

The National Bank of Belgium's new business survey indicator

I. De Greef
C. Van Nieuwenhuyze *

Introduction

The business survey indicator is one of the most valuable statistics, published each month by the National Bank of Belgium. It owes its reputation to the reliable way in which, for several decades, it has reflected cyclical movements in economic activity in Belgium. That reputation even extends far beyond the country's borders, as it is considered to be an accurate leading indicator of economic growth in the euro area. Every month, many analysts await with interest the publication of the Belgian business survey indicator, which is one of the first indicators on economic activity to be published in the euro area.

The indicator is compiled on the basis of the responses to the business survey which the Bank conducts each month among firms in Belgium. Although the survey was launched in 1954, it was not until 1972 that the results were published in the form of a synthetic business survey indicator, for the purpose of economic analysis. This methodology was revised in 1983 and in 1990.⁽¹⁾ It needs to be reconsidered periodically to maintain the indicator's quality. Thus, the changing nature of the economic environment or imperfections exposed by usage may necessitate an update. The Bank therefore considered it desirable to revise the 1990 methodology, which proved to be extremely robust.

This article describes the new method of calculating the business survey indicator, which took effect in April 2009. This revision gradually became necessary owing to the extension of the survey in 1994 to include the business-related services branch, the results of which had not hitherto been included in the business survey indicator. Moreover, in the recent past the indicator has exhibited some erratic short-term movements. The adjustments to the 1990 methodology were minor and concern only the calculation of the synthetic curves, by modifying the selection of questions included in the synthetic curves per branch of activity and by incorporating the services curve in the overall indicator. The aim of these changes was to strengthen the indicator's correlation with the growth of gross domestic product (GDP), to reduce its short-term erratic volatility and to preserve its quality as a leading indicator. The new indicator thus meets the requirements of the various users, and the time lag to publish the smoothed overall synthetic indicator has been cut from four months to two, with no loss of quality.

Before discussing the reform of the indicator, the article describes its general framework and, more broadly, that of the business surveys. Thus, section 1 describes the history, general methodology and scope of the surveys. On the basis of the experience gained during their use, it is possible to determine a series of quality criteria which a good economic indicator should satisfy. Those criteria formed the basis for this methodological revision which is recounted in detail in section 2. The final section of the article compares the profile presented by the new business survey indicator with that of the old one. The business cycle information in this article covers the period up to March 2009.

* The authors would like to thank Pierre Crevits, Luc Dresse and Jean-Paul Vonck for their valuable contribution.

(1) The original methodology and successive revisions were published in the NBB Economic Reviews dated October 1972, September 1983 and August-September 1990 respectively.

1. General framework

1.1 History of the business surveys and metadata

HISTORY

In 1954, Belgium became one of the first countries to conduct business surveys, following their introduction in the United States in the 1930s, and in West Germany in 1949.

Various professional federations, represented by the Federation of Enterprises in Belgium (FEB/VBO), had asked the Bank to organise this type of business survey to provide timely information on the economic situation to supplement the information based on quantitative data. The practical arrangements were determined in close collaboration with the various professional federations. With their knowledge of the business sectors and their close contact with business leaders, these federations provided valuable assistance in choosing the branches of activity and composing a representative sample of businesses.

From 1970 the number of participants increased steadily and the business surveys were extended to cover virtually all sub-branches of activity in manufacturing industry, trade and building. In 1994, the surveys were also extended to the service sector, with a survey of the hotel and restaurant branch and tourism sector being launched in 2004.

Although the surveys were launched in 1954, it was not until 1972 that their results were synthesised for the purpose of economic analysis in an overall business survey indicator. The methodology used to calculate this indicator was revised in 1983 and in 1990. From 1962 onwards, the surveys were harmonised by the European Union (EU). That harmonisation concerns the type of questions,⁽¹⁾ the possible responses, and the processing of the qualitative responses into a balance result per question, but not the methodology underlying the production of confidence indicators. However, on its own account, the European Commission (EC) calculates harmonised confidence indicators for the various countries on the basis of the data from the national surveys (EC, 2007).⁽²⁾

The Bank's indicator has gained an international reputation, beyond what might be expected from the size of the Belgian economy, since the publication of an article⁽³⁾ in *The Wall Street Journal* in 1999 stating that it is a good indicator of economic growth in the euro area. It is regularly included in the economic information analysed by the ECB Governing Council in its discussions on euro

area monetary policy. Moreover, it is often used by the economic organisations of the European Union.

METADATA

The quality of the Bank's business survey is largely due to the representativeness of the sample of participants. Thanks to close collaboration with the various professional associations, the survey now has just over 5,000 participants, representing between 22 and 33 p.c. of total turnover or employment in their sectors, a proportion which can be considered very satisfactory by international standards.

Furthermore, the Bank's survey is very detailed in terms of the questions asked, and especially from the point of view of the branches of activity polled. Thus, summary indicators – known as synthetic curves – are produced not only for the four main branches of activity but also for 88 sub-branches. Every month the survey can count on a very high response rate, over 90 p.c., encouraged by sending the participants detailed results for the branch in which they operate: that information is valuable to them. Other factors which foster this high response rate are the simple wording of the questions, geared to the firms' activities, and a qualitative response format not requiring any onerous research.

1.2 Objective and methodology

1.2.1 Objective: a mirror of economic activity

The business surveys aim to collect qualitative information providing a picture of the business cycle.

On the basis of the definition offered by Burns and Mitchell (1946): *"Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic"*, the business cycle can be described as a more or less regular, recurrent fluctuation affecting macroeconomic variables. However, that definition is open to interpretation.

(1) However, the Member States are free to add extra questions to the survey.

(2) These indicators are deemed to permit international comparison. They are calculated by the European Commission services (DG-ECFIN) and made available on their websites at the end of the month, that is 5 to 10 days after the national institutions have published their own confidence indicators.

(3) The Wall Street Journal (1999), *Euroland discovers a surprise indicator: Belgian confidence*.

TABLE 1 BUSINESS SURVEY METADATA
(2006)

	Manufacturing industry	Trade	Building	Business-related services
Launch year	1954	1954	1956	1994
Population ⁽¹⁾	22,936	33,100	29,831	27,888
Sample ⁽²⁾	1,950	1,300	1,050	1,100
Sample coverage rate (p.c.) ⁽³⁾	33	23	22	28
Response rate (p.c.)	96	94	96	90
Number of questions ⁽⁴⁾	13	10	13	12
Number of sub-branches of activity ⁽⁵⁾	60	15	8	5

Source: NBB.

(1) Number of enterprises filing annual accounts according to the Central Balance Sheet Office.

(2) Number of enterprises participating in the monthly business survey.

(3) As a percentage of the sector's turnover (manufacturing industry, trade) or employment (building, business-related services).

(4) Total number of questions in the monthly survey.

(5) Number of sub-branches of activity for which a synthetic curve is calculated.

Thus, the term *"many economic activities"* is deliberately vague in order to stress the fact that it concerns a movement common to a large number of variables (output, employment, consumption, prices, interest rates, etc.). In practice, the business cycle is measured by a small number of variables or a carefully chosen reference variable, such as gross domestic product, which offers an exhaustive and reliable synthesis of economic fluctuations.

The distinction between classic cycles and growth cycles is also important. The Burns and Mitchell definition originally concerned variations in the level of economic activity (classic cycles). That interpretation is still used by the National Bureau of Economic Research (NBER) in the United States. Since absolute falls in the level of output have become less common in the post-war years, the emphasis has tended to be on growth cycles. These are the oscillations in economic activity around a trend. There are techniques which can be used to extract the trend from a series, permitting a breakdown between trend and cycle, but they do have their drawbacks. In practice, therefore, the analysis is often confined to variations in the growth rate of economic activity (also called the growth cycle or growth rate cycle).⁽¹⁾

A third discussion point is the duration of a cycle. Although it is certainly not fixed, and differs from one episode to another, the duration of growth cycles is assumed to be between 1.5 and 8 years,⁽²⁾ so that all other movements must be regarded as short-term fluctuations (seasonal variations and irregular factors) and long-term changes. Nonetheless, in view of the complexity of

using methods which can separate these various sources of fluctuations, the business cycle is often represented in practice by year-on-year GDP growth, where seasonal fluctuations are largely eliminated and the irregular component is contained, and therefore is largely determined by cyclical variations.

