Special Analysis

The manufacturing industry in France since 2008: what has changed?

Jean-François Eudeline
Gabriel Sklénard
Adrien Zakhartchouk

Département de la conjoncture

Like the rest of the French economy, the manufacturing industry has been hit hard by the crisis since 2008, and output has not yet returned to its previous level. In the first part of this report an analysis of the various stages of "deindustrialisation" in France since the beginning of the 1980s highlights the fact that certain unfavourable dynamics recorded since 2008 were actually already at work beforehand. For example, the fall in the margin rate and the deterioration of the balance of trade had already started in the period 2001-2007. The fall-off in prices in the sector dates back to the 1990s, but increased in the 2000s.

To offer a better understanding of the dynamics at work in the French manufacturing industry since the start of the 2000s and to identify the respective contribution of the various items of demand, the second part of the report analyses the supply and use balance of the 14 branches that compose this industry. In this way powerful factors common to almost all the branches can be identified. In the 2000s, the slowdown in production triggered by a deceleration in exports was offset by final consumption, which did not waver. Since 2008, the slowdown in production has gone hand-in-hand with a moderation of all the components of demand. Behind these common factors lie big differences in the scale of the slowdown, both that of the 2000s (according to investment dynamics, among other things) and that of 2008. But no link can be established at sector level between the scale of the slowdown and the dynamics of the margin rate, the balance of trade, and prices.

Lastly, part three looks at the management of production factors by manufacturing corporations since the 2008 crisis. Capital and labour have been adjusted less than expected in the light of past behaviour, to the extent that apparent total factor productivity (TFP) has slowed very sharply. The persistence of this phenomenon almost 5 years after the start of the crisis tends to lend credence to the assumption of a structural shift of TFP. ■

The manufacturing industry in France since 2008: what has changed?

The deindustrialisation of the French economy since the crisis is consistent with that of the preceding years

From the start of the 1980s, manufacturing jobs[1] started a downward trend that went beyond cyclical effects: this is one of the usual ways of putting a date on the start of deindustrialisation. Manufacturing jobs fell from 5.1 million in 1980 to just under 2.9 million today. In parallel the share of the manufacturing industry in value-added in value terms in France slipped from 20.6% to 10.0% (*see Graph 1 and Box 1*). In this first part of the report the various stages of deindustrialisation are retraced and any shifts that have occurred since the 2008 crisis are identified. Four phases are studied: 1980-1989; 1990-2000; 2001-2007; 2008-2012. The first three correspond to a full peak-to-peak business cycle[2] of the French economy.

1980-1989: the balance of trade is at equilibrium and businesses rebuild their margins

In the course of the 1980s, the share of industry in value-added and employment slipped back...

From 1980 to 1989 the share of the manufacturing industry in total employment fell from 22.1% to 17.8% and its share in value-added in value terms followed a similar course, falling from 20.6% to 17.7% (*see Graph 1*). As the behaviour of prices in the manufacturing branches had been similar to that of the French economy (*see Graph 2*), manufacturing value-added also grew more slowly in volume than total value-added in volume (*see Graph 3*).

Part of this fall-off in manufacturing business was actually only an artefact, caused by the change in organisation of companies which externalised numerous activities that were not their core business. This effect has been estimated to have caused around 25% of the drop in industrial employment over the period (*see Box 2*). It remained moderate and does not call into question the reality of deindustrialisation during this period.

... but the balance of trade was at equilibrium on average...

From 1980 to 1989 the manufacturing industry balance of trade[3] fell by 16.1 Bn Euros (*see Graph 4*), but the deficit observed at the end of the 1980s was probably cyclical in origin, as growth was particularly strong during those years. As an average over the period, the balance of trade was largely positive (4.7 Bn Euros).

... and margins improved

The margin rate in the manufacturing branch progressed over the period, from 27.6% to 34.0% (*see Graph 5*): indeed, the labour cost per head grew less quickly in real terms than productivity (2.1% against 2.9% per year). The end of automatic indexing of wages, against a backdrop of still-sustained inflation, very likely contributed to the improvement of margins, which had decreased after the oil shocks in the 1970s.

During the 1980-1989 decade deindustrialisation was thus real but controlled: in a context in which prices in the manufacturing industry were as dynamic as in the rest of the economy, the balance of trade excluding cyclical effects was at equilibrium and the margin rate of companies once again stood at a high level.

(1) Throughout the report, we focus on the manufacturing "branch" as defined the national accounting, and this should not be confused with the manufacturing sector (*see below, Box 3*)
(2) We therefore compare the levels of the years 1989, 2000, 2007 and 2012, when the data are available.
(3) Throughout the report, the balance of trade data concern the manufacturing industry excluding coke and refined petroleum products, as the balance of trade in this subsector is extremely sensitive to fluctuations in oil prices.

Box 1 - Deindustrialisation: should we focus on the share in value or volume in total value-added?

When the aim is to observe economic variables over time, various types of measurement are available. Take production, for example (but this applies to all the other economic aggregates of goods and services):

- we can focus on production in value. In this case, we measure each year of growth in production in Euros, and this is then included in price rises.

- if we are only interested in the increase in quantity produced, we use production in volume. This series is built to measure only the variations in the quantity and quality of goods,[1] and does not include price variations. Hence the value (in Euros) of a good may be broken down as follows:

Value change = Quantity change + Quality change + Inflation

Volume change

Generally speaking economists prefer to use volumes because they allow a measurement of the real changes in the economy. Figures for GDP growth or household consumption are thus always given in volume. However, volumes do require a few precautions when phenomena such as deindustrialisation are analysed.

First of all, strictly speaking volume is only appropriate for measuring changes, not levels. Indeed, while it is (relatively) easy to define a volume for an elementary good or service (quantity of apples, number of haircuts at a hairdresser's, number of overnight stays in hotels), it is more complicated to do so for aggregates such as industry as a whole, or even narrower aggregates such as electrical equipment. To perform this aggregation, we generally weight the elementary volumes by the value in a given year of the goods or services. In the French national accounting - as in that of many European countries - it is the weights of the previous years that are used, in both the annual and the quarterly accounts. The growth rates of the resultant "volumes" are then chain-linked to provide users with data in volume, but users should be aware that as the weightings are not fixed once and for all, these volume indices are not directly interpretable. So the parallelism between manufacturing value-added and total value-added between 1990 and 2007 in volume (*see Graph 3*) is deceptive, because it could lead one to believe that the manufacturing industry's share in the total remained stable. In reality the share in terms of value dropped from 17.7% to 11.9% over this period.

Next, if the situation of industry is considered to be of concern today, it is mainly because industry represents a large proportion of trade, and a trade deficit has to be financed in value rather than in volume.

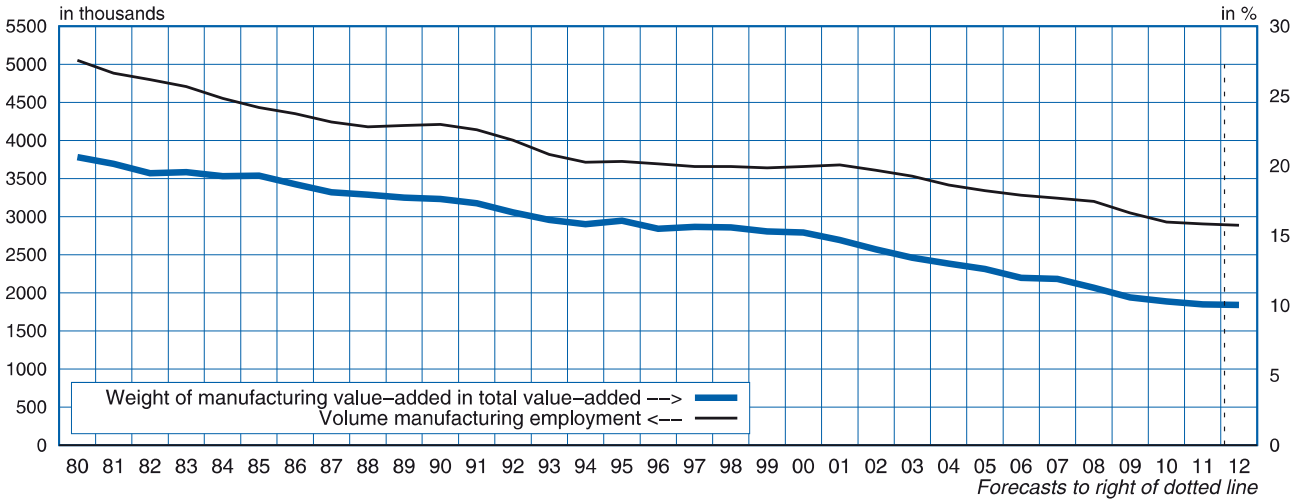
Lastly, it is value-added in value which is taken into account in the calculation of business margins and which is used to determine what can be paid to employees.

For all these reasons, the share of value-added in value is the most appropriate notion for appraising the scale of deindustrialisation in France, and the one that is used in all reports on this subject, most notably those by *Aghion et al.* (2004) and *Gallois* (2012). ■

(1) In particular, technological improvements. For example, in the automobile industry in France, the quality effect needs to be integrated: a carmaker's latest model is better-quality than this carmaker's latest model 10 years previously. This effect is particularly important in industry, unlike in other sectors: an apple or a haircut are globally comparable in quality between 1980 and 2012, something that certainly cannot be said of automobiles, and even less so of electronic goods and computers.

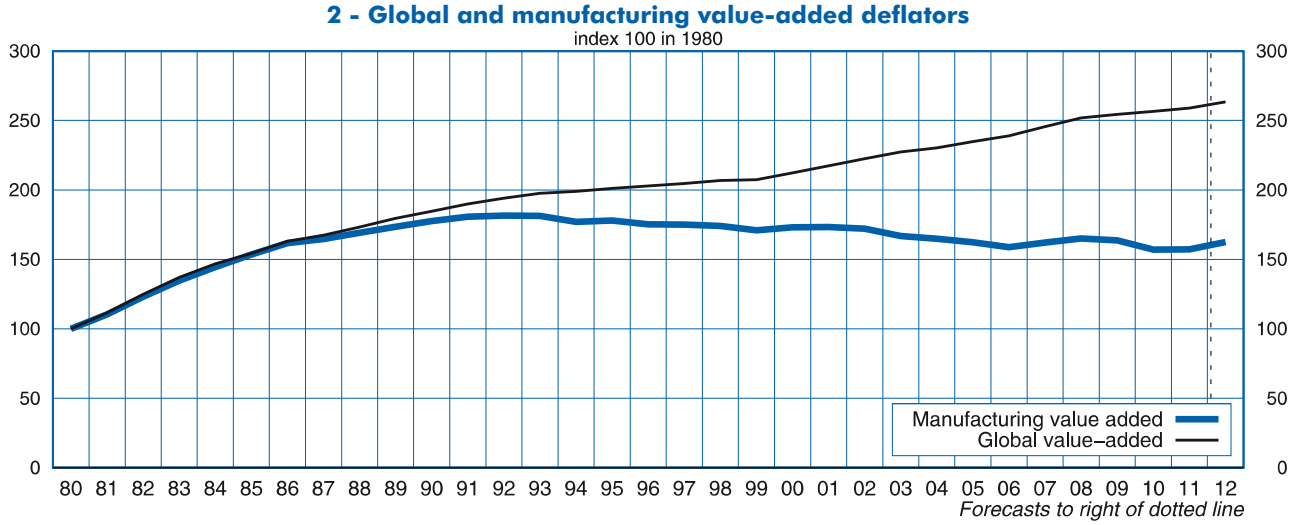
The manufacturing industry in France since 2008: what has changed?

