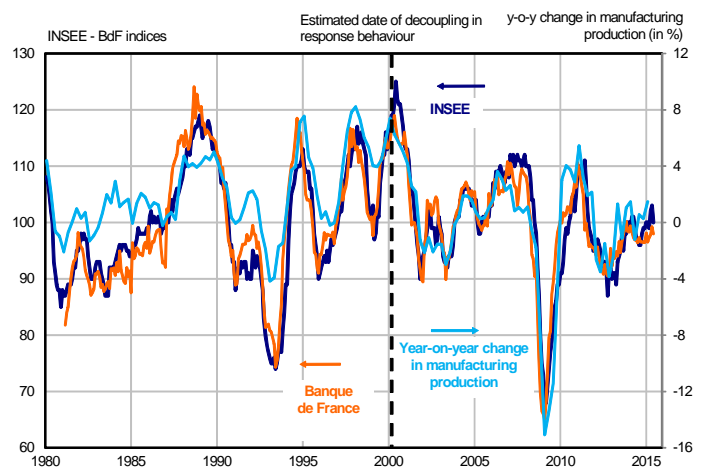


How closely do business confidence indicators correlate with actual growth?

- There is a close link between economic growth and the business confidence indicators published by the three organisations that conduct economic surveys in France (INSEE - the French national statistical institute, Banque de France and Markit). All three surveys have "reference thresholds" expressing the balance of optimistic/pessimistic answers. The INSEE and Banque de France set their thresholds at 100, reflecting a long-term average value; the Purchasing Managers' Index (PMI) calculated by Markit has an "expansion" threshold of 50 above which the economy is assumed to be growing. Using simple models, we find that the INSEE and Banque de France 100 thresholds correspond to a quarterly GDP growth of 0.35% since 2000. By contrast, the PMI 50 threshold corresponds to a slightly positive economic growth rate since 2012, and therefore does not reflect an "expansion" threshold. Although these models are solely based on the composite sentiment indicator, their performance are close to more sophisticated models incorporating a lot more information (e.g. all balances of answers to survey questions).
- As the correlation between GDP growth rates and survey reference thresholds differ from one country to another, one should exercise caution when using surveys for international comparisons. For example, in Italy, the PMI 50 threshold effectively corresponds, on average, to zero GDP growth. That is not the case in Germany or France, where the 50 balance indicates that the economy is already expanding at a quarterly pace of around 0.15%.
- The relationship between economic confidence measured in surveys and actual growth has changed considerably since the early 1980s. From 1980 to 2000, the INSEE and Banque de France reference threshold correlated with an average quarterly GDP growth of 0.5%. Since 2000, it has generally correlated with 0.35% growth. This shift is especially visible in French manufacturing, where the reference threshold correlated with 0.5% quarterly growth in production until 2000 and has since correlated with zero growth.
- The explanations for the shift in the relationship between economic confidence and growth are still very tentative. The decoupling may reflect a slowdown since 2000 in the quality effect, whose strength in the 1990s was due to the dissemination of information and communication technologies. However, without a reliable estimate of the quality effect, this hypothesis is hard to test on a comprehensive basis. The decrease in the growth level associated with the reference thresholds may also be connected with the decline in potential growth during the period.

INSEE / Banque de France economic sentiment and manufacturing production



Source: INSEE, Banque de France.

1. Business confidence indicators: a highly reliable summary of economic conditions

Business confidence indicators are closely correlated with variations in economic activity. There is a very strong link between the INSEE and Banque de France surveys and the year-on-year change in French GDP: the correlation coefficients being around 90% since 1989. The Composite Purchasing Managers' Index (PMI) calculated by Markit seems slightly less correlated with the year-on-year GDP change but is reasonably consistent with the quarterly change, with a correlation coefficient of around 75%. However, the PMI decoupled sharply in 2012 and 2013¹. These differences in performance are largely due to the

smallness of the Markit sample and the time frame of the survey questions (see box 1).

For the other euro area economies, the European Commission surveys-supervised by the Directorate-General for Economic and Financial Affairs: DG ECFIN-are compiled from national surveys and, like them, are rather well correlated with year-on-year GDP changes. As these indicators reflect changing economic conditions (see charts 1 and 2) and are available on a monthly basis, they provide timelier information than the quarterly national accounts.

