THE 'CAISSE DES DÉPÔTS ET CONSIGNATIONS' LEADING INDICATOR

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Paris 1996

43463

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Methodology

STUDY - SPECIAL ISSUE
January 1996
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Methodology

Drawing on the available monthly series of economic data, we construct a leading indicator that can be used to estimate the growth rate of French GDP in the current quarter and the coming quarter. This indicator is an (optimal) combination of factors calculated from the basic economic series, and those factors can themselves be interpreted from an economic viewpoint.

Study conducted by Patrick Artus, Moncef Kaabi and Najib Sassenou
Introduction

In countries (such as the United States) in which a leading indicator is available, it is merely a synthetic variable (with interpretable components) representing the available data on the state of the economy. Our ambition is to set up one (or several) more sophisticated indicators which will not only synthesize the available information but will also enable GDP growth to be predicted.

The methodology we have chosen is the following:

− We select a great number of variables which we see as providing forecasting information about the economic cycle, while restricting our choice to series available on a monthly basis;

− We transform these variables (generally by differentiation) to make them stationary;

− We carry out a principal components analysis on this set of transformed variables; the initial components synthesize therefore the cyclical data available at a given moment. We shall see that they can be interpreted econometrically;

− We construct econometric equations which explain the GDP growth rate (of the previous quarter, if not yet known, the current quarter and the forthcoming quarter) and which use as explanatory variables the principal components derived from the analysis.

It will therefore be possible, on the one hand, to comment on the movements in these components, as these movements summarize in a synthetic manner the cyclical situation as described in the initial variables, and on the other hand, weight the various variables (using coefficients derived from the econometric estimates) to construct a single leading indicator which predicts GDP growth (in fact there are several leading indicators, since forecasts are made each month about GDP growth in the current quarter, the coming quarter and even the past quarter in so far as the GDP in that quarter is not yet known).

This approach differs from the one used by the OECD in drawing up G7 leading indicators in the statistical method used to extract cycles and in the calculation of the indicator itself. The OECD extracts cycles by direct observation of turning points, whereas we use an econometric forecasting approach to determine which variables display a cyclical lead.

The indicator we thus obtain is also different from the American leading indicator, in particular because of the method of weighting the various basic variables, which is arbitrary in the United States (cf. Annex 3) and econometric in our case.

Selecting the initial variables

We draw on all the variables released on a monthly basis which seem relevant to forecasting growth (see details in Annex 1). We exclude variables which are released only quarterly as they would have to be smoothed in some arbitrary manner. This is sometimes detrimental since a given number of interesting variables is only released every quarter in France: unemployment, disposable income, investment.
We calculate the variables according to their publication date (Annex 2). The variables we use are the following:

− sector-based indices of industrial production (some sectors may have a cyclical lead which we can exploit);

− price variables: domestic prices, foreign trade prices, prices of imported commodities; a variation in prices can result from a movement in the economy and, conversely, impacts on incomes;

− INSEE business sentiment surveys (bearing on production, stocks, order books, capacity utilisation rate) with their obvious relevance in terms of forecasting;

− demand: new car registrations, building permits, consumption of industrial products;

− French and foreign stock exchange indices and, for France, sector-based stock exchange indices; in theory, share prices reflect expectations of future earnings (and therefore of activity);

− variables representing changes in employment and incomes (which determine future demand): unemployment, wages;

− foreign trade: overall trade balance, Franco-German balance, exports, imports. Developments in foreign trade are known rapidly and reflect changes in activity in France and abroad;

− exchange rates (FF/$, FF/DM, DM/$) for their effect on demand and incomes (via the terms of trade) and also because they, too, theoretically incorporate expectations of future growth;

− various definitions of the money supply which reflect anticipated activity;

− trends in bank credit (which provide indications about savings and investment);

− variables characterizing the economic situation abroad: industrial production, inflation, trade balance in the United States and Germany, as they obviously have an effect, be it immediate or lagged, on activity in France;

− interest rates, nominal and real, short- and long-term, in France, Germany and the United States. We isolate in particular the differential between the long rate and the short rate in each of these three countries. As is well known, this spread is a reliable forerunner of activity, probably because it incorporates anticipations bearing on future monetary policy.

