PART THREE: SURVEY APPLICATIONS

PART THREE: SURVEY APPLICATIONS

3.1. - Annual investment growth rates

3.1.1. - A leading macroeconomic indicator

Unlike in other business surveys, the main information provided by the quarterly Investment Survey is a quantitative statistic: annual investment expenditures for three consecutive years. These values enable us to make eight consecutive estimates of the annual investment growth rate between years N-1 and N (*see* Table 3 and Appendix 3). These estimates are leading indicators of the investment growth that will be supplied later by other annual sources, such as Annual Enterprise Surveys (EAEs) in industry and the national accounts.

The first estimate of investment growth is available in October of year N-1. At that date, investment plans for the following year are not defined with precision, and firms announce intentions that they are not sure of fulfilling. The correlation between this information and the growth rate determined from the EAE, available in July N+1, is close to 0.6 (*see* Table 7).

As the year proceeds, information on investment becomes more specific. By the second estimate, in January of the current year, the correlation between the estimates based on the Investment Survey and the EAE in industry has risen to 0.86. It continues to improve, reaching 0.97 in the final Investment Survey estimate, available in July of year N+1.

We can draw the same conclusions about national-accounting data: the correlation between this source and the Investment Survey rises with successive estimates, from 0.63 in the second to 0.84 in the eighth (*see* Table 7). These correlations are weaker than the ones above, owing to the different scope of coverage: the Investment Survey concerns industry, while national accounting tracks all non-financial enterprises.

Table 7:
Correlation between annual investment growth rate computed from Investment Survey and rates derived from EAEs and national accounts, 1990-2006

	Investment Survey (scope of coverage: manufacturing industry)							
	1st Oct. N-1	**2nd Jan. N**	**3rd April N**	**4th July N[1]**	**5th Oct. N**	**6th Jan. N+1**	**7th April N+1**	**8th July N+1[1]**
Correlation with EAE (scope: manufacturing industry)	0.58	0.86	0.91	0.94	0.96	0.95	0.96	0.97
Correlation with national accounts (scope: non-financial enterprises)	0.35	0.63	0.71	0.73	0.80	0.83	0.83	0.84

1. The July series exists only since 2003. It is completed by the April series for the years before 2003.
How to read this table: The correlation between the first estimate of investment growth computed from the Investment Survey and the rate provided by EAEs is 0.58.
Sources: Investment Survey; EAE; national accounts; authors' estimates

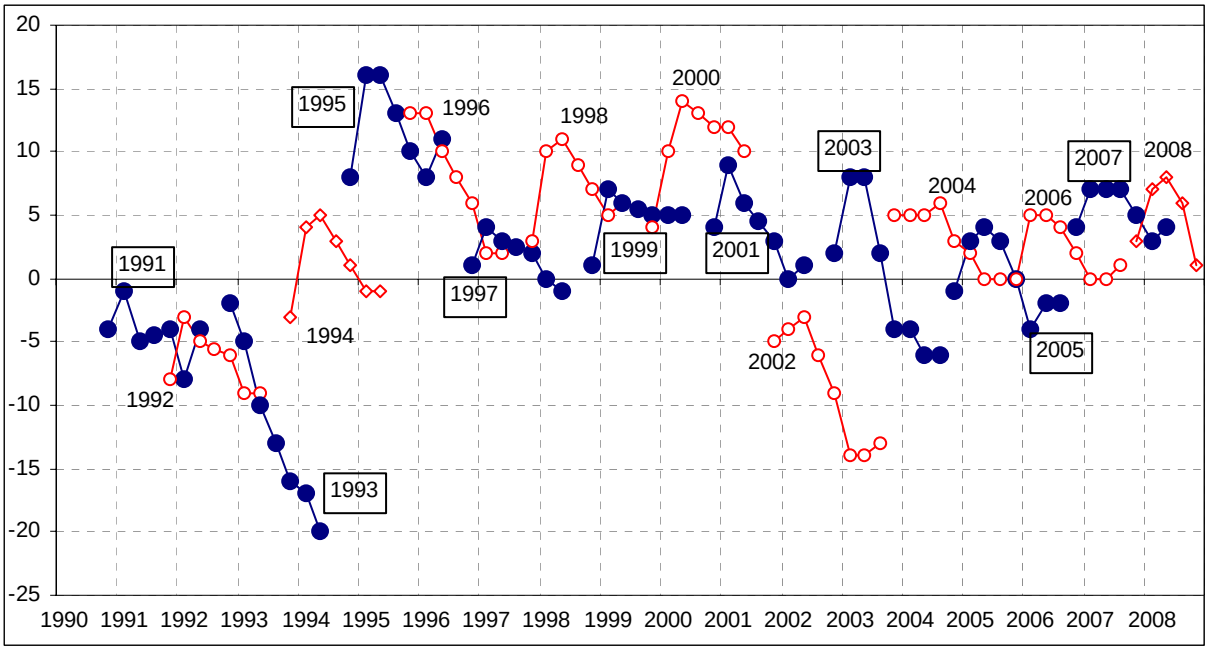
With each new estimate, the published Survey results rapidly converge towards actual changes in industrial investment. This convergence is a key criterion for assessing Survey quality, as changes in successive estimates are due not only to random statistical fluctuations but also to changes in investment intentions over time.

