Using survey data for predicting Belgian quarterly GDP growth

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This draft: October 15, 2013

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1. INTRODUCTION

The design of appropriate macroeconomic - and, in particular, fiscal and monetary - policies requires accurate knowledge of ongoing cyclical developments. However, national accounts data that can inform policymakers typically come with some delays. The first, so-called 'flash' estimates for real quarterly GDP growth usually only become available long after the reference quarter has ended. For the EU countries, the official Eurostat data on quarterly GDP are released some seven weeks after the end of that quarter, while earlier publications by certain national statistical institutes - such as for the UK, Spain and Belgium - still take about one month. In addition, these flash GDP estimates are prone to subsequent revisions, that can sometimes be large (de Antonio, 2014).

However in the course of the reference quarter several indicators are published that contain information on the current state of the economy. These indicators include both 'hard' and 'soft' data usually with a monthly frequency. The former range from important production or business statistics, such as total industrial production or turnover according to VAT declarations, that are used for the compilation of the Belgian national accounts, to specific information on certain expenditure categories such as car sales or building starts. The latter pertain to data contained in various business cycle surveys, that are mostly also available on a monthly basis. The surveys provide synthetic indicators of business or consumer confidence but the actual survey questions also contain more detailed information on specific issues including demand expectations, hiring intentions, saving capacity or even investment plans.

Short-term business cycle analysis or forecasting then boils down to extracting the relevant information from those hard and soft monthly - or higher-frequency - data. Golinelli and Parigi (2007) show that models that exploit this information generate better forecasts of GDP for shorter horizons than benchmark univariate and multivariate models that do not take account of the information that becomes available in the course of the reference quarter.

Both central banks and international organisations now routinely use specific models for this purpose. These models generally take into account a mixture of hard and soft data. While hard data are typically more closely related to actual GDP (and are sometimes part of that GDP such as industrial production) survey-based data present two important advantages. First, they usually become available earlier. Second, while hard data may be revised in subsequent data releases, this is in principle not the case for survey results.

This paper focuses on the role of survey data in explaining Belgian activity growth in the short run. We use and briefly present the BREL model that uses BRidge equations with predictors selected on the basis of an ELastic net procedure and is part of the National Bank of Belgium's new now-casting platform (Piette, 2014). The remainder of the paper is organised as follows. Section 2 reviews the literature. The third section gives a brief overview of the existing infra-annual surveys on the economic situation in Belgium that may be used for short-term economic forecasting. Section 4 introduces the model and assesses the relevance of survey data, in particular, for short-term GDP projections taking into account the specific data release calendar. This latter analysis is repeated in section 5 for other important macroeconomic aggregates. The final section presents both conclusions and avenues for further research.

2. LITERATURE REVIEW

While estimating and analysing short-term economic fluctuations has always been high on the agenda of policy institutions, the literature on now-casting and short-term economic forecasting has grown substantially in recent years. Different approaches are proposed.

One distinction is between the so-called partial and joint models. The former class of models consist of single-equation approaches that typically aim at estimating quarterly GDP growth using a set of regressors that mostly include monthly or higher-frequency data. As the explanatory variables need to be aggregated to a quarterly frequency and are usually only partially available, missing observations are forecast using AR, ARIMA or other satellite models. These partial approaches, that take the technical form of Autoregressive Distributed Lag (ADL) models, have a long tradition in central banks and international organisations and are usually referred to as 'bridge models'.

Joint models are multivariate dynamic models that can be written in the state space form. The dependent variable and the set of independent variables that are used as predictors are essentially estimated jointly with a view to making full use of the joint dynamics of the variables considered. Practical applications mostly take the form of Dynamic Factor Models and, to a much lesser extent, (mixed-frequency) VARs.

Bessec (2013) points out that central banks increasingly use such models in addition to bridge models to make short-term projections and lists a number of recent examples. As regards Belgium, the earliest example of a dynamic factor model that was used by the National Bank of Belgium was developed by Van Nieuwenhuyze (2006) and this Belgian model was also included in Bahroumi et al. (2008). The model was used in conjunction with and as a cross-check for other short-term forecasting tools. More recently, a joint Dynamic Factor Model for Belgium and the euro area was elaborated by de Antonio (2013). This model is now being used, together with the BREL bridge model, referred to in section 4, as well as other tools, in the context of the National Bank of Belgium's analyses and forecasts of short-term economic developments.

Apart from the technical aspects the key difference between the joint and partial approaches is of a conceptual nature. Joint models are better suited to assess the specific impact of each new piece of information (Bańbura et al., 2013). New data for any of the predictors can be easily compared to the value forecast by the model and the impact of the 'news' or 'surprise' component of the data release on the dependent variable can then be quantified. As such, these models help to interpret the data flow. Results are often presented as a timeline of forecast updates linked to data releases.

Partial models, on the other hand, offer more flexibility. Different specifications can be used for different moments in the data release calendar with a view to giving estimated or observed values of the different predictors the appropriate weights.[1] In the early stages of the data release calendar, no observations for hard data will be available and the bridge models are more likely to pick up survey-based data as predictors. Later on, as observations for certain hard data become available, the exact econometric specification may change. An example of such a sequence is described in section 4.

In principle, both approaches can be combined to the extent that factors summarising large data sets can be part of bridge equations. The 'bridging with factors' approach was pioneered by Giannone et al. (2008) and Bahroumi et al. (2008), as well as Angelini et al. (2011), show that it can help to improve the forecast accuracy for predicting euro area GDP or that of individual euro area countries compared to traditional bridge models. Hybrid forms or factor-augmented ADL models are now also explored, for instance, in the context of the MIDAS applications aimed at extracting data from large cross sections of mostly daily financial data (e.g. Andreou et al., 2013).

Another distinction pertains to the variable(s) that are estimated. Direct estimation approaches immediately target GDP growth while alternative adding-up approaches focus on estimating different GDP components and only then aggregating them. Golinelli and Parigi (2007) refer to the former as supply-side approaches and to the latter as demand-side approaches. In actual practice, both approaches are often combined and serve as a cross-check, while the adding-up ones obviously also facilitate the story-telling to the extent that short-term economic developments can then be more easily traced back to specific industries or demand components.

Apart from GDP components, the aggregation issue may also pertain to geographical clusters. Estimating euro area growth in the short run, for instance, can also be done in a direct manner using euro area variables as regressors or by aggregating a number of country-specific estimations. In this connection, Marcellino et al. (2003) show that forecasts constructed by aggregating the country-specific models tend to be more accurate than forecasts constructed using the aggregate data.

Finally, output formats of short-term forecasting models may also differ. Most models specifically aim at forecasting actual GDP growth, others focus on underlying trends. An example of the latter is the Eurocoin indicator predicting euro area GDP growth and developed by the Banca d'Italia (Altissimo et al., 2001; Altissimo et al., 2007). In this context, it should be added that survey results themselves are typically presented in the form of a synthetic indicator that is designed to track economic developments without actually conveying precise quantitative signals. The widely-used PMI data from Markit Economics that are anchored to an expansion/contraction threshold are a case in point.

