export volume per worker (percentile of the overall distribution)

a) Blue-collar workers



b) Executives



Légendes: No agreement  
 Firm-level agreement  
 Industry-level agreement

Note: The average hourly wage in euro is reported as a function of percentiles of the export and offshoring distributions. Exports and offshoring per employee are used to control for wage differences due to differences in firm size. Percentiles are computed over our sample distribution and the average hourly wage is calculated for each percentile of the export and import distributions.

Figures 3 and 4 show the average wages of blue-collar workers and executives according to firm's export and offshoring intensities and for three different wage bargaining regimes: no agreement, industry-level agreement, and firm-level agreement. Wage gains stemming from the signature of firm-level agreements accrue to all worker categories, regardless of trade intensity. The wage gap between firms covered by a firm agreement and those

covered by an industry agreement is approximately 10%. Wage gains associated with industry-level agreements (relative to a situation with no wage agreement of any kind) accrue only to blue-collar workers, and they are rather weak (close to 2%).<sup>2</sup>

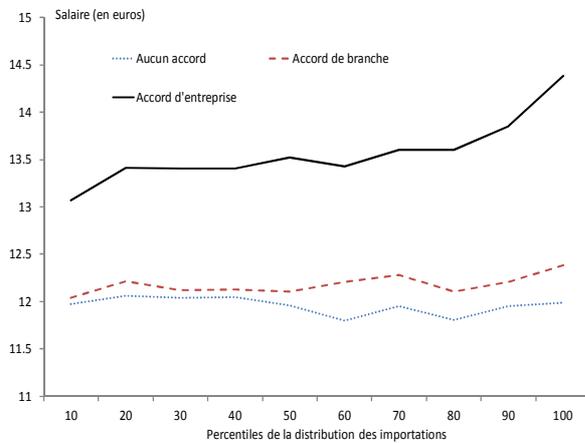
The wage-bargaining premia vary according to export and offshoring intensities. For blue-collar workers, the wage gain associated with firm-level agreements (compared to industry agreements) increases with the level of exports and offshoring per worker. It is slightly less than 10% in the firms that are low exporters or low offshorers, and almost 15% for the most intensive exporting or offshoring firms. Wage gains associated with industry-level agreements (compared to no agreement) increase with offshoring but less steeply. For executives, the wage gain associated with a firm-level agreement is positive, but decreases slightly at high levels of export and offshoring intensity, which might suggest that firm-level wage agreements are favourable to blue-collar workers.

Our econometric estimations provide broad, but not complete, support to these statements. The elasticity of wages to exports is higher in firms that frequently sign firm-level agreements, both for blue-collar workers and executives. The elasticity of blue-collar wages to offshoring is negative in the absence of an agreement, and becomes positive when the firm is covered by an industry- or firm-level agreement. However, we do not find any significant differences in wage gains associated with collective agreements across worker categories.

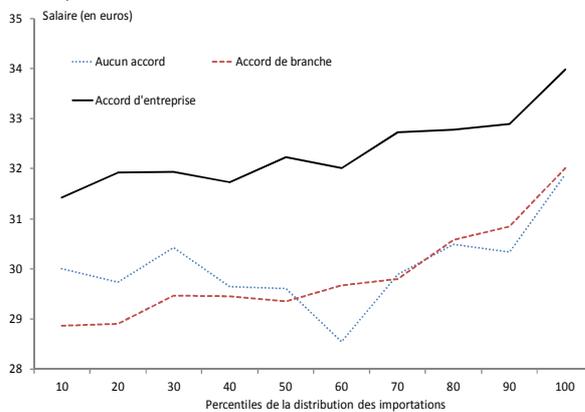
<sup>2</sup> André (2012) and Luciani (2014) use information on all French firms, and find a firm-level agreement wage premium of 5% (compared to an industry-level-only agreement). Dahl *et alii* (2013) find similar results for Danish firms.

F4: Average hourly wage (in euro) by offshoring volume per worker (percentile of the overall distribution)

a) Blue-collar workers



b) Executives



Note: The average hourly wage in euro is reported as a function of percentiles of the export and offshoring distributions. Exports and offshoring per employee are used to control for wage differences due to differences in firm size. Percentiles are computed over our sample distribution and the average hourly wage is calculated for each percentile of the export and import distributions.

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