1 - Deindustrialisation since 1980



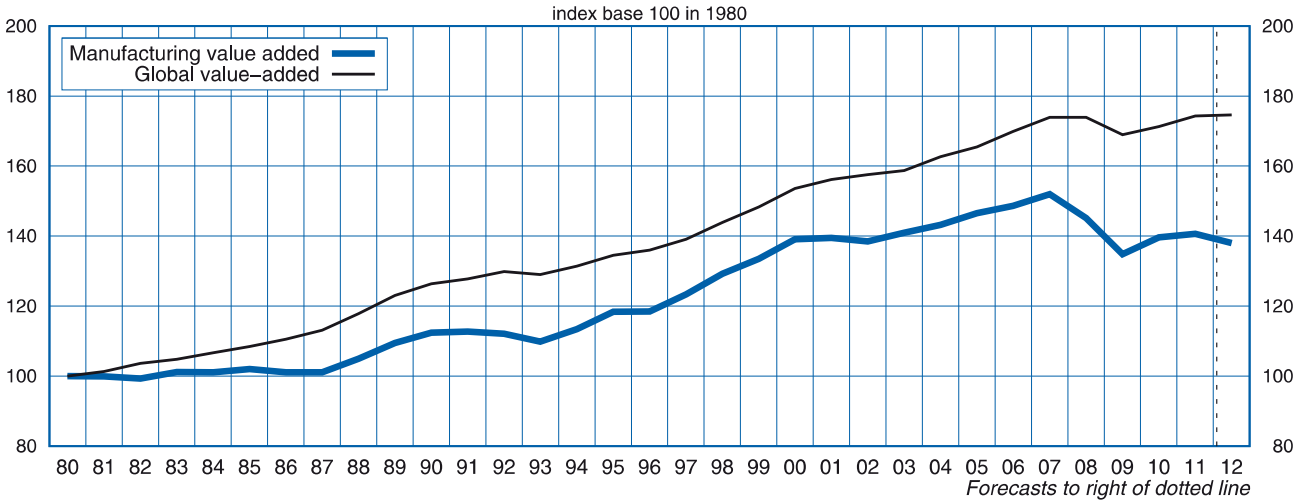
Sources: INSEE, Quarterly national accounts

2 - Global and manufacturing value-added deflators



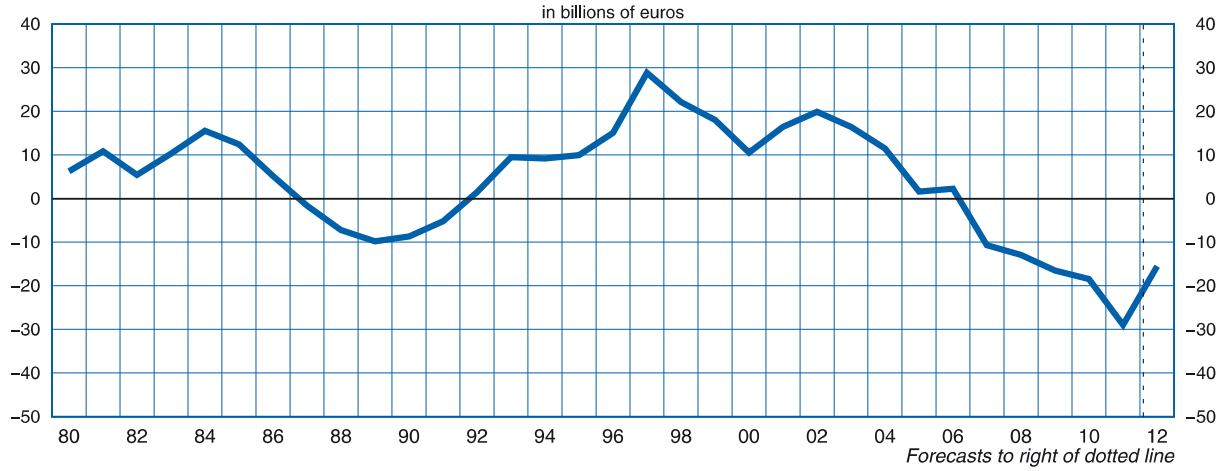
Sources: INSEE, Quarterly national accounts

3 - Global and manufacturing value-added in volume



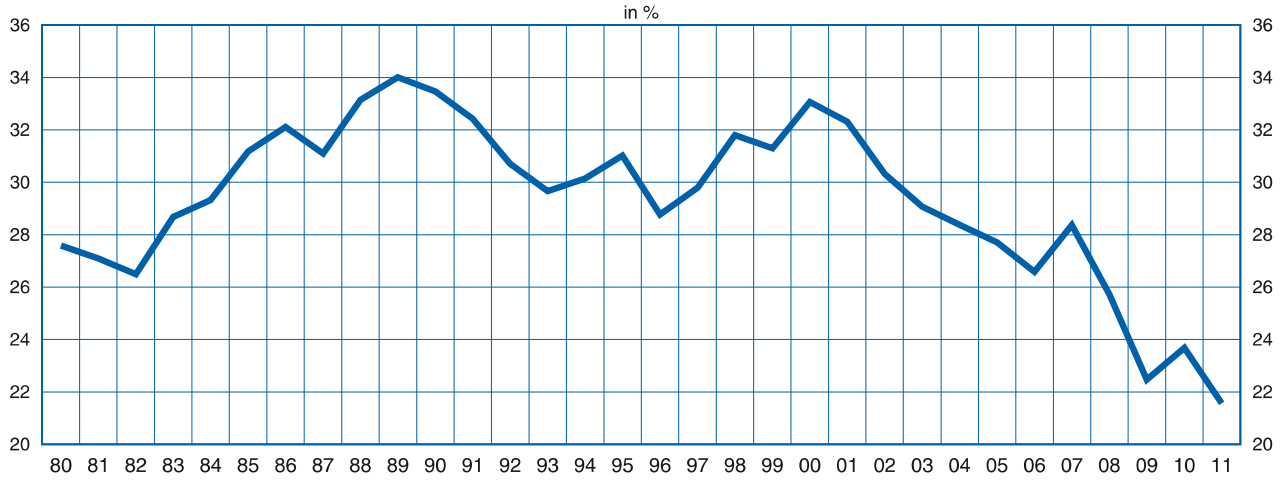
Sources: INSEE, Quarterly national accounts

4 - Balance of trade of the manufacturing industry*



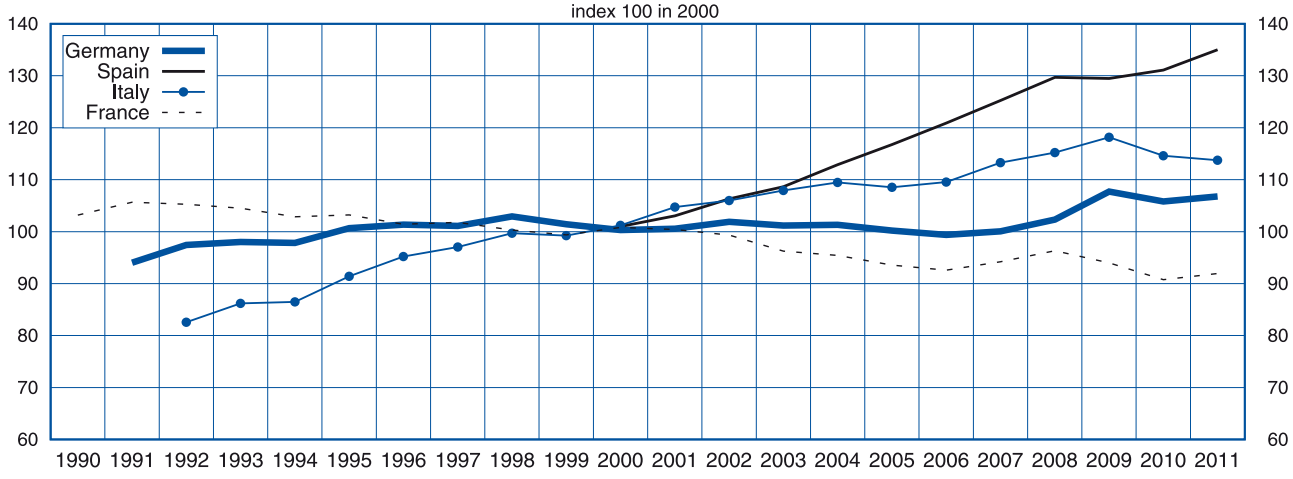
* Excluding coke and refined petroleum products; excluding correction CIF-FOB
Sources: INSEE, Quarterly national accounts

5 - Margin rate in the manufacturing industry



Sources: INSEE, Quarterly national accounts

6 - Weight of manufacturing value-added in total value-added (in value)



Source: Eurostat

Box 2 - The structural reasons for desindustrialisation over the last 30 years

Structural decline of industry in France: "substitution effect" and "income effect".

The structural decline of the industrial sector in the economy can be explained by two key effects: the income effect, and sectoral productivity gains. When variations in consumption are explained by variations in income, this is called the income effect. But numerous results[1] suggest that the income elasticities of demand for industrial goods in France are less than one, with an increase in income tending to have a more important effect on the consumption of services than on the consumption of goods, thus creating a divergence between the demand for goods and that for services. The economy as a whole saw large productivity gains throughout the period 1980 - 2007. Incomes therefore globally progressed and the manufacturing industry had a structural tendency to stagnate in an economy that was no longer catching up, as was the case in France from the 1980s. Fontagné and Bouhlol (2006) even pinpoint the 1960s as the period after which income became sufficiently high for positive demand to negatively influence the share of demand focused on industrial goods.

Furthermore, the industrial sector enjoyed greater productivity gains than the economy as a whole. The sector was thus able to lower the relative prices of its goods. But empirically,[2] the elasticity of substitution between industrial goods and other goods and services is lower than [1]: the drop in industrial prices is not exactly offset in terms of supplementary demand. In other words, if the price of a manufactured good is divided in two, households will not buy twice as much of the good but will instead profit from the situation and consume more of other goods and services. If all goods undergo a price cut, households will tend to change their consumption structure in favour of services. Therefore, better productivity in industry than in services produces the consequence - via this "substitution effect" - of lower demand for manufactured goods than for services.

According to *Demmous* (2011), these demand-structure effects are responsible for around 30% of industrial job losses between 1980 and 2007.

The effect of trade

The increase in foreign trade has contrasting effects on manufacturing employment. On the one hand it provides an increase in outlets for French industrial companies. On the other, the heightened competition on the world goods market, particularly from the emerging countries, takes its toll on the price competitiveness of French businesses, both in exports and on the domestic market.

There is, however, little consensus in the economic literature on the quantification of the effect of the globalisation process on deindustrialisation. Indeed, econometric approaches give barely significant results.

Using an accounting approach, *Demmous* (2011) quantifies the weight of globalisation in industrial job losses at 13% between 1980 and 2007. This contribution would appear to have reached 28% over the recent period (2007-2011).

An "accounts related" decrease: externalisation and temporary work

Additionally, two key phenomena are at the origin of an accounts-related drop in the weight of industry in the calculation of total value-added in France over the last 30 years: externalisation and temporary work. These phenomena contribute to an artificial reduction in manufacturing value-added and employment, thereby amplifying the impression of deindustrialisation observed, and must be taken into account.

Starting from the 1980s, the manufacturing industry did indeed start to externalise on the French territory. Numerous services which used to be within the same company - and hence considered as constituting industrial value-added - were subcontracted to service companies.

Jobs externalised in this way have regularly increased over the last 30 years: they accounted for 25% of industrial employment in 2007 against 9% in 1980.