We thus have at our disposal most of the monthly cyclical information. Other variables can of course very well be added in the future. The variables presented hereabove, according to their nature, are input either as levels (e.g. survey results...) or as growth rates (e.g. output,...). In the latter case, we simultaneously use instantaneous growth, growth smoothed over 3 months and year-on-year growth.
Stationarization

We carry out a battery of unit root tests on all the variables while trying to take into account the problems of the robustness of these tests. We use argumented Dickey-Fuller (ADF) tests of the nature of the process the variables might follow. Several stages were required to achieve these results.

Firstly, the stationarity of all these variables was tested by supposing that they followed a first-order autoregressive process (AR (1)) with or without a trend. All series are in growth rates (annual, quarterly, monthly) except interest rates (level), survey results (level) and trade balances (variation in level over 12 months and over 3 months).

In a second stage, a similar operation is carried out on those series for which the existence of a unit root is not rejected, by supposing this time a second-order autoregressive process AR(2) or an AR(1) process in the differences.

Lastly, by iterative differentiation, we only keep transformed variables for which we accept the hypothesis of stationarity.

Principal components analysis

It is far more useful (for ease of interpretaton) and practical (for conducting econometric tests) to work with a reduced number of variables. To this end, we carry out a principal components analysis (PCA) on the initial variables and we attempt to interpret econometrically the components (axes) thus obtained. This essentially descriptive method of analysis allows a limited number of orthogonal factors to be derived from a relatively high number of variables correlated in varying degrees among themselves. These orthogonal factors are supposed to explain a substantial part of the information contained in the group of variables initially selected. For our part, we have selected 96 economic and financial variables (cf. our description of these variables, above) which we observe on a monthly basis over the period from December 1979 to December 1995.

The first 19 axes explain 75% of the total inertia or information contained in the 96 initial variables. In the table below we give, for the 9 first axes, the proportion of the inertia which is explained.

<table>
<thead>
<tr>
<th>Axes</th>
<th>Inertia as %</th>
<th>Cumulative inertia as %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14.46</td>
<td>14.46</td>
</tr>
<tr>
<td>2</td>
<td>9.55</td>
<td>24.01</td>
</tr>
<tr>
<td>3</td>
<td>7.79</td>
<td>31.80</td>
</tr>
<tr>
<td>4</td>
<td>7.03</td>
<td>38.83</td>
</tr>
<tr>
<td>5</td>
<td>5.35</td>
<td>44.18</td>
</tr>
<tr>
<td>6</td>
<td>4.13</td>
<td>48.31</td>
</tr>
<tr>
<td>7</td>
<td>3.31</td>
<td>51.62</td>
</tr>
<tr>
<td>8</td>
<td>3.04</td>
<td>54.66</td>
</tr>
<tr>
<td>9</td>
<td>2.82</td>
<td>57.48</td>
</tr>
</tbody>
</table>
The great variety of initial variables explains why the first axes explain a relatively low part of the total inertia (14% for the first one).

With the PCA factors defined, the following stage consists in giving an economic interpretation of these synthetic variables. To do so, their correlations with the basic variables are considered. We provide in the table in Annex 4 the sign of the correlation whenever the correlation coefficient between an axis and an economic variable is significant.

Examination of this table allows the factors to be interpreted economically. We specify such an interpretation for the first nine axes which together explain 57% of the total information.

- **Axis 1** is positively correlated with the overall and sectoral French stock exchange indices as well as with the Dax and the Dow Jones Industrial Average1. Prices (inflation, import prices, US inflation) are negatively correlated with this axis (stock exchange valuation axis). As is well known, a rise in the price level causes the stock exchange to fall, maybe because of a money illusion mechanism (the discounting rate used rises with inflation).

