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Warning : This paper is an update of Aubert and Sillard (2005a and b) who covered the 1995-2001 period. This new version partially extends results to the 1995-2003 sub-period. The text systematically mentions whether figures pertain to this extended 1995-2003 period or still refer to the shorter 1995-2001 sub-period.

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We estimate the amount of job losses in the manufacturing sector in France due to off-shore outsourcing. Our estimation is based on exhaustive, micro-level data covering all firms in the manufacturing sector in France from 1995 to 2001. We identify the groups or firms where employment decreases in French units and, at the same time, for which the imports of the good previously produced in France increases.

Between 2000 and 2003, 15 000 jobs have been lost each year on average in France due to off-shore outsourcing in the manufacturing sector. This figure is higher than for the 1995-1999 subperiod, where its stood at 13 000 per year. The share of emerging countries in this total is also increasing : from 37% in 1995-1999 to 57% between 2000 and 2003. Among these, China is the main destination, far ahead of North Africa, Eastern Europe, Asia, Brazil. Job losses are more frequent in some sectors, such as clothing, textile, domestic equipment, manufacture of electronic equipments and components. Nonetheless, off-shore outsourcing is observed in nearly all sectors.

Keywords: off-shore outsourcing, international competition, job loss, industrial organization

Cette étude vise à mesurer le nombre d'emplois concernés, en France, par le phénomène de délocalisation d'activités industrielles. La mesure se fonde sur des données individuelles d'établissements, d'entreprises et de groupes. Les délocalisations sont détectées lorsque l'emploi diminue ou disparaît au sein d'un établissement et que les importations du groupe détenant l'établissement touché augmentent pour le type de biens auparavant produits en France.

Sur la période 2000-2003, le nombre d'emplois délocalisés aurait été en moyenne d'environ 15 000 par an, en progression par rapport à la sous période 1995-1999 où il était de 13 000 par an. La part des pays émergents dans ce total et également croissante, de 37% entre 1995 et 1999 à 57% entre 2000 et 2003. Parmi ces pays, la Chine représente la principale destination de délocalisation, loin devant l'Afrique du Nord, l'Europe de l'Est, le reste de l'Asie et le Brésil. Certains secteurs sont plus particulièrement touchés par les délocalisations : habillement et textile, équipements du foyer, fabrication de composants et de matériels électroniques. Cependant, le phénomène s'observe dans pratiquement tous les secteurs.

Mots-clés : délocalisation, concurrence internationale, réduction d'effectifs, économie industrielle

Classification JEL : F16, F23

Introduction

For a number of years now, the issue of "off-shoring" has given rise to much debate and been a cause for concern among the public. During the recent period, the widely reported closure of several large establishments has further heightened this concern.

Off-shoring is an important aspect of the debate on the *de-industrialisation* of France (Fontagné-Lorenzi, 2005). However, de-industrialisation is a much wider issue than off-shoring alone, and it is also explained by other factors, both internal and external. The internal factors, for example, are productivity gains and the fact that certain tasks are being outsourced to the tertiary sector. The external factors include the consequences of international openness, of which off-shoring is only one aspect. Conversely, off-shoring is not limited solely to industry but also is affecting services, as is occurring with call centres and accounting and research activities. In this study, however, we shall only consider off-shoring in the industrial sector.[1]

Off-shoring and international openness

Off-shoring is only one facet of the opening up of economies that is often described as "globalisation". Consequently, the issue of *off-shoring* must not be confused with the wider issue of international competition, nor with the issue of *where new units are located*. Off-shoring can be defined as the decision by a company or a group to replace production initially carried out in France with production carried out abroad, which may be outsourced. It is only one of the consequences of international competition, which includes other developments, such as the disappearance of French companies unable to withstand competition from foreign companies.

Competition from low-wage countries has been a focus of concern in developed countries for over ten years. In 1993, the Arthuis Report already raised the issue of the danger that competition from emerging countries posed for French industry. The developments that were identified then still remain valid. There is still a considerable difference between the costs of factors of production in Western countries and emerging countries. According to the neo-classical theory of international trade (Box 1), the opening up to low-wage countries should have effects that would be positive on the whole, but that would not benefit all economic players equally, posing the problem of how the gains reaped should be shared to compensate the losers. This economic openness might drive down the wages of low-skilled workers in the older industrialised countries or, if there are wage rigidities, increase unemployment for this category of workers.

1. The scope of this study is limited to the manufacturing industry. The energy sector has therefore also been excluded.

With the growing internationalisation of companies, these effects of competition from low-wage countries are taking yet another form, consisting of the geographical restructuring of multinational enterprises, one of the effects of which is the off-shoring of production to economies with lower labour costs.

A limited trend?

However, it would be wrong to conclude that differences in labour costs will ultimately lead to the off-shoring of the entire industrial sector of developed countries to low-wage countries. Many economists even say that the opposite is true, arguing that the magnitude of this trend is limited since there are natural barriers to the off-shoring of domestic production units abroad.

Firstly, there are opportunity costs. When production units have already been established in the country, the fixed costs of setting up these units have already been paid and for the most part cannot be recovered by the company (these are known as "sunk costs"). Relocating these production units in low-wage countries would mean paying these sunk costs twice. Consequently, the mere fact that production costs abroad are lower than domestic costs is not sufficient for off-shoring to occur.

What is more, producing abroad is costly for companies because of the distance of low-wage countries, since producing abroad to serve the domestic market generates additional costs, such as transport costs. Keeping production units in the country is also an asset for selling on the domestic market. Off-shoring can therefore generate indirect costs by lowering sales and increasing the cost of marketing products on the French market.

Another aspect of this issue is the emergence of new markets. Emerging countries are not simply competitors with potentially lower production costs than developed countries, but they are also the customers of industrial countries and their demand should grow as the income that they earn from international trade increases and their economic development accelerates. The case of China is revealing in this regard, for between 1993 and 2003 China's per capita GDP grew by 214%, while France's only rose by 16%. At a result, China's share of French exports rose by nearly 56% between 1993 and 2003 – accelerating sharply towards the end of the period – even though this was still only a small 1.5% share of total French exports in 2003.

These factors make it possible to relativise somewhat the fears that the entire production system of industrialised countries may ultimately be moved off-shore. The emergence of low-wage countries can also open up new markets for the companies of developed countries. In part, the reason why European and U.S. groups are establishing production units in emerging countries is to gain markets and not simply to lower production costs. Production may be primarily aimed at serving local markets rather than at being re-imported to developed countries. Consequently, in most cases it would not replace production initially carried out in these developed countries, and it is likely that only a small portion of the production units established in emerging countries actually involve off-shoring.

A poorly measured trend

Recent reports have stimulated the debate on off-shoring (the Senate's Grignon Report and the Fontagné-Lorenzi Report of the *Conseil d'Analyse Economique*). They conclude that the magnitude of this trend is small and they place it in the perspective of broader economic openness. However, all of these reports underscore one of the weaknesses of their conclusions, which is due to the lack of an accurate measurement of this trend. In virtually all studies, the magnitude of off-shoring is only "estimated" indirectly, for example by examining the share of emerging countries in French investments or imports. This trend has still not been quantified in terms of the number jobs and firms affected.

This study is aimed at quantifying this trend by providing an estimation of the number of French industrial jobs affected by off-shoring between 1995 and 2003. In the first part, we shall begin with a brief description of the existing evaluations and the definitions on which they are based, and then we shall explain the definition chosen in this study and how it is applied using data on individual firms.

I Available evaluations: a brief summary

Evaluating the number of jobs affected by industrial off-shoring raises two problems: a problem of definition, i.e. what is meant by off-shoring, and the problem of the choice of the measurement tool(s) used to apply this definition.

There is no immediate answer to either of these problems. Some direct estimates are admittedly available, consisting of figures gathered on the basis of cases of off-shoring reported in the press. This approach is useful, but is only indicative. These estimates do not constitute a "measurement" of the trend of off-shoring for there is no control as to whether the cases detected are exhaustive and the definition of "off-shoring" is not clearly codified.

Even though they are not exhaustive, some studies do try to estimate within a restricted field the magnitude of off-shoring in relation to a broader development, such as industrial restructuring as a whole or all foreign investment operations. These studies are based on information available on industrial restructuring or foreign investments, combined with qualitative analysis aimed at determining which cases can be considered as "off-shoring". For example, Fontagné and Lorenzi (2005) cite the work of the European Monitoring Centre on Change, which estimates the magnitude of off-shoring and international outsourcing at approximately 7% of the jobs destroyed by the restructuring of companies in Europe between 1 January 2002 and 15 July 2004. Similarly, Grignon (2004) cites estimates made in 2002 by the economic missions of DREE[2] in Central and Eastern European countries: of the French investment operations counted, approximately 10% could be considered as off-shoring. However, as in the

2. Department of External Economic Relations, belonging to the Ministry of Economy, Finance and Industry.

case of the estimates of off-shoring reported by the press, these studies do not constitute measurements of the trend in the statistical sense of the term since they do not determine whether the cases studied are representative and the criteria used to describe certain cases as “off-shoring” have not been specified.

Consequently, we must turn to other approaches, which are generally indirect approaches. We shall begin with a brief summary of the results and limitations of three approaches that have already been used in the literature, i.e. macroeconomic approaches based on international trade data, approaches based on general equilibrium models and approaches based on the tracking of foreign direct investment flows. Then, in the following section, we shall make a detailed presentation of the alternative approach being discussed in this paper.

I.1 Macroeconomic approaches: from the employment content…

An initial very broad approach consists of considering that off-shoring has occurred whenever foreign production replaces domestic production to meet the same demand. This is the case, for example, when a French producer loses its customers to a more competitive foreign producer. Understood in the broad sense, this criterion leads to considering that any import flow is a concealed form of off-shoring because it amounts to consuming in France a good or service produced abroad and that could be or might have been produced in France. This would mean that the jobs moved off-shore would be equivalent to all the jobs required to produce in France all the imported foreign production. This was the approach used in the Arthuis Report (1993).

The advantage of this approach is that it can be based on macroeconomic data and it naturally fits into the theory of international trade (Box 1). The idea is to quantify the number of jobs “lost” by answering the following question: how many jobs would have to be created in the importing country in order to produce domestically all the goods that are currently being imported? The conversion of the value of imports into production jobs is carried out using the input-output table of the national accounts and the volume of employment for each industrial branch. This is the algorithm that underlies the calculation of the **employment content** of imports.

Box 1. **What does economic theory tell us?**

According to the theories of international trade, certain consequences of the opening up of countries to trade can be foreseen.

Classical theories argue that each country specialises in the production of goods for which it has a relative advantage in terms of production costs. When production techniques are identical and factor mobility is low, each country specialises in the production of the goods that use most intensively the factors with which it is relatively best endowed. These theories have made it possible to explain the growth of trade between developed countries, where capital was abundant and labour scarce, and undeveloped countries, where the opposite situation prevailed. A large portion of world trade also involves bilateral trade in the same kind of goods. The new theory of international trade is based on consumers' taste for variety, product quality and innovation and the existence of increasing returns as the basis for formalising this development.

The increasing opening up of capital markets has led to a questioning of the assumption regarding the immobility of capital as a factor of production. In a Solow-type growth model (1956), the lower the initial capital, the more profitable an investment will be. An emerging country's opening up to trade therefore results in an increasing flow of capital from developed countries and a search for high returns. This will lead, for a given technology, to a process of economic convergence. In the transition phase, growth in the emerging country will be higher than in industrialised countries. This will lead to high growth in its industrial production and exports. Openness will increase global growth from which developed countries will also benefit. Beyond the direct effects of convergence through a common technology, technological differences can also explain growth differentials between countries.