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1 While such bridge models are generally not used to identify the specific impact of each data release, this is technically not impossible if one imposes the same econometric specification before and after the data release.

An issue that is related to the one of model selection is whether to use individual models or forecast combinations from different models. The literature by and large shows that, in many cases, accuracy can be improved by combining different models (e.g. Bec and Mogliani, 2013). Against this background, the specific forecast of individual models is usually just one element that is taken into account by policy institutions such as central banks when defining their short-term outlook.

In all models the selection of appropriate predictors is key. Different approaches have been developed. Survey data are generally found to contribute to forecast performance if the aforementioned time dimension related to the non-synchronous data releases is duly taken into account (e.g. Bańbura and Rünstler, 2011). Another finding in the literature is that it is worthwhile to also use the disaggregated survey results, based upon the replies to individual questions, rather than just the synthetic indicators (e.g. Bec and Mogliani, 2013). The selection algorithm that is used in BREL is based on Bessec (2013) and will be described in greater detail in section 4.

3. EXISTING SURVEY DATA ON THE BUSINESS CYCLE IN BELGIUM

The National Bank of Belgium has a long tradition of conducting business cycle surveys. Two monthly surveys in particular, the ones regarding business (or producer) and consumer sentiment, provide highly relevant and timely information on the cyclical conditions in the Belgian economy. In the context of the Joint Harmonised EU Programme of Business and Consumer Surveys both of these surveys are harmonised at the European level, as regards the minimum set of questions, the possible replies, as well as the aggregation of these replies into a summary indicator per question. While the European Commission calculates composite sentiment indicators according to a harmonised methodology, in order to facilitate international comparisons, participating national institutions are free to summarise survey information into own synthetic indicators, and, in principle, to add additional survey questions.

Apart from the aforementioned business and consumer sentiment survey, the National Bank of Belgium also conducts other surveys, including the Bank Lending Survey, a survey on capacity utilisation and investment plans in the manufacturing industry as well as a series of ad-hoc surveys. However, all of these surveys have a lower frequency (mostly quarterly or biannual) and, hence, are somewhat less suited for now-casting or short-term economic projections. In addition, investment plans indicated in the replies to the investment survey tend to significantly overestimate actual investment.

The remainder of this section briefly discusses the exact contents of the business and consumer sentiment surveys. We focus on the detailed questions that may provide an input for BREL. The reader is referred to the Bank's website[2] and De Greef and Van Nieuwenhuyze (2009) for a more extensive discussion on the surveys as well as more information on the exact definition of the Bank's synthetic indicators in particular.

The business sentiment survey was launched in 1954 at the request of several professional federations. It is conducted on a monthly basis for a representative panel of about 6000 businesses. Four different industries are covered (manufacturing, business-related services, construction and retail trade) and results are published at the industry level. The survey is actually also conducted for a fifth industry - civil engineering and roadworks - but these results are not published and replies for this industry are not taken into account in the global sentiment indicator, as developments in this industry are thought to be less cyclical (given that they are more dependent on government activity) .

The survey questions[3] generally focus on sales or activity, (total and export) orders, prices and employment and, for each of these topics, address three different dimensions: a factual reporting of current developments, the respondent's appreciation of these developments and the respondent's expectations for the future. Only three qualitative replies can be given for each question: one positive, one neutral and one negative. The aggregation procedure is the net balance approach: the average reply for each question is simply the difference between the percentages of positive and negative replies. Only about half of the questions are taken into account for the construction of the National Bank of Belgium's synthetic indicator of business sentiment.

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2 http://www.nbb.be/pub/stats/surveys/opinions.htm?l=en

3 The specific questions are included in Annex Table 1 that describes our data set.

In the early seventies a specific consumer sentiment survey was also introduced. Unlike the business sentiment counterpart, this survey is not organised using a fixed panel of respondents. Each month a different sample of 1600 households are interviewed. Apart from respondent identification questions (sex, age, employment situation, income and education level), a total of 17 questions are asked about the economic conditions and unemployment level, the respondent's own financial situation and capacity to save, price developments and major expenditure (such as purchases of cars, furniture and other durables as well as construction or renovation of dwellings).[4] Questions relate to past developments, the (assessment of) the current situation and the outlook for the next twelve months. Replies are again qualitative with the exception of the two questions on past and future price developments, for which an actual inflation rate is asked. Only four questions are used in the construction of the National Bank's consumer sentiment indicator. All of these are forward-looking and pertain to the respondent's outlook, over the next twelve months, for the general economic situation, the unemployment level, his or her household's own financial position and the capacity to save.

Replies to the survey questions are part of the data set that is used by BREL. For the business sentiment survey we consider all questions, irrespective of whether they are taken into account for the National Bank of Belgium's composite indicator of business sentiment or not. We also include the survey replies for the civil engineering and roadworks industry; while activity and sentiment in this industry may be less related to the 'private-sector' business cycle, GDP also reflects government (consumption and) investment and, hence, these survey replies may contain information on GDP developments. For the consumer sentiment survey we restrict ourselves to the four questions that are used in the synthetic consumer sentiment indicator. In both cases, we only put replies to individual questions and not the synthetic indicators in the data set. Finally, so far, we have only looked at the net balance for each of the questions considered, not at other aspects of the distribution of the replies (such as concentration indices).

4. FORECASTING GDP USING BREL

4.1. Model description

As indicated, the National Bank of Belgium uses different models and approaches to produce short-term economic projections. This paper is anchored to the recently created BREL model (Piette, 2014). It relies on a standard bridge model infrastructure that relates a quarterly macroeconomic aggregate (Y_t), in this case real GDP growth compared to the previous quarter[5], to a set of monthly predictors that are converted to a quarterly frequency ($X_{i,t}^{Q}$). In its most general form, it is specified as an autoregressive-distributed lag model (ADL):

$$Y_{t+h} = \mu + \sum_{j=1}^{p} \rho_j Y_{t-j} + \sum_{i=1}^{n} \sum_{j=0}^{q} \beta_{i,j} X_{i,t-j}^{Q} + \varepsilon_t$$

where p is the number of autoregressive terms, n is the number of predictors, and q the number of lagged explanatory variables included in the equation. The parameters of the equation, i.e. the constant μ, the autoregressive parameters ρ_j and the coefficients $\beta_{i,j}$ can be estimated by means of a simple ordinary least-square regression. The lead parameter (h) can be either equal to 0, for predicting the value of Y in the current quarter, or to an integer equal to 1 or more for the subsequent periods.

One particular and well-known problem when using such bridge models in a policy environment is the ragged-edge nature of the data set of predictors. Typically, forecasts of the current quarter need to be made when only part of the monthly predictors ($X_{i,m}$) for that quarter are available. This is the case, for instance, when in mid-February one already wants to have an estimate of GDP growth in the first quarter: at the very best, only monthly values for January will be available for some predictors. Hence, the model

4 The full survey is included in Annex 2.

5 Adjusted for seasonal and calendar effects.

needs to be complemented by a tool that provides forecasts for these missing observations for the monthly predictors in order to aggregate them to quarterly numbers.