- **Axes 2 and 3** are positively correlated with production, business sentiment surveys and demand variables (building permits, consumption...) (demand axes) as well as with interest rates and rate spreads.

- **Axes 4 and 5** are linked to international inflation, exchange rates and activity abroad (with different signs) (imported inflation, foreign growth and exchange rate axes).

- **Axis 6** is positively correlated with the dollar’s exchange rate against the FF and the DM (in the direction of a rise in the dollar), import prices, long-term interest rates, US prices (imported inflation axis).

- **Axis 7** is the French short rate axis.

- **Axis 8** is positively correlated with domestic inflation (domestic inflation axis).

- **Axis 9** is the monetary axis (axis 10 is also linked to the money supply, with an opposite sign).

The above shows that the axes have an economic interpretation in terms of growth, exchange rates, interest rates, stock exchange prices and components of demand.

To illustrate this point, we show in the following charts the chronological changes in some of the most frequently significant factors in the following econometric estimates. **These factors are therefore similar to the various components of the American leading indicator.**

To summarize the economic variables to which the factors can be related:

- **Factor 1** to stock exchange prices,
- **Factors 2 and 3** to demand,
- **Factor 4** to foreign growth,
- **Factor 5** to foreign inflation,

---

1 Axis 16, which is often significant, is also correlated with the stock exchange variables.
• Factor 6 to long rates,
• Factor 7 to the French short rate,
• Factor 8 to domestic inflation,
• Factor 9 to the money supply.

For factors 8 and 9 the link with a single econometric variable is less obvious.

What relation is there between the PCA factors and real GDP growth in volume?

We construct a leading indicator of changes in GDP from a simple econometric model which links the growth rate of GDP in volume terms to factors derived from PCA. We have take into account the position within the quarter of the month in which the forecast is made. In view of the fact that GDP data are released quarterly, whereas basic economic and financial variables (interest rates, exchange rates, stock exchange prices, CPI, PPI...) used in constructing the principal axes are released on a monthly basis, the further one advances into a quarter, the more information is available to forecast past, present and future change in GDP. This has led us to carry out our economic estimates according to the position of the month in the quarter. This model has been estimated in two variants: in the former we took the year-on-year change in (real) GDP as the dependent variable; in the latter the quarter-on-quarter change. The first specification can be compared to a medium-term model supposed to bring out the structural determinants of GDP trends. The second corresponds to a short-term model in which the emphasis is on the determinants of the immediate economic situation.

For the two variables to be explained (GDP year-on-year (YOY) or quarter-on-quarter (QOQ), the import of the factor axes is qualitatively identical as the parameter estimated for a given axis has the same sign in both cases.

It is at the level of statistical significance of the parameters that differences have been noticed. Firstly, we begin by giving - as an example - detailed econometric results for GDP year-on-year. Secondly, we compare the two models to see which one gives the best predictions in terms of quarterly changes in GDP.

For our estimates, we distinguish the models according to two criteria: the month in which the prediction is made (1st, 2nd or 3rd month of the current quarter) and that of the GDP to be predicted (past, current or future quarter). We estimate all in all seven models (the GDP of the past quarter only needs to be estimated in the first month of each quarter since it is known thereafter). Table 3 presents the detailed results and table 4 contains the interpretation of the links between GDP growth and the factors.

Examination of table 3 demonstrates that the predictive ability of the annual model is good ($R^2$ is always higher than 0.75). In charts 2 and 3 we give the observed and simulated changes in year-on-year GDP growth rates for current and forthcoming quarters. These two charts confirm the quality of our modelling: the selected models predict in a satisfying manner the future trend of GDP growth, because of the smoothed character of the variables.
Table 3
Econometric results: year-on-year change in GDP

1. Forecasting model: GDP of previous quarter in 1st month of current quarter

\[
\text{GDP (YOY)} = 1.58 \text{ (Factor 2)} + 0.68 \text{ (Factor 3)} - 0.27 \text{ (Factor 6)} + 0.34 \text{ (Factor 8)}
\]
\[
\begin{align*}
(0.16) & \quad (0.15) & \quad (0.17) & \quad (0.15)
\end{align*}
\]
\[R^2 = 0.77\]
Axes 2 and 3: demand-pull expansion
Axis 6: long-term interest rates
Axis 8: inflation.