For instance, in April of year N+1 and approximately one year before the publication of the "semi-final" national accounts, the Survey gives an accurate idea of year-N changes in industrial investment. While this information precedes the national accounts, it comes too late to be of value in short-term analysis. By contrast, short-term forecasting exercises make extensive use of prior estimates.

3.1.2. - However, the indicator is subject to potential revision

Chart 1 plots the eight consecutive estimates of annual growth from 1990 to 2008. It reveals major revisions in consecutive estimates for a given year. The initial estimates may diverge significantly from the final outcome.

Chart 1:
Consecutive estimates by firms on changes in their investment expenditures
manufacturing industry, %



How to read this chart: Each curve plots consecutive estimates for the year shown next to it. The x-axis indicates Survey dates.

The curves show that, on average, the revisions of expected and actual growth rates exhibit a fairly constant profile. Initial estimates display a positive bias relative to the final estimate. On average, the first estimate provided in October year N-1, the second estimate in January year N, and the third estimate in April year N are overestimated by 2.6 points, 6.5 points, and 5.8 points respectively (*see* Table 8). The average bias then decreases gradually.

It is therefore essential to take this bias into account for a rigorous analysis of consecutive estimates of the investment rate.

Table 8:
Average revisions of firms' estimates of their annual investment growth (%)

Estimate and survey date relative to year N	Average of annual investment growth rates for year N	Average difference relative to estimates in April N+1 survey
1st estimate: October N-1	1.1	2.5
2nd estimate: January N	5.1	6.5
3rd estimate: April N	4.4	5.8
4th estimate: October N	0.8	2.2
5th estimate: January N+1	-1.4	0.0
6th estimate: April N+1	-1.4	0.0

How to read this table: Between 1991 and 2006, in the October survey wave of the previous year (year N-1), firms expected their investment to rise by an average 1.1% in year N. Later, in the April wave of the following year (N+1), they reported a 1.4% decline, i.e., an average downward revision of 2.5 points relative to the October year N-1 survey.

Scope of coverage: manufacturing industry, period 1991-2006.

Sources: Investment Survey; INSEE; authors' estimates

3.1.3. - An indicator that is hard to use for sub-annual assessments

Until 1997, INSEE directly adjusted the published results for average bias. This procedure proved ill-advised for the period 1991-1995, as the raw results turned out to be closer to investment growth rates actually observed. Since 1991, the change in the Investment Survey calendar and the inclusion of investment in leased assets in the definition of investment have caused a discontinuity in the bias type, undermining its medium-term estimation. We have therefore discontinued the dissemination of bias-adjusted results since the January 1998 Survey wave.

In contrast, revisions between two consecutive surveys appear to provide particularly interesting information. For example, the revision of +6 points between the October 1999 and January 2000 waves exceeded the 4.4-point average. The revision is therefore a positive information item, consistent with the robust 4.3% growth in corporate GFCF in Q1 2000. Another example is the expected decline in the growth rate between the October 1992 and January 1993 waves, which sent a very negative signal on the industrial investment outlook. The signal was later confirmed by the quarterly national accounts, which effectively showed a 1.8% decrease in GFCF in Q1 1993.

It is therefore essential to take into account the optimism or pessimism of industrial firms' expectations as well as the revisions between consecutive estimates.

3.2. - Individual revisions of investment figures

3.2.1. - Information summarised in a robust indicator

The information conveyed by the change in the aggregate growth rate between two Survey waves may be contaminated by noise due to the highly diverse characteristics of investment or by inconsistencies between responses by a single enterprise and errors in the amounts reported. In particular, some growth-rate revisions are due more to changes in previous-year figures than to changes concerning the year of interest. We therefore need to construct a revision indicator that accommodates these specific factors.

Ferrari (2005) proposes a robust indicator based on individual data. The indicator's main characteristics are described below.

3.2.1.1. A quarterly revision indicator covering the manufacturing industry

The revision indicator is confined to the manufacturing industry, as coverage of the food and energy sectors was relatively poor until 2003.

In each wave, we measure the direction and amplitude of individual revisions of investment expectations. The year examined is the "earliest" year possible: in October N-1, firms are asked for the first time to forecast their year-N investment; by the January N wave, we can therefore compute the difference between the figures reported in October N-1 and January N (*see* Table 9).

This gives us quarterly revisions for the January, April, and October waves but not yet for the July wave, which has been conducted only since 2003. Until a sufficient number of July waves are available, and out of concern for preserving consistency over time, we perform the October revisions with reference to the April wave rather than the July wave immediately preceding. We thus obtain quarterly revisions for the January and April waves and a six-month revision for the October wave.