To this end, monthly predictor series are prolonged, where necessary, using a simple univariate AR model:

$$X_{i,m} = \phi_0 + \sum_{j=1}^{l} \phi_j X_{i,m-j} + \eta_m$$

where l stands for the number of autoregressive parameters.[6] As a rule, for every monthly predictor considered, we select the number of lags that minimizes the AR model's Schwartz information criterion (SIC), with a maximum of 12 lags.

The predictors are chosen among a large set of hard an soft data that can be considered as business cycle indicators (see Annex Table 1). The selection procedure is based upon an algorithm that uses the elastic-net regression approach that was pioneered by Zou and Hastie (2005) and applied in the context of short-term forecasting using a large set of high-frequency indicators by Bai and Ng (2008). It is essentially aimed at removing irrelevant predictors and takes the form of a minimisation problem with a penalty function for the number of parameters. This procedure has two key advantages compared to other selection methods. First, it is specifically designed to find the most relevant explanatory variables from an unrestricted linear regression model where the initial number of variables can be larger than the number of observations. Hence, the forecaster is in principle not required to make a first manual selection as in other procedures. Second, Zou and Hastie (2005) show that it performs better than alternative procedures when some potential predictors are strongly correlated, which is typically the case for many of the monthly predictors used in short-term forecasting models.

The selection algorithm is more often applied to dynamic factor models - prior to the factoring - e.g. by Bai and Ng (2008) and Bessec (2013). To the best of our knowledge, a similar procedure has only been applied to bridge models by Bulligan et al. (2012). We specifically follow the approach suggested by Bessec (2013) in that the selection procedure is modified to take into account the ragged data edges. To this end, the data set is transformed in such a way that it mimics the situation in terms of data availability that prevails at the time that the forecast is made. These 'data availability scenarios' are described in greater detail in the following section. In practice, if observations of (potential) predictors for certain months at the end of the data set are missing, the corresponding observations in previous quarters are replaced by their estimates based upon the aforementioned AR procedure. Altering the data set in this manner before running the elastic net regression ensures that the selection is not purely based upon in-sample explanatory power when all observations are available (which may not help the forecaster when they are not) but essentially also takes account of the goodness of the fit of the AR models used to generate missing observations.

In our view, this technical modification is required to duly reflect the data release calendar. As soft data are typically available earlier but are likely to be less correlated with the dependent variable, it avoids a selection bias towards hard data in particular: their typically higher in-sample predictive power overstates their usefulness in a real-time forecasting environment.

4.2. Data set and data release calendar

Our data set comprises a broad range of indicators of different types. Annex Table 1 offers a detailed overview. Apart from the net balances taken from the replies to the individual questions in the aforementioned producer and consumer sentiment surveys conducted by the National Bank of Belgium (type: SURVEY), we consider three other data types:

- HARD: this category includes various hard data such as industrial production indices constructed by the statistics office of the Federal Public Service Economy and turnover statistics reported in VAT

[6] This is, by and large, in line with the standard approach in the literature. The alternative ARIMA approach has a higher computational cost, which is specifically burdensome as the predictor selection procedure requires a very large number of forecasts (see below).

declarations, as well as new car registrations, several labour market statistics (of which the work volume of temporary workers is thought to reflect cyclical changes quite quickly) and permits for new buildings;

- FINANCIAL: this category brings together a limited set of financial data, including Belgian and European stock market indices, short- and long-term interest rates, oil and other commodity prices, the EUR/USD exchange rate, as well as the gold price.
- INTERNATIONAL: this category comprises both survey and hard data pertaining to the external environment. We include the EC's confidence indicators for the euro area and Belgium's main trading partners (Germany, France and the Netherlands), as well as certain industrial production and trade indices, also for advanced and emerging economies.

We specifically exclude certain hard data from the data set as they are typically revised often and/or to a large extent. Hence, the initial vintage may give wrong information on the business cycle. This is the case, in particular, for the monthly statistics on Belgian imports and exports.

In the econometric estimations, all indicators with the exception of those that can take zero or negative values (e.g. survey indicators) are expressed in natural logs. Those for which a unit root was detected, either by the Augmented Dickey-Fuller or the Phillips-Perron tests, are included in first differences so as to make them stationary. Moreover, like GDP growth, all predictors are adjusted for seasonal effects and, where needed, also for differences in the number of working days.

For the GDP estimates that are discussed in the remainder of section 4, the full data set is used with the exception of the synthetic survey indicators of the Belgian producer and consumer sentiment as those are simply linear combinations of the net balances of the replies to the individual survey questions. However, the estimates for other macroeconomic aggregates - discussed in section 5 - are carried out on a restricted data set. A pre-selection is performed to focus only on the indicators that we deem relevant for the variable to be estimated. In the case of value added in the manufacturing industry, for instance, we obviously do not include indicators from the producer sentiment survey or turnover statistics that pertain to other industries than manufacturing and we also exclude data on permits for new buildings and certain financial indicators. All indicators in the INTERNATIONAL group, on the other hand, are kept in the data set as external developments are indeed likely to influence industrial activity in Belgium. We do exclude these latter indicators for the estimates of other aggregates such as value added in construction and the services sector as the direct impact of international developments on these aggregates is likely to be more limited.

For each of the macroeconomic variables considered, GDP or the other aggregates, six different estimates are made to take into account data availability at different points in time. We consider, in particular, six stylised 'data scenarios' that replicate in a simplified manner the standard data release calendar and, hence, the actual data set that can be used in real time by the forecasters. Broadly speaking, survey data pertaining to a given month are generally available at the latest towards the end of that month and the same holds for all financial data considered here. Certain 'early' hard data (e.g. on the labour market situation or pertaining to car registrations) typically become available in the following month. However, the majority of the hard data are only released in the month after that. This adds up to the six different data scenarios that are detailed in table 1 and range from the beginning of the quarter considered (no data on that quarter is available) to two months after the end of the quarter considered (a first vintage of all data relative to that quarter is available). In this manner, our estimation framework takes due account of the different release dates for the different data types.

Table 1 - Data availability scenarios for forecasting quarter Q

	Survey and financial data until	'Early' hard data* until	Hard data until
scenario 1 (3 months before the end of Q)	3rd month of Q-1	2nd month of Q-1	1st month of Q-1
scenario 2 (2 months before the end of Q)	1st month of Q	3rd month of Q-1	2nd month of Q-1
scenario 3 (1 month before the end of Q)	2nd month of Q	1st month of Q	3rd month of Q-1
scenario 4 (end of Q)	3rd month of Q	2nd month of Q	1st month of Q
scenario 5 (1 month after the end of Q)	1st month of Q+1	3rd month of Q	2nd month of Q
scenario 6 (2 months after the end of Q)	2nd month of Q+1	1st month of Q+1	3rd month of Q

* Including, in particular, data related to the labour market and car registration.