Although capital mobility has risen sharply over recent decades, labour mobility remains low. In addition, there is still the diversity of know-how, acquired through education and training, experience and research. Schematically, it can be said that there are two types of workers: skilled workers and unskilled workers. Developed countries are relatively well endowed with the former and emerging countries are well endowed with the latter. The competition from emerging countries leads to a drop in the relative price of goods using unskilled labour intensively, which leads to the off-shoring of this production, higher unemployment among the least skilled workers and a decline in their relative wages to an extent that is determined by the flexibility of wages and the costs generated by trade (transport) and by capital mobility (risks). A detailed discussion of this aspect is provided by Fagnart and Fleurbaey (2002).

Given the limited weight of emerging countries in the trade of industrialised countries, this method has the effect of evaluating a net impact on the labour market that remains fairly limited. For example, Fontagné and Lorenzi (2005) estimate a "book" balance of the jobs incorporated into trade flows with these countries that is lower than 1% of industrial employment. Using a similar methodology, Boulhol (2004) estimates at approximately 250 000 the number of industrial jobs lost in France between 1970 and 2002 because of trade with Southern countries, or approximately 15% of the decline in industrial employment.

It is significant that this very limited result is obtained using a method that is theoretically relatively extensive. On the one hand, it encompasses more than the magnitude of "off-shoring" alone since it also includes other effects of international competition, such as the establishment of new units and activities discontinued by companies that are no longer able to face foreign competition. It is also a "stock-based" approach to the phenomenon, which is somewhat removed from the idea of off-shoring, which is interpreted more in terms of a "flow" of jobs.

These are not the only problems, however. There are many other reasons for considering that on the whole the method is not very rigorous (Guimbert and Lévy-Bruhl, 2002). More specifically, the trend of the employment content can be interpreted as the outcome of pressure on employment, but also of pressure on wages and, discretely, even on various skills. The method is also based on too many assumptions to allow a reliable and

relevant estimate of the number of jobs destroyed (Wood, 1995), in particular with regard to the distinction between value and volume, the effects on demand of a change in the prices of products and the effects of capital-labour complementarity. It also ignores the international division of labour, which implies that an imported intermediate good can be processed in the home country and then exported, and the horizontal development of firms, which is achieved by establishing subsidiaries as close as possible to the destination markets in order to reduce transport costs and ensure that the end product is better adapted to local demand.[3]

For example, let us take the case of a growth in imports of products with a low technological content. These imports come from emerging countries where the cost of labour is lower than in France. If we assume that the growth of imports of the product considered involves the replacement of French production by foreign production, the number of jobs in France decreases, all other things being equal. The employment content of the imports corresponds to the French jobs that would be necessary, in the industrial branch considered, to produce the same value as the increase in imports. This implies that the value added of French and foreign production is identical. However, since labour costs are higher in France, the unit costs of French and foreign goods are different. For an identical production technology, the employment content of the additional imports underestimates the French employment "lost". What is more, if the imported goods were produced locally, the market price of these goods would be higher, which would mechanically lead to lower demand. Lastly, to reduce this excess cost, there would have to be a substitution of capital for labour in the domestic production of the goods concerned and thus a different production technology. In short, all this makes estimating the number of jobs affected when one country's production is replaced by another's a highly uncertain process.

I.2 …to general equilibrium models

One of the main difficulties of the employment content approach is the lack of a direct relationship between the factors that determine the location of the production unit and the measurement used. In all cases, the measurement used includes other elements besides off-shoring undertaken to optimise factor costs alone. For example, an increase in imports is not a direct sign that foreign production capacity has replaced French capacity. However, the **computable general equilibrium** approach has the merit of formalising the causes of capital redistribution. It is less simple that the preceding approach, but it makes it possible to correct the measurement of off-shoring for elements that are extraneous to capital redistribution alone.

For example, Bchir et al. (2002) propose a model simulating the case of the European Union and the Maghreb-Turkey area. They show that the impact of more open trade is beneficial to both areas, both in terms of factor return, for skilled and unskilled labour in particular, and in terms of the long-term balance of trade. In the short

3. Foreign imports from subsidiaries most often consist of trade in goods between the parent company and the subsidiary that in no way involve the replacement of domestic production by foreign production.

term, the latter aspect must be qualified since the improvement in the terms of trade for Europe is actually the result of the fact that imports are growing more rapidly than exports in volume. Thus, the price-competitiveness of the industrialised area is deteriorating in this initial phase. In a second phase, the growth of factor return will re-establish the overall equilibrium and the effect of more open trade will ultimately be beneficial for both areas.

Nevertheless, the fact remains that it is relatively difficult to break down the different elements that come into play in a general equilibrium model. The results are also highly sensitive to the many assumptions that go into the model and its calibration (Bchir et al. 2002).

I.3 The foreign direct investment (FDI) approach

An alternative approach consists of focusing on capital transfers. In this approach, "off-shoring" would be defined as a relocation of production capacities from one country to another. In practice, it implies the presence of *foreign direct investment* (FDI). The idea is as follows: when off-shoring is carried out by establishing a new subsidiary abroad, it implies a capital flow to the relevant foreign country. This approach can be based on micro- or macroeconomic data. At the microeconomic level, this approach will retain the cases in which groups or companies relocate their production capacities through a capital transfer. At the macroeconomic level, it will retain all cases in which capital is flowing out of France at the same time as other capital is being invested in another country to finance identical production. The capital transfer might take place through complex movements.

Here again, the use of the method produces limited results. For example, Drumetz (2004) shows that the group China-Brazil-India and the ten new members of the European Union only account for 5.6% of French FDI flows between 2001 and 2003. One the whole, French FDI flows to emerging countries are low because of convergence and trade-offs between factor costs. According to various estimates (Grignon, 2004; Fontagné-Lorenzi, 2005), at most these flows account for 10% of total French FDI. This would show that the impact of off-shoring to these countries is limited.[4]

Two difficulties arise, however. Firstly, this approach does not include, or does so poorly, off-shoring carried out through subcontracting. It is admittedly possible that this off-shoring sometimes may involve capital transfers to the subcontractor, but this is by no means certain. Secondly, FDI flows may underestimate off-shoring, for the fact that an FDI flow goes from country A to country B in no way implies that B's production will in turn be imported by A. The phenomenon of FDI redistribution is occurring at a global level independently of production, its final

4. Drumetz (2004) qualifies this observation by pointing out that, although emerging countries account for a small share of French foreign investment (around 10%), they do account for a larger share of the employees of the subsidiaries of French groups abroad (35%). However, this latter approach suffers from the same weaknesses as the FDI approach. Just as FDI to emerging countries cannot be considered as being the identical to off-shoring, the employees of subsidiaries of French groups abroad can in no way be considered as jobs moved off-shore.

destination and thus of trade. For example, it is entirely possible that the rationale behind FDI may be to gain markets rather than to move production off-shore.

In summary, the FDI approach is imperfect, for off-shoring and redistribution of productive capital are not synonymous. There may be off-shoring without a redistribution of productive capital and there may be a transfer of capital without this involving off-shoring. In addition, the study of bilateral FDI flows does not make it possible to encompass fully the dynamics of capital redistribution taking place in the global economy. At most, it makes it possible to show that redistribution is occurring, but not really to quantify it. In fact, it is sometimes inaccurate to identify FDI flows as capital transfers. For example, purchasing an existing foreign production unit does not change the production capacities of the FDI target country. In other words, no distinction is made between productive investment and purely financial investments. As a result, strictly speaking FDI does not necessarily reflect a redistribution of capital. This is frequently the case since it is estimated that the creation of completely new production units through FDI (greenfield investment) only accounts for 6.5% of global FDI flows (Aussilloux and Cheval, 2002).

II A new microeconomic approach based on industrial imports

II.1 The choice of a definition

The limitations of the approaches that we have just discussed suggest that alternative methods should be tried, and this will be the aim of this paper. It will not seek to provide a definitive estimation of the magnitude of off-shoring that would totally replace the other approaches, but it will explore an alternative way of reaching an estimation, and we shall endeavour to show both its advantages and limitations. This estimation will be based entirely upon microeconomic data. We shall see that this has the advantage of making it possible to break down this estimation easily in sectoral and local terms. We shall also try to base this approach on a definition of off-shoring that is as explicit as possible.

We shall therefore start with the following definition. We shall use the term off-shoring if ***French production is replaced by foreign production as the result of a decision by a producer to stop producing in France in order to relocate or subcontract production abroad***. Consequently, this off-shoring is defined specifically at the microeconomic level, and one of its essential features is that it must involve a decision made by a clearly defined producer, whether a group or an independent company. It is this economic agent that chooses to meet its demand by changing the organisation of its production by closing or limiting the activities of a production unit in France and replacing it with production carried out abroad.

The other necessary condition is that there must be existing production in France which is replaced by production abroad. If a factory in France closes and its production is not resumed by a foreign producer, this will be considered as a *discontinued activity* rather than off-shoring. If there was no existing production in France prior to the appearance of a producer abroad, we shall describe this as the *establishment of a new unit*.

On the other hand, we shall not impose any condition as to whether the foreign chain of production belongs to the group responsible for the off-shoring. Similarly, we shall not specify whether the off-shoring involves greenfield production capacities abroad or the use of pre-existing resources. Consequently, there can be off-shoring without foreign investment by the group; this is the case, for example, if the group uses foreign subcontractors to replace the production that is disappearing in France. It is also the case if the group simply decides to increase the production of an existing subsidiary abroad. In the microeconomic sense, off-shoring does not necessarily involve a direct transfer of capital abroad.

Consequently, contrary to approaches based on macroeconomic international trade data, this approach makes a distinction between what is due to off-shoring decisions as such and what is due to the much less clear-cut effects of international competition. In this sense, the definition is more restrictive than the one used for calculations based on the employment balance. In comparison with the FDI flow approach, it also excludes FDI aimed at gaining new markets rather than re-importing the goods produced back to France. However, unlike the FDI approach, it does include cases of off-shoring through subcontracting.

This definition is fairly close to the definitions proposed in the Grignon Report (2004), which identifies two levels of off-shoring: the first is based on the physical relocation of a production unit abroad,[5] and the second, which is broader, refers to subcontracting abroad.

Lastly, we should point out that that we will study this off-shoring on the basis of a “flow” approach, for this is a transitory phenomenon since it involves the discontinuation by a producer of production in France and its replacement by production or provision abroad and the destruction of jobs in France that this generates. “Off-shoring” therefore designates the producer’s decision rather than the resulting situation. Consequently, “employment moved off-shore” refers to the number of jobs destroyed following off-shoring during a given period and not the total of all jobs destroyed in the past.

5. Sometimes called “off-shoring in the strict sense”.

II.2 The choice of sources

The application of this definition will be based on a number of sources within the French statistical system that make it possible to track French companies and the operations that they own. These sources mainly consist of the SIRENE inventory of establishments and enterprises, DADS (annual declarations of social security data), which provide information on employment in companies, customs data that specify for each company the value of goods exported and imported by the nature of the goods and by origin or destination. To these can be added various sources that make it possible to reconstruct the characteristics of the deciding entity, whether it is a group or an independent company as the case may be.

As we have already mentioned, none of these sources can make possible a *direct* observation of cases of off-shoring. None of the preceding databases contain explicit information making it possible to identify a drop in employment or a flow of imports resulting from off-shoring. One the other hand, by cross-referencing these sources, it is possible to detect "presumed" cases of off-shoring as we have defined it, i.e. cases of job losses that are *likely* to be due to discontinued production that has been replaced by production abroad. The method definitely remains an indirect method, for off-shoring is not identified *directly*, but through its impact in terms of employment and imports.