Table 9:
Provisional timetable for calculating year-N indicator

Survey waves	k	Figures requested	Indicator calculated from the difference in year-N figures:
January N	1	Years N-2, N-1, and N	between October N-1 and January N waves
April N	2	Years N-2, N-1, and N	between January N and April N waves
October N	3	Years N-1, N, and N+1	between April N and October N waves

3.2.1.2. An indicator based on macroeconomic information

The individual revisions of investment figures are proportional to enterprise size, measured by the latest available turnover[12] (noted TO^i_a for enterprise *i and* year *a*). With $I^i_{a,\,k}$ as the investment figure reported by enterprise *i* in wave *k* of year *a*, the individual revision indicator $d^i_{a,\,k}$ is given by the following formula:

$$d^{\,i}_{a,k} = \begin{cases} \dfrac{I^{\,i}_{a,k} - I^{\,i}_{a,k-1}}{TO^i_{a-1}} & if\ \ k \in \{2,3\} \\ \dfrac{I^{\,i}_{a,1} - I^{\,i}_{a-1,3}}{TO^i_{a-2}} & if\ \ k = 1 \end{cases}$$

These individual indicators are then aggregated. A weighted average proves disappointing, as its correlation with quarterly investment growth is weak. Individual revision indicators are highly volatile[13]. When extreme values are present, such an aggregation is not very robust, since the removal of a single observation may alter its value. We therefore need an aggregation method that is robust to these extreme values. Ferrari (2005)[14] proposes the M-estimators method, which is a generalisation of the ordinary least squares (OLS) method: the distribution "centre" is estimated by minimising a cost function noted ρ—which differs from the sum of squares—applied to the residuals[15]:

$$For\ all\ k \in \{1,2,3\},\quad \left(\hat{I}_{a,k}\right)_{a\in A} = \arg\min_{I_{a,k}} \sum_{i,a} \rho\left(d^{\,i}_{a,k} - I_{a,k}\right)$$

where $(\hat{I}_{a,k})$ denotes the estimators for the various years available for wave k.

[12] Year N-1 turnover in the April, July, and October waves of year N; year N-2 turnover in the January wave of year N.
[13] These series are also said to display a "fat tail" distribution.
[14] For a more detailed description, see the article by Ferrari (2005).
[15] In practice, the computation method is slightly more complicated: the indicators are calculated by strata, and the heteroskedasticity of residuals is corrected.

The wave series are zero-meaned for comparability. To construct the quarterly indicator, we aggregate the three wave series into a single series. At the end of the process, the average revisions in the January N wave cover Q1 of year N, the April revisions cover Q2, and the October revisions cover Q3 and Q4. Absent a sufficiently long series for the July wave, we assign the indicators for the following October waves to the July waves.

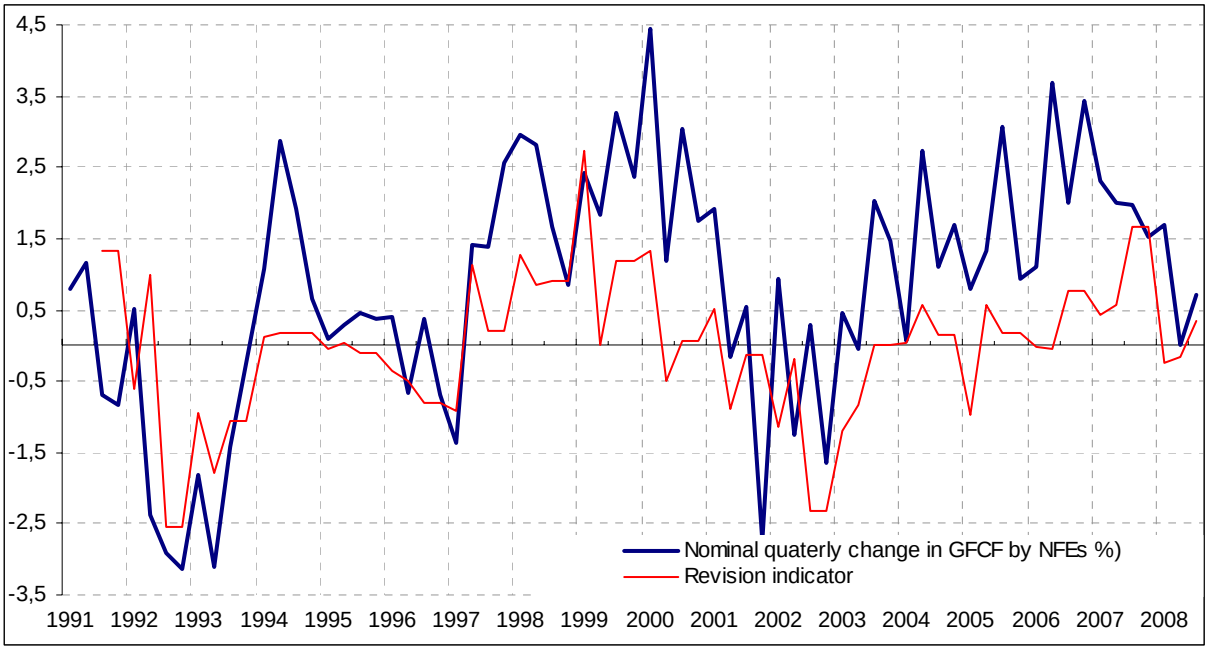
3.2.2. - A useful indicator for analysing short-term investment trends

3.2.2.1. A distinctly closer correlation

The quarterly variations in nominal GFCF by non-financial enterprises and the revisions of published annual rates between two surveys are weakly correlated. For the period from Q3 1991 to Q3 2008, the correlation is 0.21. The reason is that growth-rate revisions are partly due to changes in year-earlier investment figures and therefore yield a noisy signal on the change in GFCF in the year of interest.