Scenario 5 generally corresponds to the situation in which the first flash estimates of GDP growth are produced by statistical agencies and by the Belgian National Accounts Institute in particular. These flash estimates have to be made before certain source data, in particular most relevant hard data, for the final month of the quarter are available, which may partly explain the rather frequent and sometimes significant revisions to these first quarterly estimates.

It is important to stress that our estimates take account of the current data vintage. We could not reconstruct series on the basis of the first data vintages, neither for the dependent variable(s) nor for those indicators - in particular certain hard indicators - for which some data points are likely to have been revised since their first release.

4.3. Predictive performance of BREL

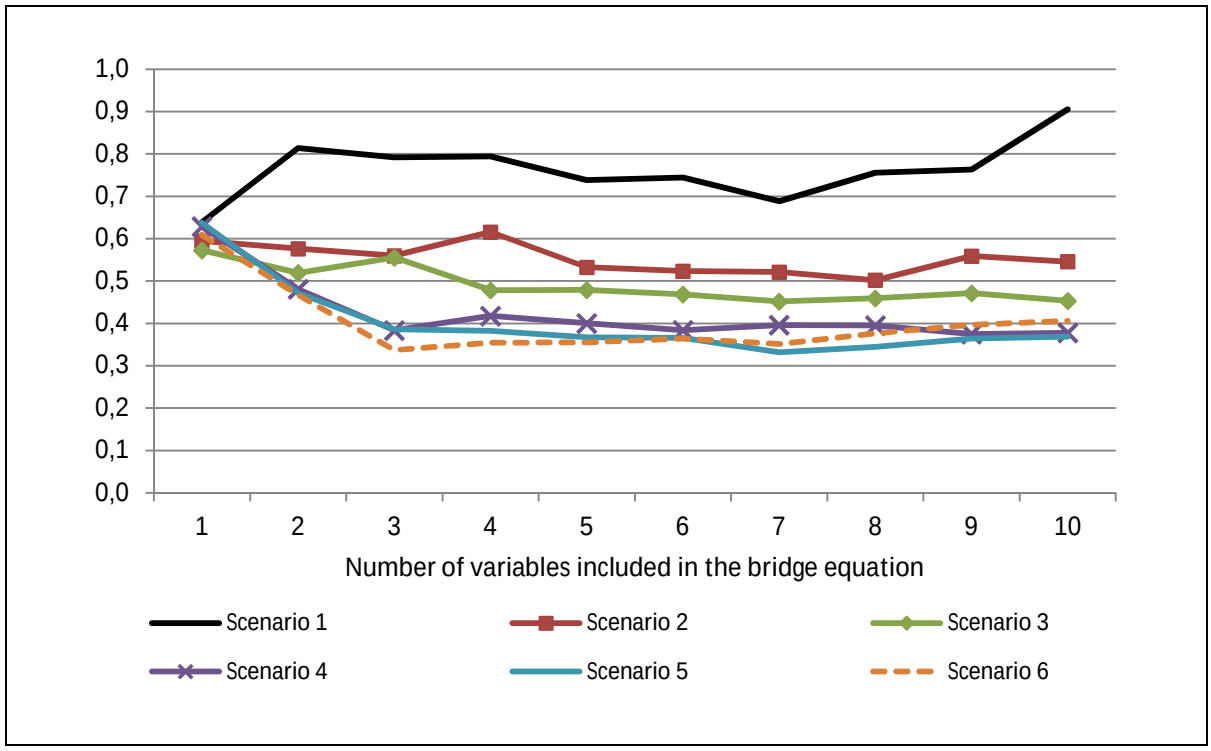
Chart 1 reports the root mean square forecast errors (RMSFE)[7] from a series of recursive BREL forecasts for quarterly GDP growth in Belgium, carried out over the period from the first quarter of 2003 to the fourth quarter of 2012. In line with the benchmark approach in the literature, we measure accuracy in this paper by comparing the estimates to the current national accounts data, i.e. not to the first data release. This implies that statistical data uncertainty that exists at the time of this first data release will also be reflected in the reported forecast errors as the focus is on the capacity to predict final national accounts data.

For every quarter within the 2003-2012 period, the aforementioned indicator selection procedure was run six times, i.e. for each of the six data scenarios described in the previous sub-section. We then used the top-ranked indicators in a bridge equation in order to produce the forecasts.

In addition, we looked at the relevance of including more predictors by sequentially increasing the number of independent variables considered in the equation, in line with the ranking, starting from the top-ranked predictor up to the predictor that came in in the 10th place.

7 For a series of forecasts for a variable Y generated over T periods, the RMSFE is defined as:
$RMSFE = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(\hat{Y}_t - Y_t\right)^2}$

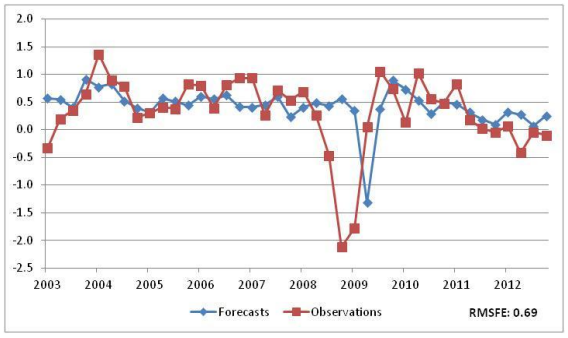
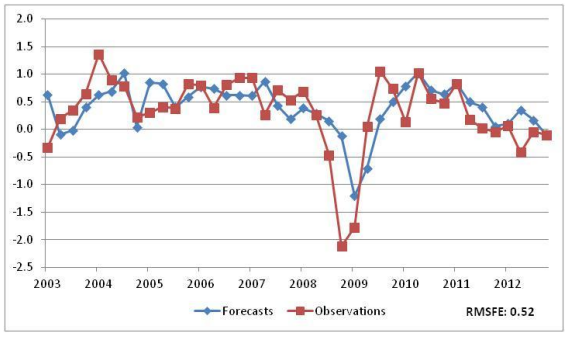
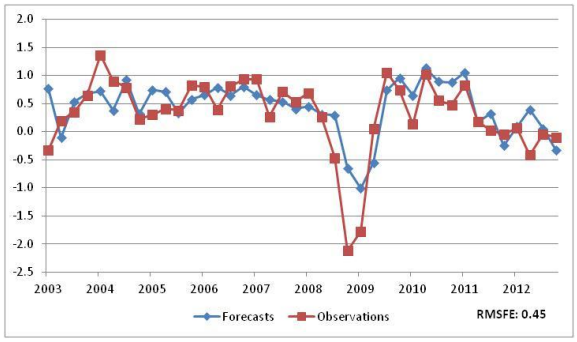
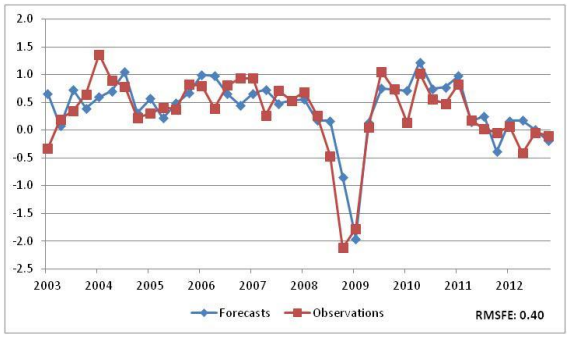
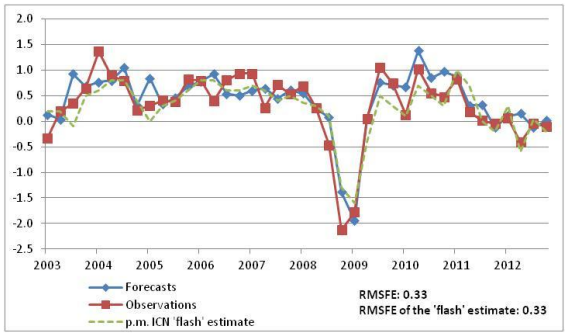
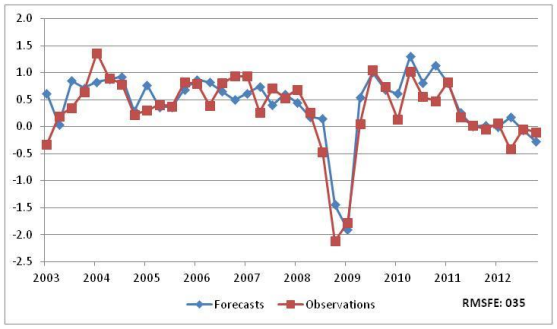
Chart 1 - Forecast errors as a function of the data scenario and the number of variables included in the bridge model
(RMSFEs in percentage points; simulations performed over the period 2003Q1-2012Q4)