Chart 1: INSEE / Banque de France economic sentiment and GDP

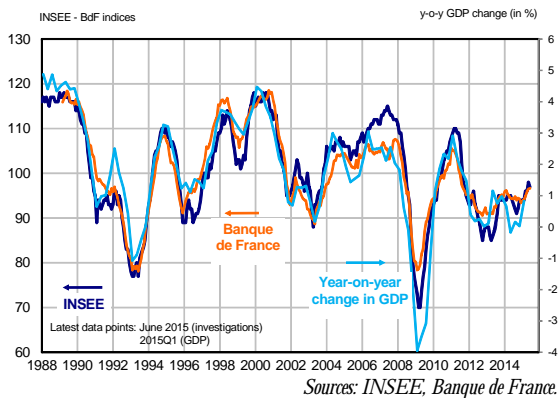
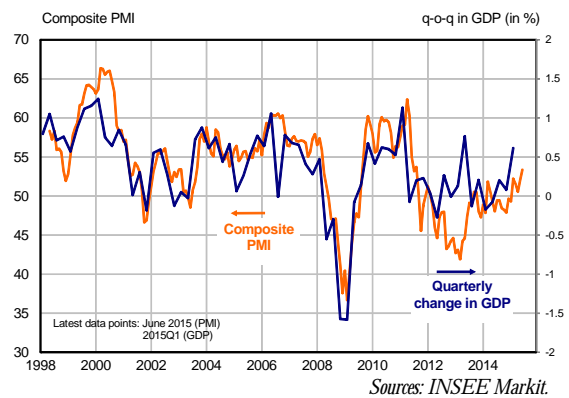


Chart 2: Markit (PMI) economic sentiment and GDP



On this basis, we can develop growth estimation models based exclusively on composite sentiment indicators. Considering their extreme simplicity, these models prove satisfactory. Economic analysts generally choose "direct approaches" that are more "sophisticated", as they use selection procedures to draw on a panel of information from the full set of balances of answers to survey questions². By comparison with these "direct approaches", the information loss due to the use of models based on the composite alone is relatively modest. Moreover, our

proposed model on economic sentiment is extremely simple and relies on a single series.

On average, the standard forecasting error is around 0.28% versus 0.24% for "optimal" models based on survey balances chosen by means of selection algorithms³. We can therefore legitimately use the simplified models based on sentiment alone, and then qualify the sentiment levels in terms of economic growth-more specifically, the headline thresholds of 100 (INSEE and Banque de France) and 50 (PMI).

2. Translating survey reference levels into average GDP growth rates: results differ from one period and country to another

Economic sentiment (INSEE and Banque de France for France, Markit PMI for France and other countries) is typically expressed relative to a reference level. For the INSEE and Banque de France indicators, the values are a long-term average; for the PMI, the value is supposed to represent the "economic expansion" threshold. Because these indicators can be used to compare the dynamics of national economies, it will be helpful to provide guidance for the analysis by seeking to quantify the average growth levels correlated with economic sentiment indicators for each country and survey.

2.1 The long-term average of INSEE and Banque de France indicators have correlated with 0.35% quarterly GDP growth since 2000

The estimated models enable us to determine the growth rate compatible with economic sentiment stable at 100 (for INSEE and the Banque de France) and a Composite PMI stable at 50 (see box 1). At present, **for the INSEE monthly survey, an economic sentiment persisting at its long-term average of 100 seems to correlate with average quarterly growth of 0.3-0.4%.**

(1) See S. Capet and S. Combes (2014), "Are business surveys equally successful to forecast economic activity in France?", *Trésor Economics* no. 125.
 (2) See É. Lalande and T. Rioust de Largentaye (2015), "La prévision de croissance de court-terme à la DG Trésor", DG Trésor, *document de travail* (working paper) no. 2015/04.
 (3) 0.26 versus 0.23 for the Banque de France surveys, 0.30 versus 0.24 for INSEE and 0.28 versus 0.26 for the PMI models. "Optimal" models are selected using a stepwise procedure.

Box 1: Overview of business confidence and estimated models

1) To create a composite index of economic confidence in France, the producer organisations apply different methods that aim to synthesize all the information from sectoral surveys, for example on industry and services.

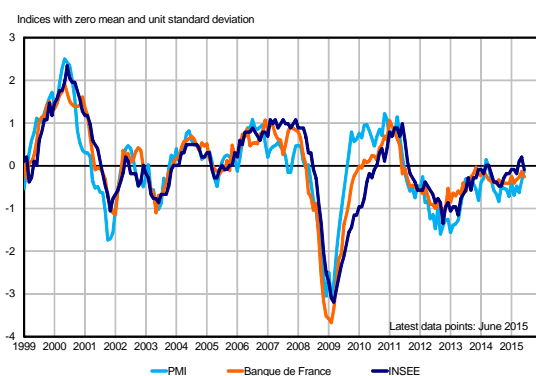
Markit aggregates the Industry PMI and the Services PMI, weighting them by the share of the production of goods and services in the market sector (around 25% and 75% respectively). The Banque de France does not publish a composite index: we constructed the sentiment indicator discussed here using the same weighted-average method used by Markit. By contrast, INSEE calculates economic sentiment as the "common factor"^a of the 26 balances obtained from surveys in five sectors: Industry, Services, Construction, Wholesale Trade and Retail Trade.