Furthermore, even for tasks directly linked to production, the manufacturing industry makes extensive use of temporary employment firms. Temporary employment grew substantially in the 1990s, with the number of such workers increasing from 257,000 in 1990 to 626,000 in 2000. The rate of use of temporary work in the manufacturing sector then stabilised at around 8% on average during the 2000s.

In the national accounting, temporary workers - who are employed by temp agencies - are assigned to the corresponding branch. The temporary employment service purchased by the user branch features as this branch's intermediate consumption and contributes to the value-added of temp agencies. Therefore, manufacturing value-added and employment have tended to decrease due to the increased use of temporary employment, profiting services.

Demmous (2011) estimates that this phenomenon contributed to around 25% of industrial job losses over the period 1980-2007. In the recent part of the period, between 2000 and 2007, the phenomenon slowed, mainly because companies were starting to reach the end of their externalisation process. Over the period, externalisation may have represented only 5% of industrial job losses. ■

(1) For exemple *Demmous*, 2011.
(2) *Rowthorn* et *Ramaswamy* (1998) et *Fontagné* et *Bouhlol* (2006)

1990-2000: the manufacturing balance of trade shows a structural surplus

In the course of the 1990s, the weight of industry fell once again...

During the 1990s the share of the manufacturing branch in terms of both value-added and employment continued to fall, from 17.7% to 15.2% and from 17.8% to 14.3% respectively. The contribution of externalisation appears to have been minor over the period, and as such does not call into question the reality of deindustrialisation.

... manufacturing prices and value-added stabilised...

However, this period differed from the previous one as regards the stability of the price of manufacturing value-added (0.0% per year), falling behind the price of total value-added which was progressing by 1.5% per year.

This fall-off was made possible by stable unit wage costs in the manufacturing branch: although the labour cost per head picked up, growing by 3.3% per year in real terms,[4] productivity gains were also more dynamic, at 3.5% per year. In this context, manufacturing value-added in volume was now growing as much as total value added on the one hand, and on the other the margin rate was globally stable over the period, excluding cyclical effects.

... and the balance of trade improved

This price stability in the manufacturing branch came hand-in-hand with an improvement of the price competitivity in France[5] and in the manufacturing balance of trade (from -9.8 Bn Euros in 1989 to 10.5 Bn Euros in 2000, that is, a surplus of 10.1 Bn Euros on average over the period). The persistence of a significant surplus at the end of the period at the same time that growth in domestic demand was strong seems to indicate that at that moment, the manufacturing trade surplus had become structural, under the effect of disinflation.

2001-2007: the margin rate drops and the balance of trade becomes negative

Over the period 2001-2007, the share of industry in the economy slipped back further...

At first sight, the period 2001-2007 resembled the previous period: the weight of the manufacturing branch continued to diminish in terms of value-added in constant Euros and in terms of employment (respectively 15.2% to 11.9%, and 14.2% to 12.0%). But the pace of decline accelerated (-3.5% against -1.4% per year) in terms of the share in value-added. Deindustrialisation did not happen so quickly in the neighbouring Eurozone countries (*see Graph 6*), mainly because the price of manufacturing value-added was more dynamic in those countries: over the period it grew by 24% in Spain, 12% in Italy and remained stable in Germany, while in France it fell by 6% (*see Graph 7*).

... the margin rate dropped sharply...

As unit wage costs remained stable, the drop in the price of value-added led to a decrease in the margin rate in the manufacturing branch, from 33% to 28%.

... and the balance of trade deteriorated

Additionally, in spite of a sill favorable price competitivity, the balance of trade of the manufacturing branch gradually deteriorated, sliding from + 10.5 Bn Euros in 2000 to -10.7 Bn Euros in 2007. Cumulatively over the period, the running balance was, however, clearly positive. This could put the deterioration of the balance of trade into perspective somewhat, considering that the end-of-period deficit was cyclical. However, the GDP growth level reached in 2007 (+ 2.3%,

(4) The purchasing power gain for employees stood at 1.4% per year but the real labour cost per head was more dynamic, as the price of manufacturing value-added did not progress whereas the consumption deflator increased by 1.9%.
(5) Measured by the ratio of export prices between France and its major trading partners converted in domestic currency

against 4.2% in 1989 and 3.7% in 2000), as well as the production capacity utilisation rate (87.0% against 89.8% in 1989 and 88.8% in 2000), were particularly low for a cycle peak, and the continuous deterioration of the balance of trade since 2002 tends to point towards a structural phenomenon.

2008-2012: the crisis accelerates the trend

It was against this backdrop that the crisis arrived in 2008. The period that commenced in 2008 is not comparable with the previous three phases, as it is very likely that the business cycle is not finished yet.

A certain continuity compared with the previous period...

Compared to the previous period there has been a certain continuity: the drop in the sector's share in terms of value-added in current Euros and in terms of jobs has continued (respectively -1.8 and -1.3 percentage points), and the price of manufacturing value-added has also fallen once again, the reverse of what has been observed elsewhere in Europe (- 2% in France, against +8% in Spain and +7% in Germany between 2007 and 2011). Deindustrialisation has continued to be more extensive in France. The margin rate has also continued to deteriorate (-6.8 point between 2007 and 2011).

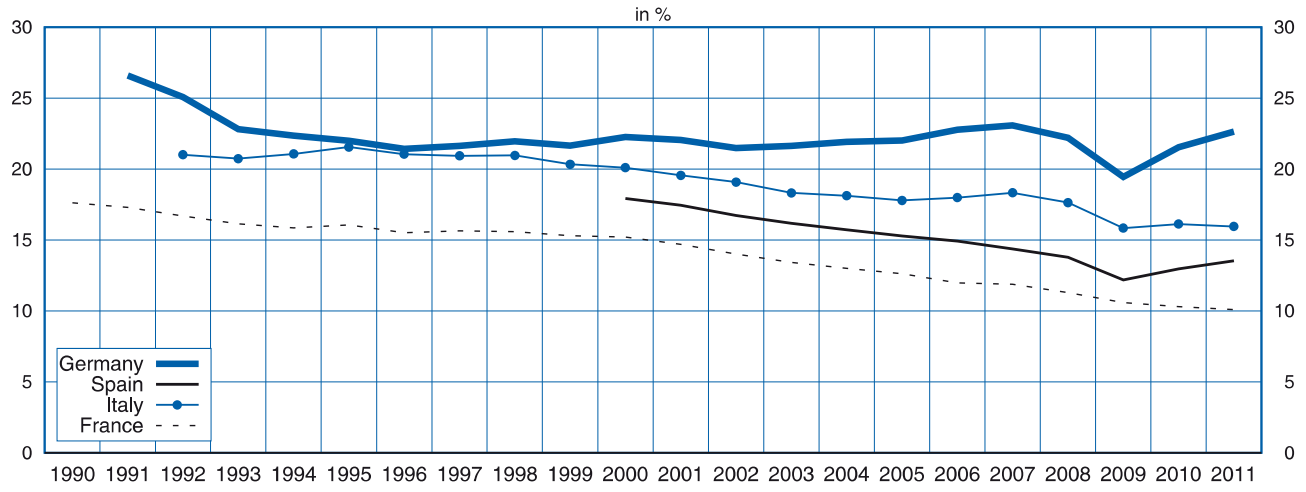
... but the drop in the margin rate amplificates...

The amplification of the drop in the margin rate can be explained by the very marked slowdown in productivity (+0.9% per year since 2007, against 3.1% over the period 2001-2007) while a similar adjustment of real wages has not occurred. This phenomenon, which is analysed in detail in part three of this report, has also been observed in the rest of the French economy and in other countries such as Germany and the United Kingdom, and can partly be explained by the position in the cycle.

... and the deterioration of the balance of trade seems to be slowing

The balance of trade trend has been less clear-cut since the crisis. From 2008 to 2010 the deterioration continued; it then worsened suddenly in 2011, under the effect of a peak in imports. But the balance of trade rebounded sharply in 2012, so much so that the deterioration since 2007 seems to have been offset, which may be attributable to the depreciation of the Euro over the period.

7 - Manufacturing value-added deflator



Source: Eurostat

How do we explain the deterioration of the margin rate and the balance of trade in the manufacturing branch since 2001?

Non-price competitiveness seems to have deteriorated in the 2000s

It was as if, in the course of the 2000s, companies had been forced to moderate their prices more than in the 1990s in order to remain competitive, even though they could not afford to do so because unit wage costs were not decreasing. This fall in prices has to do with the strong appreciation of the euro over the period ; in fact, it has probably been necessary in order to preserve price competitivity of firms.

How do we explain this phenomenon has not been observed in the other Eurozone countries? An explanation often put forward (for example by Gallois, 2012) pinpoints the range of French products. For companies to be able to keep a certain latitude in their price-setting, their products have to be differentiated, particularly in terms of quality. Otherwise, faced with heightened competition worldwide, particularly from the emerging economies, the need to keep price-competitiveness to the maximum generates great pressure on sale prices. Indications of a stagnation in the range of French production emerged in the 2000s. For example, exports of high- and medium-technology goods fell, whereas as they increased over the same period in Germany.[6] The average quality of goods in France thus seems to have been lower than in Germany.[7]

This failure to move upmarket may have had multiple origins, which are identified in the recent literature: low levels of investment in research and development, difficulties growing the number of exporting companies, etc. A vicious circle may therefore have been set in motion in French industry: the inability to set sufficiently high prices affected margins and hence profits, thereby reducing the incentive and capacity to invest and to increase market share.

The second part of this report analyses the sector-level dynamics of manufacturing activity in an attempt to understand the transformations - sometimes divergent from one branch to the next - of French industry and to sift through the possible explanations, the relevance of which may differ from one sector to the next. ■

(6) *Fortes*, (2012)
(7) *Fontagné* et *Gaulier* (2008)

The manufacturing industry in France since 2008: what has changed?

A sector-by-sector analysis of the various items of demand highlights the shifts that have occurred since 2008

To offer a better understanding of the dynamics of the French manufacturing industry since the start of the 2000s, this section analyses its 14 branches (see *Box 3*). As well as the interest of having more detailed knowledge of the manufacturing industry, an identification of regularities or, conversely, disparities in the dynamics of these branches may enable us to choose between the various hypotheses put forward in section one.

A method to link the changes in production to those in demand for each type of product

A method to identify the contributions of final demand to production

More specifically, we analyse the supply and use balance of each of the 14 products which make up the manufacturing industry in order to identify the respective contributions of domestic demand, export capacity, or a problem of competitiveness on the domestic market. The final uses of production are studied. To do so, the supply and use balance of each branch is rewritten in order to assign the final destination of intermediate consumptions.

Box 3: The various manufacturing branches

To distinguish between the various industrial branches, the INSEE's national accounts classification is used, which allow to split the manufacturing industry into 14 branches. A branch groups together homogenous production units which manufacture products belonging to the same item of the NAF rev.2 classification of activities. Each branch is referenced by a two-letter code. It must not be confused with the sector of activity, which divides all companies up according to their main activity. The production of a company may be broken down into several branches according to the products it markets. ■

14 branches of manufacturing industry

Two-letter code	Short description of the branche	Exemple of productt	Weight in the manufacturing value added (2010) in %	Weight in manufacturing employment (2010) in %
CA	Food products	All food products, wine and tobacco products	16.8	20.8
CB	Textiles	Wearing apparel, leather and related products	3.0	4.3
CC	Wood and paper products	Wood and wood products; paper, paperboard, printing and reproduction of recorded media	6.5	7.7
CD	Coke and refined petroleum products	Coke and refined petroleum products	1.4	0.3
CE	Chemicals and chemical products	Fertilisers and nitrogen compounds	7.2	4.2
CF	Basic pharmaceutical products	Pharmaceutical products and pharmaceutical preparations	4.1	2.6
CG	Rubber and plastics products	Glass products ans glass fibres, cement, concrete and plaster	9.5	9.8
CH	Basic metals and fabricated metal product	Metal elements for construction, machining tools hardware weapons	14.8	15.2
CI	Computer, electronic and optical products	Computer, radar, watches, electro medical products, cameras, arms	3.3	4.1
CJ	Electrical equipment	Electric motors, fiber, appliances	3.6	3.1
CK	Furniture; other manufacturing	Turbines lifts machine tools	6.4	6.1
CL1	Motor vehicles, trailers and semi-trailers	Motor vehicles, vehicule equipment (wich motor)	5.1	5.5
CL2	Manufacture of other transport equipment*	Plane, boats, railway locomotives , motorcycle, combat vehicles	4,6	3,5
CM	Others manufacturing and repair	Furniture, repair and installation of machinery, jewelry, toys and games.	13,8	13,0

Source: Quarterly national accounts

For example, in this section exports of a given product will cover both direct exports of this product and its export as an intermediate consumption that has led to the manufacture of another exported product. To indicate that the destination of intermediate consumptions is included, we will refer to this demand as adjusted final demand. The method and its identifying hypotheses are explained in detail in *Box 4*.