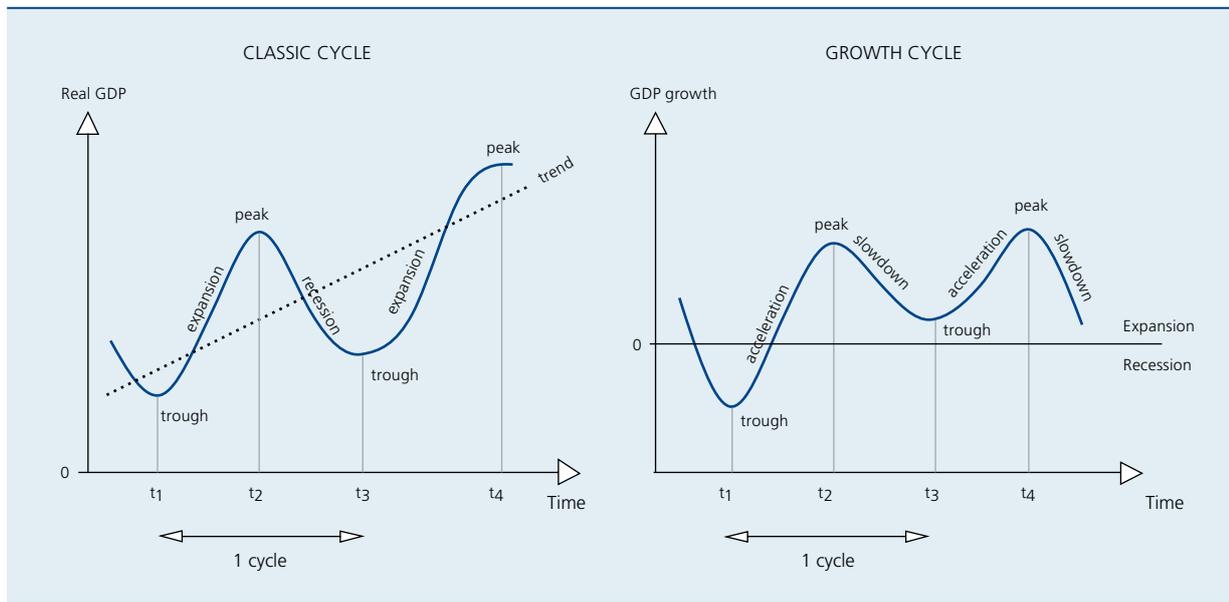
Just as there is no absolute consensus on the concept of the business cycle, given the specific character of each business cycle there, is also no complete explanatory theory, and the business cycle remains primarily an empirical datum (*"measurement without theory"*, Koopmans, 1947).

Exogenous factors, such as wars, climatic phenomena, political factors, oil prices, etc., may do service as theoretical explanations. Numerous economic theories tend to be built around the importance of endogenous factors and mechanisms to explain fluctuations in economic activity, such as changes in the money supply, lending (monetary theories), spontaneous investment dynamism, known as *"animal spirits"*, and the accelerator-multiplier principle (Keynesian theories) of the rate of technological progress, preferences and tastes (neo-classical theories such as the real business cycle theory), rational expectations

(1) Mintz (1969) compared the growth rate of numerous economic series and their deviation from their trend, and concluded that the cycles obtained were not fundamentally different from one another. For that reason, and as use of the growth rate can be seen as a simple way of eliminating the trend, both are called growth cycle methods.

(2) Cf., for example, Baxter and King (1999), King and Plosser (1994), Stock and Watson (1998) and Christiano and Fitzgerald (2003). In this connection it must be stressed that Burns and Mitchell already mentioned a minimum period (16-22 months) and a maximum period (100-106 months) while indicating that this period could vary over time. However, the conclusion of Burns and Mitchell was only valid for the duration of classic cycles, which are generally longer and less symmetrical.

CHART 1 DIAGRAM OF THE BUSINESS CYCLE



Source : NBB.

(neo-classical theories) or market imperfections (neo-Keynesian theories). Less well-known theories place the emphasis on psychological factors, access to information, etc.

1.2.2 From the business survey to the business survey indicator: general methodology

The Bank's business survey aims to offer a picture of the business cycle by asking business leaders specific questions on, for example, the rate of production, employment, stocks, etc., for a particular product.⁽¹⁾ The questions, which are listed in Annex 1, can be divided into three categories:

- questions about recent developments;
- questions about the opinions of business leaders;
- questions about the outlook.

In most cases, the respondent can choose from three possible responses corresponding respectively to an improvement; stabilisation or a deterioration in the economic situation. The responses received are therefore qualitative.

(1) A firm may therefore be sent several survey forms. Given the very detailed level available in the surveys, the term 'product' is used rather than branch of activity for the most detailed results.

(2) This general scheme is also used by other institutions producing confidence indicators such as the IFO or the EC. However, within this general framework each institution makes specific choices so that the methodologies are far from being harmonised.

Apart from these qualitative responses, quantitative data may be obtained in some cases, such as the number of months for which activity is assured in manufacturing industry and building.

The qualitative data form the basis of the business survey indicator. It is important to note that, although the indicator is also referred to as the "business confidence indicator", that 'confidence' is based mainly on real economic developments (movement in orders, demand, etc.). The construction of the Bank's business survey indicator can be subdivided into four stages (cf. also Annex 2).⁽²⁾

In phase 1, for each question relating to a given sub-branch of activity, simple qualitative data are converted into quantitative values; these are obtained by establishing the difference (balance) between the percentage of positive responses and the percentage of negative responses to a given question, while taking account of the firm's weight in its branch of activity, measured on the basis of turnover or employment.

In phase 2, all factors which might distort the cyclical information are eliminated. There are many complicated breakdown methods as well as straightforward seasonal adjustment. Up to now, the Bank has confined itself to conventional seasonal adjustment using the Census X-11 program.

In phase 3 the seasonally adjusted balances are aggregated into composite confidence indicators per branch of activity – “*synthetic curves*” or “*synthetic indicators*” in the Bank’s terminology – and finally into an overall composite indicator called the “*overall synthetic (business survey) curve*” or the “*business survey indicator*” for short. The respective aims of these indicators are to reflect the business cycle in the various branches of activity and in the economy as a whole. The process of aggregation may involve the use of weighted or unweighted averages, or complex methods, such as analysis into principal components. For simplicity and to avoid having to revise historical data every month, the Bank prefers to use averages (cf. box).

This is the step that was revised in April 2009. According to the 1990 methodology, the curves were calculated in the form of an average of all the questions except those concerning prices and impediments to production, and those added to the survey after 1985; in contrast, the new synthetic curves represent the average of a smaller number of questions. According to the 1990 methodology, the overall business indicator represented a weighted average of the synthetic curves of manufacturing industry, trade and building. Under the new methodology, the synthetic business-related services curve has also been included in that average.

The last phase concerns the final form that the result may take. There are various options here, which is one of the reasons why the indicators vary from one country to another. In Belgium, the result at the end of the third phase is not converted to an index but is presented in the form of a balance (“*gross indicator*”). In addition to this gross indicator, the Bank also publishes a “*smoothed indicator*”, intended to reflect the underlying business cycle trend in economic activity by eliminating extreme values in the gross indicator by means of a statistical smoothing method. That method was also revised in April 2009, though only for the overall indicator, and the time lag to publish the smoothed global indicator was cut from four months to two.

1.3 Use

In order to guarantee the quality of the business indicator, it is important to update the methodology periodically. To assess whether a methodological revision is necessary, it may be useful to consider applications of the business surveys and on that basis define some quality criteria which a good business indicator should satisfy. Those criteria held a central position in the preparation of the new methodology.

1.3.1 Advantages of business surveys as opposed to quantitative data

The widespread use of qualitative business indicators, including the one produced by the Bank, is due to their advantages over quantitative data.

Thanks to the simplicity of the qualitative questions and the calculations, the survey results become available quickly, namely – in Belgium’s case – about 10 days before the end of the month to which they relate. They are therefore the first source of information on activity relating to a given quarter. In Belgium, the other activity indicators, such as industrial output and foreign trade, are not complete until 55 and 75 days after the end of the quarter. Although the GDP figure is already published 30 days after the end of the quarter, a more detailed and accurate estimate is available only 70 and 120 days after the end of the quarter.

In contrast to GDP, the survey results are not subject to revisions, and they also have the advantage of being available on a monthly basis. In addition, they offer a broad view of economic trends, including the trend in employment and prices. Moreover, they comprise information on variables which are difficult or impossible to measure with the aid of quantitative data, such as expectations, the use of production capacity, etc.

Finally, the correlation between the business survey indicators and the quantitative reference variables is usually high, and in some cases the former give a purer signal, since their movement is less erratic because, for example, they are unaffected – or less affected – by strikes.

Unlike quantitative statistics, however, the business indicators have the disadvantage of not providing exhaustive coverage of all economic activities, and they are expressed as a rather intangible unit (points versus growth rates or euros). Moreover, it is their sole purpose to measure cyclical fluctuations in economic variables, so that they cannot be used to analyse structural relationships in an economy.

1.3.2 Scope of the business surveys

Much use is made of the business surveys for the purpose of analyses and economic reports aimed at monitoring business cycle developments. In addition, the survey results are also used to produce projections for given reference variables, such as GDP growth, often on the basis of charts but also of models. The information which they contain about the variables that cannot be measured by quantitative statistics also lends itself to specific macro-economic research. Furthermore, the surveys can be used

to estimate economic trends at a detailed level, e.g. by branch of activity or by region.

The business surveys are the key instrument for monitoring the economic situation in real time. Their findings indicate whether economic growth is accelerating or slowing down. The business surveys also permit early identification of turning points in the business cycle. That capability is due primarily to the fact that they are available sooner than quantitative data, but it is also due to their reliability, as illustrated, for example, by their close correlation with annual GDP growth, a correlation which stands at 0.8 in the case of the overall synthetic business survey indicator. The turning points are identified more easily and quickly than by using quantitative data, since the surveys usually display lower volatility, whereas the quantitative data are subject to measurement errors.