2. Forecasting model: GDP of current quarter in 1st month of current quarter

\[
\text{GDP (YOY)} = 0.37 \text{ (Factor 1)} + 1.56 \text{ (Factor 2)} + 0.75 \text{ (Factor 3)} + 0.33 \text{ (Factor 4)}
\]
\[
\begin{align*}
(0.16) & \quad (0.16) & \quad (0.14) & \quad (0.16)
\end{align*}
\]
\[R^2 = 0.80\]
Axis 1: stock exchange valuation.
Axis 4: imported inflation

3. Forecasting model: GDP of coming quarter in 1st month of current quarter

\[
\text{GDP (YOY)} = 0.55 \text{ (Factor 1)} + 1.34 \text{ (Factor 2)} + 0.76 \text{ (Factor 3)} + 0.71 \text{ (Factor 4)}
\]
\[
\begin{align*}
(0.18) & \quad (0.17) & \quad (0.16) & \quad (0.18)
\end{align*}
\]
\[R^2 = 0.76\]

4. Forecasting model: GDP of current quarter in 2nd month of current quarter

\[
\text{GDP (YOY)} = 0.32 \text{ (Factor 1)} + 1.74 \text{ (Factor 2)} + 1.00 \text{ (Factor 3)} + 0.22 \text{ (Factor 4)} + 0.31 \text{ (Factor 16)}
\]
\[
\begin{align*}
(0.15) & \quad (0.11) & \quad (0.12) & \quad (0.11) & \quad (0.12)
\end{align*}
\]
\[R^2 = 0.89\]
Axis 16: Paris stock exchange.
Table 3 (cont.)

5. **Forecasting model: GDP of coming quarter in 2nd month of current quarter**

\[
\text{GDP (YOY)} = 0.53 \text{ (Factor 1)} + 1.52 \text{ (Factor 2)} + 0.89 \text{ (Factor 3)} + 0.45 \text{ (Factor 4)} + 0.41 \text{ (Factor 9)} \\
0.16 \quad 0.17 \quad 0.17 \quad 0.16 \quad 0.20 \\
R^2 = 0.78
\]

Axis 9: money supply

6. **Forecasting model: GDP of current quarter in 3rd month of current quarter**

\[
\text{GDP (YOY)} = 1.22 \text{ (Factor 2)} + 1.06 \text{ (Factor 3)} - 0.30 \text{ (Factor 4)} + 0.46 \text{ (Factor 5)} - 0.63 \text{ (Factor 6)} \\
-0.44 \text{ (Factor 7)} + 0.48 \text{ (Factor 8)} + 0.33 \text{ (Factor 9)} \\
0.13 \quad 0.13 \quad 0.12 \quad 0.12 \quad 0.12 \\
0.13 \quad 0.15 \quad 0.12 \\
R^2 = 0.80
\]

Axis 7: French short rate.

7. **Forecasting model: GDP of coming quarter in 3rd month of current quarter**

\[
\text{GDP (YOY)} = 0.36 \text{ (Factor 1)} + 1.68 \text{ (Factor 2)} - 0.89 \text{ (Factor 3)} - 0.30 \text{ (Factor 6)} - 0.25 \text{ (Factor 10)} \\
+ 0.45 \text{ (Factor 16)} \\
0.12 \quad 0.12 \quad 0.13 \quad 0.11 \quad 0.13 \\
0.16 \\
R^2 = 0.89
\]

Axis 10: credit supply (negatively).