The slowdown in manufacturing production since 2008 is observed in virtually all branches

A sharp slowdown in manufacturing activity in the majority of branches since 2008...

The growth rate of manufacturing production was lower in the 2000s than in the previous decade (0.7% per year against 2.9% in volume). This slowdown has become more pronounced since 2008 - production has fallen by an average of 1.6% per year in volume (*see Graph 8*) and this is common to most branches of activity. It is observed in 12 branches out of 14; only transport equipment excluding automobiles and computer and optical products are exceptions (*see Graphs in the appendix*). Since 2008 production has also fallen in 11 branches out of 14.

... caused by the downturn in overall final demand

This slowdown in manufacturing production since 2008 can be found in all the final uses of manufacturing production: adjusted consumption (from +1.7% to +0.3%) and adjusted exports (from +2.4% to 0.1%) have slowed sharply and adjusted investment has declined (-1.4% after +1.9%). Imports have also slowed, more than exports, thereby slowing the deterioration of the balance of trade, but not enough to stabilise it [8].

In the 2000s, the slowdown was not so widespread...

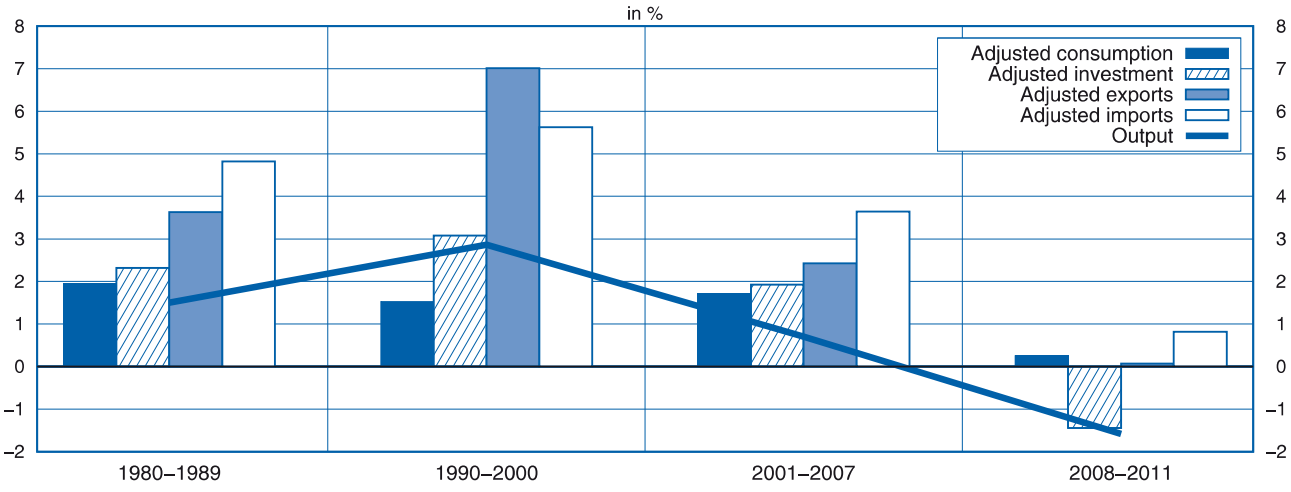
During the 2000s, the slowdown in production was already underway in virtually all branches. However, the scale of this slowdown differed greatly from branch to branch. Six branches did not suffer a slowdown, or barely (less than a 1% loss in the growth rate).

... and domestic demand held firm

In the 2000s, the slowdown in domestic demand was not so marked and was concentrated in adjusted investment (+1.9% after +3.1%), while adjusted consumption conserved the same pace of progress (+1.7%, after +1.5%).

(8) Let us remind that the manufacturing balance of trade is particularly deteriorated in 2011.

8 - Growth rate of manufacturing production and the main adjusted components



Source: INSEE, Quarterly national accounts

Conversely, adjusted exports slowed very sharply (+2.4% after +7.0%), far more than imports (+3.6% after +5.6%), resulting in a deterioration of the balance of trade. All the branches experienced a marked - or very marked - downturn in exports in the 2000s. The branches where production slowed the least were those for which domestic demand had taken over.

Three families of manufacturing branches

The changes in manufacturing activity and its branches thus present certain similarities, but also some divergences. The branches are grouped together into three families to be analysed in the next part of this section:

- The branches that held firm over the period 2000-2007, and in which production has fallen since 2008;
- The branches in which production fell sharply at the start of the 2000s, to the extent that it did not progress between 2000 and 2007;
- The branches in which production continued to grow from the start of the 2000s and has not slowed since 2008.

The branches that held firm until the 2008 crisis

First group: "metallurgy", "rubber and plastics", "other machines and equipment"

The "metallurgy", "rubber and plastics" and "other machines and equipment" branches have the common feature of a production which has dropped sharply since 2007 (between -2.4% and -2.8% per year), whereas they had remained in a growth phase in the 2000s. This group represents 30% of manufacturing value-added and 31% of manufacturing jobs.

No slowdown in activity in the 2000s

Within this group, growth in production was remarkably stable between the two periods 1990 - 2000 and 2001 - 2007. Indeed, the average production growth rate spread did not rise above 0.5 point. The production growth rates were, furthermore, relatively high in the 2000s, between +1.1% for the "metallurgy" branch and +2.7% for the "other machines and equipment" branch.

In the 2000s, final domestic demand held strong, but exports slowed

As in all the manufacturing branches, the structure of adjusted demand changed between the 1990s and the 2000s. Adjusted domestic demand - consumption and investment - accelerated. However, foreign demand contributed negatively to growth in production of these products, while it had previously contributed positively. Over this period domestic demand thus took over from foreign demand.

The fact that imports grew faster than exports over the period may simply be the consequence of domestic demand being more dynamic than in our partner countries, but could also be the result of a loss in competitiveness.

Since 2008, consumption and investment have fallen sharply

From 2007 to 2011, production in these three branches suffered a sharp decline, with a fall in the average growth rate of between -3.9 points and -5.5 points. The growth rate of consumption of investment and of exports in these products did indeed plummet and become negative. Imports slowed less than exports, to the extent that the contribution of foreign trade stabilised, whilst still remaining negative (due to the initial imbalance).

The branches that slowed as early as the start of the 2000s

Second group: "computer, electronic and optical equipment"; "electrical equipment"; "chemistry" "wood, paper"; "automobile"; "textiles"; "coke and refined petroleum products"

The second group is composed of the "computer, electronic and optical equipment", "electrical equipment", "chemistry", "wood, paper", "automobile", "textiles", and "coke and refined petroleum products" branches. This group accounts for 30% of value-added and 29% of jobs in the manufacturing branch. These branches share the characteristic of having experienced a sharp deceleration in their production in the 2000s (fall in the growth rate compared to the previous period of between -2 % and -10 % per year).

A slowdown already underway in the 2000s...

So production in these branches stagnated or even declined in the period 2001-2007, whereas in the 1990s it had increased by between 1.4% and 8.7% per year, depending on the branch, apart from the "textile" branch, where it was already declining. In this context, the deceleration observed since 2008 can be interpreted as an exacerbation of the deterioration in activity in these branches, rather than as a genuine shift, as was the case of the first group.

... because domestic demand slowed...

The fall in demand in the period 2001-2007 was characterised by a sharp deceleration in adjusted investment and, to a lesser extent, in adjusted consumption. Apart from "wood, paper" products, adjusted investment slowed very sharply in the 2000s. For "computer, electronic and optical equipment" and "electrical equipment" products, adjusted investment was subdued.

... and the balance of trade deteriorated

Furthermore, for these sectors the balance of trade deteriorated particularly sharply in the 2000s: the global trade deficit of this group represented 11.0% of their imports in 2007 against just 1.2% in 2000. Therefore, adjusted foreign trade contributed negatively to growth in production and explains how in the absence of support from adjusted domestic demand, production did not grow in the 2000s for these branches. The deterioration was not, however, generalised: it was not observed for the "electrical equipment" and "chemistry" products.

From 2008, certain branches did not experience a further slowdown...

While these branches share the characteristic of the 2000s downturn, their behaviour between 2008 and 2011 varies within the group. For the "chemistry", "computer, electronic and optical equipment" and "electrical equipment" branches, growth in production changed little between the pre- and post-crisis periods. Thus, decrease in production has been limited since 2008, in particular thanks to the resistance of comsumption.

... while the 2008 crisis exacerbated the decline for the "wood, paper", "automobile", "textile" and "coke and refined petroleum products " branches

The "wood, paper", "automobile", "textiles", and "coke and refined petroleum products" branches have experienced an aggravation of the fall in production since the crisis. Over the period 2008-2011, production in the "coke and refined petroleum products" branch lost more than 5% per year (after -1.3% pre-2008), that of the "textiles" branch more than 7% (after -4.3% pre-2008), that of the "automobile" branch almost 5% (after stability in the 2000s) and that of the "wood, paper" branch more than 2% (after stability in the 2000s).

The further drop in activity is mainly due to the decline in all the items of demand, in particular the very marked decline in domestic demand (notably investment), except for the "automobile" branch for which the decline in exports played the most important role.

Compared with the first group, these manufacturing branches thus show the characteristic of having experienced a drop in their domestic demand under the effect of the marked slowdown in investment, without foreign trade offsetting this, imports being systematically more dynamic than exports.

The manufacturing industry in France since 2008: what has changed?

Four branches have held firm

Third group: "agrifood industry"; "pharmacy"; "other manufactured products"; "other transport equipment"

The two groups analysed above represent around 60% of value-added and jobs in the manufacturing industry. Four branches account for the remaining 40%: "agrifood industry"; "pharmacy"; "other manufactured products"; and "other transport equipment". These branches have shown a greater ability to resist the crisis: in 2011 their production had returned to or exceeded their level of 2007. These branches are structurally atypical.

Agrifood industry: a strong ability to resist thanks to domestic demand

The agrifood industry branch could be classed in the first group because it slowed between the 2000-2007 and 2008-2011 periods, but its slowdown since 2008 has been limited (-0.9 point). This branch has benefited from sustained demand even in times of crisis, most notably because the demand for foodstuffs is less income-elastic.

Pharmacy: structurally dynamic demand

Since 2002 the pharmacy branch has kept a virtually unchanged growth rate which was unaffected by the crisis.[9] It benefits from both sustained consumption and dynamic exports.

Other manufactured products: atypical activities

The other manufactured products branch could be classed in the second group because of the sharp slowdown in production in the 2000s, but its production continued to progress. This branch is also rather particular in that its production mainly comprises (around 70%) repair services, which are not strictly speaking the production of goods.