As expected, the predictive power of the bridge equations clearly improves when more data become available. Clearly, accuracy is poor when no specific data for the quarter considered are available. The RMSFE is relatively large for the earliest scenario but already drops considerably as soon as the first - survey and 'early' hard – data for the quarter considered become available (scenarios 2 and 3). The accuracy of the estimates further improves by the end of the quarter considered with the RMSFE in scenarios 4 to 6 falling to about half of that in the earliest estimates considered here. Quite remarkably, the accuracy of the scenario 5 estimates, that, in terms of timing and data availability, correspond to the flash estimate of the Belgian National Accounts Institute, is very much in line with that of these first official quarterly national accounts statistics that exhibit a RMSFE of around 0.33 percentage points compared to the current national accounts data.

Chart 1 also shows that forecast accuracy clearly depends on the number of variables included in the bridge equations. However, accuracy gains are far from uniform and, generally, seem to become significantly smaller once 3 or 4 predictors are taken into account. At some point, they even become negative on average, suggesting that including more predictors actually worsens forecast performance. Across data scenarios, the errors are on average the smallest for the model using 7 predictors. Chart 2 gives an overview of the goodness of fit for that specification.

Chart 2 - Accuracy of BREL GDP forecasts using 7 predictors
(percentage changes compared to the previous quarter)

Scenario 1: 3 months before the end of the target quarter	Scenario 2: 2 months before the end of the target quarter
	
Scenario 3: 1 month before the end of the target quarter	**Scenario 4: end of the target quarter**
	
Scenario 5: 1 month after the end of the target quarter	**Scenario 6: 2 months after the end of the target quarter**
	

Sources: NAI, NBB.

Box 1 – An alternative to predictor selection: bridging with factors

The rationale behind using a predictor selection procedure such as the elastic net regression lies in the fact that bridge equations can not include a very large number of variables. A way to get around this drawback of the standard bridge model consists in replacing the monthly predictors in the equation by a small set of factors in the context of the BREL forecasting platform:

$$Y_{t+h} = \mu + \sum_{j=1}^{p} \rho_j Y_{t-j} + \sum_{k=1}^{r} \sum_{j=0}^{q} \varphi_{i,j} F_{k,t-j}^{Q} + \varepsilon_t$$

The factors (F_k) are basically calculated as a weighted average of the monthly predictors:

$$F_{k,t} = \sum_{i=1}^{n} w_{k,i} X_{i,t}$$

The idea is to use these weighted averages to capture the main 'co-movements' in the business cycle that drive the monthly indicators, which are also likely to explain developments in GDP and other quarterly aggregates. In practice, we calculate the weights $w_{k,i}$ using the method based on principal components proposed by Stock and Watson (2002).[8] This calculation is made over the sample period that ends in the last month for which all observations for the various predictors are available. When forecasting, the factors are prolonged applying these weights to the forecasts for the monthly predictors, which are computed using the same univariate AR satellite model used in the standard bridge model.

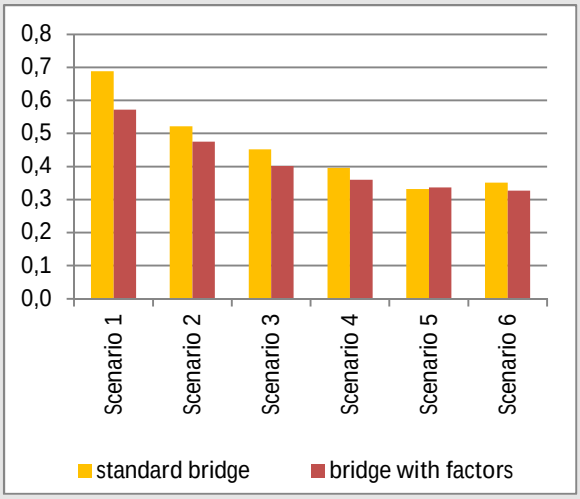
From the simulations it appears that the predictive abilities of the standard bridge model, with a limited number of selected variables and that of the model with factors, which encompasses all the available indicators, are relatively similar. This suggests that the limited number of indicators selected using the procedure described above succeeds in capturing most of the business cycle movements. However, on average over the simulation period, the bridging with factors approach exhibits a small advantage in terms of forecast accuracy, as measured on the basis of the RMSFE. It is more substantial in the first data release scenarios, when only a few monthly data on the quarter concerned are available and when the prediction relies more extensively on survey indicators. The bridging with factors approach is however not always superior. In particular, the standard bridge model performs better in predicting the negative GDP growth rates observed at the time of the great recession, i.e. from the second quarter of 2008 to the first quarter of 2009.