2) Sectoral indices:

In industry, INSEE, the Banque de France and Markit administer a monthly questionnaire to a panel of firms concerning items such as the change in activity in past months or the change expected in the months ahead, the state of their order books, and a general opinion on economic activity in France. The differences between the "economic sentiment" values published by the three organisations may be due to sample size (Markit surveys around 400 industrial firms; the Banque de France and INSEE approximately ten times as many), the time frame of the questions (Markit and the Banque de France ask questions on monthly changes; INSEE asks questions on quarterly changes) or to the method for calculating economic sentiment (principal component analysis for the Banque de France, common factor for INSEE, fixed-weight average for the PMI).

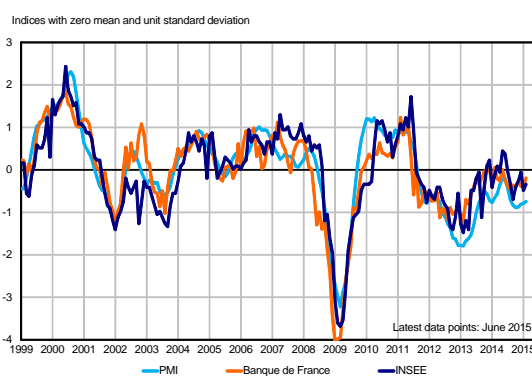
The three economic sentiment indicators reflect very similar dynamics of actual economic growth. The only notable difference is visible in the recovery phase starting in mid-2009, for which the Markit PMI shows a more rapid improvement (see chart 3). This discrepancy is mainly due to the time frame of the questions and to the balances chosen to calculate economic sentiment. If we confine ourselves to the balance of answers on past production and convert the questions to a common time frame^b, the difference in survey timeliness is almost entirely eliminated (see chart 4).

Chart 3: Economic confidence in industry measured by business surveys



Sources: INSEE, Banque de France, Markit.

Chart 4: Balance of answers to business survey questions on past quarterly production



Sources: INSEE, Banque de France, Markit, DG Trésor calculations.

In the service sector, the differences in survey construction are identical. However, as the sector is more fragmented, the smallness of the Markit sample has greater adverse consequences than for industry.

3) For the other countries of the euro area, Markit publishes Composite PMI indices using the same procedures as described above. For all the European Union economies, DG ECFIN publishes harmonised business surveys based on national surveys (for France, on the INSEE survey) to provide an Economic Sentiment Indicator (ESI).

4) Estimated models

For each country, the estimated models have the following form:

$$g_T = \alpha + \beta(C_T - Threshold) + \gamma(C_T - C_{T-1}) \quad (1)$$

g_T is the quarterly change in the variable of interest in Q (GDP, manufacturing production, IPI or production of market services).

C_T is the level of economic sentiment (INSEE/Banque de France/PMI in the estimates prepared for France or ESI/PMI for European comparisons) for one of the three months of quarter Q (chosen with the stepwise procedure).

Threshold equals 100 except for the PMI, where it is set at 50.

We examine the α (quarterly change in GDP compatible with a stable sentiment at 100 or a stable PMI at 50) and β parameters (long-term acceleration linked to a permanent 1-point rise in sentiment) of equation (1). The γ parameter does not differ significantly from zero for most PMI calibrations.

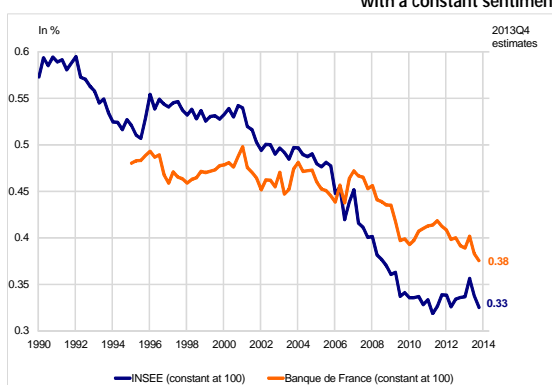
a. The method is described in INSEE's *Conjoncture in France*, December 2008.