Table 4

<table>
<thead>
<tr>
<th>Factors</th>
<th>Sign of correlation with GDP</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 16</td>
<td>+</td>
<td>GDP follows stock exchange prices.</td>
</tr>
<tr>
<td>2 and 3</td>
<td>+</td>
<td>GDP follows demand components.</td>
</tr>
<tr>
<td>4 and 5</td>
<td>+ or -</td>
<td>Link between GDP and imported inflation.</td>
</tr>
<tr>
<td>6 and 7</td>
<td>-</td>
<td>GDP declines with (short- and long-term) interest rates.</td>
</tr>
<tr>
<td>8</td>
<td>+</td>
<td>Inflationary growth</td>
</tr>
<tr>
<td>9 and 10</td>
<td>+</td>
<td>Effect of money supply on GDP.</td>
</tr>
</tbody>
</table>
The model which explains GDP in terms of quarter-on-quarter growth provides a better prediction than the year-on-year GDP growth model does.

As we specified hereabove, by modelling GDP year-on-year and quarter-on-quarter, we have sought to improve the forecasting of the GDP growth rate from one quarter to another. The two models are not directly comparable (in terms of R\(^2\) or MSE) as the endogenous variables are not the same and one is faced with different specifications according to the position of the month in the quarter. To compare these two models we proceeded in three steps:

- Starting with year-on-year changes in GDP forecast from the seven models presented above, we deduce the quarterly growth rate of GDP entailed by the simulated year-on-year change;
- We recover the quarterly changes in GDP predicted using the corresponding seven monthly models;
- We calculate the forecasting error in both cases so that we can compute the mean squared errors and compare them.

In the following table we give the standard deviation of the forecasting error for both models.

### Table 5
Comparison of accuracy of the forecasting models for the quarterly growth rate of GDP

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Standard deviation of the error - quarterly growth model as %</th>
<th>Standard deviation of the error - year-on-year change model as %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous</td>
<td>0.47</td>
<td>1.04</td>
</tr>
<tr>
<td>Current</td>
<td>0.52</td>
<td>1.06</td>
</tr>
<tr>
<td>Future</td>
<td>0.61</td>
<td>1.21</td>
</tr>
</tbody>
</table>

The statistics in this table show that:

- the quarter-on-quarter model of GDP is more accurate than the year-on-year model in terms of predicting the growth rate of GDP in the previous, current and coming quarters;
- for the quarter-on-quarter model, as could have been expected, the previous quarter is better forecast with a mean forecasting error of 0.47% against 0.52% for the current quarter and 0.61% for the coming quarter. This ranking is coherent, since the previous quarter is the one for which the most information is available.

Charts 4 and 5 show, for the period between early 1985 and December 1995, quarterly GDP growth in the current quarter (chart 4) or the forthcoming quarter (chart 5), using the equation corresponding to the position of the month in the quarter. One sees that accuracy is quite good, with the largest errors observed, naturally, for the following quarter (as would be expected from the examination of standard deviations of the forecasts). Nevertheless, the various acceleration and deceleration movements in growth are well simulated, except for GDP of the following quarter, as the recession began in 1993.
Chart 2
Forecast of GDP by volume in France for the current quarter (year-on-year changes as %)

Chart 3
Forecast of GDP by volume in France for the coming quarter (year-on-year changes as %)
Chart 4
Forecast of GDP by volume in France for the current quarter
(T/T-1 as %)

Chart 5
Estimate of GDP by volume in France for the coming quarter
(T/T-1 as %)
Annex 1

Initial cyclical information

✈ Growth:
- Total IPI (IPI)
- IPI excluding construction (IPIHB)
- IPI of capital goods (IGDPE)
- IPI of consumer goods (IGDPC)
- IPI of intermediate goods (IGDPI)
- Manufacturing IPI (IPIM).

✈ Domestic Inflation:
- Total CPI (CPI)
- CPI excluding tobacco (CPIHT)
- CPI excluding food (CPIHA)
- CPI for food (CPIA)
- CPI for services (CPIS).

✈ Imported inflation:
- Prices of all commodities (IPMPT)
- Prices of industrial commodities (IPMPI)
- Import prices (PM).