Other transport equipment: strong growth

The final branch, that of other transport equipment in which the aeronautical industry is preponderant, is something of a singularity of the French economy. The growth rate for its production - around 3% - was remarkably stable between the pre- and post-crisis periods. It is as if this branch, composed of numerous exporting companies and highly integrated internationally but also with a large domestic market, barely noticed the crisis.

What can we conclude from this sector-by-sector analysis?

Strong trends common to industry as a whole...

This analysis has identified some powerful factors which are common to virtually all the branches. In the 2000s production slowed, mainly because exports were very sluggish. However, the vitality of final consumption sustained activity. Since 2008, the common factors have not been a surprise. Production has slowed because all the components of demand have been marking time: consumption, although it has almost systematically continued to grow, investment, and exports.

... but also major differences between branches

Behind these common factors we also observe some major disparities in terms of the scope of the slowdown: this is unsurprising, as the manufacturing industry is not homogenous. In the 2000s, the ability or inability of investment to hold firm played an important role. Since 2008 the differences in performance have widened: three branches have a growth rate of over 1% per year while three others have declined by an average of 5% per year.

This heterogeneity could be helpful for identifying the origin of the slowdown in the 2000s, particularly if we observed this slowdown in the branches where the margin rate and the balance of trade deteriorated, or those where the price of value-added was the most constrained.

(9) When the periods 2008-2011 and 2001-2007 are compared a slowdown appears because the branch experienced very strong growth at the start of the 2000s.

In practice this is not what has been observed (see *Tables 1 to 3*). As regards the margin rate, the deterioration over the period 2001-2007 is indeed concentrated in the branches where production slowed sharply in the 2000s (group 2). This correlation is obviously not a causality, especially as the drop in the margin rate may be induced by the slowdown in value-added due to the inertia of production factors.

Furthermore, there is no apparent correlation between the variations in the margin rate and the balance of trade until 2007. On the one hand, in the "computer, electronic and optical equipment" and "coke and refined petroleum products" branches, the drop in the margin rate came hand-in-hand with a continuous deterioration of the balance of trade. On the other hand, in the "chemistry" branch the drop in the margin rate was accompanied by a long-lasting trade surplus. And, conversely, in the "rubber and plastics" branch the increase in the margin rate came with a continuous deterioration of the balance of trade.

Similarly, we have not observed any particular price dynamic in the branches that held firm in the 2000s. As in the other branches, the slowdown in prices was very pronounced in the 1990s, and continued in the 2000s. ■

Table 1

Growth rate of manufacturing production and the main adjusted components

in %

Branche	1980-1989	1990-2000	2001-2007	2008-2011
Groupe 1				
Rubber and plastic products	5.8	-0.6	-1.5	-3.4
Basic metals	9.7	1.6	1.1	0.1
Others machinery and equipment	4.1	-0.4	-2.0	1.8
Groupe 2				
Textiles	8.0	-0.3	-0.8	-1.1
Wood and paper	8.0	1.2	-1.2	-3.7
Coke and refined petroleum products	1.3	6.2	1.7	23.0
Chemical products	6.6	-2.4	0.0	2.5
Computer. electronic and optical products	3.9	-4.4	-10.3	-13.0
Electrical equipment	5.1	-2.5	0.5	4.3
Automobile*	-	-	-1.2	8.5
Groupe 3				
Food products	7.2	1.5	0.8	-1.0
Pharmaceutical products and pharmaceutical preparations	4.6	0.9	-3.7	-12.6
Other manufacturing	3.4	-1.0	-0.4	1.9
Other vehicules*	-	-	3.6	1.6
Overall manufacturing industry	**6.6**	**0.0**	**-0.9**	**-0.8**

* Only aggregated data are available for these branches between 1980 and1998. Morever, data for 2011 are not available, here the last colonn show the average grouth rate between 2008 et 2010

Source: Quarterly national accounts

Table 2

Average margin rate by branche

in %

Branche	1980-1989	1990-2000	2001-2007	2008-2010
Groupe 1				
Rubber and plastic products	18	26	29	23
Basic metals	24	25	24	21
Others machinery and equipment	25	26	29	24
Groupe 2				
Textiles	19	21	19	20
Wood and paper	18	24	25	20
Coke and refined petroleum products	66	51	26	41
Chemical products	46	42	27	33
Computer. electronic and optical products	40	36	28	10
Electrical equipment	38	40	27	15
Groupe 3				
Food products	29	31	29	24
Pharmaceutical products and pharmaceutical preparations	43	48	51	42
Other manufacturing	5	10	16	15
Other vehicules*	10	20	19	7
Overall manufacturing industry	**25**	**27**	**26**	**21**

* Only aggregated data are available for these branches.

Source: Quarterly national accounts

Table 3

Trade balance by branche

in Mds €

Branche	2000	2007	2011
Groupe 1			
Rubber and plastic products	-0,3	-2,7	-5,3
Basic metals	-2,3	-6,2	-6,1
Others machinery and equipment	-3,8	-3,1	-3,5
Groupe 2			
Textiles	-7,4	-10,1	-12,3
Wood and paper	-3,5	-4,3	-4,8
Coke and refined petroleum products	-0,9	-4,8	-13,2
Chemical products	6,3	6,9	7,3
Computer. electronic and optical products	-6,2	-13,1	-15,1
Electrical equipment	0,3	0,5	-2,6
Automobile*	9,5	2,0	-3,9*
Groupe 3			
Food products	7,0	6,6	6,5
Pharmaceutical products and pharmaceutical preparations	2,3	4,1	1,6
Other manufacturing	-2,9	-5,5	-6,9
Other vehicules*	11,5	14,2	20,7*
Overall manufacturing industry	**9,7**	**-15,5**	**-42,1**
Overall manufacturing industry excluding coke and refined petroleum products	**10,5**	**-10,7**	**-29,0**

* For these branches, the last data are available for 2010

Source: Quarterly national accounts

Box 4 - Methodology: adjusted demand

Consider the theoretical situation where the "computer, electronic and optical equipment" branch produces 100 Euros of goods and where, of these 100 Euros, 40 Euros are consumed directly, 10 Euros are exported, 20 Euros are investment products and 30 Euros are the intermediate consumption of companies in the automobile branch (electronics embedded in a vehicle, for example). If, in addition, half the production of companies in the automobile branch is used for domestic consumption and half for exports, then of the 100 Euros of electronic, computer and optical products, 15 Euros of exports and 15 Euros of "indirect" consumptions are added to the direct demand. Therefore, the "adjusted" consumption of electronic, computer and optical products will be 55 Euros and "adjusted" exports will be 25 Euros. By subtracting the balance of intermediate consumptions (which correspond to "indirect" demand), the supply and use balance is as follows:

Production (100) = Consumption (55) + Exports (25) + Investment (20)

This methodology ios inspired by recent works realised in previous Conjoncture in France (Insee 2009 and Insee 2012).

Adjusted consumption (Ca), adjusted exports (Xa), adjusted imports (Ma), adjusted investments (Ia), adjusted inventory change (DSa) and taxes and margins (IM) are the components of uses such that, with production P:

$$P + Ma + IM = Ca + Xa + Ia + DSa$$

This constitutes the adjusted supply and use balance, controlled for each branch. The adjusted components are obtained by adding final demand to each component, and by adding to imports and taxes and margins the corresponding component of final demand (as well as imports, exports and margins) from the other branches proportionally to the intermediate consumption by the second branch of the first branch.

Formally, the initial supply and use balance is written:

$$P + M + IM = C + X + I + DS + CI \times U$$

with vectors (n,1) production P, final consumption expenditures C, exports X, investment I, imports M, taxes and margins IM, inventory change DS, the matrix (n,n) of intermediate consumptions CI where n is the number of branches of the economy, and U the vector (n,1) such that $U = {}^{t}(1,....1)$.

We then define A, such that $CI = A \times diagP'$ with $P' = P + IM$ where diagP' is the diagonal matrix (n,n) such that $diagP'(i,i)=P'(i)$.

A is then matrix (n,n) defined by $A = CI * diagP'^{-1}$.

A new supply and use balance is written as follows:

$$P' - AP' = C + X + I + DS - M$$

i.e., with $Ca=(I-A)^{-1}C$, $Xa=(I-A)^{-1}X$, $Ia=(I-A)^{-1}I$, $Ma=(I-A)^{-1}M$, $DSa=(I-A)^{-1}DS$

$$P + Ma + IM = Ca + Xa + Ia + DSa$$

We obtain:

$$P = Ca + Ia + DSa + (Xa - Ma) - IM$$

Or, denoting SBCa the adjusted balance of trade:

$$P = Ca + Ia + DSa + SBCa - IM$$

For the supply and use balance to be respected at each date and for each branch, here we work with a constant-price volume (price of the base year). ■

Since the crisis, capital and labour have not been adjusted to the extent expected, resulting in a proportion of the slowdown in apparent total factor productivity remaining unexplained

This section analyses the way production factors- labour and capital - have been managed by industrial companies since the crisis. The growth accounting methodology is used for this purpose (*see Box 5*).

Sharp slowdown in apparent total factor productivity

An accounting approach to the contribution of production factors to the change in value-added...

The change in value-added can be broken down into two components related to changes in the labour and capital factors used to produce, and one component known as "total factor productivity", or TFP: this measures the efficiency of capital-labour production combinations at a given level of capital and labour. It is mainly determined by technological and organisational innovation processes which optimise the production system, but also partly translates the improvement in the level of qualification of the labour force and the quality of the capital.

Growth accounting methods give a measure of the contribution of various production factors to the change in value-added, and by subtraction, identify TPF. TPF is equal to the difference between the growth rate of value-added and the sum, weighted by the respective share of their remuneration in value-added, of the growth rates of hours worked and capital stock.

Box 5 - Breakdown of contributions to value-added via the so-called "growth accounting" approach

Value-added in the manufacturing branch is here assumed to result from a production function of the Cobb-Douglas form with constant returns to scale:

$$VA_t = A_t . L_t^{\alpha} . K_t^{1-\alpha}$$

Where VAt denotes gross added-value (in chained volumes and previous year's prices)

A_t, a scale factor modelling technical progress

L_t, the hourly volume of work

K_t, the volume of gross fixed capital (in chained volumes and previous year's prices). It measures the stock of assets acquired by the gross fixed capital formation (GFCF) of previous periods that are still used in production at the moment when the stock is measured.

Here the parameter α designates the average share of payroll in value-added in value over the period 1980 - 2012 (a perfect competition hypothesis implying that the production factors are remunerated at their marginal productivity in value). Here $\alpha = 0.65$. With this specification, the growth rate of value-added is broken down as follows:

$$\frac{\Delta VA_t}{VA_t} = \frac{\Delta A_t}{A_t} + \alpha . \frac{\Delta L_t}{L_t} + (1-\alpha) \frac{\Delta K_t}{K_t}$$

Thus the evolution of manufacturing value-added results from three determinants:

$\frac{\Delta L_t}{L_t}$, measuring the growth rate of employment in the manufacturing industry (in hours worked)

$\frac{\Delta K_t}{K_t}$, measuring the growth rate of gross fixed capital

$\frac{\Delta A_t}{A_t}$, total factor productivity (still called the "Solow residual") measuring the degree of efficiency of capital-labour production combinations at a given level of capital and labour. ■

... preferably over full business cycles

On average over a cycle, growth in total factor productivity measures the efficiency gains in the use of production factors. However, when the cycle is incomplete, as is the case since 2008, variations in TFP also translate the variations in the extent of utilisation of production factors.

A sharp apparent slowdown in total factor productivity since 2008...