This is not the case with the revision indicator, which is based on investment in the year of interest (*see* §3.2.1). The indicator is far more efficient: its correlation with GFCF by non-financial enterprises is 0.61 (*see* Chart 2).

Chart 2:
Comparison between revision-indicator series and
quarterly investment-growth series



Sources: national accounts; Investment Survey; INSEE

For a given quarter, the revision indicator is available by mid-quarter. It can then be used to forecast the changes in the figures for that quarter in the "*Conjoncture* in France" report published at the end of the quarter[16].

[16] This is not the case, however, for the third quarter and the October *Point de conjoncture* [English edition: "*Conjoncture* in France"]. But the inclusion of the July wave will eventually enable INSEE to construct an indicator available by mid-August, which will complete the forecast for Q3 of the current year.

3.2.2.2. Higher-quality forecasts

The Investment Survey revision indicator provides highly useful information for forecasting business investment. As shown by the calibration reproduced below, the indicator yields significant extra information for forecasting real changes in business investment (*see* also Chart 3):

Estimation on quarterly data from Q2 1992 to Q4 2005

$GFCF^{NFE}_{q}$ = 0.34 + 0.45 $GFCF^{NFE}_{q-2}$ + 0.61 $Ind\_Revision_q$ - 0.62 $DP210_{q-2}$ + 0.32 $ACUR_q$

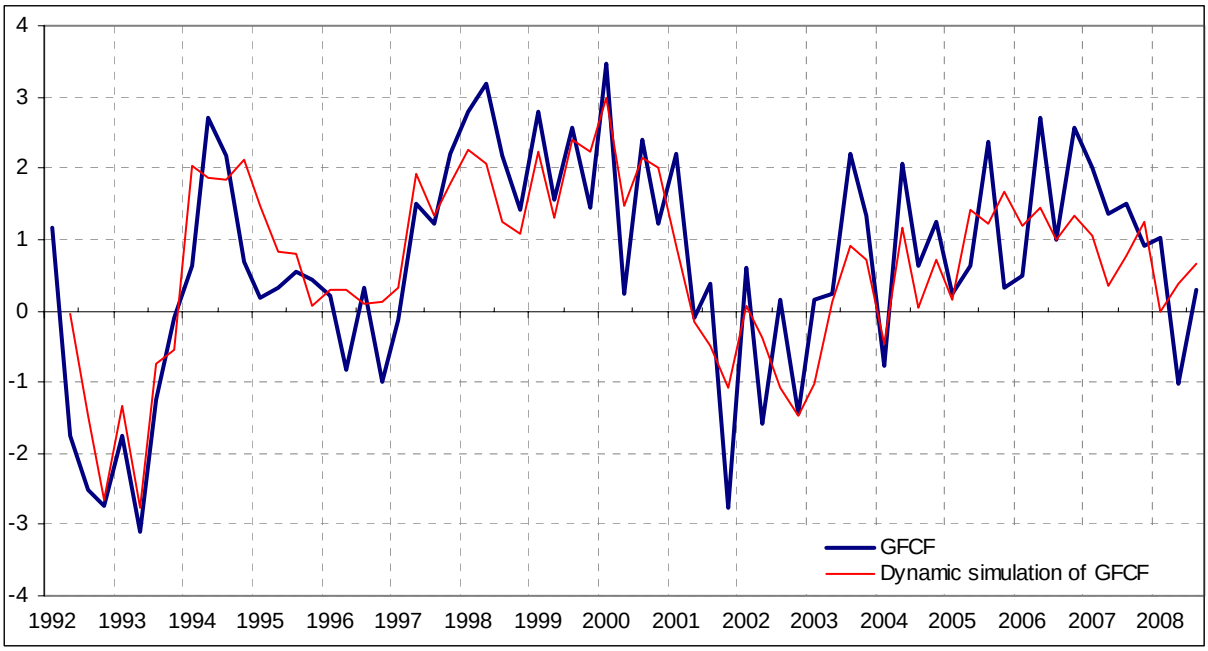
(Student) (2.9) (5.6) (4.8) (-5.8) (3.0)

RMSE = 0.78
R^2 = 0.81

With:

- $GFCF^{NFE}_{q}$: quarterly growth rate of real GFCF by NFEs for quarter q
- $Ind\_Revision_q$: revision indicator for quarter q
- $DP210_{q-2}$: six-month difference in real interest rate for quarter q-2
- $ACUR_q$: acceleration in productive capacity utilisation rate for quarter q.