On the basis of developments concerning certain questions, the business surveys may also provide information on the causes and determinants of the business situation, such as a deterioration in the external environment which would essentially depress export orders.

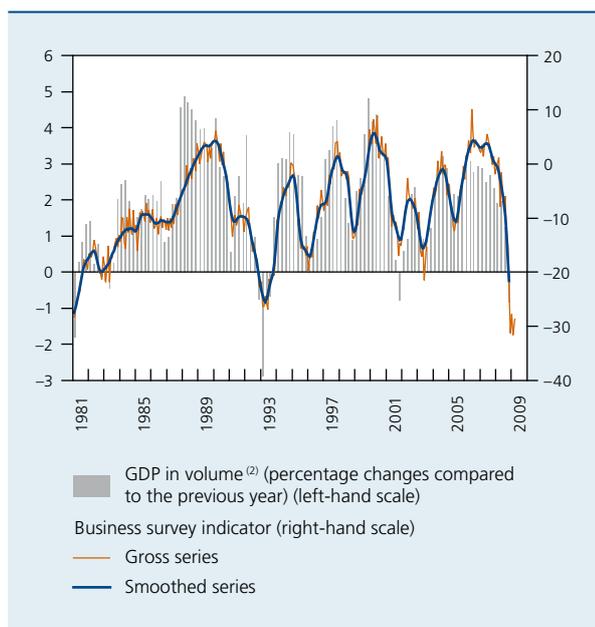
Given the importance of having access to indicators in good time to assess the economic situation, the survey results – which, owing to their publication date, already

have an advantage over quantitative data from the information angle – are studied in depth in order to construct indicators which anticipate the reference economic cycle. Owing to the international synchronisation of business cycles, that reference cycle may also be the cycle for neighbouring countries or the euro area, for example. Thus, the Bank's indicator anticipates the economic situation in the euro area ("leading indicator").⁽¹⁾ Conversely, at the national level, the overall indicator and most of the sub-indicators tend to coincide with one another and with the economic situation ("coincident indicator").

The survey results can also be used to produce projections for certain quantitative reference variables. The commonest application concerns short-term GDP growth forecasts (one to two quarters ahead), but the survey results may also prove useful for estimating the future development of certain variables, such as exports, consumption, etc. These estimates may be produced informally, on the basis of charts, or with models in which they are used individually (univariate regressions) or in combination with quantitative data (e.g. factor models). Compared to models using purely quantitative data, those based on the survey results tend to be better at prediction thanks to the link of the

(1) More specifically, the manufacturing industry confidence indicator has a "lead" over the manufacturing industry confidence indicator for the euro area as a whole (Vanhaelen et al., 2000 and Bodier et al., 2005). That lead emerged in 1993 and has since been confirmed to varying degrees. To explain that lead, reference is often made to the importance of exports for the Belgian economy and the fact that Belgian manufacturing industry specialises in semi-finished products.

CHART 2 OVERALL BUSINESS SURVEY INDICATOR ⁽¹⁾ AND GDP

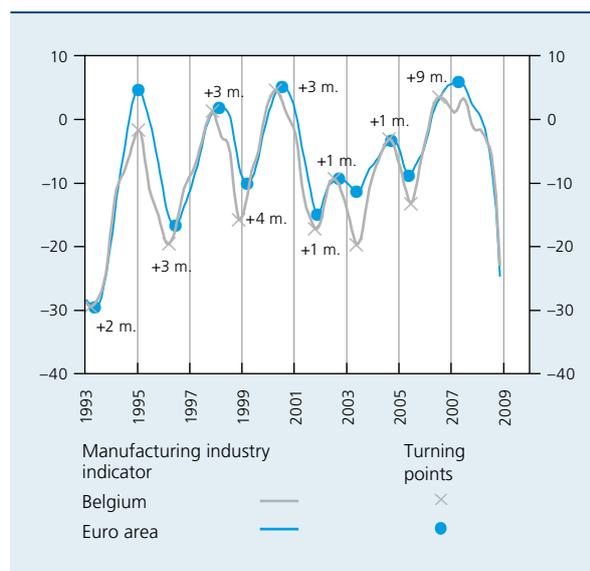


Sources: NAI, NBB.

(1) According to the old methodology (1990).

(2) Data adjusted for seasonal and calendar effects.

CHART 3 LEADING INDICATOR FOR THE EURO AREA ⁽¹⁾



Sources: EC, NBB.

(1) Cf. Vanhaelen et al. (NBB, 2000), NBB manufacturing industry indicator for Belgium based on the new calculation method (2009). To identify the turning points, the indicators were smoothed according to the NBB's smoothing method.

latter with the reference variables and their speedy availability.⁽¹⁾

The business surveys are also widely used because they supply information on variables which cannot be measured by means of quantitative statistics, such as expectations, the factors hampering production, and the capacity utilisation rate, etc. Various economic theories highlight the role of expectations in the business cycle. The importance of these factors and the difference between actual economic developments and expectations can be illustrated with the aid of the “business cycle clock”, which can identify several phases in a cycle. Thus, a typical business cycle can be viewed as a sequence of periods: a recovery, in which expectations are already picking up but the current situation does not yet show any progress, a boom, in which both expectations and the actual situation are improving, a slowdown, when expectations decline while the actual situation remains buoyant, and a recession, when both factors are weakening. Perceived inflation is another example of this kind of variable. Business surveys, in this case the consumer surveys, give an indication of perceived inflation by means of questions concerning prices. Perceived inflation as measured by the question in the consumer survey was found to deviate significantly from actual inflation in 2002-2003 (Aucremanne et al., 2007). The survey data are therefore a source of information on variables (inflation expectations) which may have a significant impact on other economic variables (e.g. via wage negotiations).

Finally, the survey details also provide valuable information for assessing the economic situation at regional and meso-economic level (the level of the branch of activity). That is particularly useful for business leaders wishing to gain an idea of the economic situation and the outlook for their branch of activity. It gives them a better basis for their decisions (investment, etc.) and for determining their relative position within their sector. For that purpose, quantitative data are often insufficient since they are usually lacking in detail and published after a considerable period of time. Access to this confidential information is a real incentive for business leaders to participate in the survey, and therefore plays a major role in the practical organisation of the survey.

1.4 Quality criteria

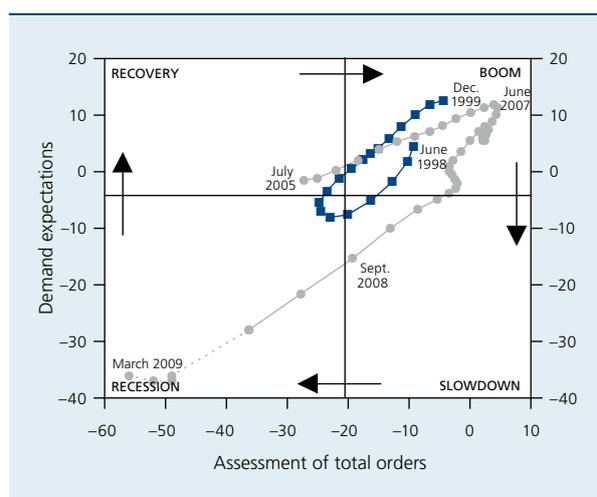
Since the survey results are used essentially to assess the economic situation and to produce a short-term GDP growth forecast, it is possible to define a number of statistical criteria which a good business indicator should preferably satisfy:

- a high correlation with annual GDP growth, which can be regarded as the reference cycle for the overall business survey indicator;
- a variation which is determined essentially by cyclical fluctuations (between 1.5 and 8 years) and therefore not by irregular factors or trend components;
- a high informative value, namely as a leading indicator.⁽²⁾

The first and third criteria can be calculated relatively easily using respectively the correlation and the cross-correlation between the indicator and GDP growth. The latter measures the correlation between these two variables, shifting one of them in time. If the cross-correlation reaches a maximum when the value of the indicator for a given period is compared with GDP growth of a later period, this means that the indicator anticipates the movement in GDP.

The second criterion can be measured via the smoothed indicator used by the Bank.⁽³⁾ That smoothed indicator in fact reflects the underlying business cycle trend

CHART 4 MANUFACTURING INDUSTRY BUSINESS CYCLE CLOCK⁽¹⁾



Source: NBB.

(1) The data points are based on the smoothed series relating to the questions “demand expectations” and “assessment of total orders” for manufacturing industry. The vertical and horizontal black lines represent the average values of these series since 1980. Since December 2008, the data points have been obtained by means of the gross series.

(1) Cf. in particular Barbur and Rünstler (2007). Owing to its ability to predict GDP growth, the Bank’s business survey indicator is also included in the explanatory variables of a number of models, such as the EuroSTING model for the euro area (Comacho and Perez-Quiros, 2008).