More specifically, the presumed off-shoring will have to meet two conditions (Box 2):

> **Condition 1**: A group (or an independent company)[6] has sharply reduced the staff employed in one of its industrial establishments over a short period of time. This staff reduction is either the result of a sharp reduction in the volume of work (at least 25% of the initial volume) or of the closure of the establishment.
>
> **Condition 2**: At the same time, this group has increased its imports from a given foreign country of the same type of good that was previously produced in France. The amount of this increase in imports must represent at least a certain percentage of the French production discontinued. The amount of this percentage will depend on the country of origin: it may be 100% or less, depending on whether the wage costs in the country are comparable to or lower than these costs in France.

6. Throughout out the remainder of this paper, we shall indiscriminately use the term "group" to designate, depending on the case, both groups in the strict sense and independent enterprises.

Using these two criteria, presumed off-shoring can be detected both through the creation of a foreign subsidiary and the use of a subcontractor abroad, for there can be off-shoring even if the group does not own the producer that replaces the French producer. Box 2. **Application of the method**

A detailed presentation of the difficulties and limitations of this method is provided in Annex A. We shall only present the main technical points here.

Condition 1: Major reductions in staff

We consider that there is a "major reduction in the staff" of an establishment when there is either the closure of the establishment or at least a 25% decrease in the initial number of staff. This 25% "threshold" was chosen on the basis of a statistical criterion: staff reductions above 25% are more than one standard deviation below the average variation in staff during the period.

The staff reductions must take place over a maximum period of three years: for example, for 1998, we consider the variation in the number of jobs between 1997 and 1999. We also apply criteria in order to ensure that the staff reductions observed actually occurred and are not simply due to changes in codes or in the legal status of the employing establishments, or to the redeployment of staff between different establishments of the same group. These criteria were developed following the case-by-case validation of the main staff reductions carried out by the regional directorates of the INSEE (Aubert, 2005). For example, a staff reduction observed must actually correspond to a decrease in employment in the sector within the commune and a reduction of staff in the group within the employment area. For major staff reductions, we verify that these really correspond to a decrease in activity and not merely to a change in the structure of the workforce. To ensure that this is the case, we check that the wage bill has also decreased by at least 25%. The use of this dual criterion makes it possible to eliminate 11% of the staff reductions that would be included if we used a simple criterion based on the variation in the number of jobs alone. Lastly, the "closing of an establishment" is defined by the fact that the establishment no longer employs any workers and has not been taken over by another company.

Condition 2: an increase in imports…

Imports are aggregated at the level of a group of companies. This makes it possible to describe a flow of imports by type of product, year, country of origin and the importing group. The "type of product" is identified using the French NES 114 summary classification. We only retain increases in import flows that are not temporary, but eliminate the increases when the amount of imports returns to its original level during the two following years. When a number of flows of the same product are created from a number of different countries in the same year, we retain the largest of these flows. For the sake of uniformity with the staff reductions used, the variations in the amounts of imports are calculated over three-year periods: for example, for 1998, we consider the variation between 1997 and 1999. The creation of import flows and the staff reduction do not necessarily occur in the same year, but the time gap between these two events must not exceed two years.

…proportionate to the production discontinued in France

The "discontinued French production" is estimated on the basis of the reduction in the wage bill in the establishment where the staff reduction is occurring, multiplied by the average production/wage bill ratio in the sector (NAF 700 line-of-business nomenclature). French production and the amounts of imports are expressed in constant 2001 euros: the price indices for French production and for imports are calculated on the basis of national accounts data at the NES 114 level.

Lastly, we only retain increases in import flows when they account for at least a certain percentage of the discontinued French production. This percentage makes it possible to take into account cost differentials across countries. It is calculated on the basis of the quotient of average wage costs in France divided by the average wage costs in the foreign country, which is then approximated by the ratio of GDP per capita (Annex C). To give an example, an import flow must represent at least 10% of the value of the French production discontinued if it comes from China, 20% if it comes from Tunisia, 30% if it comes from Poland and 100% if it comes from most developed countries. This criterion may lead to overestimating off-shoring to very low-wage countries, such as China and India, in comparison with higher wage countries. This is the case if the differential between the value of French production and foreign production is much lower than the wage cost differential.

II.3 Some factors that can lead to overestimating off-shoring

No method is perfect and this holds true for this method. We can take stock of its main limitations, which can lead either to overestimating or underestimating off-shoring.

It will be overestimated if certain cases identified as "presumed off-shoring" are not actually viewed as such by those involved. The number of jobs moved off-shore that we estimate may then be higher than the extent of the "off-shoring" as it is sometimes presented in public debate. For example, we do not eliminate staff reductions observed when there is no closure of the establishment: a group can partially relocate an activity by reducing staff without stopping production completely in the establishment. Nor does "presumed off-shoring" imply the creation of new factories abroad, for the group may merely expand its production in existing subsidiaries or else subcontract it.

We also consider that there is reason to presume that off-shoring has occurred even if it involves a developed country where wage costs are higher than in France. This is because off-shoring can have other rationales besides the lowering of production costs, such as eliminating duplication in multinationals.

The method also includes presumed off-shoring even if the product manufactured abroad is not strictly identical to the product formerly made in France. This limitation is related to the data used, and more specifically to the definition of "products" based on the NES 114 nomenclature. We identify types of products that are given general headings: automobiles, beverages, household appliances, etc. For example, two automobiles of different models or even different makes are considered as one and the same "product". It can therefore be presumed that there is off-shoring when a group stops manufacturing a good that was produced in France and simultaneously increases the production abroad of another good which is different but similar. These situations are generally not viewed as off-shoring by the public. To a certain extent, therefore, we are estimating the impact in terms of jobs lost of a broader phenomenon, which includes changes in product lines or catalogues made at the expense of French employment.

II.4 Some factors that can lead to underestimating off-shoring

On the other hand, certain situations that are viewed as off-shoring cannot be detected using our approach. On the whole, we only detect presumed off-shoring when the production moved off-shore is intended for the French market. This restriction is due to the availability of data: the substitution of production intended for French customers can be observed through the reimporting of the good by the group in France. This is not the case when the production transferred off-shore was intended for foreign markets. The off-shoring of an establishment whose production was mainly intended for foreign markets cannot in fact be identified using our method, since it does not

detect the creation of import flows that coincide with the decrease in activity.[7] An example might be the case of a subcontractor producing for a single customer established abroad.

Nor are we able to detect the cases in which the production moved off-shore is not reimported by the group, even if it is ultimately intended for French customers. This is the case if this production is entirely marketed by the foreign producer, or even if the group or company disappears in France. This latter case can cover several situations, such as the actual disappearance of the group or the relinquishing of plants in France by a group that continues to have employees abroad, or a merger with another group. It is difficult to estimate the magnitude of the staff reductions in these cases. We can only point out that, over the 1995-2001 period, 60% of the jobs destroyed by major staff reductions occurred in groups that remained in business, i.e. that continued to employ staff in France after the staff reductions. Situations in which presumed off-shoring cannot be detected therefore seemed to account for 40% of major staff reductions.[8] However, it is relatively rare for this kind of job destruction to be due to off-shoring, for the disappearance of a group is most often explained by the impact of competition (possibly international) rather than by a group's decision to relocate all of its production units. In the other case, i.e. in groups maintaining employees in France, it is certainly less costly to market goods through French subsidiaries, even if these goods are produced abroad. In this case, the reimporting of goods by the group will be observed.

The off-shoring may not be detected if it concerns a good that does not match the primary line of business of the establishment in which it was produced. Inasmuch as our product nomenclature is relatively aggregated, there are no doubt not many such cases. Similarly, off-shoring cannot be identified if the heading of the imported product does not match exactly the primary line of business of the establishment that is destroying jobs. Such cases are no doubt not very frequent, but there are examples of this, such as the case of an establishment that manufactured "electrical equipment" whose production was replaced by the importation of "electronic components".

Lastly, we consider that off-shoring is a *concentrated* phenomenon, both in time and space. Consequently, off-shoring is not presumed to occur when the staff employed decreases slightly over a long period of time or in a large number of different establishments. Similarly, the creation of import flows will not be considered as a presumption of off-shoring if it occurs slowly over a long period of time or if it takes place through slight increases in imports from many different countries.

7. One can gain an idea of the bias introduced by conducting a robustness analysis that takes into account the drop in companies' exports (Annex B). The calculation of the number of jobs moved off-shore would then increase by 30%.

8. Of this 40%, only 4% of the jobs destroyed were in establishments belonging to foreign groups that may continue to exist in other countries. Consequently, for the remaining 96%, the fact that the group no longer has any employees in France meant that the group has disappeared completely. Foreign groups relinquishing all activities in France thus accounted for relatively few jobs (on average, 1 750 per year in industry), and it is therefore certain that there were relatively few cases of such foreign groups off-shoring all of their units located in France.

III Results

According to this method, it would appear that some 124 000 industrial jobs were lost in France and moved off-shore between 1995 and 2003, or an average of 13 800 per year, with a margin of uncertainty of about [-33%;+50%] around this central estimate[9]. The corresponding figures were 95 000 and 13 500 in the initial Aubert and Sillard study, i.e. for the 1995-2001 subperiod.

By comparison, the gross number of jobs lost annually in industry stands at roughly 500 000.[10] For the entire 1995-2003 period, the presumed off-shoring came to a total of 3.2% of the 1995 workforce in industry excluding energy, i.e. some 3.9 million workers. At an annual rate, 0.35% of industrial jobs appear to have been moved off-shore every year between 1995 and 2003, or slightly more than one job out of 300.

The method allows quantifying the share of off-shoring in major staff reductions. For the subperiod 1995-2001, approximately 12% of these major staff reductions were the result of off-shoring.[11] These "major" reductions are of two types: they are either the result of the direct closure of an industrial establishment or of a staff reduction equal to at least one-fourth of the initial staff of an establishment over a maximum period of three years. Among this presumed off-shoring, only 52% of jobs would be destroyed as a result of the complete closure of establishments. Consequently, it would seem that off-shoring is carried out through reductions in activity nearly as much as through closures of establishments.

However, what we describe as "major staff reductions" only account for a part of this job destruction in industry. We are not counting smaller reductions falling between 0 and 25% of jobs, which are probably not due to off-shoring but rather to cyclical workforce variations.[12] Consequently, the 12% figure cannot be interpreted as the share of off-shoring in the reduction of industrial jobs. This share would necessarily be lower if we took into account staff reductions lower than 25% in establishments.

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9. This bracket derives from the sensitivity analysis conducted for the 1995-2001 sub-period. See Annex B.

10. Jobs lost refers to layoffs and fixed-term contracts that expire. Their number in industry is estimated on the basis of an annual rate of jobs lost of 13%, which is calculated for establishments with over 10 employees in the industrial sector between 1996 and 2001 (source: DARES, *EMMO-DMMO*). It should be pointed out that a job moved off-shore does not necessarily lead to a job lost if the employee is transferred to another establishment of the group or retires.

11. Some of this job destruction is caused by companies or groups that disappear, either because they discontinue all activity in France or because they are taken over by other groups. In such cases, it is difficult to detect off-shoring since the creation of an import flow by the group cannot be observed. If we consider that our methodology only allows us to detect off-shoring in continuing groups and that major staff reductions must therefore only be taken into account in these continuing groups, presumed off-shoring accounts for approximately 20% of jobs destroyed.

12. The 25% "threshold" was therefore chosen on the basis of a statistical criterion. Staff reductions greater than 25% are more than one standard deviation below the average workforce variation over the period. On the other hand, we consider that workforce variations beyond one standard variation are due to cyclical variations rather than to a real reduction in the establishment's activity.

III.1 A relatively small number of jobs affected

"Jobs moved off-shore" are not exactly synonymous with layoffs. Employees working in an establishment whose production is moved off-shore are not systematically laid off, for they may be transferred to other establishments of the group or hired by other companies in the same employment area.[13] An initial idea of the difference between the number of jobs moved off-shore and the number of jobs really destroyed as a result of off-shoring can be obtained by observing the trend of the staff employed by groups in the employment areas where the off-shoring occurs. For the 1995-2001 sub-period, the number of jobs destroyed annually due to off-shoring then appears to be nearly 10% lower, being closer to 12 500 than to 13 500.