b. INSEE asks firms to characterise their production in the past three months compared with the previous three months. The Banque de France (BdF) and Markit ask them to compare their production of the past month with that of the previous month. We can therefore assume that the INSEE balance is consistent with the quarterly change whereas the BdF and Markit balances are consistent with the monthly change. Accordingly, we use the following transformation, where X_m is the BdF/Markit balance for month m and X_m^{quart} is the balance reflecting the INSEE time frame for the past three months over the previous three months:

$$X_m^{quart} = \frac{1}{3}X_m + \frac{2}{3}X_{m-1} + X_{m-2} + \frac{2}{3}X_{m-3} + \frac{1}{3}X_{m-4}$$

We may legitimately ask, however, if this statistical link has varied over time. Stability tests confirm a decoupling in the estimated relationship between the INSEE economic sentiment survey and GDP growth in the early 2000s⁴. In other words, the 100 reference threshold probably "represented" a higher growth rate in the 1990s than after 2000: the rolling ten-year estimate of quarterly GDP growth compatible with a stable economic sentiment of 100 shows a decline in the threshold's value for the INSEE and Banque de France surveys (the decline was slightly milder for the Banque de France: see chart 5). For both surveys, the estimate seems to have remained stable since the early 2000s, i.e., for the past 15 years or so. Since 2000, the 100 threshold has been compatible with quarterly growth ranging between 0.3% and 0.4%, down from approximately 0.5% in the 1980-2000 period.

Chart 5: Rolling ten-year estimate of quarterly GDP growth compatible with a constant sentiment



Source: DG Trésor calculations.

How to read this chart: From 1988Q2 to 1997Q1, we estimate that the 100 threshold of INSEE sentiment correlated with average quarterly growth of 0.55%.

Moreover, a 4-point rise in economic sentiment in three months correlates, on average, with a quarterly GDP acceleration of 0.3 points (see box 2).

PMI surveys are somewhat more problematic, as the lack of time depth restricts the possibility of performing break tests. Coefficient estimation is also highly sensitive to the inclusion of the years 2012-2013, in which the PMI "decoupled" from GDP growth⁵ (and the short time frame rules out robust stability tests). For the entire data availability period (1998-2014), the 50 threshold is linked to quarterly GDP growth of around 0.15% in France, and the value is significantly positive, implying that it does not constitute the economic expansion threshold. However, when we restricted the estimate to 1998-2011, we generally found compatibility with near-zero GDP growth, suggesting that the threshold did indeed indicate economic expansion. In any event, the Markit survey's sharp decoupling observed in 2012-2013 undermines its usefulness for short-term

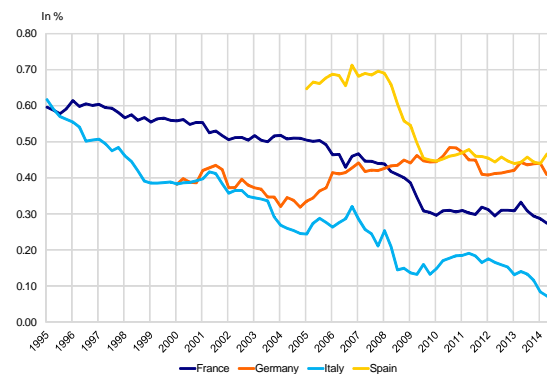
economic analysis, as it is hard to determine whether the link between GDP growth and the PMI has been restored or lastingly altered.

2.2 Comparison of link between reference level of business confidence and GDP growth in several European countries: substantial differences

In the PMI survey, the 50 reference level is supposed to represent the economic expansion threshold. As this postulate is widely accepted and discussed, it is important to verify its statistical reality. By this standard, the 50 threshold effectively correlates, on average, with zero GDP growth in Italy. By contrast, the correlation does not hold in Germany or France (at least for the entire 1998-2014 period: see above), where the 50 balance corresponds to an already positive average quarterly growth rate of around 0.15%. In Spain, the estimate is unstable and comprises as do the DG ECFIN surveys two very distinct sub-periods: before and after 2008.

These differences by country are also reflected in estimates based on DG ECFIN surveys. The estimates show that a stable European Sentiment Indicator (ESI) of 100 has correlated with average quarterly growth of 0.4% in Germany since 1991, 0.3% in France since 2000 and 0.15% in Italy since 1994 (see chart 6). However, only Germany displays a stable relationship between economic sentiment and GDP growth over the entire estimation period⁶. By contrast, we see breaks in the relationship at specific dates in Italy (1994) and France (2000). In Spain, the GDP/ESI correlation is highly unstable before and after the financial crisis. For all these countries (except Spain since 2008), the 90% confidence interval is approximately ± 0.1 points.