(2) However, a leading indicator will generally have a weaker correlation with GDP growth than a “coincident” indicator. Whether a business indicator should preferably be a leading indicator therefore depends on the purpose for which it is used. If what is needed is an indicator which has the optimum correlation with GDP growth and reflects the current situation, a coincident indicator is more useful. It should be noted that such an indicator may possibly have a lead over other reference variables (such as employment, or the economic situation abroad). Thus, the Bank’s indicator is coincident with Belgium’s annual GDP growth but has a lead over confidence indicators for the euro area.

(3) Centred weighted moving average of the centred moving median of the gross indicator over five months, with weights 1/8, 1/4, 1/4, 1/4, 1/8.

and is almost immune to the influence of short-term erratic movements, whereas such movements (known as the zigzag pattern) do appear in the gross indicator. The smoothed indicator is therefore less volatile than the gross indicator. A high ratio between the variance of the smoothed indicator and that of the gross indicator therefore reflects the fact that the latter displays relatively few short-term irregular fluctuations. By maximising that ratio it is therefore possible to limit the erratic volatility of the gross indicator.

This yardstick can be used to assess the gross indicator's undesirable short-term volatility. In contrast, direct consideration of the standard deviation or the variance of the gross indicator does not allow to identify whether the volatility is due to cyclical movements – which the indicator should properly reflect – or irregular variations which need to be minimised.

These statistical criteria held a central position in the assessment of the new business survey indicator. However, a multitude of other factors also have a role in the assessment of the quality of a business survey indicator, such as the indicator's track record, its simplicity (the indicator must be understood by a large number of diverse users), and the absence of monthly revisions of historical data.

2. The new business survey indicator

The methodological reform only concerns the calculation of the synthetic curves. The other methodological elements, such as seasonal adjustment or the presentation of the indicator in the form of a balance, are unchanged. The new methodology differs from the previous one in three respects:

- first, the composition of the synthetic curves is based on only a small number of questions, ranging from

- three to four depending on the branch of activity, whereas in the 1990 methodology all questions were included, except those concerning prices;
- second, the synthetic business-related services curve was incorporated in the overall indicator by revising the weights assigned to the branches of activity;
- third, taking account of the decline in the short-term volatility of the gross indicator following those revisions, it was possible to simplify the method of smoothing the overall indicator, cutting the time lag to publish the smoothed overall business indicator from four months to two.

The methodological changes are limited to avoid calling into question the principles underlying the previous revision. The 1990 methodology was based on simplicity and stability. The principle of simplicity was intended to ensure that the result would be comprehensible to a broad public, while the principle of stability indicated the preference for a result which does not need to be revised in the ensuing months, in contrast to what generally is the case with quantitative statistics. These two principles favoured the use of averages, weighted or not, for calculating the synthetic curves. More complicated methods, such as principal components analysis, have the disadvantage of being less readily understood and entail revisions of historical data. Moreover, in the case of the Bank's business survey, they do not produce better results than simple methods (cf. box).

By basing the calculation of the synthetic curves on a new and smaller selection of questions from the survey, and by incorporating business-related services in the synthetic business survey indicator, the aim was to improve the correlation between the business indicator and GDP growth, to reduce its erratic short-term volatility and to preserve its leading character. The new indicator thus meets the requirements stipulated by the various users.

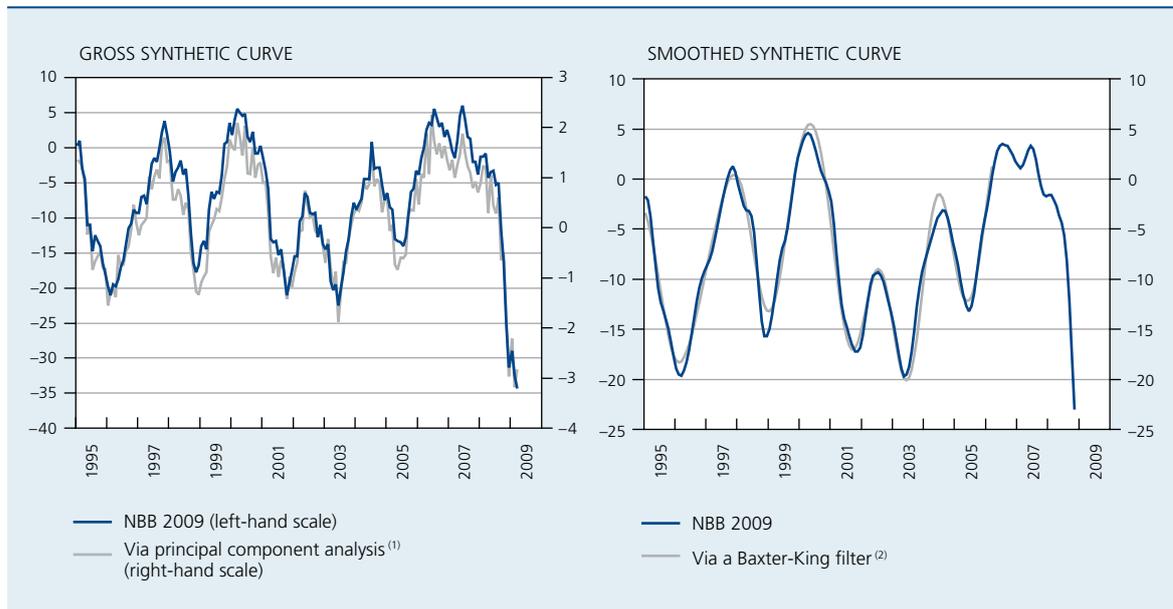
Box – Method of calculating business cycle indicators: simplicity versus complexity

With the present revision the Bank remains faithful to the most important principle governing the previous methodology, namely simplicity. That simplicity concerns both the calculation of the synthetic curves by using averages and the application of a statistical smoothing filter intended to reveal the underlying business cycle trend in the economy.

Various methods can be used for these two issues, such as principal component analysis, as an aggregation technique, or the Baxter-King filter (1999), as a breakdown method for extracting the cyclical component of the series.



MANUFACTURING INDUSTRY : METHODOLOGY USED BY THE NBB VERSUS COMPLEX METHODS



Source : NBB.

(1) Based on the first principal component of the 10 qualitative questions in the manufacturing industry survey, standardised data.

(2) Curve obtained by applying to the gross series a "low-pass" Baxter-King filter which removes frequencies lasting less than 18 months from the gross series. The Baxter-King filter is a constant symmetrical filter over 73 observations.

However, these more complicated methods have the disadvantage of entailing revision of the historical series data, since they are based on statistics, such as the standard deviation, the covariance matrices, etc. relating to a given reference period which has to be updated over time. Moreover, they do not make it easier for the general public to understand the results. These drawbacks should be viewed in the light of a possible improvement in quality which may result. In the case of the Bank's survey, analysis shows that these more complex methods do not improve on the results obtained by the new method of calculating the business survey indicator.

The principal components summarise the overall variance of the series in a small number of independent factors. The first factor generally explains a large part of the variance, and can be used as a business indicator. Applied to manufacturing industry, the analysis shows that the synthetic curve thus obtained is comparable to the one resulting from a simple average⁽¹⁾ of the selected questions. However, the principal component, which is based solely on the correlation patterns between the series, does not succeed in substantially reducing the short-term volatility, unlike the Bank's methodology.

Apart from the aggregation technique, the Bank uses a simple method to isolate cyclical fluctuations in the gross indicators by means of a statistical smoothing filter with constant parameters, resulting in the smoothed indicator. The latter largely corresponds to the result obtained by the Baxter-King filter which can completely eliminate short-term volatility (cf. Dresse and Van Nieuwenhuyze, 2008). However, this accurate breakdown by the Baxter-King filter has the inherent drawback that it is not available for the last three years of observations, while other similar methods, such as the Christiano-Fitzgerald filter (2003), involve revisions. The Bank's statistical smoothing method

(1) The reason may be that the principal components analysis is based on a small number of variables which are closely correlated, as is usual the case in the business survey. The European Commission's business climate indicator is a good example here. The profile of that indicator, which is based on a principal components analysis of the questions, is not fundamentally different from that of the manufacturing industry confidence indicator published by the European Commission, which is calculated as an average of the questions.



– which is not subject to revisions and for which the loss of observations has been cut from four to two months for the overall indicator – is therefore a simple and effective method of reflecting cyclical fluctuations and plays a role in the quality criteria set for the gross indicator under the current methodology.

These findings justify the Bank’s decision to retain a simple methodology while attempting, by means of an optimisation exercise,⁽¹⁾ to find the best composition of the synthetic curves and the business survey indicator in terms of the correlation with GDP growth, short-term volatility and leading behaviour.

(1) In Jonsson and Lindén (2009), a comparable optimisation technique is applied to the EC’s consumer confidence indicator. However, the only criterion which it considers is the correlation with GDP, and not the short-term volatility or the advance character of the indicator.

2.1 Revision of the gross indicator

2.1.1 Selection of the questions

While under the 1990 methodology the synthetic curves were based on all the questions, with the main exception of the questions on prices,⁽¹⁾ the new indicator is composed of a smaller number of questions.

The 1990 methodology aimed to give the broadest possible picture of the business survey results, but without paying attention to the movement of the final indicator and the information it provided for a reference variable such as GDP.