In addition, the estimates for jobs moved off-shore do not show the impact of this trend on French employment. This is only a partial analysis, focused on staff reductions. In order to take stock of the impact on employment, it would also be necessary to analyse the creation of new establishments and increases in staff. For example, there are cases in which production may be "off-shored" *to* France, for example, if a group has two similar factories in France and the United States and wishes to eliminate this extra factory. This group might decide to close the unit in the United States and increase production in the French factory to compensate for this move. This case can be described as off-shoring, of which France is the beneficiary.

Furthermore, presumed off-shoring does not make it possible to estimate the number of jobs lost directly as a result of off-shoring. There may be indirect effects on jobs, however, which are negative in most cases but which may also be positive in some cases. The off-shoring of an establishment may lead to job losses among suppliers or in the employment area where the establishment that was moved off-shore was located. On the other hand, off-shoring may lead to productivity gains in a group, enabling it to increase its market share and ultimately to increase its workforce in the units that it has kept in France.

Consequently, if we only retain the presumed off-shoring in groups that actually reduced their staff *throughout France* in a given industry, fewer than 10 000 jobs would be moved off-shore annually (Annex B). In one out of three cases of presumed off-shoring, the job eliminated in one of the group's establishments would therefore be offset by the creation of a job at another of the group's sites.[14]

13. "Employment areas" were defined by a regional nomenclature established in 1994. Under this nomenclature, metropolitan France is divided into 384 employment areas.

14. In particular, these cases include the relocation of establishments and the redeployment of staff outside the initial employment area. These types of transfers are frequent in some concentrated sectors in which very large groups are active, such as the automobile and aeronautics sectors.

III.2 About 8500 jobs moved off-shore towards emerging countries between 2000 and 2003

If we split the 1995-2003 period in two sub-periods, 1995-1999 and 2000-2003, we find a slight progression of the annual number of jobs lost by off-shoring, from about 13 000 each year in the first sub-period to about 15 000 each year during the second subperiod (Tables 1a and 1b). There is also a significant progression of jobs moved off-shore toward so-called "low-wage" or emerging countries[15] (Table 1). These countries accounted for approximately 5000 job losses each year during the first sub-period, and 8500 during the second one. Approximately one closure of an industrial establishment out of 280 and slightly less than one out of twenty jobs destroyed appear to be the result of off-shoring to a low-wage country. If we restrict the scope solely to groups that remain in business, approximately one out of 150 closures of establishments is a case of presumed off-shoring, accounting for slightly more than one job destroyed out of ten.

Table 1a. **Main off-shore countries between 1995 and 1999**

Low-wage countries		Developed countries	
4 859	Number of jobs moved off-shore each year	8094	Number of jobs moved off-shore each year
Country:	%	Country:	%
China	30	Germany	21
Brazil	12	Belgium	16
Morocco	8	Italy	16
Romania	5	United States	13
Tunisia	5	Spain	12
Philippines	5	United Kingdom	6
Vietnam	3	Netherlands	6
Poland	3	Ireland	2
Bulgaria	3	Finland	1
Czech Republic	3	Switzerland	1
Venezuela	3		
India	3		
Pakistan	2		
Chili	2		

How to read the table: Between 1995 and 1999, an average of 4 859 jobs appear to have been lost each year as the result of off-shoring to a low-wage country. 30% of these jobs were moved off-shore to China, 12% to Brazil, etc.

Scope: Industry excluding energy.

15. *i.e.* all countries other than those of Western Europe, the United States, Canada, Japan, South Korea, Israel, Australia and New Zealand.

Table 1b. **Main off-shore countries between 2000 and 2003**

Low-wage countries		Developed countries	
8 550	Number of jobs moved off-shore each year	6425	Number of jobs moved off-shore each year
Country:	%	Country:	%
China	50	Spain	20
Turkey	8	Germany	17
Tunisia	7	Belgium	15
Morocco	7	Italy	13
Poland	5	United Kingdom	13
Hungary	5	Netherlands	4
Romania	3	United States	3
Czech Republic	3	Portugal	3
Pakistan	3	Denmark	2
Slovakia	3	Luxemburg	1
Vietnam	3		

How to read the table: Between 2000 and 2003, an average of 8 550 jobs appear to have been lost each year as the result of off-shoring to a low-wage country. 50% of these jobs were moved off-shore to China, 8% toTurkey, etc.

Scope: Industry excluding energy.

Among developed countries, the main off-shoring destinations are the countries bordering France, and the United States. This "off-shoring" largely reflects a policy of restructuring and reconsolidating groups within developed countries rather than a rationale of seeking lower production costs. Consequently, this trend is not necessarily detrimental to France, which can also benefit from the restructuring of groups.

Among the emerging countries, China is by far the prime off-shoring destination, and this relative share has increased very significantly between the two sub-periods. The absolute number of jobs transferred to China has increased from about 1500 to 4300 per year. Even if the magnitude of the phenomenon remains limited, this increase is in line with general perception of the phenomenon by public opinion. The other main destinations are North African countries (especially Morocco and Tunisia), Asia, Eastern Europe and South America, particularly Brazil.

III.3 Off-shoring appears to be mainly carried out by very large groups

The frequency of major staff reductions decreases with the size of the group. This is true both for staff reductions by groups that remain in business and by those that do not. Conversely, the frequency of off-shoring of jobs increases with the size of groups (Table 2). By the same token, when there are major staff reductions, the larger the group, the more likely that off-shoring is involved.

On the whole, over the 1995-2001 sub-period, groups and independent companies with more than 500 employees account for less than one half of industrial employment, but for more than two-thirds of the jobs moved off-shore. This is the case in particular when the production is being transferred to a developed country. For example, very

large groups employing over 5 000 employees in France[16] alone account for over half of the jobs sent off-shore.[17] Their share of the presumed off-shoring to developed countries is four times higher than is the case for major staff reductions as a whole. This share is somewhat lower for off-shoring to low-wage countries (47%), but it nevertheless remains significantly higher than is the case for major staff reductions as a whole.

The difference between the destination areas might be due to sectoral specificities, since the off-shoring of production to developed countries occurs more frequently in highly concentrated sectors such as automobiles, aerospace and pharmaceuticals. This off-shoring is also frequently undertaken by multinational groups for the purpose of restructuring or eliminating duplication, and it is therefore natural that there is a high share of groups employing more than 5 000 employees in France.

In small independent companies, which often consist of a single establishment, the closure of the establishment often means that the company disappears. The fact that these small companies only account for a small share of off-shoring might therefore reflect the differing impact of international openness depending on the size of groups or companies, i.e. the company disappears in the case small units, and production is moved off-shore to subsidiaries in the case of large groups.

Major foreign groups that have a single subsidiary in France are a special case. These groups may seem small in terms of the number of their employees in France, even though they employ considerable staff worldwide. If they move their single subsidiary in France off-shore, this cannot be detected since the closure of the establishment will be seen as the "disappearance" of the group in France and its products will not subsequently be re-imported by the group. However, these cases are relatively rare, for foreign groups that completely stop employing staff in France account for an average of 1 750 industrial jobs lost annually, only part of which is actually due to outsourcing. These cases of undetected off-shoring account at most for 13% of our estimation, and will not substantially alter the results.

16. This only refers to jobs in France within groups. However, a group may be very large worldwide and employ few workers in France. Consequently, the share of groups employing over 5 000 employees in France underestimates the share of very large groups.

17. The relation between the globalisation of companies and employment has been studied by Biscourp and Kramarz (2003) in a perspective slightly different from the approach used here. Nevertheless, their conclusions are very similar: during the 1986-1992 period, for a given size and industrial sector, importing is generally specifically associated with job destruction.

Table 2. **Frequency of major staff reductions and off-shoring by size of group (1995-2001)**

%

Group's staff numbers in France[1]	Share of industrial employment	Jobs destroyed by major staff reductions[2]		Jobs moved off-shore[2]	
		All groups	Groups that remain in business	In developed countries	In low-wage countries
Fewer than 10 employees	11	6.9	2.7	0.02	0.02
10 to 49 employees	18	3.8	1.5	0.01	0.05
50 to 499 employees	23	2.7	1.6	0.05	0.13
500 to 4999 employees	24	2.0	1.9	0.29	0.21
5000 employees or more	25	1.6	1.5	0.41	0.32
Total	100	2.9	1.8	0.19	0.17

Notes: Annual average between 1995 and 2001. The scope is industry excluding energy.

(1) The size of the group is calculated on the basis of the number of staff employed in France in all sectors in work-year equivalents. By convention, "group's staff numbers" also refers to the staff of independent companies. Establishments' share in industry is weighted by the number of staff.

(2) As a percentage of industrial employment (excluding energy) in the category.

How to read the table: In groups with 5 000 employees or more, 1.6% of jobs disappear on average each year as a result of major staff reductions; 0.41% of jobs are moved off-shore to developing countries and 0.32% to low-wage countries.

Relatively few cases of presumed off-shoring are observed in small establishments (Table 3). They mainly involve medium-sized establishments: in cases of off-shoring to low-wage countries, nearly two-thirds of the jobs affected are in establishments with 50 to 500 employees. Here again, the differences in destination countries might reflect sectoral specificities.

Table 3. **Frequency of major staff reductions and off-shoring by size of establishment (1995-2001)**

%

Staff numbers of establishment	Share of industrial employment	Jobs destroyed by major staff reductions		Jobs moved off-shore	
		All groups	Groups that remain in business	All groups	Groups that remain in business
Fewer than 10 employees	12	5.8	2.5	0.11	0.06
10 to 49 employees	23	4.1	2.1	0.19	0.14
50 to 499 employees	43	2.5	1.8	0.22	0.24
500 to 4999 employees	19	1.4	1.3	0.18	0.13
5000 employees or more	4	0.0	0.0	0.00	0.00
Total	10	2.9	1.8	0.19	0.17

Notes: Annual average between 1995 and 2001. The scope is industry excluding energy. Establishments' share in industry is weighted by the number of staff. (column 2). The jobs destroyed by major staff reductions and the jobs moved off-shore are expressed as a percentage of total employment in the category (columns 3 to 6).

How to read the table: 12% of employees in industry are employed in establishments with fewer than 10 employees; on average, each year 5.8% of jobs are destroyed by major staff reductions in these small establishments; 0.06% of jobs are moved off-shore to low-wage countries.

III.4 The preponderance of a few multinational groups

Between 1995 and 2001, ten major groups by themselves accounted for nearly one-fourth of the jobs lost in cases of presumed off-shoring. Off-shoring is therefore highly concentrated in a few very large groups. If these ten groups are excluded, off-shoring would have accounted for an average of 10 500 jobs destroyed per year, or 10% of major staff reductions.

Similarly, a small number of establishments can account for a large share of the staff reductions resulting from off-shoring. For example, the ten establishments that moved largest number of jobs off-shore were responsible for 9% of the total jobs sent off-shore during the period. The twenty largest off-shoring establishments accounted for 15% of the total.

These results show a source of inaccuracy in the estimations of jobs moved off-shore, since we only detect "presumed" off-shoring, which is not directly identifiable. An error regarding a single major staff reduction – for example, presumed off-shoring that is actually a change in the range of products – can thus cause the estimated number of jobs moved off-shore to vary significantly. This is all the more problematic in major international groups, which have a complex structure and for which it is difficult to detect off-shoring. In particular, these groups often produce a broad range of products, and since our methodology detects products at a relatively aggregated level,[18] the decision to stop manufacturing a certain type of product in France and to increase the production of a similar but not identical product in a foreign subsidiary could be mistaken for a case of off-shoring.