Chart 3:
Forecast of quarterly variations in real GFCF by NFEs



Sources: Investment Survey; INSEE

Retrospectively, the model's forecasts capture the turning points in the investment cycle correctly. For example, the model plots the upswing that started at end-1993 very accurately. Likewise, the model effectively charts the sharp investment slowdown in Q2 2001, which marked the end of the "Internet bubble". Over the recent period, the revision indicator pointed to 1% investment growth in Q4 2007. This forecast is identical to the value given in the preliminary quarterly national accounts.

Amid the scarcity of tools for forecasting GFCF by non-financial enterprises, the Investment Survey thus provides valuable short-term information to assess future changes in business investment. The results published in growth-rate form are very useful for a qualitative approach but display some weaknesses with regard to implementing quantitative tools for quarterly forecasting. Those weaknesses are overcome by the revision indicator, which offers relevant information for forecasting investment variations.

3.3. - Other information provided by the Survey

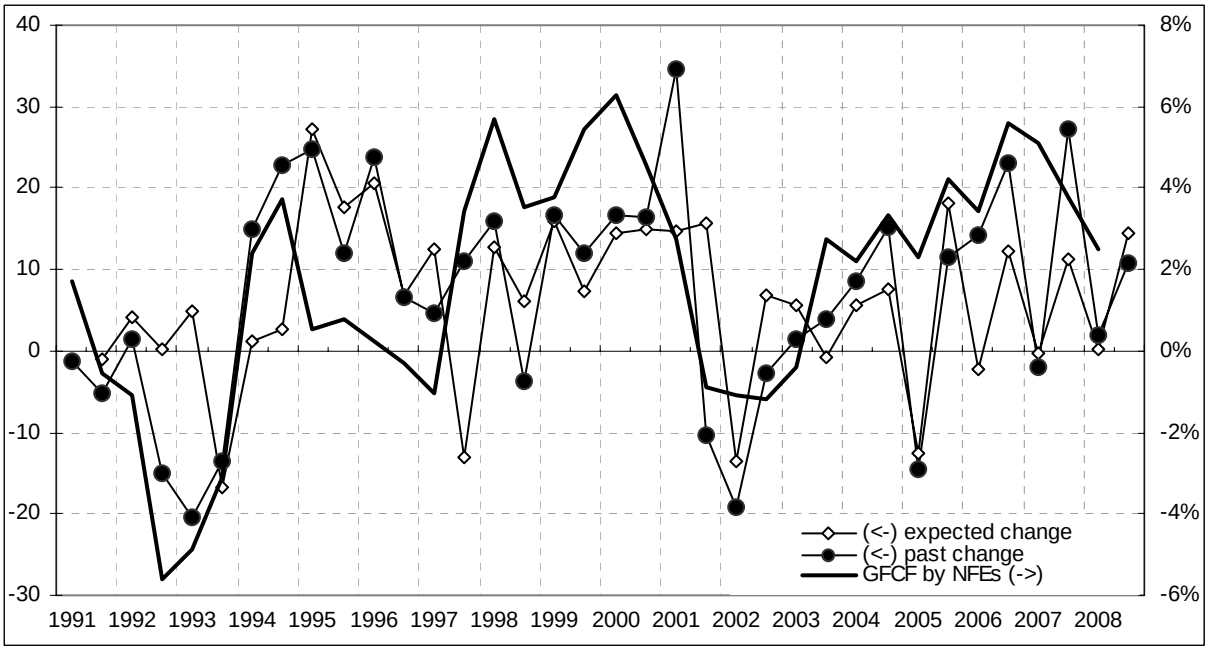
3.3.1. - Opinion on six-month change in investment

In addition to annual investment figures over three consecutive years, respondents also give their opinion on the past and expected six-month change in their investment expenditures. Since 2003, these questions have been asked each quarter. Previously, they were included only twice a year, in April and October. The firm is offered three choices (⇗, ⇨ or ⇘) and must choose the one that best describes the change.

The initial information may be summarised without significant loss by a balance of opinion that consists of the algebraic difference between the two percentages for opposite opinions (*see* §2.3.3.2). After seasonal adjustment, the balance proves to be a representative indicator of economic cycles (*see* Chart 4).

The balance of opinion should not be interpreted as a direct measure of the growth rate of the variable to which it refers. The level of the balance has little significance *per se*. It is informative only by reference to earlier balances or to its long-term average. As a rule, the higher the percentage of firms having responded positively (investment up) or negatively (down), the more reliable the information provided by the balance.