Chart 6: Rolling 10-year estimate of quarterly GDP growth compatible with a constant sentiment of 100



Source: Eurostat, DG Trésor calculations.

How to read this chart: From 2004Q3 to 2014Q2, we estimate that the 100 threshold of the ESI for Germany correlated with 0.4% average quarterly GDP growth. In France, we estimate that the threshold correlation has stabilised at around 0.3% since 2000.

- (4) The stability tests (Chow tests and Quandt-Andrews tests) performed indicate that the relationship has been stable since the early 2000s, i.e., for the past 15 years or so. For the Banque de France indicator, the hypothesis of stability since 1989 cannot be rejected.
- (5) See S. Capet and S. Combes, 2014, *op. cit.*
- (6) However, the data-and hence the estimates-for reunified Germany do not begin until 1991, whereas the estimates for Italy and France start in 1985.

Box 2: What is the average effect of a rise in business confidence on GDP growth?

The models estimated directly on economic sentiment enable us to determine the GDP growth compatible with an economic sentiment stable at 100 (for INSEE and the Banque de France) or a Composite PMI stable at 50. We can also test the link between an increase in sentiment and an acceleration of the economy (or between a decrease in sentiment and a deceleration of the economy).

The models indicate that a permanent 4-point rise in INSEE or Banque de France (BdF) economic sentiment correlates with a temporary 0.3-point GDP acceleration during the quarter in which the survey indicator rises, followed by a 0.1-point acceleration (with respect to the initial growth rate) in subsequent quarters. For the Composite PMI, a permanent 4-point rise translates on average into a 0.3-point GDP acceleration during the quarter in which the PMI rises (with respect to the initial growth rate) and during subsequent quarters as well (see chart 7 and table 1).

Table 1: Estimation of equation (1) for French GDP

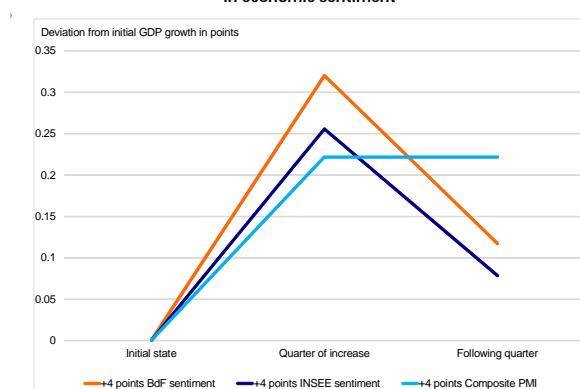
	Estimation period in which coefficients remain stable	α = estimated correspondence between reference threshold (100, or 50 for PMI) GDP q-o-q	90% confidence interval	β = estimated acceleration of GDP growth with a permanent 4-point increase in sentiment	90% confidence interval	$\beta + \gamma$ = estimated temporary acceleration of GDP growth with a 4-point increase in sentiment	90% confidence interval
<i>BdF</i>	1989Q2 - 2014Q3	0.42	+/- 0.05	0.12	+/- 0.02	0.33	+/- 0.06
BdF	2000Q1 - 2014Q3	0.38	+/- 0.06	0.12	+/- 0.03	0.37	+/- 0.08
<i>INSEE</i>	1982Q1 - 2000Q2	0.56	+/- 0.05	0.10	+/- 0.02	0.27	+/- 0.05
INSEE	2000Q3 - 2014Q3	0.33	+/- 0.07	0.08	+/- 0.03	0.25	+/- 0.07
PMI	1998Q2 - 2014Q2	0.17	+/- 0.08	0.22	+/- 0.05	0.22	+/- 0.05

Source: DG Trésor calculations.

Using alternative specifications for equation (1), we can show that this relationship is indeed linear. It does not vary according to the direction (up or down) of the change in economic sentiment, and non-linear effects do not improve the model significantly. In other words, on average, a 4-point rise in economic sentiment "starting" at a level of 90 has the same effect as "starting" at a level of 110.