In the manufacturing branch, total factor productivity clearly contributed to sustaining dynamism and hence labour productivity gain trends in the past. Since 1980 it has contributed an average of more than 2 points to the annual growth of manufacturing value-added. Between 2008 and 2011, it appears to have slowed sharply as it shows a slight drop, of 0.2% per year (see *Graph 9*), compared to an increase of 2.2% per year from 2001 to 2007.

... partly for business cycle reasons

The sharp slowdown in TFP in 2008 can partly be explained by the scale of the crisis. Indeed, there exist downward rigidities in production factors, both capital and labour. The following sections highlight the fact that capital stock has barely adjusted and that its degree of utilisation has dropped sharply. They also provide a reminder that labour in the manufacturing sector adjusted less than had been feared given the drop in activity. Mechanically, this contributes to reducing the TFP measured even more than in a usual productivity cycle.

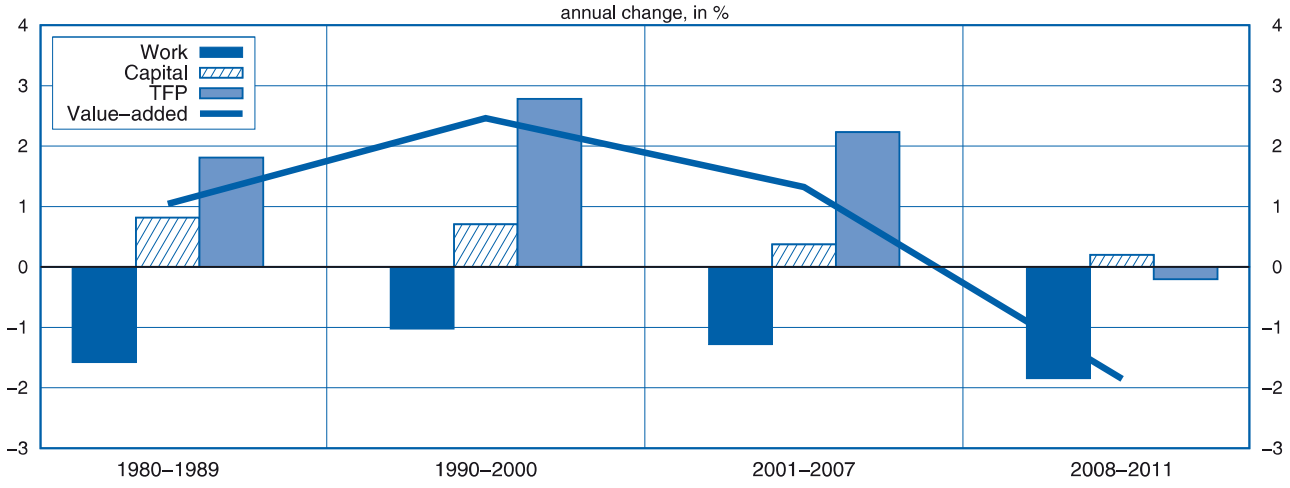
Capital accumulation slowed far less than expected, but its utilisation rate has been very low on average since 2008

2011 net capital stock at its pre-crisis level...

Investment by the manufacturing branch has held up particularly well since the crisis. Although it slipped back in 2009 (-13.5%), it has now returned to a slightly higher level than that of 2007.

This resistance by investment in the manufacturing branch is confirmed by an econometric equation of the error correction model type which accounts for the dynamic of short-term adjustment to a long-term target and which is traditionally written as an investment ratio target. In the short term, the adjustment dynamic uses past variations in investment and value-added in the branch. It highlights the "accelerator effect" specific to investment behaviours: the amplitude of investment variations in the cycle is greater than activity variations (see *Box 6*).

9 - Breakdown of manufacturing value-added according to its main determinants



Source: INSEE, Quarterly national accounts

Box 6 - Manufacturing investment model

Error correction equation model estimated over the period 1980 - 2007:

Here the model is estimated annually, as the investment by branch data are only available annually.

Model variables (the variables in lower case are in logs):

- fbcf_vol: gross fixed capital formation in the manufacturing branch (in chained volumes)
- fbcf_val: gross fixed capital formation in the manufacturing branch (in value)
- va_vol: value-added in the manufacturing branch (in chained volumes)
- va_val: value-added in the manufacturing branch (in value)

The Student t-values are in parentheses.

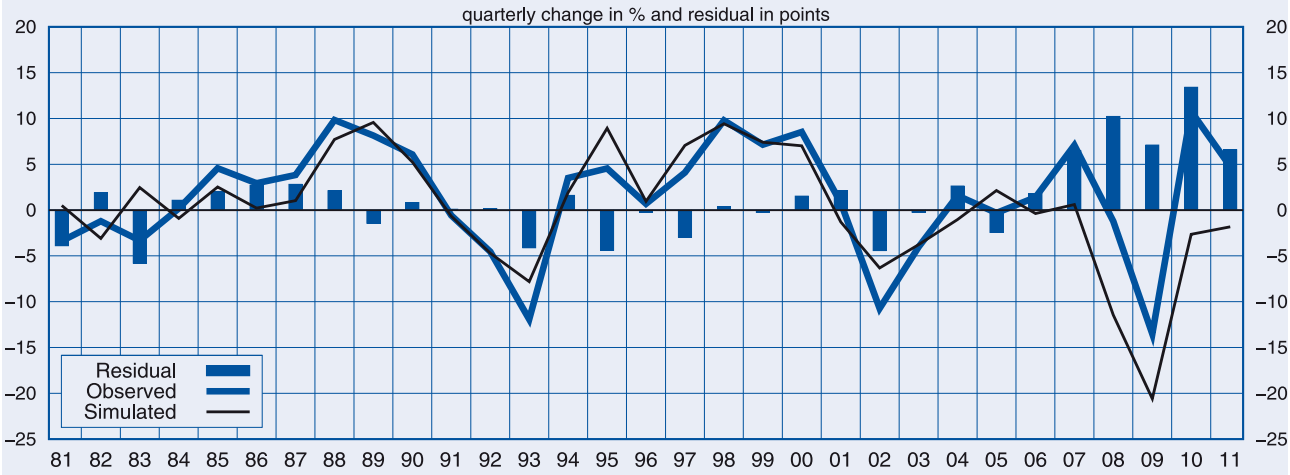
Short-term equation:

$$\Delta fbcf\_vol_t = \underset{(-2,9)}{-0,42} + \underset{(6,2)}{1,96}\Delta va\_vol_t + \underset{(3,2)}{0,35}\Delta fbcf\_vol_{t-1} - \underset{(2,7)}{0,20}\left[fbcf\_val_{t-1} - va\_val_{t-1}\right]$$

Long-term equation:

$$fbcf\_val_t = -1,9 + va\_val_t + \hat{\varepsilon}_t \quad \blacksquare$$

GFCF observed in the manufacturing branch, simulated GFCF and residual (in growth rates)



Source: INSEE, Quarterly national accounts

Investment by the manufacturing branch has turned out to be more dynamic each year since 2007 than in the equation forecast, even though this forecast correctly retraces the evolutions of investment since the start of the 1980s.

Due to the resistance of investment, gross capital stock has continued to grow and ultimately has barely slowed (+0.6% per year since 2008, against +1.2% over the previous period). The net capital stock of fixed capital consumption[10] is stable (+0.2% per year). There is therefore no loss of production capacity linked to a drop in capital stock, either at manufacturing branch level or at sector level.

...but the capacity utilisation rate is very low

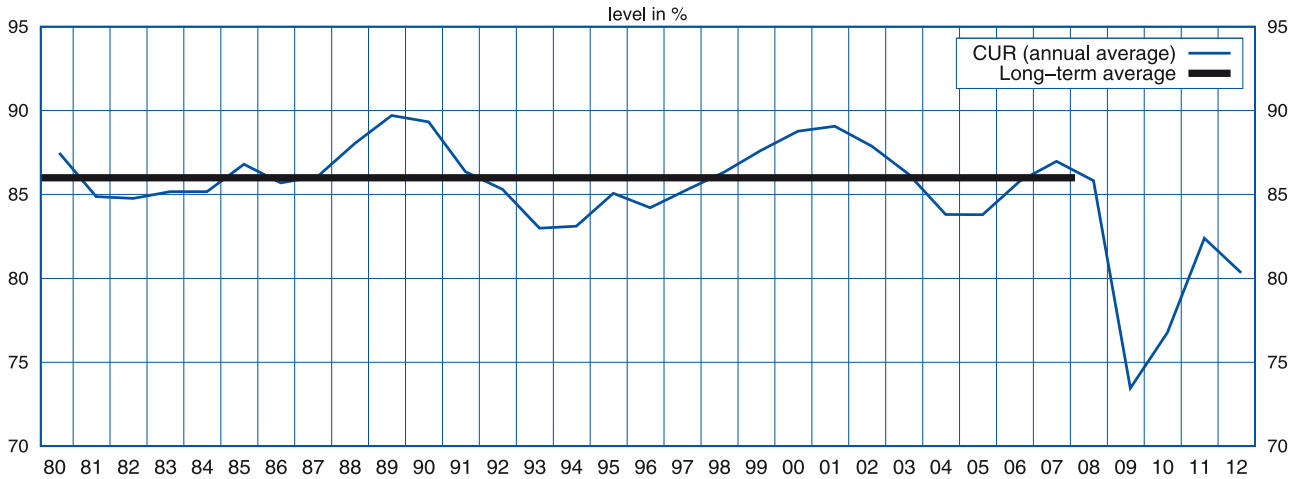
The capacity utilisation rate (CUR) is a quantitative indicator which seeks to establish the ratio between production actually achieved and production potentially achievable, at a given capital stock. The CUR published by INSEE comes from the quarterly Business Tendency Survey on activity in industry and accounts for the intensity at which production capacity is used.[11]

The CUR is a robust indicator of business cycle fluctuations: indeed, due to the time required for fixed capital stock to adjust to unexpected variations in demand, the adjustment of production leads to a variation in the CUR in the short term. The CUR thus fluctuates around a long-term average which stands at 86% and its dynamic is a fairly accurate reflection of the short-term business cycle of the manufacturing industry.

The CUR fell sharply at the first signs of recession in Q4 2008 and reached a low point in Q2 2009 at 71%, almost 14 points adrift of its long-term level (*see Graph 10*). Although the CUR picked up temporarily in the recovery phase in 2010 (reaching 83%), up to 2012 it has remained at low levels (at the end of 2012 it once again fell below 80 points). As an average over 2008-2012, it stands at 80 points, i.e. 6 points below its long-term level. This under-utilisation of capital stock reduces TFP in accounting terms when we do not have a full

(10) Fixed capital consumption (FCC) measures the loss in value, for a given period, of the stock of fixed capital used by a producer due to the effects of time, physical wear and tear, ordinary obsolescence or current accidental damage.
(11) This indicator is calculated based on the following question: "Your company currently operates at ...% of its available capacity". It is specified that this is the "ratio (as a %) of your current production to the maximum production that you could obtain if you took on extra staff".

10 - Production capacity utilisation rate (CUR) in the manufacturing industry



Source: INSEE, Quarterly national accounts

economic cycle. This prolonged period of weakness of the CUR is costly for the manufacturing industry because it corresponds to under-utilised capital, thereby deteriorating this capital's yield.

The change in manufacturing employment since 2008 is not in line with past behaviour

Manufacturing employment in a downward trend since 1980...

Paid employment in the manufacturing sector has been in a downward trend since 1980 in France. This is one of the concrete manifestations of the deindustrialisation process. Around this downward trend manufacturing employment has experienced short-term fluctuations reflecting cyclical variations in activity in this sector. Indeed, employment lags behind fluctuations in value-added somewhat, and this is known as the "productivity cycle": productivity slows sharply during episodes of recession. Symmetrically, it accelerates during growth phases.