Chart 4:
Six-month change in past and expected investment in April and October



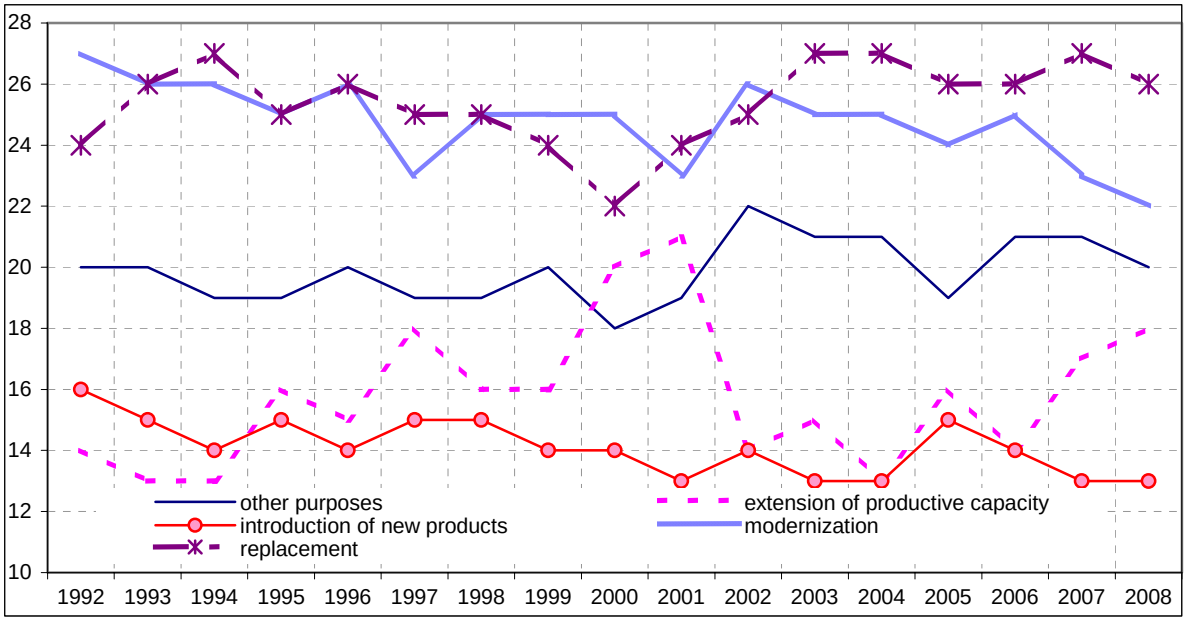
Sources: Investment Survey; INSEE

3.3.2. - Investment purposes

For a given year N, firms are asked four times to specify the purposes of their investment (*see* §2). They supply a six-month breakdown from October of the previous year (early forecast) to October of the following year (outcome).

The breakdown of investment by purpose changes relatively little from year to year (*see* Chart 5). The share of spending to raise productive capacity for existing products is logically correlated with total investment growth. After a sharp rise in the late 1990s and early 2000s, it dropped steeply in 2002.

Chart 5:
Investment purposes in April of year examined



Sources: Investment Survey; INSEE

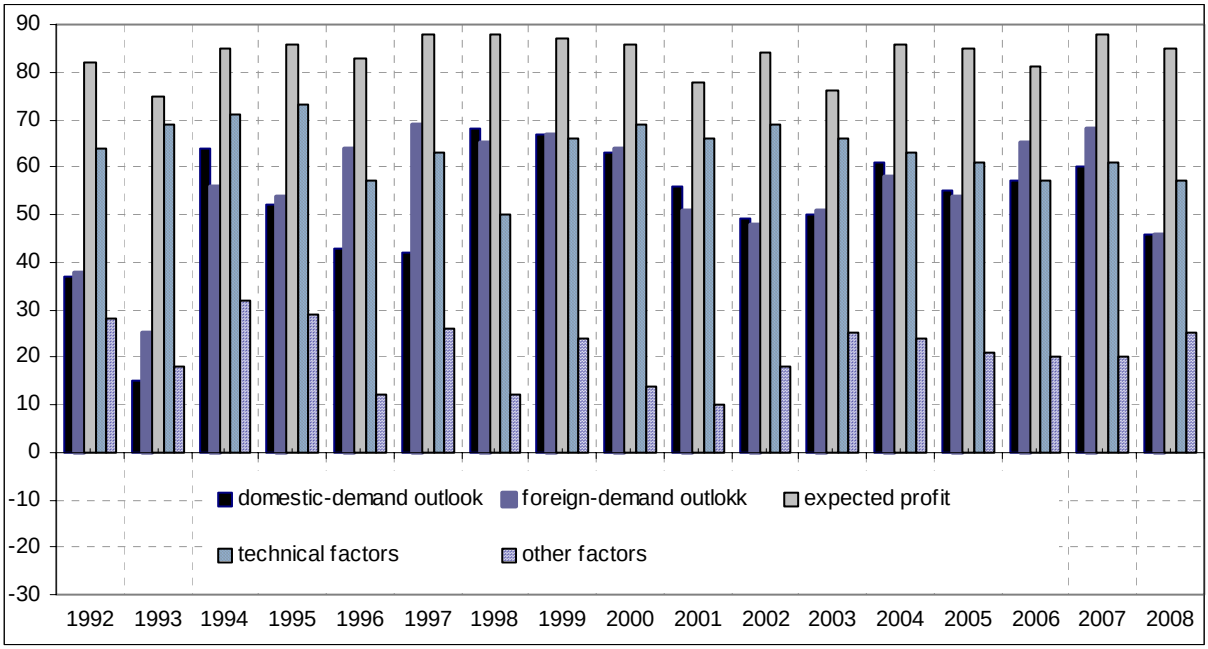
3.3.3. - Factors in the investment decision

For a given year N, firms are asked twice to indicate factors influencing their investment decision. Respondents rank nine factors on a scale of five levels from “very stimulative” to “very restrictive”, in October of the year examined (forecast) and in October of the following year (outcome).