III.5 Foreign groups move off-shore slightly more frequently

Groups move production off-shore much more frequently than independent companies (Table 4). On average, between 1995 and 2001, 0.09% of employment in independent companies was moved off-shore, as compared with 0.52% in groups. In relation to the share of each type of company, off-shoring was five times more frequent in the subsidiaries of groups than in the establishments of independent companies.

Nevertheless, the difference between groups and independent companies is primarily related to size. Off-shoring in large independent companies is nearly as large as in groups.

18. For example, the "products" considered, identified by the NES 114 nomenclature, are of the following type: beverages, furniture, "spacecraft and aircraft", etc. This means that two different models of cars are considered as one and the same product, as are a television set and a washing machine, a bottle of champagne and a bottle of mineral water or a helicopter and a rocket.

Table 4. **Frequency of major destruction of jobs and of jobs moved off-shore by type of company (1995-2001)**

%

Type	Share of industrial employment (excluding energy)	Jobs destroyed by major staff reductions		Jobs moved off-shore		
		All groups	Groups that remain in business	Total	To developed countries	To low-wage countries
Independent companies	40	4.4	1.9	0.09	0.03	0.05
Groups, of which:	60	1.9	1.7	0.52	0.28	0.23
French groups	41	1.8	1.6	0.47	0.23	0.25
Other European groups	13	2.3	2.1	0.59	0.42	0.17
Non-European groups	6	2.0	1.9	0.66	0.41	0.25
Total	100	2.9	1.8	0.35	0.19	0,17

How to read the table: Independent companies employed on average 40% of the industrial workforce between 1995 and 2001. On average, 4.4% of their workforce disappeared yearly in a "major staff reduction". Similarly, each year 0.05% was moved off-shore to a low-wage country and 0.03% to a developed country.

These observations do not necessarily mean that the jobs of small and medium-sized companies are less affected by international competition. The consequences of this kind of competition can in fact vary depending on the type of company: if it faces excessively strong international competition, a small independent company may have to terminate its activity and disappear, while a major group will move certain production units off-shore without closing all of its factories in France.

Foreign groups move off-shore slightly more often than French groups. This is the case in particular when production is moved to a developed country. This result is consistent with the idea that, when groups reorganise, they give precedence to their original base.[19] When they must eliminate duplication, French groups most frequently keep their production units in France, while foreign groups, which are almost exclusively European, North American and Japanese, tend to retain their units in their home country. However, the difference between groups of various nationalities is far less significant than the difference between groups and independent companies.

19. The identification of the off-shore country can be partly biased if the products moved off-shore are not re-imported directly to France. In particular, if this production transferred off-shore is first imported by the country in which the group's headquarters are located and then shipped to France, it is the headquarters country that will be considered as the off-shore country rather than the country in which the production actually took place.

With regard to off-shoring to low-wage countries, there is little difference; the difference tends to be between European groups on the one hand and French and non-European groups on the other.[20] Non-French European groups tend to move their production to low-wage countries less frequently.

III.6 Methods of off-shoring: using subsidiaries rather than outsourcing

Off-shoring to developed countries is most often carried out by establishing a subsidiary. In low-wage countries, except for Eastern Europe, outsourcing is the favoured method of off-shoring. Table 5 shows the average intra-group rate[21] for imports when production has been moved off-shore in comparison with the average rate in general, i.e. independently of whether or not production has been transferred off-shore.

Table 5. **Intra-group share of imports by origin (1995-2001)**

%

Origin of imports	Intra-group share of imports	
	All French imports	Import flows from production moved off-shore
North Africa	47	42
China	71	58
Eastern Europe	54	68
NAFTA	78	85
15-Member EU	81	86

Note: Average weighted by the value of the import flow (column 2) and by the value of the French production moved off-shore (column 3).

Source : Cross-correlation with data from the "Globalisation" Survey (SESSI & INSEE, 1999).

How to read the table: 47% of imports from North Africa are between subsidiaries of the same group. Of the import flows from production moved off-shore to North Africa, 42% are between subsidiaries of the same group.

It is more frequent for companies moving production off-shore to relocate physically when the off-shore country is a developed country. This is consistent with the idea that off-shoring to these countries is most often the result of an internal reorganisation of the group rather than a decision related to factor costs. In the case of emerging countries, the production is most often moved off-shore without relocating it physically. This is consistent with the idea that production is outsourced to emerging countries in sectors in which competition is strong and in which subcontractors have relatively low margins. It would therefore useless to try to compete with the subcontractor's low margin by relocating physically.

20. Similar results are obtained if we analyse the share of jobs moved off-shore in the total jobs destroyed by major staff reductions. In this case, off-shoring to developed countries accounts for 12% of the jobs destroyed in French groups, as opposed to 18 to 20% in foreign groups. On the other hand, off-shoring to low-wage countries appears to account for less than 8% of the major staff reductions in non-French European groups, as against roughly 14% in French and non-European groups.

21. Intra-group trade consists of trade between subsidiaries of the same international group.

III.7 Some sectors are harder hit…

Off-shoring to low-wage countries is more frequent in low-technology sectors employing relatively unskilled labour, such as the clothing, leather goods and textile sectors (Table 6).

However, there has also been a great deal of off-shoring to low-wage countries in more high-technology sectors, such as electronics and household appliances in the household equipment sector. Nevertheless, the nomenclature that classifies sectors into "high" and "low" technology does not make any distinction between the different phases of production within industry sectors. Off-shoring in "high-technology" sectors is not necessarily synonymous with the off-shoring of high value-added activities, for within these sectors, high value-added R&D activities may remain in France or in Europe, while lower value-added manufacturing activities may be move off-shore to low-wage countries.

There are many cases of presumed off-shoring in highly concentrated sectors, in which major multinational groups are active: automobiles, aerospace, pharmaceuticals and electronic components. In these sectors, presumed outsourcing appears to be responsible for a large share of the jobs lost in major staff reductions.

The sectors in which there are many cases of presumed off-shoring did not necessarily lose jobs between 1995 and 2003. In particular, despite the high share of presumed off-shoring among major staff reductions, the number of jobs grew during the period in the automobile and electronic component sectors. We must bear in mind that the impact of off-shoring is not a sufficient basis for making an overall assessment of employment. When its rationale is the restructuring of groups, off-shoring is not necessarily detrimental to France for it can also have a positive impact indirectly on the number of staff employed by groups in France.

Conversely, off-shoring is not the only source of job losses in French industry, nor is it only caused by international competition. For example, staff reductions in certain declining sectors may be far greater than the number of jobs lost because of off-shoring. This is the case in particular for clothing and textiles. This means that many French producers are disappearing in these sectors, without necessarily moving their production off-shore, because they are losing customers to other producers, who may be foreign.

The aggregated nomenclature of sectors of activity used in Table 6 can give a false idea of the products for which production has been moved off-shore. For example, subcontractors in the automobile sector may be classified in the automobile sector as such, but also in the household equipment sector (manufacturing of automobile seats) or the electronic component sector (manufacturing of electrical equipment for motors and vehicles). As a result, the distribution by sector may give an imperfect picture of the impact of off-shoring on industries.

For example, if we only consider the specific sector of automobile equipment manufacturing, the presumed off-shoring only concerned about 400 jobs annually during the 1995-2001 period, primarily to developed countries such as Spain, the United Kingdom and Portugal. However, some automobile equipment is classified in other

sectors,[22] in which approximately 400 jobs were moved off-shore annually, mainly to low-wage countries such as Tunisia, Morocco, Poland and the Czech Republic.

Table 6. **Jobs moved off-shore by sector (1995-2003)**

Sector	Industrial employment		Jobs moved off-shore, annual average 1995-2003		Main off-shore countries
			% of employment in 1994		
	In 1994	Annual average variation %	To developed countries	To low-wage countries	
C1: Clothing, leather goods	194	-2.1	0.0	0.4	Tunisia, Morocco
F2: Textiles	134	-3.4	0.0	0.4	Pakistan, Morocco, Romania
E3: Electrical and electronic equipment	228	-0.2	0.2	0.5	China
C3: Pharmaceuticals, perfumes and cleansing/polishing	143	1.0	0.3	0.0	United Kingdom, United States
F1: Mineral products	189	-1.6	0.2	0.1	Italy, Belgium
C2: Publishing, printing, reproduction	216	-0.9	-0.9	0.0	Italy, China
F3: Wood and paper	195	-1.2	0.1	0.1	Chile
C4: Household equipment	230	-1.9	0.1	0.5	China
E1: Shipbuilding, aerospace and railway products	158	-1.2	0.5	0.0	United States, Germany
D0: Automobiles	283	0.5	0.3	0.0	Spain
E2: Mechanical capital goods	425	-0.1	0.2	0.1	Italy, Germany
F5: Metal products and metal processing	439	-0.1	0.2	0.1	Belgium, Brazil
F4: Chemicals, rubber, plastics	345	-0.1	0.2	0.1	Belgium
B0: Farm products and food	569	0.9	0.2	0.0	Germany
F6: Electrical and electronic components	178	0.6	0.5	0.5	Germany, Italy
TOTAL	3 934	-0.1	0.2	0.2	

How to read the table: In 1994, there were 194 000 persons employed in the “clothing and leather goods” sector in France. This number fell by an average of 2.1% per year between 1994 and 2003. Between these two dates, approximately less than 0.1% of jobs were moved off-shore each year to developed countries, while 0.4% were transferred to low-wage countries. This presumed off-shoring accounted respectively for 1% and 14% of the jobs destroyed by major staff reductions in the clothing and leather goods sectors.
Note: The sectors correspond to the NES 16 nomenclature. They are classified by the annual average variation in sectoral employment (top of table: sector in which employment fell the most; bottom: sector in which employment increased the most). The rate of variation presented in column 3 is the average of the variations from one year to the next between 1995 and 2003. The main off-shore countries are the ones whose share represents more than 15% of the total job off-shoring.

22. *i.e.* the manufacturing of electricity and automobile electronics (NAF 316A), automobile seats (part of NAF 316A), automobile locks (part of NAF 286F) and automobile springs (part of NAF 287H). cf. Brocard and Donada (2002).

III.8 … but virtually all sectors are concerned

Presumed off-shoring can be observed in virtually all sectors[23] (Table 7). The nomenclature that we are using distinguishes between 60 industrial sectors excluding energy. Of these 60 sectors, 56 experienced at least one case of presumed off-shoring between 1995 and 2001. Consequently, it appears that there is virtually no sector that is "protected" from this trend, even though its magnitude varies considerably across sectors.

Table 7. **Presumed off-shoring: number of sectors, groups and establishments concerned, by countries (1995-2001)**

Countries	Number of sectors (NES 114)	Number of groups	Jobs lost	Number of establishments	Number of establishments with at least 10 jobs lost
	Total for 1995-2001		Yearly average		
TOTAL	56	1224	13 545	467	203
Total, developed countries	55	694	7 175	291	111
Total, low-wage countries	52	597	6 370	177	92
China	35	166	1905	53	26
Spain	32	105	1148	41	15
Italy	45	156	1093	51	20
Germany	45	146	1018	46	19
United States	24	53	933	23	11
Belgium	27	66	707	36	10
United Kingdom	32	73	579	32	11
Brazil	7	15	519	6	5
Netherlands	24	49	517	20	10
Morocco	11	50	514	13	7
Tunisia	11	78	483	15	10
Czech Republic	17	20	371	6	3
India	17	31	333	9	3
Poland	22	32	297	7	3
Switzerland	19	28	263	6	2
Vietnam	5	12	252	3	2
Romania	8	17	227	5	4
Bulgaria	6	16	197	4	3

23. Sectors are now defined at a more detailed level using the NES 114 nomenclature rather than the NES 16 nomenclature.

Portugal	15	36	177	7	3
Ireland	7	11	174	4	2
Indonesia	8	13	159	3	2
Turkey	10	23	156	10	4
Sweden	12	14	124	3	1
Venezuela	1	1	123	10	3
Finland	9	8	106	5	2
Japan	9	10	100	2	1
Malaysia	8	8	94	3	1
Madagascar	7	12	83	3	1

How to read the table: Between 1995 and 2001, 166 groups moved part of their production to China, in 35 different sectors of activity (out of the 60 industrial sectors included in the NES 114 nomenclature). On average, 53 establishments per year were affected by this off-shoring to China, and for 26 of them more than 10 jobs were moved off-shore. This off-shoring of jobs to China involved an average of 1 905 jobs per year.