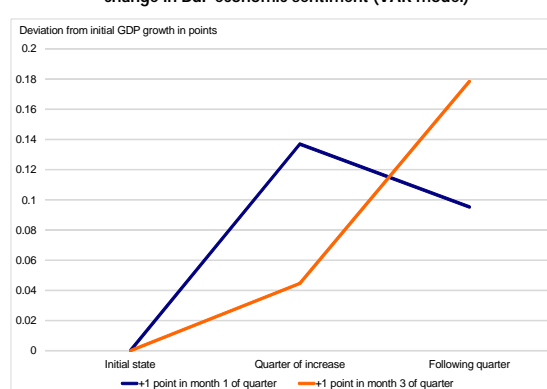
Regarding the impact of the month in which sentiment rises, the models described above measure only the effect of an "average" rise in sentiment during the quarter, since the estimate does not distinguish the month in which the sentiment rises from the other two months. We therefore estimate a quarterly VAR^a to measure the impact of a structural shock of a 1-point rise in economic sentiment by month of publication. By logic, the maximum effect is obtained in the publication quarter itself if the shock occurs in month 1 of that quarter; the effect peaks in the following quarter if the shock occurs in month 3 of the publication quarter (see chart 8).

Chart 7: Simulated profile of GDP growth following a change in economic sentiment



Source: DG Trésor calculations.

Chart 8: Simulated profile of GDP growth consecutive to a structural 1-point change in BdF economic sentiment (VAR model)



Source: DG Trésor calculations.

- a. We arrange the variables by chronological order of publication to perform a Cholesky structural identification (Month 1 of quarter, Month 2 of quarter, Month 3 of quarter then Quarterly GDP change). Chart 8 plots the response functions of GDP to a structural shock (i.e., a shock not expected in the model) on months 1 and months 3 of economic sentiment.

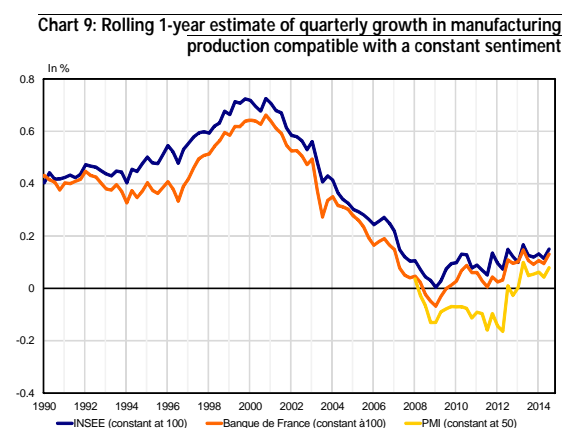
3. In France, a sharp decoupling between business confidence in industry and manufacturing production occurred in the early 2000s

We repeat the previous approach, focusing now on industrial production. As before, we want to determine if the relationship between economic sentiment in industry and production is stable over time. We begin by analysing manufacturing production in France, as calculated and published by national accountants.

However, as the concept of manufacturing production is not fully consistent in accounting terms from one country to another, we used the Industrial Production Index (IPI) to perform our comparisons between the four main economies of the euro area. Although standardised at European level, the IPI is limited in scope, for it merely serves as an indicator to estimate production before a more precise value is calculated for the annual national accounts.

3.1 In France, the long-term average of economic sentiment indicators in industry appears to correlate, since 2000, with zero growth in production as defined in the national accounts

As with GDP, the link between surveys and French manufacturing production as defined in the national accounts appears to have shifted in the early 2000s. Before the 2000s, a stable economic sentiment of 100 in the manufacturing industry correlated with manufacturing production growth of around 0.5%, for both the INSEE and Banque de France surveys. Since 2000, the threshold has correlated with zero growth. We find the same shift in the PMI⁷ (see chart 9).



Source: DG Trésor calculations.

How to read this chart: From 2004Q4 to 2014Q3, we estimate that the 100 threshold of economic sentiment in industry tracked by the Banque de France and INSEE surveys correlated with 0.1% average quarterly growth in manufacturing production.

In services, the quality of production calibrations from surveys is generally inferior⁸. The INSEE and Banque de France surveys diverge strongly, and it is hard to discern a genuine difference in predictive capacity between them. On balance, the analysis of the service sector highlights the same decoupling in the early 2000s for the INSEE surveys.

3.2 International comparison of industrial production indices: similar results except for Germany

As noted above, the concept of manufacturing production, as defined in France, is not necessarily calculated in the national accounts of other countries. For international comparisons, we therefore use the Eurostat industrial production index (IPI).

When we repeat the analysis previously conducted with the PMIs of the main European countries, the 50 threshold appears to correlate with zero growth in the French IPI (as is the case with the specifically French manufacturing production aggregate). For Italy and Spain, the reference threshold seems identical, signifying zero IPI growth. **By contrast, the link does not appear to hold for Germany, where the 50 threshold seems to reflect significantly positive IPI growth of around 0.4%**⁹.