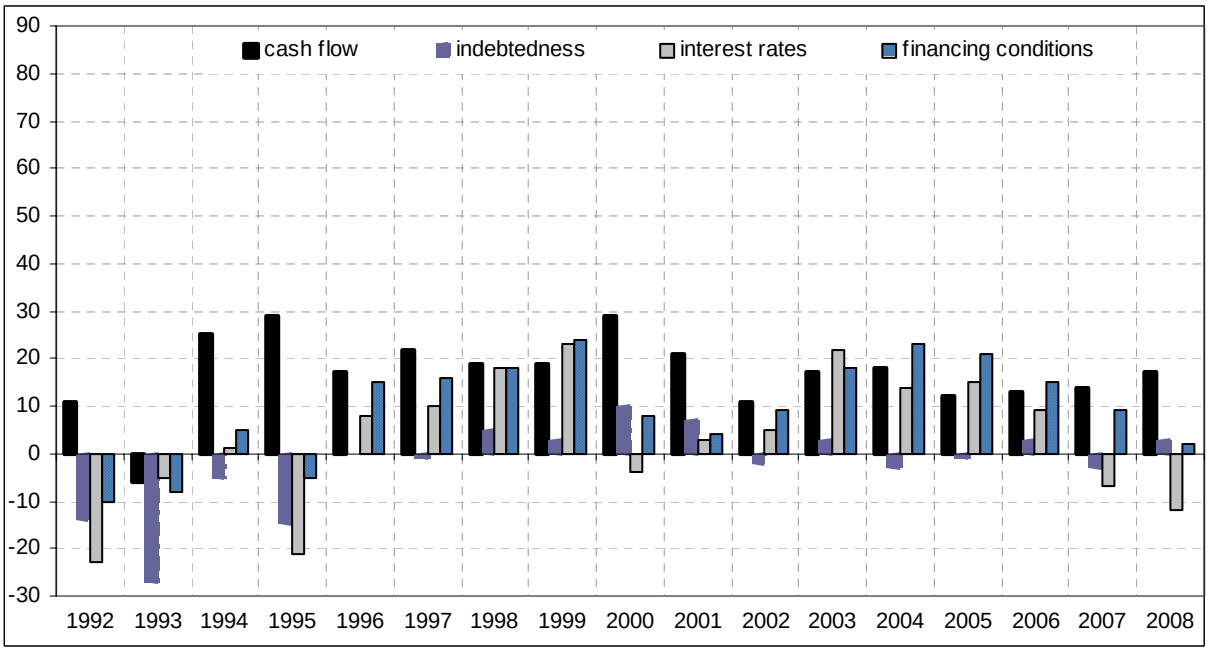
We reduce these qualitative questions to summary balances for each factor. Over the medium term, profit expectations remain by far the most stimulative factor in the investment decision (*see* Charts 6a-b). They are followed by technical factors and the domestic and foreign demand outlook, whose importance has been growing since the mid-1990s. Terms of financing seem less decisive.

Charts 6a-b:
Factors in investment decision in October of year examined

a. Non-financial factors



b. Financial factors



Sources: Investment Survey; INSEE

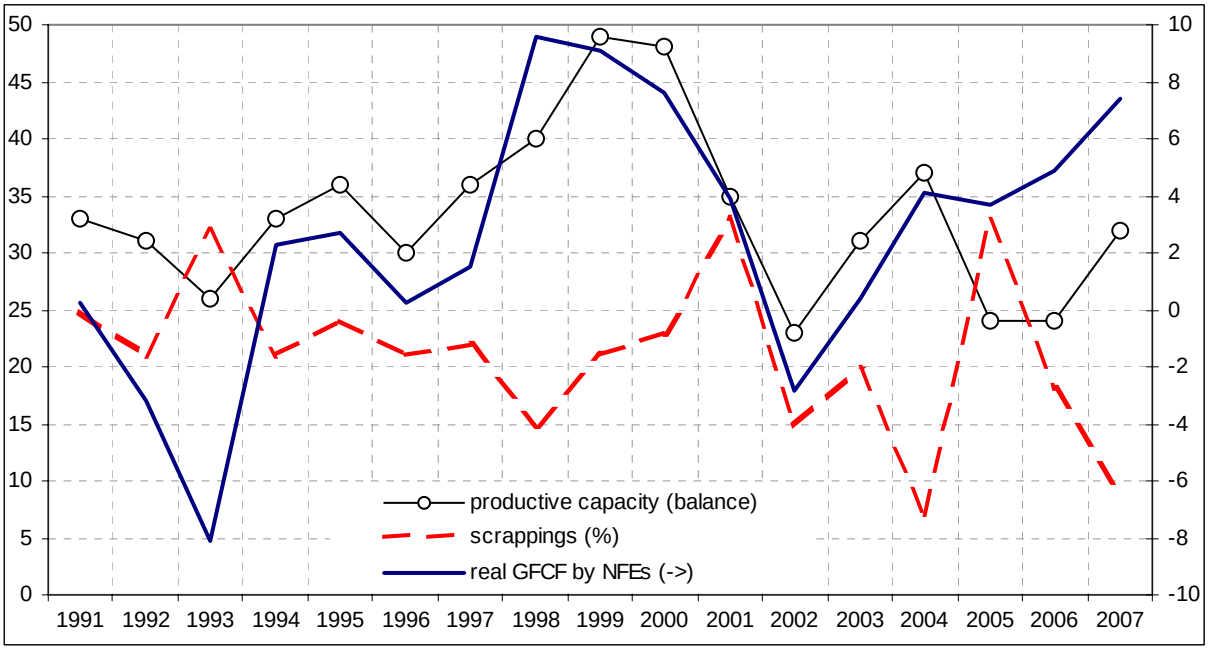
3.3.4. - Change in productive capacity and scrapping