Note: the same group may move a number of establishments off-shore to several different countries. The total number of groups concerned by country and by area is therefore higher than the total number of groups concerned.

The fact that virtually all sectors were affected can be explained mainly by the off-shoring to developed countries. This is a trend of restructuring by multinational groups rather than of "off-shoring" as such. For the main destinations, i.e. the United States and France's neighbouring countries, off-shoring is observed in more than one out of two industrial sectors.

For some destination countries, the presumed off-shoring occurs mainly in a few specific sectors: automobiles for Spain, aerospace for Germany and pharmaceuticals for Switzerland, for example (Table 8). This off-shoring is generally carried out by major multinational groups. As a result, the destination countries mainly reflect the geographical location of these groups.

Table 8. **Main sectors of off-shoring by destination country: developed countries (1995-2003)**

Country	Average number of jobs lost per year	Main sector	%	Second main sector	%	Third main sector	%
Germany	1 435	Electrical and electronic components	20	Shipbuilding, aerospace and railway products	18	Farm products	17
Belgium	1 133	Farm products	52	Mineral products	10	Chemicals, rubber, plastics	10
Spain	1 125	Automobiles	47	Chemicals, rubber	14		
Italy	1 091	Publishing, printing	25	Mechanical capital goods	16	Mineral products	15
United States	699	Shipbuilding, aerospace and railway products	40	Electrical and electronic components	25	Pharmaceuticals, perfumes	14
United Kingdom	637	Pharmaceuticals, perfumes	25	Electrical and electronic components	22	Farm products	22
Netherlands	378	Electrical and electronic components	25	Farm products	23	Chemicals, rubber	23
Ireland	130	Pharmaceuticals, perfumes	49	Chemicals, rubber, plastics	20	Electrical and electronic components	16
Portugal	109	Automobiles	48	Clothing, leather goods, textiles	18	Electrical components	12
Finland	85	Mechanical capital goods	58	Electrical and electronic components	34		
Switzerland	76	Household equipment	29	Mechanical capital goods	19	Metal products and metal processing	13
Japan	62	Chemicals, rubber, plastics	33	Electrical and electronic components	27	Shipbuilding, aerospace and railway products	16
Sweden	47	Electrical and electronic components	44	Mechanical capital goods	22	Pharmaceuticals, perfumes	21

How to read the table: An average of 1 125 jobs were moved each year to Spain, 47% of which were in the automobile sector.

Note: Annual averages for the 1995-2003. The scope is the industry excluding energy. We only retain the sectors accounting for more than 10% of the jobs moved off-shore to each country. The following grouping were made: “farm products” designate the farm products and food (B0 in the NES16 nomenclature); “clothing, leather goods and textiles” combine the sectors of clothing and leather goods and textiles (C1 and F2); the chemicals, rubber and plastics sector (F4) is divided into “plastics processing” (F46 in the NES 114 nomenclature) and “chemicals and rubber”; “electrical components” designate the sector of the electrical and electronic components industry (F6); “electrical equipment” designates electrical and electronic equipment (E3); “metal products” designates metal products and metal processing (F5); the household equipment sector is divided into (C4) “furniture, chairs” (C41), “jewellery, music” (C42), “games, sports items” (C43), “household appliances” (C44), “audio-visual equipment” (C45) and “optical and photographic equipment” (C46).

On the other hand, off-shoring to low-wage countries tends to reflect sectoral decisions, since presumed off-shoring is concentrated in a limited number of sectors, such as the clothing and leather goods sectors for Tunisia, Vietnam and Morocco, and the steel and agri-food sectors for Brazil (Table 9).

Off-shoring to China and to a lesser extent Poland, India and the Czech Republic is observed in many sectors, including sectors that are not very unskilled labour intensive, in which these countries' low labour costs do not give them a decisive advantage. This may reflect that fact that off-shoring to these countries is not only aimed at reducing factor costs, but also at enabling firms to gain a foothold in strategic markets.

Table 9. **Main sectors of off-shoring by destination country: low-wage countries (1995-2003)**

Country	Average number of jobs lost per year	Main sector	%	Second main sector	%	Third main sector	%
China	2 720	Electrical and electronic equipment	42	Household equipment	27		
Morocco	445	Clothing, leather goods, textiles	50	Electrical components	35	Farm products	11
Tunisia	399	Clothing, leather goods, textiles	56	Metal products	16	Chemicals, rubber	10
Brazil	332	Metal products	81	Farm products	12		
Turkey	324	Automobiles	30	Mechanical capital goods	29	Electrical components	20
Poland	289	Chemicals, rubber	37	furnitures	27	Electrical components	16
Romania	265	Clothing, leather goods, textiles	74				
Hungary	209	Electrical components	78	Clothing, leather goods, textiles	11		
Czech Republic	174	Electrical equipment	49	Electrical components	32		
Vietnam	138	Clothing, leather goods, textiles	86				
India	102	Farm products	47	Clothing, leather goods, textiles	29	Electrical equipment	12

How to read the table: An average of 2 720 jobs lost each year were moved to China, 42% of which were in Electrical and electronic equipment sector and 27% in the household equipment sector.

Note: Annual averages between 1995 and 2003.The scope is the industry excluding energy. We have only retained the sectors accounting for more than 10% of the jobs shifted to each country. Cf. Table 8 for the description of the sectors.

Off-shoring to emerging countries is mainly affecting three sectors: the clothing, leather goods and textiles sector; the electronics sector, which includes the electrical and electronic component and equipment industries; and household equipment industries. The latter includes household appliances and the game and toy industry.

Nearly one out of every three cases of off-shoring to a low-wage country took place in the clothing, leather goods and textile sectors, with an average of 29% during the period. One-third of these cases involved off-shoring to North Africa, but also to Asian countries such as China and Vietnam, and to Eastern Europe, especially Romania.

By order of magnitude, the second type of activity involving the most cases of presumed off-shoring to low-wage countries consisted of the electrical and electronic component and equipment sectors. In these sectors, off-shoring appears to have been relatively evenly divided between the three major destination areas, i.e. Eastern Europe, especially the Czech Republic; Asia, mainly China; and North Africa.

However, off-shoring in the household equipment sector, which includes household appliances and the game and sports items manufacturing industry, was concentrated geographically. Most cases involved off-shoring is to China and Poland.

Figure 1a. Jobs moved off-shore to low-wage countries between 1995 and 2001compared with the number of industrial jobs in 1994 (% of industrial employment)

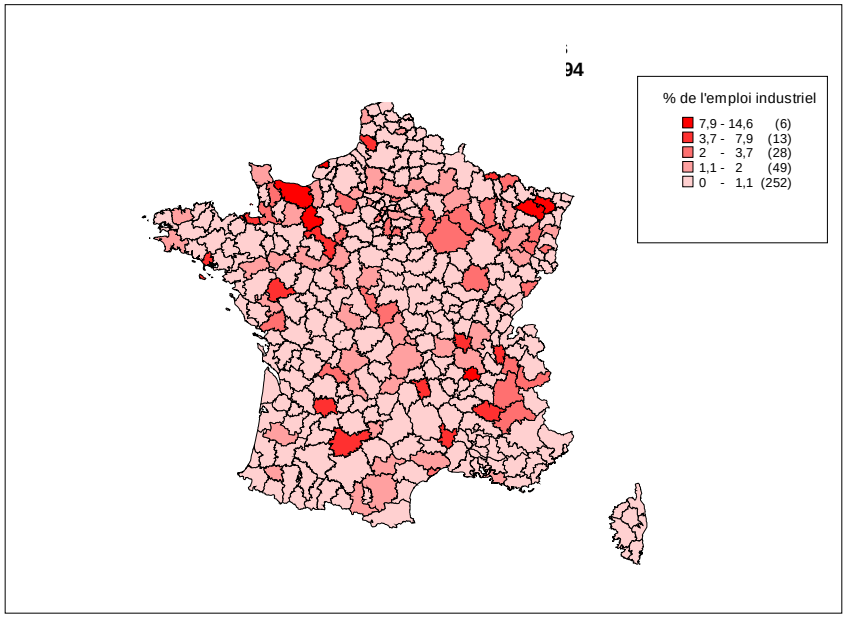

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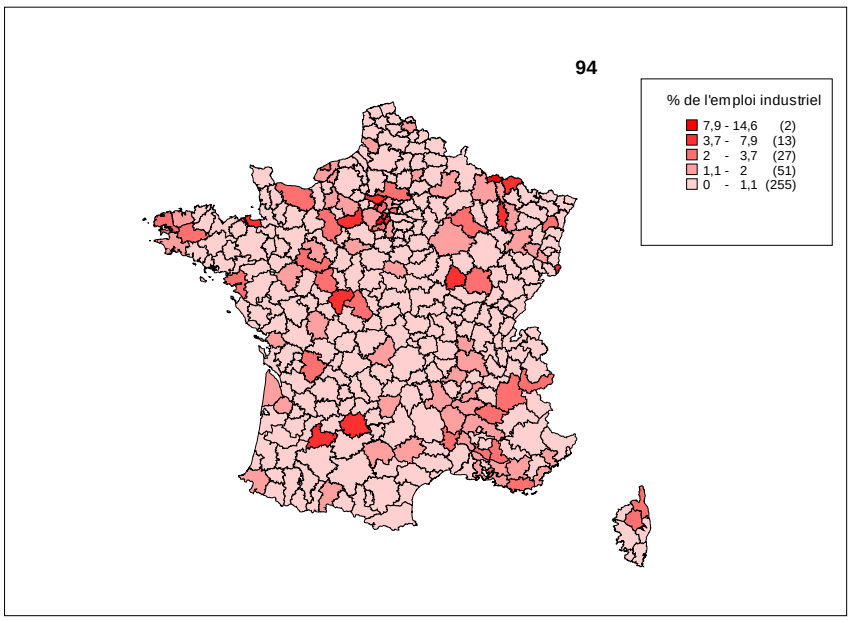
Figure 1b : Jobs moved off-shore to developed countries between 1995 and 2001 compared with the number of industrial jobs in 1994 (% of industrial employment)



How to read the table: distribution of the total number of jobs moved off-shore by employment areas between 1995 and 2001 compared with the number of jobs in 1994.

III.9 Few regional differences

The differences appear to be less large between regions than between sectors, at least for the 1995-2001 period. However, some regions, such as *Basse Normandie*, Lorraine and the Champagne-Ardenne region, were affected more severely by off-shoring to low-wage countries (figure 1). These differences might be explained by regional specificities regarding the main industry sectors.

Some employment areas appear to have been hard hit by off-shoring. For the 352 areas of metropolitan France having industrial establishments in 1994, over 10% of industrial employment was moved off-shore in six areas between 1995 and 2001 and more than 5% in 30 areas. These extreme examples have heightened the concerns about off-shoring, since in some areas more than one out of 10 industrial jobs was sent off-shore during a period of only seven years. On the other hand, the employment moved off-shore over the entire 1995-2001 period amounted to less than 1% of industrial employment in 151 employment areas, i.e. in more than one-third of all areas.