8 An alternative method for calculating factors uses the Kalman filter. See for example Giannone et al. (2008).

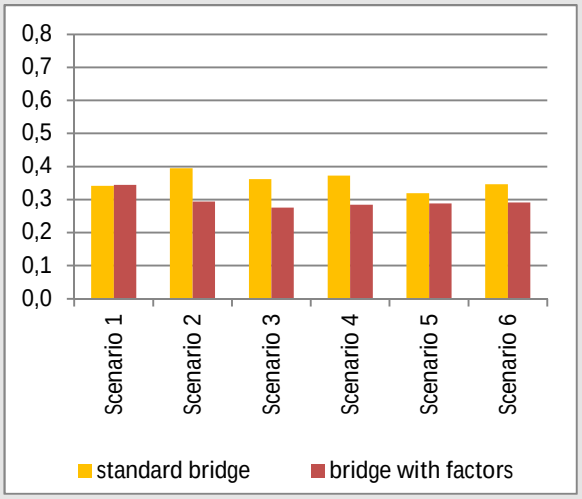
Forecast errors of the standard bridge model based on seven selected predictors and the bridge model with factors based on the full set of predictors

(by period and according to the different data release scenario)

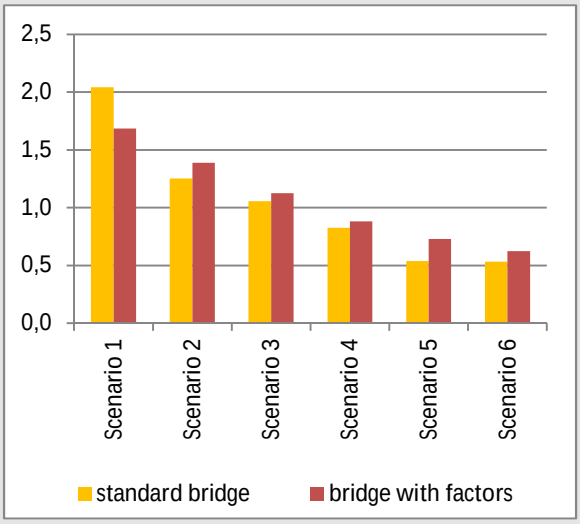
Whole period 2003Q1-2012Q4



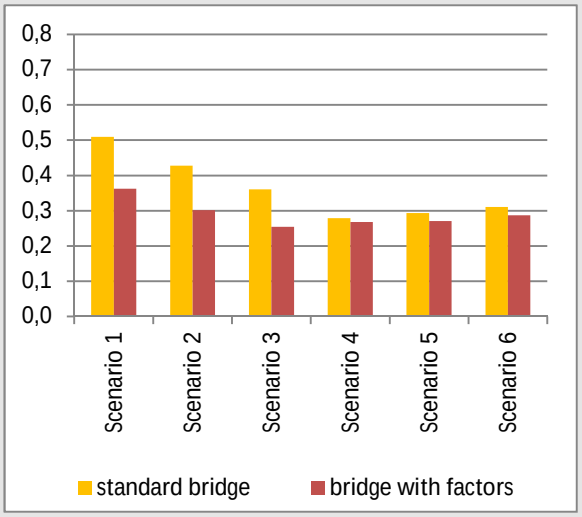
Period 2003Q1-2008Q2



Period 2008Q3-2009Q1[1]



Period 2009Q2-2012Q4



[1] Different scale.

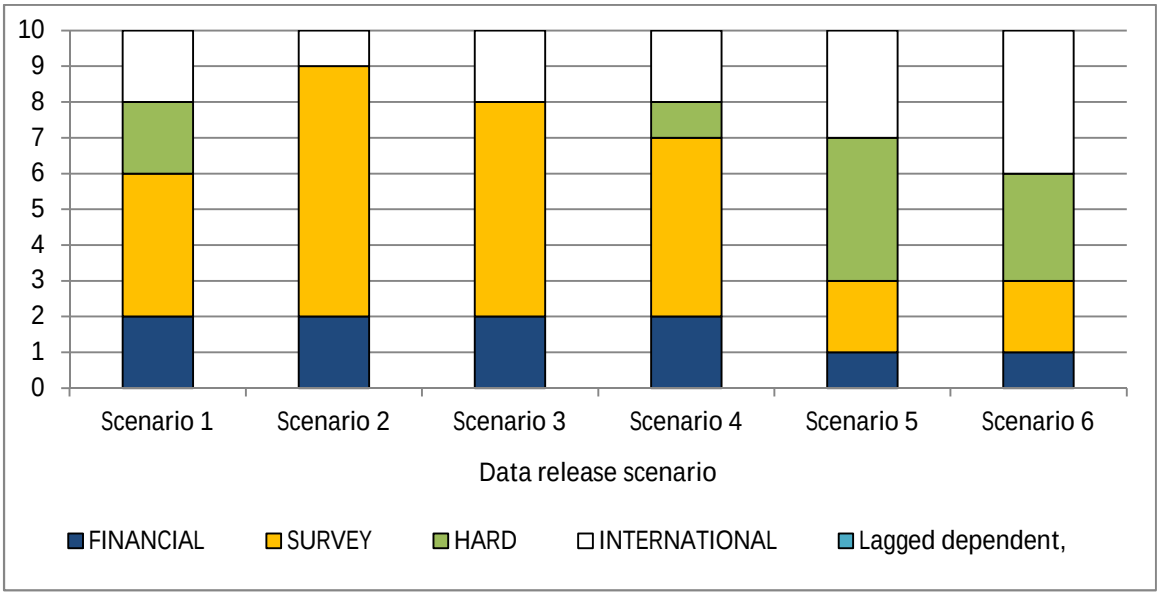
Note: The results presented in this chart, are based on a bridge model with 2 factors, including one lagged value for each of them, and no lag for the dependent variable. This is the specification that minimises the Schwartz criterion over the full sample period. All the indicators listed in Annex Table 1 are used for calculating the factors.

4.4. Empirical results: which predictors are important?

In this section we specifically assess the importance of different types of indicators for the short-term real GDP estimates. As indicated, we distinguish between international data, hard data, financial data and survey data and will particularly evaluate the role of the latter. To this end, the aforementioned selection algorithm is run over the whole sample period, from 1995Q1 to 2012Q4, and the number of indicators to be used is set to 10 for each bridge equation. Estimates are performed for each of the six different stages in the data release calendar. Hence, the procedure used in BREL selects, at different points in time, the 10 indicators that contain the most information for predicting GDP growth in the final quarter of 2012.

Two caveats are in order. First, technically this ranking of predictors only applies to that particular quarter. However, recursive estimations using other periods suggest that the results are quite robust when considering other quarters. Second, as indicated in section 4.3, actually including up to 10 predictors in the bridge equations may not necessarily give the best results in terms of accuracy.

Chart 3 -GDP estimates: importance of different data types for each data scenario
(number of appearances among the 10 top-ranked predictors)



The empirical results are summarised in Chart 3 and Table 2.[9] The results are broadly in line with expectations. Clearly, the importance of each type of data strongly depends on the exact time when the estimate has to be made. Survey data are especially important for estimates in the first months of the target quarter itself (scenarios 2 to 4), when hard data are not yet or only scarcely available. However, survey data continue to play a (more limited) role for ex post estimates, even when all relevant hard data have become available.