The new methodology opts for a different approach. It tries to improve the statistical properties of the indicator,

including the correlation with GDP growth, by selecting the questions that are included in the synthetic curves. For each branch of activity, the combination of questions selected is the one which yields the best results in regard to the three quality criteria adopted. The new synthetic curves of the branches of activity are thus calculated as the average of the following questions:

- for manufacturing industry: assessment of total order book, assessment of the level of stocks of finished products,⁽²⁾ employment expectations and demand expectations;
- for trade: demand expectations, intentions of placing orders and employment expectations;

(1) The curve also took no account of the questions added to the survey after 1985, or any questions for which no balance of responses can be obtained (e.g. factors hampering production or the number of months of assured activity).

(2) Taken into account with a negative sign in view of the negative correlation between this variable and the economic situation.

TABLE 2 SYNTHETIC CURVES: STATISTICAL PROPERTIES
(1996-2008)

	Correlation with GDP growth in Belgium ⁽¹⁾		Variance of the smoothed series / variance of the gross series ⁽²⁾		Lead (+) or lag (-) in relation to GDP growth in Belgium ⁽³⁾	
	Old	New	Old	New	Old	New
Manufacturing industry	0.83	0.83	0.79	0.89	0	0
Trade	0.53	0.57	0.68	0.79	0	0
Building	0.61	0.67	0.86	0.90	-1	0
Business-related services	0.72	0.72	0.88	0.93	0	0
Overall business survey indicator	0.82	0.84	0.83	0.91	0	0

Source: NBB.

(1) Coefficient of correlation between the level of the gross series and year-on-year GDP growth (quarterly data).

(2) Ratio between the variance of the smoothed series and that of the gross series. The higher this ratio, the lower the short-term volatility of the gross series.

(3) Number of months by which the gross series leads (+) or lags (-) year-on-year GDP growth. Determined by the moment when the cross-correlation between the indicator and year-on-year GDP growth reaches a maximum (monthly GDP growth figures obtained by linear interpolation).

- for building: trend in orders, trend in equipment, assessment of order book and demand expectations;
- for business-related services:⁽¹⁾ assessment of activity, activity expectations and general demand expectations.

For each of the four main branches of activity, the new selection of questions improves the performance of the synthetic business indicator in regard to three quality criteria. Compared to the old synthetic curves:

- the correlation with GDP growth is slightly higher in building and trade, and unchanged in manufacturing industry and business-related services;
- short-term volatility is considerably lower since the variance of the gross curve is much closer to that of the smoothed curve; this applies mainly in manufacturing industry and trade;

(1) For the business-related services branch, a weighting of individual responses is now also applied when calculating the balance of responses for each question, as was already done in the case of the other branches of activity.

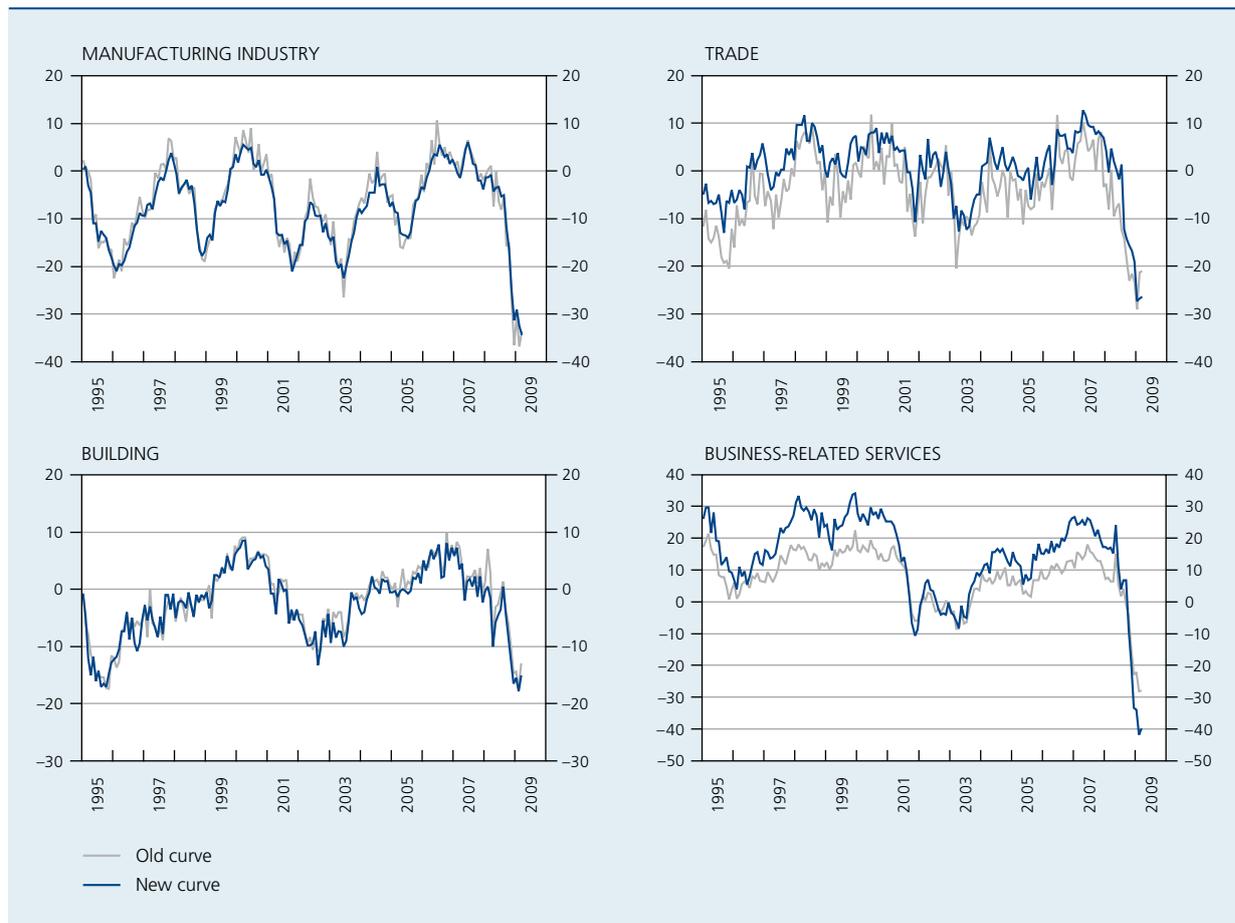
- the lead in relation to GDP growth has remained practically unchanged and even increased slightly in the building industry.

These combinations are stable over time in that, in regard to the three quality criteria adopted, their results improve on, or at least equal, those obtained by the old methodology regardless of the sub-period considered.

The main improvement resulting from the selection of questions is the marked reduction in the short-term volatility of the synthetic curve, primarily in manufacturing industry and trade. In these branches of activity, the erratic movements which sometimes used to make it difficult to interpret the gross indicator, especially around turning points in the cycle, have been largely eliminated.

The short-term volatility of the business-related services indicator has also been reduced. Conversely, the overall volatility of the indicator has increased. However, such an

CHART 5 NEW AND OLD GROSS SYNTHETIC CURVES PER BRANCH OF ACTIVITY



Source : NBB.

increase is desirable since the overall indicator reflects to a greater extent than in the past the cyclical movements seen in the service sector.

Conversely, the improvement in terms of the correlation with GDP growth and the leading character is less marked, possibly because the various questions in the business survey present a fairly similar profile in terms of correlation with GDP growth. On the other hand, they produce different results in regard to short-term volatility.

2.1.2 Inclusion of services

The second part of the reform concerns the inclusion of the service sector in the overall business indicator. Although the survey was extended to business-related services in 1994, the results were not previously included in the overall indicator, mainly because the time series was too short. On the one hand, it is vital to have a sufficiently long series so that the statistical properties can be determined with a satisfactory degree of certainty. It is also important for the business indicator to be based on a sufficiently long history in order to be able to compare the current business cycle with previous cycles. That argument is less important now that observations are available for the past fifteen years.

It also seemed desirable from an analytical point of view to include services, as the indicator would give a more general and complete picture of economic activity, no longer being confined to manufacturing industry, trade and building. In addition, the services indicator has some favourable statistical properties such as a relatively high correlation and low short-term volatility, which could improve the performance of the overall business survey indicator measured on the basis of the three quality criteria applied.

Since the business survey indicator is calculated as a weighted average of the various sub-branches, if services are to be included, they have to be accorded a weighting

coefficient, and the weightings of the other branches of activity have to be revised. Like the selection of questions, the weightings chosen are the ones which result in the business barometer which performs best in terms of the three criteria. While the old indicator was a weighted average of the synthetic curve for manufacturing industry (70 p.c.), trade (15 p.c.) and building (15 p.c.), the weightings were revised and are now 65 p.c. for manufacturing industry, 15 p.c. for building, 5 p.c. for trade and 15 p.c. for services.

The weightings of the branches of activity differ from their relative weight in the value added of the Belgian economy. The high weighting accorded to industry in the indicator is due to the notable statistical properties of its synthetic curve in terms of the correlation with GDP growth and its leading character. Conversely, trade has a relatively low weighting, as it scores less well in regard to the three quality criteria applied.