✈ Foreign trade:
- Trade balance (SCOMFRA)
- Current-account balance (SCOUFRA)
- Imports by volume (M)
- Exports by volume (X)
- DM/FR exchange rate (DMFRA)
- $/FR exchange rate (DOLFRA).

✈ Money:
- M2 (M2)
- M3 (M3)
- Bank credit (CRED)

All the above monetary series were deflated for current GDP.

✈ Pressure variables:
- Wage rate (TXSAL)
- Number of jobless (CHOM)
- Unemployment rate (TXCHOM)
- Capacity utilization rate (TUC).

✈ Surveys:
- General production prospects (OPIGEN)
- Personal production prospects (OPIPERS)
- Opinions about order books and domestic demand (OPIDI)
- Opinions about order books and foreign demand (OPIDE)
- Opinions about stocks (OPISK)
- Opinions about past production (OPIQ).

✈ Consumption and demand:
- Building permits (PERM)
- New car registrations (IMMA)
- Household consumption of manufactured goods (CMENMF)
- Household consumption excluding cars (CMENHA)
Stock Exchanges France: CAC40 (CAC)
General stock exchange index (IBT)
Industrial sector-based stock exchange index (IBI)
Energy and mining sector-based stock exchange index (IBM)
Consumer goods sector-based stock exchange index (IBBC)
Services sector-based stock exchange index (IBS)
Utility services stock exchange index (IBUT)
Financial services stock exchange index (IBFI)
Automotive sector stock exchange index (IBMO)

All the above indices were also deflated for current GDP.

French interest rates:
3-month short rate (RCFRA)
10-year long rate (RLFRA)
Rate spread (RLCFRA)
Real 3-month short rate (RCRFRA)
Real 10-year long rate (RLRFRA).  

Germany:
DAX stock exchange index (DAX)
Inflation (CPIALL)
Industrial production (IPIALL)
Trade balance (SCOMALL)
$/DM exchange rate (DOLDM)
3-month short rate (RCALL)
10-year long rate (RLALL)
Rate spread (RLCALL)
Real 3-month short rate (RCRALL)
Real 10-year long rate (RLRALL).  

United States:
Dow Jones Industrial Average stock exchange index (DJ)
Inflation (CPIUSA)
Industrial production (IPIUSA)
3-month short rate (RCUSA)
10-year long rate (RLUSA)
Rate spread (RLCUSA)
Real 3-month short rate (RCRUSA)
Real 10-year long rate (RLRUSA).  

France-Germany:
Inflation differential
Growth differential
Gap in trade balance

All the series are monthly or have been adjusted to a monthly basis (GDP, capacity utilization rate, hourly wage). Stationarity tests were run on the series of month-to-month (MOM), quarter-to-quarter (QOQ) and year-to-year (YOY) variations.
Annex 2

Publication delays of variables and frequency of forecasts

Forecasts are made on a monthly frequency. At the beginning of each month, the database is updated and a forecast is made for GDP by volume for the current quarter, the previous quarter and the coming quarter.

Publication lags for the series are summarized in the following table for the most important variables. In France, interest rates, exchange rates and stock exchange indices are computed daily and are known immediately; domestic and imported inflation and survey results are known with a one-month lag; unemployment and the trade balance, with a 2 month lag; the current-account balance and the IPI, with a 3-month lag. As for Germany, apart from the exchange rate, interest rates and stock exchange indices, the IPI and the various external balances are known with a 2-month lag. In the United States, apart from the financial sphere the lag is one month for all the other series.