We perform the same analysis using economic sentiment in industry measured by the DG ECFIN survey. For the sake of time consistency, our analysis begins in 1991, the year of German reunification. **As with the PMI, a 100 sentiment in the DG ECFIN surveys translates into positive quarterly IPI growth in Germany alone (0.9%)**. In France, Italy and Spain (with a reservation for Spain owing to pre- and post-crisis instability), the reference threshold has correlated, on average, with zero growth for the past decade or so.

In France, however, the relative stability of the relationship between the DG ECFIN survey and the IPI is a surprising result, given the substantial weakening of the link between the national surveys and manufacturing production as measured in the national accounts (see above). From a statistical standpoint, we cannot rule out a stable relationship between the IPI and DG ECFIN sentiment in industry (which roughly matches INSEE sentiment) since 1990. Admittedly, the rolling estimates show a decoupling in the relationship in the early 2000s, but it is less clearcut than for manufacturing production. This rather unexpected result stems from the fact that the IPI was far less dynamic than manufacturing production (as measured by the national accounts) in the 1990s, whereas the two indicators have moved broadly in parallel since 2001 (see below).

4. How should we interpret the decoupling between business confidence and economic activity in France in the early 2000s?

As described earlier, the connection between economic sentiment and economic activity in France was modified in the early 2000s, particularly in industry. By and large, the surveys remain a valid means of identifying cyclical movements (on average, an increase or decrease in sentiment always reflects the same acceleration/deceleration in actual activity) but the GDP growth rate compatible with an economic sentiment close to 100 has declined significantly. In theory, this difference reflects a change in firms' response behaviour. Indeed for a given level of production, firms respond more positively than before; this would explain why a given level of the balance of answers now

correlates with lower production. But beyond this observation, it is worth asking whether the decoupling reflects other developments as well.

4.1 One possible explanation may lie in a weakening of the contribution of the quality effect in French products

As discussed above, the link between economic sentiment surveys and French manufacturing production as measured in the national accounts has weakened far more substantially than the relationship between the surveys and the industrial production index (IPI). One possible explana-

(7) This validates, ex post, the characterisation of the PMI 50 threshold as the "expansion threshold", for it is based on a balance of answers and not constructed ad hoc (see box 1).

(8) See S. Combes, S. Dahmani and E. Lalande (2014), "L'activité dans les services: panorama des difficultés de mesures et apport de nouvelles méthodes de prévision", DG Trésor, *document de travail* (working paper) no. 2014-01.

(9) The stability tests were not rejected, but they were undermined by the lack of time depth of the PMIs. However, the rolling 10-year estimates do not show significant breaks, at least graphically.

tion may lie in the estimate of the quality effect by national accountants. **To test this assumption, we need to recall the differences between IPI construction and the manufacturing production aggregate in the national accounts.**

The IPI is calculated monthly from industry surveys, and relies mostly on data on quantities produced and hours worked. In this respect, it is fairly consistent with business surveys, since a vast majority of respondent firms use quantitative indicators for quantities produced and hours worked in the business surveys as well¹⁰. In both cases (IPI and surveys), the results take almost no account of improvements in production quality¹¹.

By contrast, real production in the national accounts (i.e., production in volume terms which takes into account quality) is calculated as the ratio of nominal production (i.e., production in value terms) to a price index that incorporates the quality effect. When a product is retired and is replaced by another that cannot be regarded as a perfect substitute¹², the price change between the old and new products is not reincorporated into the price index. This generates an increase in real production due not to the quantities produced but to product quality¹³. While the permanence of INSEE methods limits the risk that some

movements may be due to changes in methodology, the Institute does not indicate the contribution of the quality effect (i.e., the contribution of the replacement of one product by another) to the change in real production¹⁴. Nothing suggests that the quality effect's contribution remains stable over time.

We can try to further test this assumption by measuring the quality effect as the difference in dynamism between manufacturing production as calculated in the national accounts and the IPI¹⁵ (see chart 10). Significantly, the difference widened sharply in the 1990s but has grown more slowly since 2000. It could thus be argued that a quality effect was a strong production driver in the 1990s before losing momentum since 2000. Its average contribution (estimated as the ratio of manufacturing production to the IPI at a granular level) weakened from 1.6 points a year between 1990 and 2000 to 0.6 points a year between 2000 and 2014. This decoupling is due, in particular, to the capital goods sector, and more specifically to IT equipment. Between the same two periods, the contribution of the qualitative improvement in capital goods alone (despite their accounting for only 13% of French manufacturing production) fell from 0.6 points to 0.0 points a year (see table 2).