2.1.3 Gross indicator results

The two methodological adjustments mentioned lead to the emergence of a new overall gross business survey indicator. According to the three quality criteria applied, the new indicator performs better than the old one, even though their profile is visually similar.

The main advantage of the new indicator lies in the reduction of the erratic movements (the zigzag pattern) in the gross indicator. The variance of the gross curve is now closer to that of the smoothed curve, which is itself determined mainly by cyclical variations. The new indicator also has a slightly higher correlation with GDP growth than the previous indicator. The lead is unchanged in that the new indicator, like the old one, moves in parallel with GDP growth in Belgium.

Apart from the measurable statistical advantages, the new indicator includes services, providing the user with a more coherent and complete picture of the economy. The first

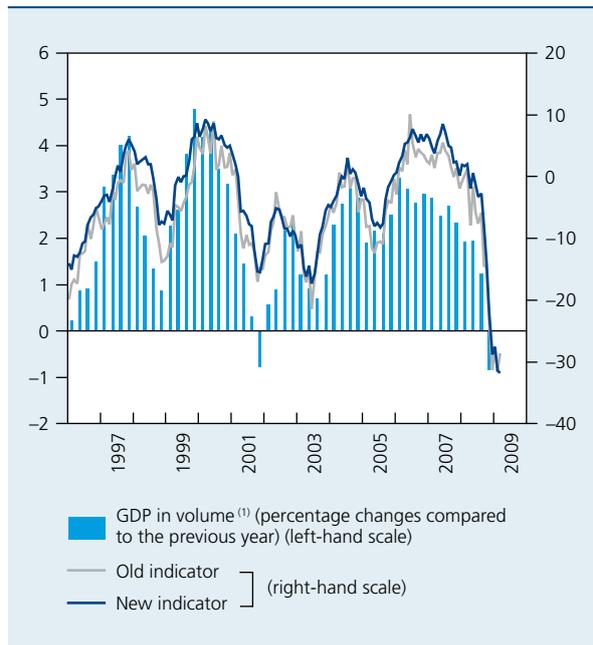
TABLE 3 WEIGHTS APPLIED TO THE BRANCHES OF ACTIVITY WHEN CALCULATING THE OVERALL BUSINESS SURVEY INDICATOR (percentages)

	Manufacturing industry	Trade	Building	Business-related services
Old indicator	70	15	15	0
New indicator	65	5	15	15
<i>p.m. Value added</i> ⁽¹⁾	31	24	9	36

Sources: NAI, NBB.

(1) Share of each branch in the total value added of the branches covered by the survey, data for 2007.

CHART 6 NEW AND OLD OVERALL GROSS BUSINESS SURVEY INDICATOR AND GDP



Sources: NAI, NBB.
(1) Data adjusted for seasonal and calendar effects.

reliable results obtained from the business-related services survey date from January 1995, so the new indicator does not begin until 1995. To remedy this drawback, however, the new series was extended to cover the period from 1980 to 1995 on the basis of the new methodology in terms of questions, but using the old weighting structure. Thus, the business survey indicator and the synthetic curves for manufacturing industry, trade and building are available in their new composition⁽¹⁾ from 1980 onwards.

2.2 Revision of the smoothed indicator

The reduction in the volatility of the gross indicator has direct consequences for the smoothed indicator. Introduced in the 1990 methodology, the latter was obtained by applying to the gross indicator a statistical smoothing filter, and was intended to reflect the “underlying” business cycle trend in the economy. In view of the high volatility of the gross indicator, a fairly powerful double symmetrical filter was chosen at the time, covering five observations on each occasion. Although this method efficiently eliminated the volatility from the gross

(1) Between 1980 and 1985, however, the synthetic curve for trade was based on two questions, since the question on the “employment expectations” was not included in the survey until after 1985.

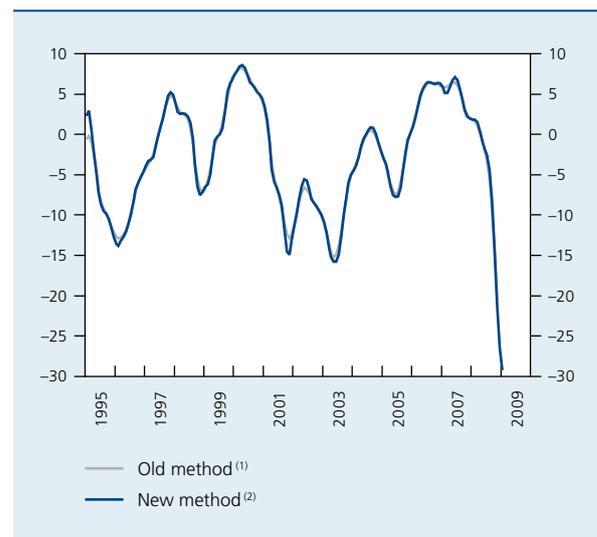
indicator without resulting in revisions, the disadvantage of the smoothed curve was that it only became available after four months. However, owing to the lower volatility of the gross indicator, it is possible to use a less powerful smoothing filter so that the delay in publishing the smoothed curve has been cut from four months to two without any significant loss of quality.

Thus, the methodology of the smoothed overall indicator was revised, and the indicator is now obtained on completion of the following two steps:

- (i) calculation of the centred moving median over three months of the gross series;
- (ii) calculation of the centred weighted moving average over three observations of the obtained series, with the weightings 1/4, 1/2, 1/4.

In fact, the smoothed curves obtained by applying the old and new smoothing method to the new gross indicator are virtually identical. The less powerful smoothing does not seem to give rise to the appearance of new cycles, and the amplitude and turning points of the cycles are practically unchanged. The differences vis-à-vis the previous smoothing method, be it in terms of scale or bias in relation to the actual situation, appear to be minimal compared to the advantage of reducing the delay in publication.

CHART 7 NEW AND OLD METHOD OF SMOOTHING APPLIED TO THE NEW GROSS OVERALL BUSINESS SURVEY INDICATOR



Source: NBB.

- (1) The old smoothing method is based on calculation of the five-month centred weighted moving average of the five-month centred moving median of the gross series, with the weightings 1/8, 1/4, 1/4, 1/4, 1/8.
- (2) The new smoothing method is based on calculation of the three-month centred weighted moving average of the three-month centred moving median of the gross series, with the weightings 1/4, 1/2, 1/4.

As the volatility of the gross indicator is higher at the level of the branches of activity and the individual questions than at the level of the economy as a whole, the old smoothing filter has been retained for the purpose of calculating the synthetic curves for the branches of activity and the questions. The new method would in fact increase the number of turning points and hence the number of cycles, and would introduce erratic movements into the smoothed curves for the various branches of activity.

The old method was therefore retained to calculate the smoothed series of the various sub-branches and questions. Remember: that method comprises the following two steps:

- (i) calculation of the centred moving median over five months of the gross series;
- (ii) calculation of the centred weighted moving average over five observations of that series, with the weightings 1/8, 1/4, 1/4, 1/4, 1/8.

The smoothed series relating to the various branches of activity and questions will therefore still be published with a four-month delay. However, that does not cause any particular aggregation problem since the smoothed indicator for the economy as a whole is not calculated in the form of an average of the smoothed curves of the sub-branches, but by applying the smoothing filter to the overall gross indicator.

(1) Number of cases since 1995 for which the sign of the month-on-month change in the gross indicator corresponds to that of the month-on-month change in the smoothed indicator for a particular month.

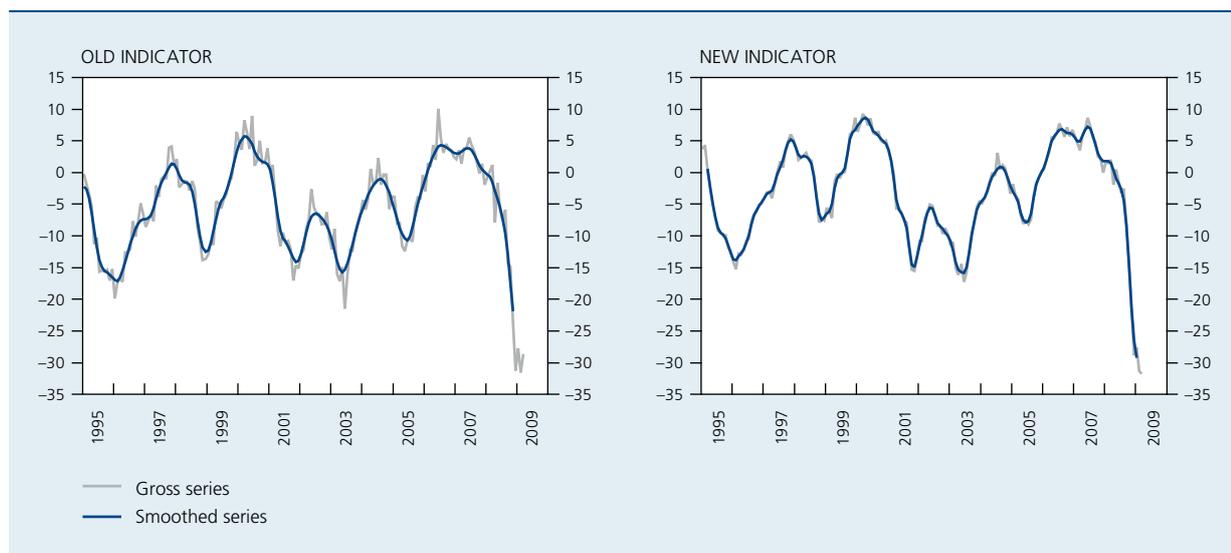
3. Characteristics of the new business survey indicator

The methodological changes have improved the performance of the business survey indicator: thus, short-term volatility is noticeably lower, the correlation with GDP growth is slightly higher and the leading character is unchanged. The lower volatility has made it possible for the delay in publication of the smoothed indicator – which reflects the underlying business cycle trend – to be cut from four months to two.