... but showing a certain level of resistance since 2008

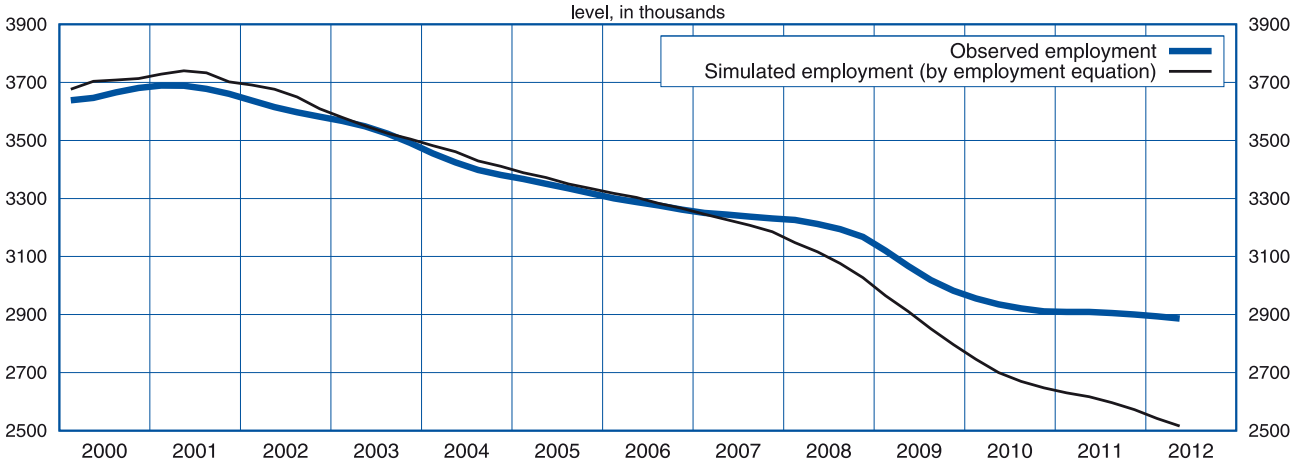
During the 2008-2009 recession, employment in the manufacturing branch declined but the scale of this decline turned out to be limited compared with the very sharp contraction of activity observed in the manufacturing industry. Hourly labour productivity has slowed sharply since the crisis (+0.8% per year against +3.7% over the period 2001-2007), despite the rise observed during the recovery of 2009-2010.

This resistance is not explained by usual employment behaviour

The slowdown in productivity cannot be explained merely by the weak activity during this major recession. This diagnostic, already established in the December 2010 issue of *Conjoncture in France*, remains true. It is confirmed by an econometric equation of the error correction model type which models the hours-worked dynamic by taking into account both their short-term determinants - mainly value-added - and their long-term determinant, the productivity rate trend which reflects the influence of technical progress on employment.

The adjustment of employment actually observed has turned out to be far smaller than that suggested by the equation, since the positive residuals appear as early as 2007 and persist up to the present day (*see Box 7*). Since the end of 2007 345,000 jobs have been lost, against the 670,000 predicted by the equation (*see Graph 11*).

11 - Observed employment and that simulated by the manufacturing branch employment equation (in natural persons)



Source: INSEE, Quarterly national accounts

Neither the fall in working time per head...

The tools designed for flexible management of working time (recourse to overtime, part-time contracts and simplification of the partial unemployment procedures during the recession of 2008-2009) reduced the working time per head during the crisis (-1.6% from 2007 to 2011). This contributed to sustaining the level of employment and slowed productivity per head by as much. However, the employment equation used here takes the number of hours worked as an employment variable. This variable is thus neutral to changes in working flexibility. Therefore the "job retention" observed since the crisis cannot be ascribed to a reduction in working time, it is a retention "of hours worked".

... nor the evolution of temporary work can explain the length and scale of this productivity cycle

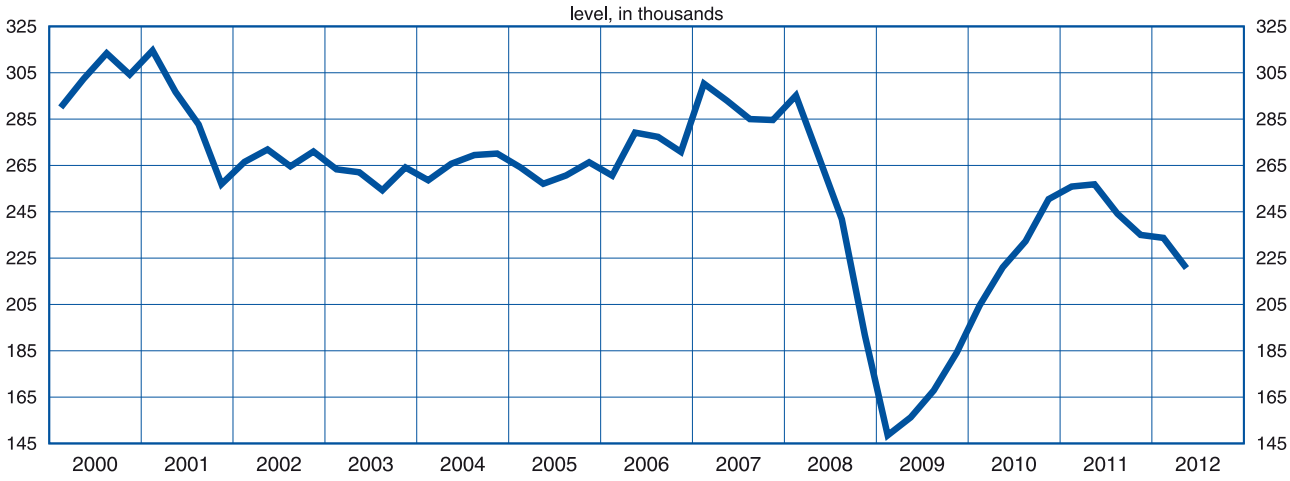
Temporary employment is not counted in the employment of companies in the manufacturing branch. It has nonetheless turned out to be one of the preferred adjustment variables among industrialists in order to adapt, in the short-term, the volume of employment to the fluctuations of the business cycle. Thus the number of temporary workers used by industry was brought down sharply in this sector: almost 50,000 temping contracts were terminated in Q4 2008 and nearly 43,000 in Q1 2009 (see *Graph 12*).

The adjustment of temporary work may therefore have contributed to the resistance of manufacturing employment at the start of the crisis. However, manufacturing employment continued to hold up better in 2009 and 2010 than would be expected in light of usual behaviour, even though temporary employment rebounded and in early 2011 almost returned to its level of the 2000s. As a result, use of temporary work cannot explain the resistance of industrial employment since the crisis.

It could be explained by the scale of the drop in activity at the start of the crisis...

The relative resistance of employment immediately after the crisis may be explained by the scale of the drop in activity, bearing in mind the downward rigidities in the employment level. As noted in a previous Conjoncture in France report (*Argouarc'h et al., 2010*), French companies started by freezing job creations before moving on to job destructions. In most branches, employment had been regularly decreasing before the crisis and its relative resistance in 2008-2009 may simply come from the fact that the pace of job destruction could not be increased in line with the adjustment of activity.

12 - Temporary employment in the manufacturing sector



Source: INSEE, Quarterly national accounts

... but the lasting nature of the phenomenon raises the question of a structural slowdown in productivity gains

However, in cases of labour force retention, during the business recovery phase real employment should progress less quickly than simulated employment, as the residuals in the equation become negative. Yet the hours worked continued to climb each quarter more than the employment equation suggests, despite the sharp rebound in the rate of use of temporary work. In many branches in 2010, a slowing of the fall in employment was observed, or even a recovery (for example in the "other machines and equipment" and "other manufacturing industries" branches). This prevented the return of productivity to its pre-crisis trajectory, pleading in favour of a structural slowdown in productivity gains.

At this stage this scenario remains a hypothesis which will need to be confirmed in coming years. The coincidence between the downward shift in productivity gains and the sudden start of the crisis is indeed troubling.[12] It is theoretically possible that the employment surplus caused companies to postpone technological or organisational innovations, a decision that would lead to a long-lasting weakness of productivity gains.[13] In this case this weakness would not be structural as these innovations can be implemented when the French economy comes out of the crisis. ■

(12) Although we observe positive residuals as early as 2007 in the employment equation, this is not robust to changes in the equation specifications.
(13) However this is not observable in the data from the survey on industrial investment or in the survey on innovation between the period 2006-2008 and the period 2008-2010.

Box 7: Manufacturing employment model

Error correction equation model estimated over the period 1990Q1 - 2007Q2:

Model variables (the variables in lower case are in logs):

- emploi: hourly volume of work excluding temporary work in the manufacturing branch (in million hours)

- va: value-added in the manufacturing sector (in chained volumes)

- Trend: trend representing productivity gains over the estimation period as a whole. They are estimated on average at 3.9% per year over the period 1990 - 2007.

The Student t-values are in parentheses.

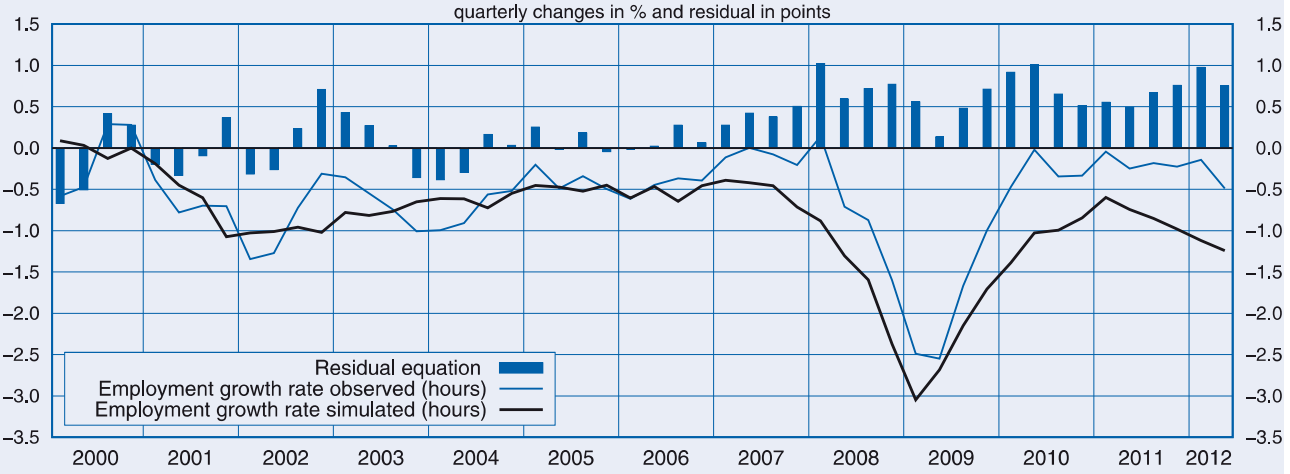
Short-term equation:

$$\Delta emploi_t = \underset{(3,1)}{6,38} + \underset{(4,6)}{0,19}\Delta va_t + \underset{(7,0)}{0,56}\Delta emploi_{t-1} - \underset{(3,1)}{0,08}\left[emploi_{t-1} - va_{t-1} + 0,039 Trend_{t-1}\right]$$

Long-term equation:

$$emploi_t = 75,48 + va_t - 0,039 Trend_t + \hat{\varepsilon}_t \quad \blacksquare$$

Employment observed in the manufacturing branch, simulated employment and residual (in growth rates)