However, the areas affected most severely were not necessarily the poorest areas nor those hardest hit by unemployment in general. For example, the cases of presumed off-shoring were slightly more numerous in employment areas where unemployment was low (Table 11). In the 25% of employment areas where the unemployment rate was lowest, an annual average of 0.4% of industrial employment was moved off-shore at the beginning of the1995-2001 period, as opposed to 0.2% in the 25% of employment areas where the employment rate was highest. The difference is very slight, but in any case areas that were more vulnerable in terms of employment did not seem to be especially affected by off-shoring.

Table 11. **Jobs moved off-shore by unemployment rate and average taxable income in employment area (1995-2001)**

Area	Industrial employment (excluding energy)		Number of jobs moved off-shore, annual average 1995-2001				
			Total	% of employment in 1994		% of "major" staff reductions	
	In 1994	Trend 1994-2001		to developed countries	to low-wage countries	to developed countries	to low-wage countries
By unemployment rate in 1999[(1)]							
Unemployment rate < 7.5%	870	5%	3 275	0.2	0.2	7	7
7.5% < unemployment rate < 8.6%	898	-3%	3 034	0.2	0.1	7	5
8.6%< unemployment rate < 10.4%	1 130	-1%	4 656	0.2	0.2	7	7
10.4% < unemployment rate	957	-1%	2 531	0.1	0.1	5	4
By average taxable income in 2001[(1)]							
Taxable income < 14 600	575	0%	1 436	0.1	0.1	4	4
14 600 < taxable income < 15 400	633	1%	2 341	0.1	0.2	5	8
15 400 < taxable income < 16 600	883	2%	2 992	0.2	0.2	7	7
16 600 < taxable income	1 765	-2%	6 728	0.2	0.1	8	5

How to read the table: in the 25% of employment areas having the lowest unemployment rate in 1999 (quartile 1: unemployment rate below 7.5% in 1999), approximately 3 275 jobs appear to have been moved off-shore each year between 1995 and 2001.

Note: (1) Regarding the unemployment rate and income, the segments were defined by quartiles so that each one covers 25% of the employment areas. Taxable income corresponds to the total resources declared by taxpayers on their "tax returns" before exemptions. It is expressed in euros per consumer unit. It is used here as an indicator for describing "rich" and "poor" areas.

A similar result is obtained if a distinction is made between employment areas on the basis of the average income. Off-shoring appears to have slightly less impact in the poorest areas, but the difference between areas appears to be small.

It is therefore difficult to identify employment areas that are more vulnerable than others to the risk of having their industries move off-shore. For example, with regard to the magnitude of off-shoring between 1995 and 2001, no clear distinction can be made between areas either in terms of the average unemployment rate or the taxable income of households or other characteristics such as industries' share of labour.

III.10 More highly skilled workers are also affected by off-shoring

On average, workers in establishments that were closed so that production could be moved off-shore to low-wage countries had slightly lower skill levels (Table 12). For example, unskilled workers accounted for 26% of the staff in these establishments, while they only accounted for 21% of jobs in all establishments closed that belonged to groups that remained in business between 1995 and 2001. This might be the result of sectoral specificities, since off-shoring to low-wage countries is more frequent in low-skilled labour sectors such as clothing and textiles.

There are many theoretical arguments to the effect that the least skilled employees are the hardest hit by off-shoring (Box 1). We might therefore have expected even greater differences between skill categories. However, "jobs moved off-shore" are not systematically the same as layoffs. Some employees may be redeployed in other establishments of the group. Consequently, the skills most affected by off-shoring cannot be determined from the skill composition of the jobs lost because of off-shoring; for example, it is possible that a group may relocate off-shore the production of an establishment that employs both unskilled and skilled staff, but that the latter will be redeployed in another establishment while the unskilled staff will be laid off. The share of unskilled staff laid off because of off-shoring might therefore be higher than the original share of unskilled staff in the establishments whose production has been moved off-shore.

The closure of establishments as a result of presumed off-shoring to developed countries appears to affect much more highly skilled staff, since 15% of the staff in these establishments were managerial staff, as compared to 13% in all the establishments closed during the period. Only 13% of the workers in these establishments were unskilled, as compared with 21% in all establishments that had their production moved off-shore.

The results were similar for major staff reductions in which the establishment did not close (Table 12). Unskilled workers held 34% of the jobs destroyed by presumed off-shoring to a low-wage country, which was greater than

their share of the total jobs in these establishments before the staff reduction (28%) and more than their share in all major staff reductions (25%).

Table 12. **Structure of jobs in establishments that closed or underwent major staff reductions, for groups that remained in business (1995-2001)**

	All major staff reductions %	Off-shoring to developed countries %	Off-shoring to low-wage countries %
In establishments that closed (1)			
Unskilled manual workers	21	13	26
Skilled manual workers	30	31	32
Unskilled clerical workers	10	11	8
Skilled clerical workers	3	1	2
Intermediate occupations	23	29	21
Managerial staff	13	15	11
Total	100	100	100
In establishments that underwent major staff reductions but did not close			
Structure of total jobs in the year prior to the reduction (1)			
Unskilled manual workers	23	11	28
Skilled manual workers	30	29	29
Unskilled clerical workers	8	8	8
Skilled clerical workers	3	1	2
Intermediate occupations	21	34	24
Managerial staff	14	17	9
Total	100	100	100
Structure of jobs destroyed (2)			
Unskilled manual workers	25	15	34
Skilled manual workers	28	31	29
Unskilled clerical workers	7	6	7
Skilled clerical workers	4	2	1
Intermediate occupations	22	35	24
Managerial staff	13	12	6
Total	100	100	100

How to read the table: In the establishments where there was a major staff reduction without the establishment disappearing, unskilled workers accounted for 23% of staff and 25% of the jobs destroyed. These unskilled workers accounted for 11% of staff (and 15% of jobs destroyed) in establishments where there was presumed off-shoring to a developed country and 28% of staff (and 34% of jobs destroyed) in establishments where there was presumed off-shoring to a low-wage country.

Notes: Average between 1995 and 2001. Industry excluding energy.

(1) Weighted by the staff of establishments. The structure of jobs and total staff are observed for the year preceding the closure of the establishment or the major staff reduction, as applicable.

(2) Weighted by the jobs destroyed in the establishment. The structure of the jobs destroyed is based on all groups of employees whose numbers decreased over the 3-year period: the total employment destroyed designates the total of all these staff reductions and the share of employment destroyed designates each group's share in this total. It is nil for categories for which the number of jobs increased or remained stable during the period.

Conclusion

Between 1995 and 2003, 13 800 jobs on the average were moved off-shore each year, which would amount to 0.35% of industrial employment and about 12% of "major" staff reductions.

These figures are no more than an estimation, since the method used only makes it possible to detect *presumed* cases of off-shoring, since confirmed cases are not detectable using the available statistics. The method is based on the observation of a situation in which a group reduces staff in France and then increases imports of the same

type of product that was previously produced in France. Furthermore, this method cannot provide a "balance sheet" of the impact of the phenomenon of off-shoring on French industrial employment. We only focus on staff reductions that seem to be caused by off-shoring, without taking into account cases of off-shoring *to* France.

The comparison between the 1995-1999 and 2000-2003 subperiods shows that emerging countries represent an increasing share of these job losses. It increased from 37 to 57% of the total between the two subperiods, with an increasing pre-eminence of China. , far ahead of Eastern Europe, North Africa (Morocco and Tunisia), South America (mainly Brazil) and the other Asian countries. Off-shoring toward developed countries especially occurs towards neighbouring countries or the United States. In these cases, "off-shoring" is mainly connected with the restructuring of major multinational groups. In line with this rationale, off-shoring seems to be carried out most often through subsidiaries in industrialised countries and through outsourcing in low-cost countries.

Virtually all industrial sectors appear to be affected by off-shoring, even though its magnitude varies across sectors. There are many cases of off-shoring to low-wage countries in the clothing and textile sectors, in electronics and in the household equipment industries. "Off-shoring" to developed countries mainly seems to involve highly concentrated sectors in which major multinational groups are active, such as automobiles, aerospace, pharmaceuticals and electronics.

Certain employment areas appear to have been hard hit by off-shoring between 1995 and 2001, while others were relatively spared. However, it is hard to say whether some areas are more "vulnerable" than others to the risk of off-shoring; for example, the poorest areas and the areas with the highest unemployment rates do not seem to have been more affected by off-shoring on average than rich areas and areas with low unemployment.

Lastly, cases of off-shoring are more numerous in low value-added sectors, and unskilled workers are on average more frequently affected than skilled workers, but no skill category seems to have been spared.

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ANNEX A: LIMITATIONS AND DIFFICULTIES

The method consists in detecting simultaneous occurrences of staff reductions in a group's establishment and increases in that group's imports of the product involved. The idea underlying the method is simple: if, for example, a group closes a shoe factory in France and at the same time starts importing more shoes, the presumption is that off-shoring has taken place, because the group's shut-down of the plant could not be justified solely by declining demand in France (in which case the group would have no need to import), nor could the higher volume of imports be justified solely by an excessive rise in French demand (in which case the group would keep its factory open to satisfy that demand).

This methodology raises a number of conceptual problems stemming from the fact that off-shoring cannot be detected if the group does not then subsequently import the products whose manufacture has been sent off-shore. This problem would arise, for example, if the products in question were not destined for the French market, or if they were not marketed in France by the group itself. These conceptual problems are discussed in Part II.

At the same time, the method runs up against a number of technical difficulties attributable to the nature of the data that it uses. Each of the "criteria" that must be present if there is to be a presumption of off-shoring must indeed be detected clearly. These include:

1. Identification of staff reductions in an establishment;

2. Identification of "products";

3. Identification of increases in imports.

Staff reductions at the local level

To track changes in the staff numbers of a given group establishment, ideally it would suffice to monitor the number of employees working in each establishment, as identified by its SIRET code.[24] In practice, two problems arise. First, a SIRET code cannot be used to track establishments, because an establishment's code can change. In addition, a reduction in staff at an establishment does not necessarily mean a reduction in activity: from one year to the next, employees may be reported under different establishments, either because a group owns more than one establishment in the same area and transfers employees amongst them, or simply because administrative reporting is switched to another establishment, with no "physical" rotation of the people involved (the so-called "regrouping" problem).

24. In the directory of the SIRENE system (a computerised system for the listing of enterprises and their establishments), a "SIRET unit" or "SIRET" designates a local legal entity, *i.e.* the geographic site of a legal or natural person. In common parlance, the term "establishment" is used.

Both these problems lead to an overestimation of job losses: each time, the staff reductions or even plant closures that are "detected" are in fact purely statistical illusions.

More precisely, the cases that can pose problems include the following:

- **Code changes:** This occurs frequently when an establishment or an enterprise is taken over, but it can also take place even if there is no change in group affiliation. If employment is monitored on the basis of establishment codes alone, there are bound to be "false" closures of establishments.

- **Reporting in multiple establishments (employee *redeployment* and *regrouping*):** If a group possesses more than one establishment within the same employment area, the number of employees per establishment is not necessarily the most relevant measure of local group activity. From year to year, some employees may be transferred from one group establishment to another, either physically (redeployment) or simply at the DADS administrative reporting level (regrouping: the enterprise does not report employees under the establishment in which they actually work). The use of "ungrouped" DADS files (for 1997 to 2000) is insufficient to control this second case.

- **Relocation of establishments:** A group may decide to relocate a production site. In this case the SIRET code would change, but there would not necessarily be any actual loss of jobs. Such cases are detected if the establishment's transfer has been reported in the SIREN registry.