At first sight, the new business survey indicator is very similar to the old one, since the correlation between the two series is 0.96. Nevertheless, the methodological adjustments made have a significant influence on the monthly fluctuations in the gross indicator. Thus, in 28 p.c. of cases the monthly variations in the new indicator have a different sign from those in the old indicator. The important point here is that the erratic short-term volatility, or zigzag pattern, of the gross indicator has been largely eliminated. The month-on-month movements in the gross indicator are therefore much more a reflection of the business cycle trend: while the gross indicator used to give an accurate business cycle signal in 61 p.c. of cases, that figure has risen to 76 p.c. with the new indicator.⁽¹⁾

This improvement is perceptible over the entire period. Thus, the wide fluctuations seen around the turning points, e.g. in 2000 and 2006, are considerably smaller. Moreover, the phases in the cycle, be they upward as

CHART 8 COMPARISON BETWEEN THE OLD AND NEW BUSINESS SURVEY INDICATOR



Source : NBB.

in 2005, or downward as in 2000, are much smoother. That is also true for the most recent period. The new indicator shows a much more marked downward trend which is less frequently interrupted by rises. In March 2009 the new indicator reached an absolute low point.

The close link between the new business survey indicator and GDP growth can be demonstrated not only by the correlation coefficient but also via a regression. The simplest classic ordinary least squares (OLS) regression thus links annual GDP growth to the new business survey indicator. The equation, calculated on a quarterly basis between the first quarter of 1996 and the 4th quarter of 2008, is as follows:

$$\text{Year-on-year GDP growth} = 2.5 + 0.15 \times \text{indicator}$$

(25.2) (10.9) (t-values)

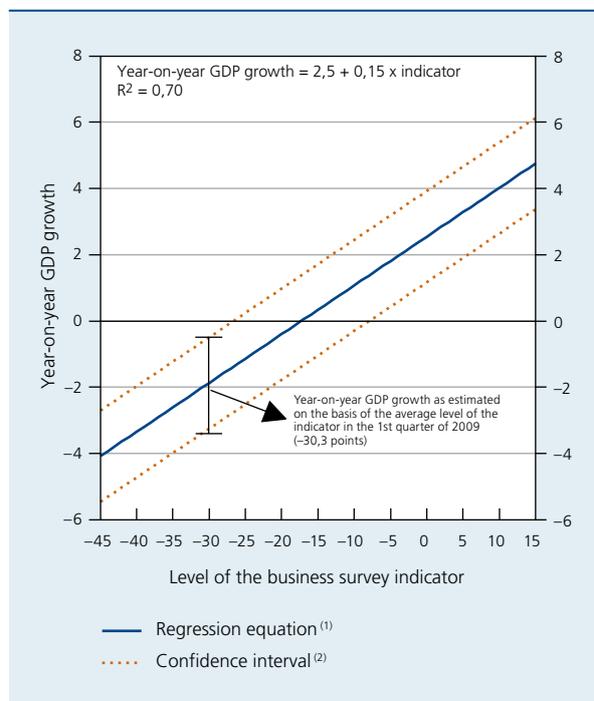
The coefficients are statistically very significant (t-value > 1.96) and the explanatory power of the regression is 70 p.c., which is very high.⁽¹⁾

The regression equation obtained allows to link the level of the gross indicator with a value for year-on-year GDP growth. However, the regression may vary over time and is subject to a margin of error, reflected by the confidence interval. The latter represents the interval which, on the basis of historical data, is 95 p.c. likely to contain the year-on-year GDP growth for a given level of the business indicator.

The regression can thus be used as a guide for converting a given level of the business survey indicator into a year-on-year GDP growth. It should be stressed that a value close to -5 corresponds to a "normal" GDP growth of around 2 p.c. The average level of the indicator in the 1st quarter of 2009 (-30.3 points) translates into a year-on-year GDP growth in that quarter of between -0.5 and -3.3 p.c., with 1.9 p.c. as the central value.

As well as assessing the economic situation via the business survey indicator, it can be useful to analyse the signals given out by individual questions in the survey, e.g. about the trend in export orders or the turnover figure. Although these questions are no longer included in the composition of the business indicator, they still appear in the monthly press release. Some questions may have a lead over others, although this lead is likely not to be stable over time. Thus, during the recent period the business survey questions relating to the demand outlook, which are included in the new synthetic curves, gave an accurate, advance signal regarding the business cycle stance (NBB, 2009).

CHART 9 REGRESSION EQUATION OF YEAR-ON-YEAR GDP GROWTH ON THE LEVEL OF THE BUSINESS SURVEY INDICATOR



Sources: NAI, NBB.

- (1) Regression of year-on-year GDP growth on the level of the business survey indicator and a constant (quarterly observations, 1996 Q1 - 2008 Q4).
- (2) Determined by the estimate \pm twice the standard error. The confidence interval reflects the interval which, on the basis of historical data, is 95 p.c. likely to contain the year-on-year GDP growth for a given level of the business indicator.

Conclusion

The business survey indicator is one of the most valuable statistics, published each month by the Bank. It owes its reputation to the reliable way in which, for several decades, it has reflected cyclical movements in economic activity in Belgium. That reputation even extends far beyond the country's borders, as it is considered to be an accurate leading indicator of economic growth in the euro area.

Although the survey was launched in 1954, it was not until 1972 that the results were published in the form of a synthetic business survey indicator. The Bank's survey covers a representative sample of participants and provides detailed information at the level of the branches of activity: those factors are part of the reason for the

(1) However, the residuals show some autocorrelation, caused by the simplicity of the specification used here, by way of illustration. That autocorrelation can be avoided by introducing, for example, a delayed value for year-on-year GDP growth into the regression.

success of the business survey indicator. The indicator also owes its popularity to the fact that it is based on qualitative data, such as the reporting of an increase, stabilisation or a decline in orders, which means that it is available quickly, in contrast to quantitative data. Finally, the success of the business survey indicator is also due to its methodology, which makes it possible to summarise the information obtained from the survey in a single figure.

To safeguard the quality of the business indicator, the method of calculating it has been revised several times, most recently in 1990. The Bank considered that it was now time to undertake a new methodological reform. That reform gradually became necessary owing to the 1994 extension of the survey to the business-related services branch, the results of which were not previously included in the business survey indicator. Moreover, in the recent past the indicator has exhibited some erratic short-term fluctuations. The present reform aims to improve the indicator's performance in terms of correlation with GDP growth, short-term volatility and lead, while paying particular attention to the substantial weight of services in the Belgian economy. Thus, the indicator could provide an even broader picture of economic activity.

The methodological changes were minor and concern only the calculation of the synthetic curves per branch of activity and the overall business survey indicator, by

calculating the synthetic curves as the average of a smaller number of questions and by incorporating the services curve in the overall indicator.

These methodological adjustments have improved the business survey indicator's performance: thus, the correlation with GDP growth is slightly higher, the leading character is preserved and the erratic short-term volatility is significantly lower. The month-on-month fluctuations in the gross indicator are therefore much more a reflection of the business cycle trend: while the gross indicator used to give a business cycle signal which was correct in 61 p.c. of cases, that figure has risen to 76 p.c. with the new indicator.

The reduction in the short-term volatility of the gross indicator meant that the method of smoothing the overall indicator could be simplified, cutting from four months to two the delay in publishing the smoothed overall synthetic indicator which reflects the underlying business cycle trend. This has increased its relevance.

Finally, it must be said that the business survey indicator's performance can only be improved on the basis of statistical properties, which necessarily relate to a particular observation period. Those properties may be impaired, particularly as a result of structural changes affecting the economy, so that this methodology too will need to be reconsidered periodically.