As regards the first estimate before the start of the quarter (data scenario 1), i.e. when no specific data pertaining to that quarter are available, almost half (4 out of 10) of the predictors already come from the two surveys organised by the National Bank of Belgium. Households' expectations regarding their financial situation over the next twelve months, as well as, to a much lesser extent, price expectations in the services industry, employment expectations in the civil engineering and roadworks industry and the demand outlook for the retail industry help in explaining future GDP developments. However, this early GDP estimate mostly relies on data pertaining to the international environment (industrial production in the emerging economies and the euro area) and certain hard data, including, in particular, the volume of temporary work. Also, two financial indicators - the stock price index and the commodity price level in international markets - seem to have a leading character with respect to GDP growth in the next period.

Moving further along the data release calendar, GDP estimates come to rely to a greater extent on survey data. In data scenarios 2 to 4, survey replies are among the most relevant predictors for the now-cast of GDP growth. In the absence of hard data, they constitute the only available information directly connected to the economic developments within the period. Survey data continue to be important for the estimates when certain hard indicators, such as industrial production and VAT turnover statistics, are released for the first month of the quarter, as in the data scenario 4. This suggests that the combination of one actual observation and two AR forecasts for these data does not suffice for the hard data to provide enough information on the activity developments in activity within the quarter considered.

9 An overview of the best predictors for GDP across scenarios is also given in the top panel of Annex Table 3.

Table 2 - Best predictors for GDP

Scenario 1: 3 months before the end of the target quarter

rank	variable	category	rank	variable	category
1	Industrial production in the emerging economies	INTERNATIONAL	6	Commodity import prices in international market, excluding energy	FINANCIAL
2	Work volume of temporary workers	EARLY HARD	7	Business-related services - price expectations (1 lag)	SURVEY
3	Industrial production in the euro area	INTERNATIONAL	8	Civil engineering and roadworks - employment expectations	SURVEY
4	Consumer survey - expectations for the financial situation of households (1 lag)	SURVEY	9	Retail trade - intentions of placing orders	SURVEY
5	Brussels All Shares Index	FINANCIAL	10	Turnover in construction	HARD

Scenario 2: 2 months before the end of the target quarter

rank	variable	category	rank	variable	category
1	Industrial production in the emerging economies	INTERNATIONAL	6	Business-related services - activity expectations	SURVEY
2	Consumer survey - unemployment expectations in Belgium	SURVEY	7	Retail trade - intentions of placing orders	SURVEY
3	Commodity import prices in international market, excluding energy	FINANCIAL	8	Consumer survey- expectations for the financial situation of households	SURVEY
4	Manufacturing industry - demand expectations	SURVEY	9	Retail trade - trend in prices (1 lag)	SURVEY
5	Brussels All Shares Index	FINANCIAL	10	Business-related services - trend in activity	SURVEY

Scenario 3: 1 month before the end of the target quarter

rank	variable	category	rank	variable	category
1	Manufacturing industry - trend in export orders	SURVEY	6	Brussels All Shares Index	FINANCIAL
2	Commodity import prices in international market, excluding energy	FINANCIAL	7	Construction - price expectations	SURVEY
3	Construction - trend in prices	SURVEY	8	Manufacturing industry - demand expectations	SURVEY
4	Consumer survey - unemployment expectations in Belgium	SURVEY	9	Consumer survey - expectations for the financial situation of households	SURVEY
5	Industrial production in the advanced economies	INTERNATIONAL	10	Industrial production in the emerging economies	INTERNATIONAL

Scenario 4: end of the target quarter

rank	variable	category	rank	variable	category
1	Consumer survey - unemployment expectations in Belgium	SURVEY	6	Industrial production in the euro area	INTERNATIONAL
2	Industrial production in the emerging economies	INTERNATIONAL	7	Construction - trend in prices	SURVEY
3	Commodity import prices in international market, excluding energy	FINANCIAL	8	Manufacturing industry - trend in export orders	SURVEY
4	Manufacturing industry - demand expectations	SURVEY	9	Brussels All Shares Index	FINANCIAL
5	Work volume of temporary workers	EARLY HARD	10	Business-related services - activity expectations	SURVEY

Scenario 5: 1 month after the end of the target quarter

rank	variable	category	rank	variable	category
1	Industrial production in the euro area	INTERNATIONAL	6	Trade in the emerging economies	INTERNATIONAL
2	Consumer survey - unemployment expectations in Belgium	SURVEY	7	Manufacturing industry - demand expectations	SURVEY
3	Work volume of temporary workers	EARLY HARD	8	Production of intermediate goods	HARD
4	Industrial production in the emerging economies	INTERNATIONAL	9	Commodity import prices in international market, excluding energy	FINANCIAL
5	Total turnover	HARD	10	Turnover in services	HARD

Scenario 6: 2 months after the end of the target quarter

rank	variable	category	rank	variable	category
1	Production of intermediate goods	HARD	6	Total turnover	HARD
2	Industrial production in the euro area	INTERNATIONAL	7	Work volume of temporary workers	EARLY HARD
3	Consumer survey - unemployment expectations in Belgium	SURVEY	8	Industrial production in the emerging economies	INTERNATIONAL
4	Trade in the euro area	INTERNATIONAL	9	Trade in the emerging economies	INTERNATIONAL
5	Manufacturing industry - demand expectations	SURVEY	10	Commodity import prices in international market, excluding energy	FINANCIAL