Table 2: Average annual changes in % and contributions in points

	1990-2000	2000-2014
Change in manufacturing production	2.9	-0.4
of which: change in quantities produced (IPI)	1.3	-1.1
of which: quality effect estimated as Prod/IPI	1.6	0.6
of which: C1 (Food industry)	0.1	0.0
of which: C2 (Coking-refining)	0.0	0.0
of which: C3 (Capital goods)	0.6	0.0
of which: C4 (Transport equipment)	0.1	0.0
of which: C5 (Other industries)	0.8	0.5

Source: DG Trésor calculations.

(10) See Y. Gorin, P.D. Olive, C. Renne, and C. Bortoli, "New advances in the use of INSEE's business tendency surveys to analyse the short-term economic outlook", *Conjoncture in France*, INSEE, March 2015.

(11) For some industries, however, the production index is calculated with the aid of deflated invoices (which therefore incorporate the quality effect), but these represent a very small proportion of the data used to construct the index.

(12) The statistical agency's choice of method for processing new products is far from neutral. As Lequiller (1997) recalls, in the wake of the Boskin report (1996), price indices, used as deflators in the national accounts, are highly sensitive to the treatment of new products and to any choices of replacement products: calculations on U.S. data show that a change in the treatment of new products has an impact of +/- 3 points on the annual change in the U.S. CPI.

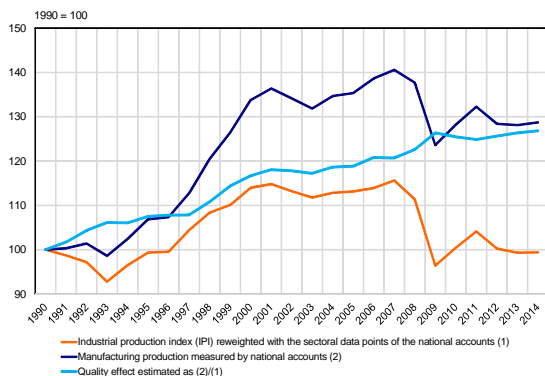
(13) This calculation is performed during the successive stages of preparation of the annual accounts (preliminary, semi-final and final accounts). But it then affects the quarterly accounts, since these are adjusted to the annual accounts.

(14) The most recent estimate for the consumer price index (not the production deflator) was calculated by Guedes (2004) for 2003. He found that the quality effect would have trimmed the annual change in the CPI by 0.3 points.

(15) This measurement must be performed after adjusting for the gaps between the IPI and French manufacturing production that are due only to differences in sector weights. The IPI measures the production of individual industries weighted by their respective shares of value added in 2010. Manufacturing production weights the production of individual industries by their shares of nominal production in the previous year (a method known as chained volume series). The IPI plotted in chart 10 is re-weighted at the most detailed level possible of the classification (A38).

On balance, the intuitive assumption that the decoupling between business surveys and economic activity is due to a weakening of the quality effect is fairly attractive, for the 1990s did witness a massive dissemination of information and communication technologies across the economy. Nevertheless, absent a more reliable estimate of the quality effect, this hypothesis is hard to test in a comprehensive manner.

Chart 10: Industrial production index and manufacturing production measured in the French national accounts



Source: INSEE, DG Trésor calculations.

4.2 In addition to the quality-effect hypothesis, value added and potential output may help to explain the decoupling

In 2011, the DG ECFIN explicitly connected this weakening of the link between business surveys and economic activity to the decline in potential output across the European

economies¹⁶. **But this hypothesis seems fragile and, in any event, it cannot explain the entire decoupling. Some survey questions were probably affected by the phenomenon:** if potential growth weakens significantly, the link between GDP growth and the questions that ask firms to evaluate their order books with respect to "normal" levels will, by logic, be unstable over time. By contrast, there is no reason why the correlation between GDP growth and the questions explicitly relating to past production (higher, lower or stable) should deteriorate. However, the link's instability in the early 2000s can also be identified simply from the balances of answers on past production. It is therefore difficult to use the decline in potential output as an explanation for this change in firms' response behaviour.

In addition, the statistical link between manufacturing value added and business surveys was less weakened than the link with production in the early 2000s. However, calibration quality is substantially reduced when we try to estimate value added directly. This is understandable, for the questions asked explicitly concern production and not value added, which is a balancing item calculated by national accountants.

All in all, it is hard to provide a complete explanation of the decoupling, although some hypotheses are worth exploring.

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(16) See "Highlight: is there a decoupling between soft and hard data?", European Business Cyclical Indicators, July 2011.

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