Annex 1

QUESTIONS INCLUDED IN THE MONTHLY BUSINESS SURVEY: STATISTICAL PROPERTIES

(1996-2008)

	Correlation with GDP growth in Belgium ⁽¹⁾	Variance of the smoothed series / variance of the gross series ⁽²⁾	Lead (+) or lag (-) in relation to GDP growth in Belgium ⁽³⁾	Composition of the old business survey indicator	Composition of the new business survey indicator
Manufacturing industry					
Trend in the production rate	0.79	0.53	0	X	
Trend in orders from the domestic market	0.75	0.54	0	X	
Trend in export orders	0.77	0.57	1	X	
Trend in prices	0.61	0.76	-2		
Assessment of total order book	0.73	0.90	-1	X	X
Assessment of export order book	0.76	0.85	-1	X	
Assessment of the level of stocks of finished products	-0.45	0.79	2	X	X
Employment expectations	0.76	0.87	0	X	X
Demand expectations	0.85	0.83	1	X	X
Price expectations	0.68	0.82	-1		
Trade					
Trend in sales	0.29	0.32	-2	X	
Trend in prices	0.18	0.63	-5		
Assessment of sales	0.41	0.56	-2	X	
Assessment of the level of stocks	-0.29	0.57	0	X	
Demand expectations	0.52	0.71	0	X	X
Intentions of placing orders ⁽⁴⁾	0.59	0.74	0	X	X
Employment expectations ⁽⁵⁾	0.32	0.65	-3		X
Price expectations	0.21	0.70	-3		
Building					
Trend in activity	0.43	0.27	0	X	
Trend in orders	0.66	0.68	0	X	X
Trend in equipment	0.32	0.62	-8	X	X
Trend in employment	0.39	0.53	-5	X	
Trend in prices	0.37	0.93	-6		
Assessment of order book	0.36	0.94	-4	X	X
Employment expectations	0.46	0.91	-5	X	
Demand expectations	0.59	0.79	1	X	X
Price expectations	0.44	0.87	-3		

Source: NBB.

(1) Coefficient of correlation between the level of the gross series and year-on-year GDP growth (quarterly data).

(2) Ratio between the variance of the smoothed series and that of the gross series. The higher this ratio, the lower the short-term volatility of the gross series.

(3) Number of months by which the gross series leads (+) or lags (-) year-on-year GDP growth. Determined by the moment when the cross-correlation between the indicator and year-on-year GDP growth reaches a maximum (monthly GDP growth figures obtained by linear interpolation).

(4) Formerly broken down into orders concerning foreign or Belgian suppliers.

(5) Not previously included in the monthly press release.

QUESTIONS INCLUDED IN THE MONTHLY BUSINESS SURVEY : STATISTICAL PROPERTIES (continued)

(1996-2008)

	Correlation with GDP growth in Belgium ⁽¹⁾	Variance of the smoothed series / variance of the gross series ⁽²⁾	Lead (+) or lag (-) in relation to GDP growth in Belgium ⁽³⁾	Composition of the old business survey indicator	Composition of the new business survey indicator
Business-related services					
Trend in activity	0.65	0.68	0	X	
Trend in employment	0.48	0.88	-2	X	
Trend in prices	0.49	0.74	-3		
Assessment of activity	0.64	0.91	-1	X	X
Activity expectations	0.70	0.85	0	X	X
Employment expectations	0.61	0.90	-1	X	
General demand expectations	0.76	0.89	0	X	X
Price expectations	0.42	0.75	-6		

Source : NBB.

(1) Coefficient of correlation between the level of the gross series and year-on-year GDP growth (quarterly data).

(2) Ratio between the variance of the smoothed series and that of the gross series. The higher this ratio, the lower the short-term volatility of the gross series.

(3) Number of months by which the gross series leads (+) or lags (-) year-on-year GDP growth. Determined by the moment when the cross-correlation between the indicator and year-on-year GDP growth reaches a maximum (monthly GDP growth figures obtained by linear interpolation).

Annex 2

OUTLINE OF THE GENERAL METHODOLOGY OF THE BUSINESS SURVEY INDICATOR

Step	Options	NBB	
		1990	2009
Conversion of qualitative responses into quantitative values for each question	Balance ⁽¹⁾ Diffusion index ⁽²⁾	Balance	Balance
Elimination of fluctuations other than cyclical variations	Elimination of seasonal fluctuations Complex breakdowns (e.g. Baxter-King filter)	Seasonal adjustment using the Census X-11 program	Seasonal adjustment using the Census X-11 program
Aggregation of the values per question	Number of questions	a) <i>branches of activity</i> : average of all questions, except those concerning prices ⁽³⁾	a) <i>branches of activity</i> : average of a small number of questions ⁽³⁾
a) in the synthetic curve specific to the branch of activity	Number of branches of activity		
b) in the business survey indicator	Aggregation method: (weighted) averages, principal component analysis	b) <i>business survey indicator</i> : weighted average of the synthetic curve of manufacturing industry, trade and building ⁽⁴⁾	b) <i>business survey indicator</i> : weighted average of the synthetic curve of manufacturing industry, trade, building and business-related services ⁽⁴⁾
Presentation of the end result	Balance Diffusion index Index of the balance or diffusion index result Standardisation Statistical smoothing	Balance Statistical smoothing ⁽⁵⁾	Balance Statistical smoothing ⁽⁵⁾

Source: NBB.

(1) Difference between the percentage of positive responses and the percentage of negative responses to a given question, ranging from -100 to 100.

(2) Sum of the percentage of positive responses plus half the percentage of responses not reporting any change, ranging between 0 and 100. Conversion from a balance result to a diffusion index can be made by means of a simple mathematical transformation.

(3) 1990: Total number of questions included in the composition of the synthetic curve specific to the branch of activity: manufacturing industry (8), trade (6), building (7), business-related services (6).

2009: Total number of questions included in the composition of the synthetic curve specific to the branch of activity: manufacturing industry (4), trade (3), building (4), business-related services (3).

(4) Weightings:

1990: manufacturing industry (70 p.c.), building (15 p.c.) and trade (15 p.c.).

2009: manufacturing industry (65 p.c.), building (15 p.c.), trade (5 p.c.) and business-related services (15 p.c.).

(5) 1990: Smoothed series obtained from the five-month centred moving average of the five-month centred moving median of the gross series, with the weightings 1/8, 1/4, 1/4, 1/4, 1/8.

2009: Same as in 1990, except for the smoothed overall indicator, obtained from the three-month centred weighted moving average of the three-month centred weighted moving median of the gross series, with the weightings 1/4, 1/2, 1/4.

Bibliography

- Aucremanne L., M. Collin and T. Stragier (2007), *Assessing the gap between observed and perceived inflation in the euro area: Is the credibility of the HICP at stake?*, NBB Working Paper 112.
- Bañbura M. and G. Rünstler (2007), *A look into the factor model black box: publication lags and the role of hard and soft data in forecasting GDP*, ECB Working Paper 751.
- Baxter M. and R. G. King (1999), *Measuring Business Cycles: Approximate Band-Pass Filters For Economic Time Series*, *The Review of Economics and Statistics*, 81(4), 575-593.
- Bodier M., E. Dubois and E. Michaux (2005), *La conjoncture belge: révélatrice de la conjoncture de la zone euro?*, Ministry of Economic Affairs, Finance and Industry, France, *Diagnostics Prévisions et Analyses Économiques*, no 60, January.
- Burns A.F. and W.C. Mitchell (1946), *Measuring Business Cycles*, NBER, New York.
- Camacho M. and G. Perez-Quiros (2008), *Introducing the EuroSTING: Short-term indicator of euro area growth*, Banco de España, Working Paper 0807.
- Christiano L. J. and T. J. Fitzgerald (2003), *The Band Pass Filter*, *International Economic Review*, 44(2), 435-65.
- Dresse L. and C. Van Nieuwenhuyze (2008), *Do survey indicators let us see the business cycle? A frequency decomposition*, *NBB Working Paper 131*.
- European Commission (2007), *The Joint EU Programme of Business and Consumer Surveys*, User Guide.
- Jonsson A. and S. Lindén (2009), *The quest for the best consumer confidence indicator*, EC Economic Papers 372, European Commission.
- King R. G. and C. I. Plosser (1994), *Real business cycles and the test of the Adelmans*, *Journal of Monetary Economics*, 33(2), 405-438.
- Koopmans T.C. (1947), *Measurement Without Theory*, *The Review of Economic Statistics*, 29(3), 161-172.
- Mintz I. (1969), *Dating Postwar Business Cycles: Methods and their Application to Western Germany, 1950-67*, NBER Occasional Paper 107.
- National Bank of Belgium (1972), *Synthetic curve of the main results of the National Bank's monthly survey*, *Economic Review*, October, 3-11.
- National Bank of Belgium (1983), *Updating the synthetic curve of the main results of the National Bank's monthly survey*, *Economic Review*, September, 3-31.
- National Bank of Belgium (1990), *Revision of the synthetic business survey curve*, *Economic Review*, August-September, 53-64.
- National Bank of Belgium (2009), *Annual Report 2008: Economic and financial developments*.
- Stock J. H. and M. W. Watson (1998), *Business Cycle Fluctuations in U.S. Macroeconomic Time Series*, NBER Discussion Paper 6528.
- The Wall Street Journal (1999), *Euroland discovers a surprise indicator: Belgian confidence*, 14 July.

Vanhaelen J.-J., L. Dresse and J. De Mulder (2000), *The Belgian industrial confidence indicator: Leading indicator of economic activity in the euro area?*, NBB Working Paper 12.