Calendar of the main French indicators
(Publication dates are approximate)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Monthly indicators</th>
<th>Lag</th>
<th>Source</th>
<th>SAD</th>
<th>Monthly survey</th>
<th>Lag</th>
<th>Quarterly Indicators/data</th>
<th>Lag</th>
<th>Source</th>
<th>CVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>between 1 and 10</td>
<td>Unemployment</td>
<td>m-2</td>
<td>INSEE</td>
<td>Y</td>
<td></td>
<td></td>
<td>Industrial production</td>
<td>T-1 (a)</td>
<td>INSEE</td>
<td>Y</td>
</tr>
<tr>
<td>between 10 and 20</td>
<td>CPI (provisional results)</td>
<td>m-1</td>
<td>INSEE</td>
<td>Y</td>
<td>Household confidence survey</td>
<td>m-1</td>
<td>Wage-earning labour, wages (traded non-farm sector)</td>
<td>T-1 (b)</td>
<td>DARES</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Current-account balance (sometimes between 20 and 25)</td>
<td>m-3</td>
<td>BDF</td>
<td></td>
<td></td>
<td></td>
<td>GDP (provisional results by volume)</td>
<td>T-1 (a)</td>
<td>INSEE</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Industrial production</td>
<td>m-3</td>
<td>INSEE</td>
<td>Y</td>
<td></td>
<td></td>
<td>GDP (detailed results)</td>
<td>T-1 (c)</td>
<td>INSEE</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Household consumption of manufactured products</td>
<td>m-1</td>
<td>INSEE</td>
<td>N</td>
<td></td>
<td></td>
<td>(values and volumes)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>m-1</td>
<td>INSEE</td>
<td>Y</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>between 20 and 25</td>
<td>CPI (final results)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Household consumption of manufactured products</td>
<td>m-1</td>
<td>INSEE</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>m-1</td>
<td>INSEE</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>between 25 and 31</td>
<td>Foreign trade (CIF/CIF) balance</td>
<td>m-2</td>
<td>INSEE</td>
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(a): published in the 2nd month after the end of the quarter in question.
(b): published in the 1st or the 2nd month after the end of the quarter in question.
(c): published in the 4th month after the end of the quarter in question.
Annex 3

The leading indicator of the United States

The composite leading indicator (LI) is published by the Bureau of Economic Analysis, for month t, between the end of month t +1 and the beginning of month t +2. For instance, the index for November 1995 was released on 29 December 1995 and that for October 1995 was released on 6 December 1995. The coincident (CI) and delayed (DI) indicators are released at the same time. All three indicators are calculated in the same way, as the weighted sum of basic cyclical indicators. Weightings are standardized and obtained by averaging the absolute values of growth rates of the components over a period chosen according to the cycle. This measurement therefore takes into account the volatility of the indicators over this period. Weightings thus calculated are applied both to the trends and to the detrended cycle.

The composite index (LI) includes eleven indicators:

- Hours put in each week by manufacturing workers,
- An index of commodity prices,
- Initial weekly claims for unemployment benefits,
- Orders for goods,
- Vendor performance index,
- An index of consumer expectations,
- Capital expenditure,
- Money supply,
- Building permits,
- Index of 500 stocks.

The fact that the LI is published so late on a monthly basis (t+2 for month t) while most cyclical indicators, which make it up, are already known, means that this indicator is not of great interest from a forecasting viewpoint. Furthermore, its predictive character has not held up well against the changes in the US economy (i.e. greater openness since the eighties). The following chart compares changes in GNP by volume, domestic demand by volume and the LI on a quarterly basis.

While the recessions (1974, 1982) and recovery phases (1975, 1983) were indeed “anticipated” by the leading indicator (with a lag of one quarter), this did not hold true for the slowdown of early 1986. The indicator’s drop from mid-1987 onwards (linked to the drop at the stock exchange) was followed by a fall in growth very much later. Nevertheless, this indicator remains a reliable forerunner of trend reversals but not of their intensity.

Translator’s note: was. This index has been privatized. It is now compiled and published by the Conference Board, effective January 1996.
Leading indicator and growth in the United States
(quarterly data year-on-year as %)

Source: DRI, FMR computation
## Annex 4

### Interpretation of principal components

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- or ++ means ≥ 50%  
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This document was produced by the economists of the Research Division and of the Economic Studies Division of the Caisse des dépôts et consignations

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