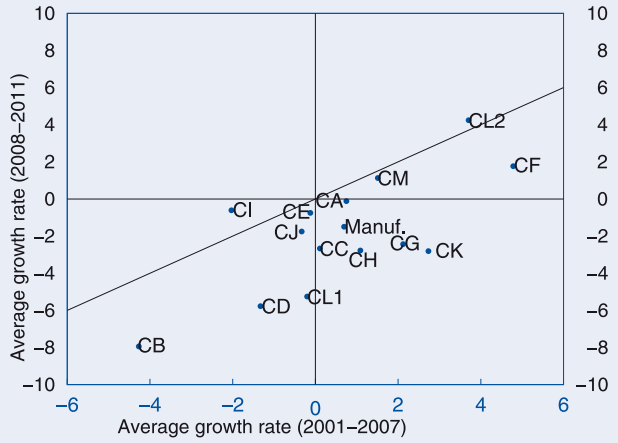


Source: INSEE, Quarterly national accounts

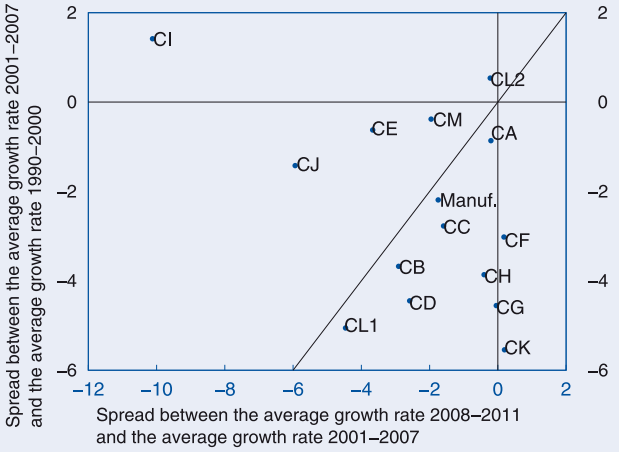
For easier reading, the hours worked have been transformed into natural persons in the text.

Appendix - Growth and acceleration in production and the various items of demand for each branch of the manufacturing industry compared between the period 2001-2007 and he period 2008 2011

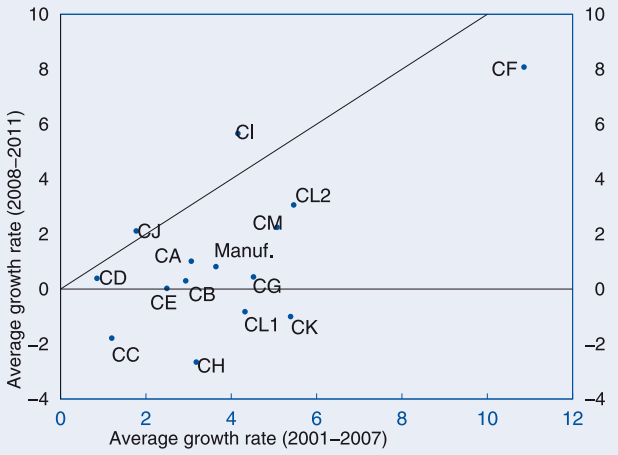
Adjusted production (growth)



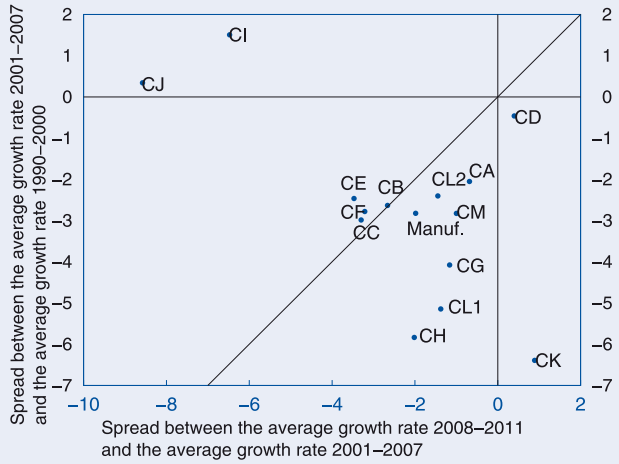
Adjusted production (acceleration)



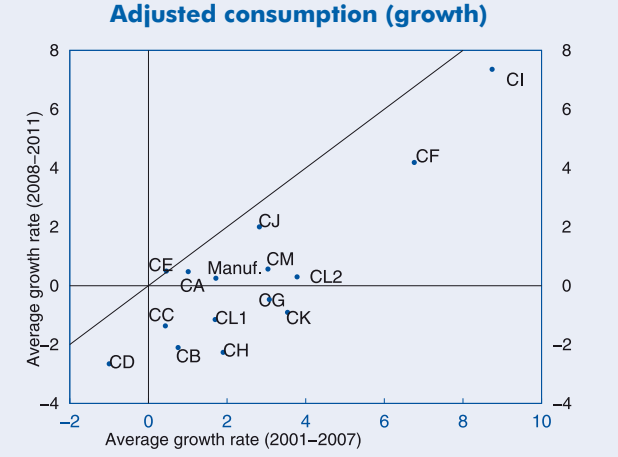
Adjusted imports (growth)



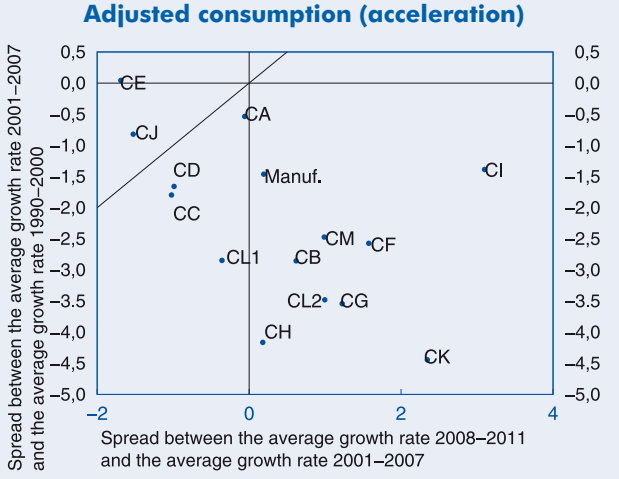
Adjusted imports (acceleration)



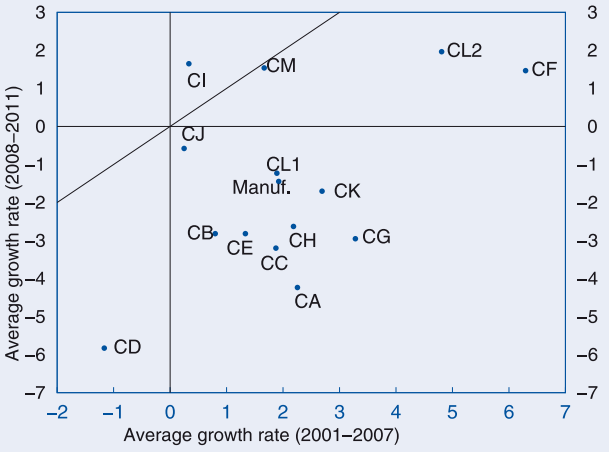
Adjusted consumption (growth)



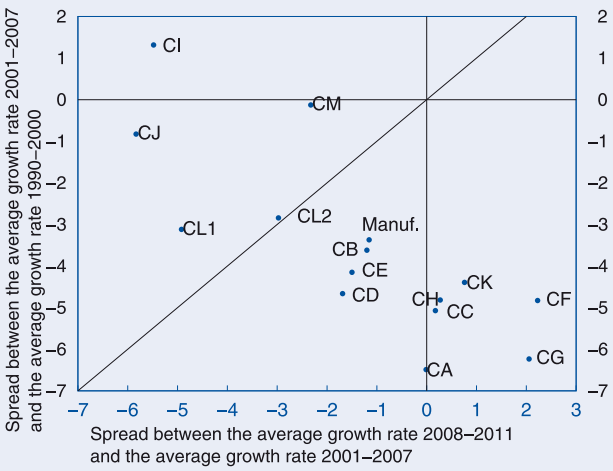
Adjusted consumption (acceleration)



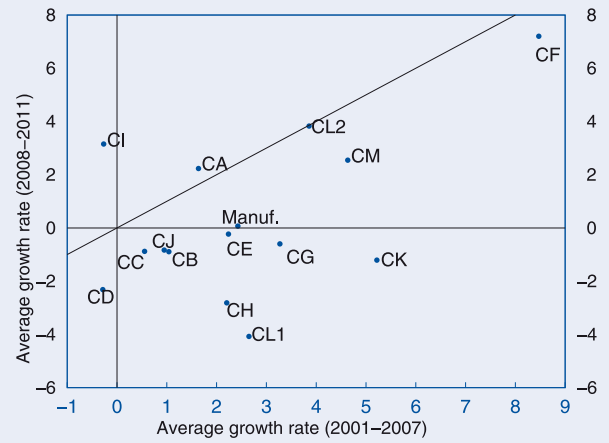
Adjusted investments (growth)



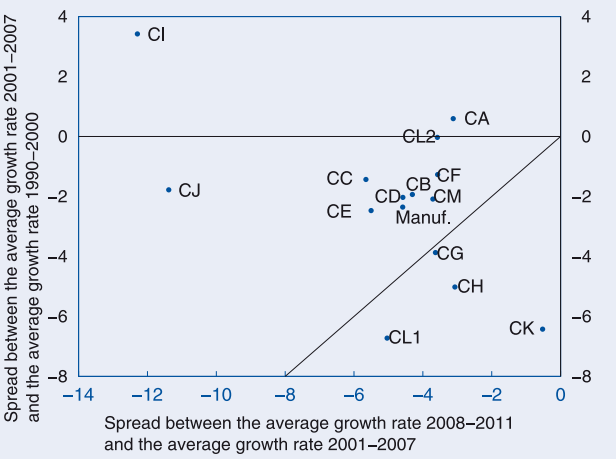
Adjusted investments (acceleration)



Adjusted exports (growth)



Adjusted exports (acceleration)



Bibliography

Aghion P., **Cette G.**, **Cohen E.** et **Lemoine M.**, 2011, "Crise et croissance : une stratégie pour la France", Rapport du Conseil d'Analyse Économique, *La documentation française*.

Argouarc'h J., **Debauche E.**, **Cottet V.** et **Smyk A.**, 2010, "Le cycle de l'emploi. Les petites entreprises ont été les premières à baisser leurs effectifs pendant la crise", *Note de Conjoncture*, Insee, mars 2010, pp 23-42.

Demmous L., 2011, "Le recul de l'emploi industriel en France entre 1980 et 2007 - Ampleur et principaux déterminants : un état des lieux", *Économie et Statistique*, n°438-440.

Fontagné L. et **Gaulier G.**, 2008, "Performances à l'exportation de la France et de l'Allemagne", Rapport du Conseil d'Analyse Économique, *La documentation française*.

Fontagné L., **Gaulier G.**, et **Zignago S.**, 2008, "Specialization Across varieties and North-South Competition", *Economic Policy* n°23.

Fortes M., 2012, "Spécialisation à l'exportation de la France et de quatre grands pays de l'Union Européenne entre 1990 et 2009", *Trésor Eco*, n° 98.

Gallois L., 2012, "Pacte pour la compétitivité de l'industrie française", *Rapport au Premier ministre*

Insee, 2009, "Le coup de frein à la production automobile : sa part dans la récession", *Note de conjoncture*, mars 2009, pp 17-20.

Insee, 2012, "Construction aéronautique et construction automobile, deux secteurs qui ont un effet d'entraînement marqué sur le reste de l'économie", *Note de conjoncture*, mars 2012, pp 91-94.

Rowthorn et **Ramaswamy,** 1998, "Growth, Trade and Deindustrialization", IMP**,** *Working Paper*, n°98/60.■