- **Temporary decrease in employment:** The phenomena that we endeavour to detect are theoretically permanent. Off-shoring is not undertaken for just a few years; the jobs lost are theoretically not replaced. With our methodology, the permanency of job losses is not tested (the same problem arises with the creation of import flows; see above): staff reductions are tracked over a three-year period, but there is no check on whether the numbers subsequently rise back to their original level. As a result, there may be false presumptions of off-shoring, if an observed reduction in staff in fact corresponds to a temporary period comprising, for example, a few months of technical unemployment.[25] Efforts are made to control this by incorporating staff reductions only if they are equal to at least 25% of the number of employees at the beginning of the period: it is considered that this threshold is high enough not to include cyclical fluctuations in employment. But this does not completely ensure that all reductions of at least 25% do in fact correspond to "real" permanent job losses.

When the database was being constructed, a number of procedures were instituted to address these problems. An extensive presentation of the procedures can be found in Aubert (2005). The main treatments are:

25. Or a problem of erroneous data attributable to the data collection phase.

- **Finding collection gaps:** A collection gap is presumed to exist when, for example, an establishment "exists" in the 1997 and 1999 bases but is absent from those of 1998. A reading is then created for 1998 as the average number of staff for 1997 and 1999.

- **Finding successors:** If a SIRET code disappears (*i.e.* the entity no longer employs anyone), an attempt is made to ascertain whether there has merely been a code change by looking for any successor, *i.e.* an establishment having a different SIRET code but which is physically the "continuator" of the vanished establishment. When a SIRET code is discontinued, a search is made for another code in the *same municipality*, during the *same year* and, in addition, having at least one of the following characteristics: belonging to *the same group* or having the *same APE code* (in the NAF 700 nomenclature) or the *same number of employees* (plus or minus 10%, and only for establishments having more than 100 employees).[26] If there is a match, the new series is tacked onto the old, on the assumption that the establishment that "appears" is the successor of the one that "disappears".

- **Consistency between staff reductions in establishments and decreases in local employment:** When a reduction in staff is detected at an establishment, a check is made of whether the reduction is in fact reflected in a reduction of employment at a higher level of aggregation: group employment within the employment area or employment within the same municipality at establishments having the same primary line of business ("APE" in the NAF 700 nomenclature).

A number of "fictitious" staff reductions will be corrected with these criteria. For example, a group's redeployment or regrouping of employees between multiple establishments within the same employment area will be factored in via the criteria of consistency between the reduction of staff in an establishment and within the group's employment area. If an establishment is taken over and its SIRET code changes, this will be detected if its APE does not change.

However, the procedures that have been introduced will not be able to correct false job losses if there is a combination of more than one problem, as when employees are transferred from one establishment to another and at the same time the new establishment is taken over by another group.

INSEE's regional directorates have validated a number of detected instances of job losses by using qualitative local data (Aubert, 2005). This shows that "complicated", difficult-to-detect cases in which, for example, there is simultaneously a change in SIRET code, a new APE and a geographical transfer of employees are not rare. As a result, the control procedures described above will in fact be necessary. While the procedures may eliminate some

26. For establishments of fewer than 100 employees, because the data encompass industrial establishments only, takeovers of establishments are not detected if there is a change of SIRET code and simultaneously a change in the primary line of business (APE) to a non-industrial activity. Such cases are not rare exceptions. In particular, an establishment can have two activities: production and trade. As a result, from one year to the next a number of establishments can switch from an industrial APE code to one in the commercial sector.

of the false job losses, it would appear that certain cases slip through the filter anyway. **In all, by using the change in establishment staff to "measure" job losses, the number of jobs effectively destroyed is inflated.**

Identification of products

This is a crucial aspect of the methodology, which endeavours to detect cases in which imported foreign products have been substituted for French ones. To match a flow of imports with a decrease in production in an establishment in France, it must be ascertained that the products are in fact the same and that the imported merchandise is effectively replacing the goods that had previously been produced in France.

In practice, products are identified using NES 114 nomenclature (see Part II). Two products having the same NES 114 code are therefore considered identical.

An initial difficulty arises from the fact that NES 114 is an aggregated nomenclature which has fairly general categories, such as "automobiles", "beverages" and "household appliances". Consequently, two cars that are different models, or even different makes, will be considered the same "product", as would a television and a video recorder, champagne and mineral water, or a helicopter and a rocket. In some cases, then, establishment closures are wrongly presumed to be off-shoring: such is the case when there is a simultaneous increase in imports of a product that is different but belongs to the same class of product (*e.g.* when a television factory is shut down in France and at the same time there is an increase in imports of video recorders).

A second difficulty stems from the identification of products that had been manufactured in establishments in which employment has diminished. Products are identified using the primary line of business (APE). This raises a problem in the event of a multi-product establishment: off-shoring cannot be detected in respect of a product that is not an establishment's primary output. But even for single-product establishments, the APE may constitute an imperfect means of product identification. Indeed, year-to-year changes in APEs are relatively frequent.[27] this means that some products are fairly poorly identified under the NES 114 nomenclature, and that mistakes can be made when the nomenclature is used to match data on imports with data on establishment staff. Changes are relatively commonplace in some sectors: for example, to switch from pharmaceuticals (sector C31) to organic chemicals (F42); in respect of certain electrical equipment for automobiles, to move from the automotive equipment sector (D02) to that of electronic components (F62); to shift from an industrial sector to a commercial

27. Such APE code changes pose a second technical problem. An establishment's production is estimated by multiplying its total wage bill by the average production/wage bill ratio in the sector (in NAF 700 nomenclature). If the APE changes, this ratio changes as well, and thus estimated production. As a result, there may be false decreases in production (if an establishment moves from a sector with a high production/wage bill ratio to one with a low ratio). It is also possible to reject erroneously certain reductions in activity because job losses will not be associated with decreased estimated production (if the establishment switches from a sector with a low production/wage bill ratio to one with a high ratio).

one, and so on. The above examples illustrate the fact that even with an even more highly aggregated line-of-business nomenclature, it is impossible to characterise the products of an establishment completely.

Increases in imports

Our methodology detects “off-shoring” in an indirect manner. Insofar as no information is available on production abroad, such production is “detected” by the existence of a heavy flow of imports. Theoretically, such a flow will persist in the wake of a move off-shore: if a group sets up a production unit in a foreign country, or if it enters into a long-term relationship with a foreign subcontractor, each year it will import a large volume of products to serve the French market. Conversely, a sharp increase in imports in any given year that is not replicated in subsequent years is not characteristic of off-shoring: it is a one-off occurrence.

A control has been introduced to “filter” such one-off increases: when an increase is noted, the level of imports is checked to ensure that import flows do not drop back to their original level over the three years following the increase. For example, if a given group’s imports from Poland are seen to increase between 1997 and 1998, the observation is included only if the amount of imports in 1998, 1999 and 2000 never falls below the maximum for the period 1995 to 1997.

A second problem is that of the comparability between the flow of imports created and the French production that is destroyed. When can it be considered that the created flow does in fact “replace” the production that had previously taken place in France? The criterion that is used to answer that question is presented and discussed in Annex C.

ANNEX B: ROBUSTNESS ANALYSIS

Quantifying the number of jobs that are moved off-shore depends in part on the method that is used. Depending on the assumptions that are made to detect "presumed" instances of off-shoring, some cases may be included in error, whereas others, in which jobs have indeed been sent abroad, will not be detected. These cases have been discussed in the body of this study, along with the principle of the method of estimation.

We give in this appendix an evaluation of the margin of error that stems from these potential misclassifications. The evaluation is provided for the 1995-2001 period, the one that was covered by the original Aubert and Sillard study (Aubert and Sillard, 2005). For this period, the central estimate of the number of jobs lost per year was 13 500.

Let us start with decreases in employment that could be wrongly attributed to off-shoring:

- Such is the case if the job losses are "compensated" in other group establishments (outside the employment area), *e.g.* because the establishment has relocated or employees have been redeployed. Roughly **4 500 jobs** presumed to have been sent off-shore may potentially fell into this category for the 1995-2001 period.
- Cases in which the goods imported do not correspond exactly to those that had been produced in France before the reduction in employment; these are not tested for in the robustness analysis because products would have to be identified at a more precise level than the NES 114 nomenclature.

Other job cuts might be attributable to off-shoring but are not detected as such under our methodology:

- Off-shore relocation of a sole subsidiary of a foreign group: since the group no longer has any employees in France after the establishment has been closed, subsequent imports of the production sent off-shore cannot be observed. Such cases could have represented **a maximum of 1 750** jobs per year.
- Off-shore relocation of a unit that produced primarily for export (**a maximum of 4 100 jobs** per year).
- The production that has been moved off-shore is not imported by the group that has relocated off-shore (not tested under the robustness analysis).

Assumptions regarding the threshold for considering that a flow of imports is in fact substituting for French production are also a factor. Nevertheless, the outcome would not seem very sensitive to these thresholds, which are calculated for each off-shore country. If every threshold were to be lowered by 25%, the estimated total number of jobs moved off-shore would increase by 14% as compared with the baseline scenario (2 100 more jobs each year).

Lastly, a case by case validation of the main job reductions corresponding to employment that has been sent off-shore was conducted by INSEE's regional directorates. This validation detects "false" job losses corresponding to changes that are not caught through the use of the filters. This is the case, for example, when ownership of an establishment passes from one group to another and at the same time the establishment's APE code changes. Of the cases studied by the regional directorates (roughly 65% of the jobs moved off-shore, corresponding to major off-shoring), some 15% could be considered invalid. If that percentage were extrapolated for the total volume of detected presumed off-shoring, it would represent approximately **2 000 fewer jobs per year.**

In all, we could adopt a (wide) range of between **9 and 20 000 jobs moved off-shore per year,** 4 to 8 000 of which to low-wage countries.

Estimations of jobs moved off-shore for the 1995-2001 period. Variations of assumptions

Scenario	Explanation	Number of jobs moved off-shore each year			Variation in relation to the baseline scenario (%)		
		All countries	Low-wage countries	Developed countries	All countries	Low-wage countries	Developed countries
Baseline	See Box 2	13 545	6 370	7 175	(+0%)	(+0%)	(+0%)
1	Excludes the 10 large groups having moved the most jobs off-shore.	10 547	4 783	5 765	-22%	-25%	-20%
2	Only reductions in employment for which employment fell sharply at group level	9 040	4 686	4 353	-33%	-26%	-39%
2'	Only reductions in employment for which employment fell sharply at group * sector (NES 114) level	9 810	5 040	4 770	-28%	-21%	-34%
3	Includes "off-shoring" corresponding to establishments taken over (by another group)	14 275	6 689	7 586	+5%	+5%	+6%
4	The "variation in flows" is computed as the sum of the increase in imports (group*country*sector) and the variation in exports (enterprise*sector). Thus, the off-shoring of units producing for export is included.	17 618	7 255	10 362	+30%	+14%	+44%
5	All thresholds for considering that import flows are substituting for discontinued French production are lowered by 25% (bearing in mind that there is one threshold per country in the "baseline" specification).	15 465	6 726	8 738	+14%	+6%	+22%
5'	All thresholds for considering that import flows are substituting for discontinued French production are raised by 25% (bearing in mind that there is one threshold per country in the "baseline" specification).	12 333	5 912	6 421	-9%	-7%	-11%
6	Employment is deemed to have decreased sharply if the decrease is equal to at least 15% of the number of staff at the beginning of the period (instead of 25%)	17 850	8 108	9 742	+32%	+27%	+36%
7	The estimated number of jobs moved off-shore is increased to include all job losses in establishments belonging to foreign groups that "disappear" from French employment	15 295	n/a	n/a	+13%		

	following the shut-down of the establishment						
8	Scenarios (4) + (7)	19 368	n/a	n/a	+43%		
	MINIMUM	9 040	4 686	4 353	-33%	-26%	-39%
	MAXIMUM	19 368	8 108	10 362	+43%	+27%	+44%