For a given year N, firms are asked twice to indicate the change in productive capacity and their scrapping intentions: in April of the current year (forecast) and April of the following year (outcome).

Change in productive capacity is summarised by a balance of opinion. For scrapping, the indicator chosen is the share of enterprises that are planning to retire equipment (*see* Chart 7).

The balance of opinion on the change in productive capacity seems fairly well correlated with GFCF growth.

Chart 7:
Change in productive capacity and scrapping in April of following year



Sources: Investment Survey; INSEE

3.4. - Dissemination of Survey results

3.4.1. - Informations Rapides

Towards the 15th of the month after the Survey, the main results are published in INSEE's *Informations Rapides* series. The publication is very widely distributed, in particular to economic journalists (*see* Appendix 3 for a sample issue of *Informations Rapides*).

3.4.2. - Website: BDM and other information available

The medium of choice for disseminating the Investment Survey is the INSEE website[17]. From the home page, visitors can click on "*Thèmes*" ["Topics"], "*Conjoncture*" ["Economic outlook"] then on "*Indicateurs de*

[17] http://www.insee.fr/.

conjoncture" ["Economic indicators"], which will take them to the issues of *Informations Rapides*, including the latest publication on the Quarterly Survey on Industrial Investment.

The main Investment-Survey results are made available in our Macroeconomic Database (Banque de Données Macro-économiques: BDM). The BDM is the prime vehicle for public release of long-term series for the Survey.

The oldest series are available from 1973. Currently, 335 series in the Quarterly Survey on Industrial Investment are accessible in the BDM. They comprise 330 annual series, 4 six-month series, and 1 quarterly series.

The series are accessed from the INSEE website[18] by following one of the three menus:

- theme ▸ business survey ▸ industrial investment
- producer organisation ▸ INSEE ▸ Department of Short-Term Economic Analysis ▸ Business Survey on Industrial Investment (using NAF classification)
- direct retrieval: the visitor must enter the identification number for the requested series[19].

3.4.3. - Data transmitted to the European Commission

INSEE's Quarterly Survey on Industrial Investment forms part of the Harmonised European Programme of Business and Consumer Surveys. The results are sent to the European Commission (EC), which disseminates them as information about France in its publications. The French Survey results are also aggregated with those of other European Union (EU) Member States in order to determine figures for the euro zone and the EU27.

The EC dissemination medium for the harmonised surveys is *European Economy: Business and Consumer Survey Results*, available on the EC website in English only.

Each month, the EC publishes the main results of business and consumer surveys in the 27 EU Member States by country and for the entire EU and the euro zone. The "France" lines give the results of INSEE business and consumer surveys under the NACE classification.

The EC collects only two waves of the Quarterly Survey on Industrial Investment: April and October. The EC disseminates the results on its website[20] through four Excel files:

- investment plans_volume: real annual change in investment in April and November. The EC calculates the capital-goods deflator. The resulting real growth rate is supplied at all-industry level only.
- investment plans_value: nominal annual change in investment in April and November using the EC's specific groupings: NACE for activity and SIZ for size (*see* §1).
- investment structure: percentage breakdown of investment by purpose (replacement, extension, streamlining, other purposes) using the same groupings.
- investment factors: shares of factors in investment decision (demand, terms of finance, technical factors, other) using the same groupings.

3.4.4. - Feeding the CITRUS register

CITRUS is an information system on corporate restructuring. It is fed by legal sources (*Bulletin des Annonces Légales Obligatoires* [BALO], *Bulletin Officiel des Annonces Civiles et Commerciales* [BOACC]) and statistical sources such as Annual Enterprise Surveys, the Revenues, Expenses, and Assets Survey, and SIRENE (French business register).

Every quarter, INSEE forwards to the CITRUS register the list of enterprises reporting a structural change—such as a takeover or spinoff—in the common core of the Investment Survey questionnaire (*see* §1.2.3.1).

[18] At the following address: http://www.bdm.insee.fr/bdm2/do/accueil/AccueilAppli.
[19] See appendix 4 for the correspondence between *Informations Rapides* and the BDM.
[20] http://ec.europa.eu/economy_finance/db_indicators/db_indicators8650_in.htm.