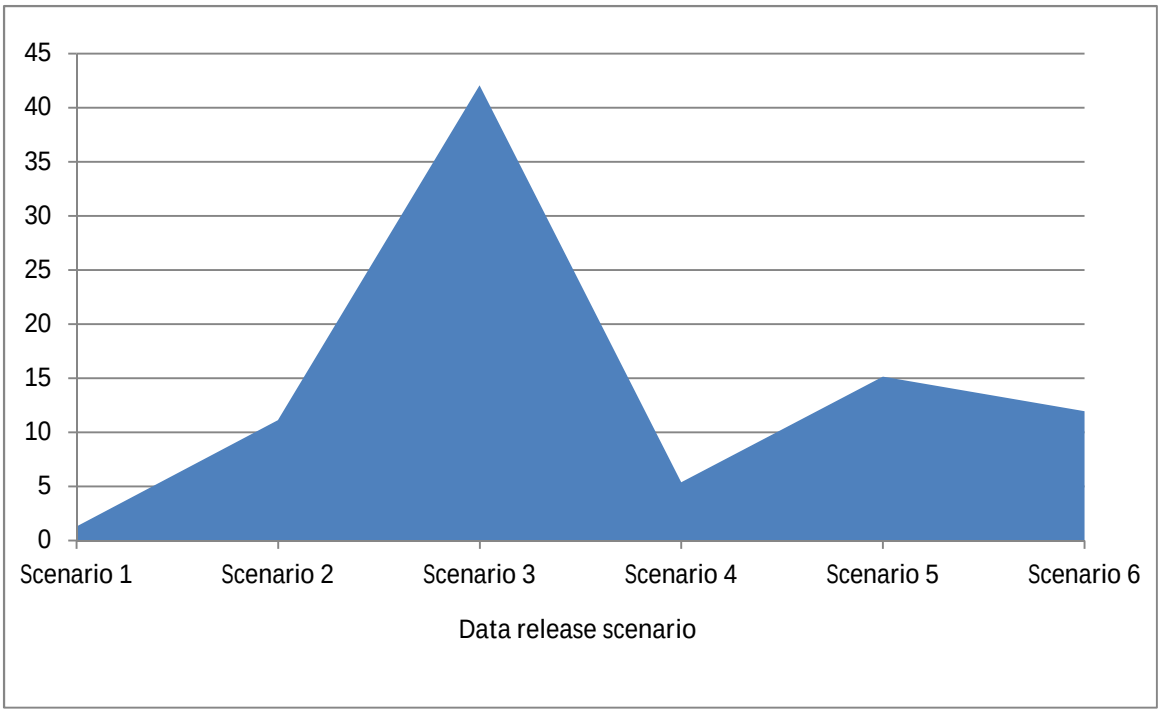
Several survey data show up in a consistent manner across these three data scenarios. This is the case for the expectations on the development of unemployment in the consumer survey, which is the most relevant indicator in scenario 4, and demand indicators for the manufacturing industry (demand expectations and/or reported trend in export orders). In the former case, the statistical relationship runs through private consumption (as will be shown in section 5), that accounts for about half of GDP, while the predominance of the demand indicators for the manufacturing industry may suggest that business cycle swings are more important - or show up earlier - in that industry. The latter observation is consistent with the 'overweighting' of this industry in the National Bank of Belgium's synthetic indicator (De Greef and Van Nieuwenhuyze, 2009). Finally, two particular indicators from the survey results for the construction sector, as well as indicators pertaining to the assessment of or expectations regarding activity and demand in the business-related services industry also contribute to explaining some of the current-quarter variation in GDP. As regards construction, the selected indicators do not relate to developments in activity or demand, as those selected for the other industries, but to the recent and expected price developments. One possible interpretation is that price developments in the construction industry might reflect general economic developments better than the respondents' assessments of actual and expected activity in that industry.

The presence of survey data on the civil engineering and roadworks industry in the earliest GDP estimates (data scenario 1) seems to be somewhat at odds with the exclusion of this industry from the National Bank of Belgium's synthetic producer sentiment indicator. However, as indicated, GDP is also to a large extent determined by government expenditure. Sentiment in this industry may be a good proxy for government expenditure and, in particular, government investment when no direct observations on this are available.

The significance of survey data declines somewhat after the quarter considered has ended (data scenarios 5 and 6). Hard data on temporary work and the production of intermediate goods and, remarkably, international indicators (trade and industrial production) begin to play a more important role in explaining short-term developments in Belgian GDP. However, even when, in principle, the full set of hard data is available for the past quarter, ex post GDP estimates continue to be anchored to certain survey results, in particular the unemployment expectations in the consumer sentiment survey and the demand expectations in manufacturing. While hard data such as those on industrial production and the turnover according to VAT statistics, are explicitly used by the National Accounts Institute for the production of quarterly GDP figures, this suggests that the mapping from those hard data to national accounts statistics is far from perfect and certain survey results help to address data gaps.

The same may be true for the number of hours worked by temporary workers, the third most relevant predictor at the time when the National Accounts Institute produces the first flash estimate of quarterly GDP (data scenario 5). Its release typically precedes by one month that of the other hard data, on production and turnover, and the predictive power for GDP is in all likelihood attributable to the fact that firms typically use temporary work as a 'buffer' to absorb activity shocks. As a result, the movements exhibited by this indicator evidently constitute a good proxy for the changes in economic activity. The presence of industrial production indices for the euro area and the emerging economies in the estimations for the last data scenario considered in this paper reflects the fact that the Belgian business cycle is determined to a large extent by external developments, in particular through the trade channel.

Chart 4 - Contribution of survey data to short-run GDP estimates: a synthetic view
(increase in the RMSFE if all Belgian survey data are excluded, in percentage points; based on bridge models with 7 predictors)



An alternative, more synthetic view on the importance of survey data can be obtained by comparing the model's performance on the basis of the full data set, as described in section 4.2, to its accuracy if no survey data are included in the data set. The same pattern emerges: excluding survey data from the short-term projections would worsen forecast accuracy for all data scenarios, although only marginally for scenario 1. Again, survey data are shown to be most useful in the course of the quarter for which the estimate has to be made, as witnessed, in particular, by the increase in the root mean square forecast error by more than 40% in data scenario 3, when almost no hard data are available. However, also after the quarter has ended (scenarios 5 and 6), forecast accuracy still clearly improves by taking into account survey data.

5. A BROADER USE OF BREL: WHICH PREDICTORS FOR OTHER MACRO AGGREGATES?

The analysis carried out in the preceding section for GDP can be easily extended to other important macroeconomic aggregates. In this section we look at the indicator selection for three supply-side variables (value added in the manufacturing, construction and market services industries), the most important demand component (private consumption), as well as employment. As indicated previously, these estimates are made using a restricted data set. Please refer to Annex Table 1 for further details. Empirical results regarding the most relevant predictors for each of the aggregates considered in this section are detailed in Annex Table 3.

5.1. Supply-side aggregates

The results obtained for value added in the manufacturing industry are broadly in line with those that emerged for GDP in the sense that survey data still prevail in the earlier stages of data releases, in the absence of the first monthly observations for the hard indicators. The indicators on the trend in export

orders and, incidentally, demand expectations, both selected for predicting GDP, are also listed among the most informative predictors for this macro aggregate. When more observations for the hard indicators become available, value added in industry is best predicted using the trade volume and the industrial production in the euro area and, to a lesser extent, by specific indicators for Belgium, namely the production of industrial goods and the work volume of temporary workers. The fact that indicators linked to the international context appear as the most informative for forecasting value added in the Belgian manufacturing industry is not surprising. It reflects that industry's important involvement in international trade, which makes it more reliant on external developments.

As far as value added in construction is concerned, the selection procedure tends to favour indicators related to the assessment made by the respondent regarding the short-term prospects in activity or in prices at the beginning of the quarter. When more survey data become available, four indicators emerge clearly: the assessment of order books, the trend in activity and the trend in prices from the construction survey, as well as the trend in prices from the civil engineering and roadwork survey. These variables remain at the top of the ranking in the presence of observations for the hard indicators, as the latter turn out to have a more limited predictive power, with the notable exception of the permits for new residential buildings.

As for the value added in services, employment and activity expectations in business-related services, and the intention of placing orders in retail trade businesses appear systematically at the top of the best-ranked predictors, whenever the forecast is carried out. When they are released, the turnover in services and the work volume of temporary workers are also found to help predicting value added in that sector. However, they do not perform as well as the survey data.

5.2. Private consumption

The selection of predictors for private consumption confirms the leading properties of the indicators on unemployment expectations and the financial situation of households from the consumer survey, which were already picked among the most relevant indicators of early GDP estimates. However, the indicator on the trend in prices in the retail trade industry performs better for this specific aggregate. When released, the turnover in retail trade is also informative, which is not surprising as the same data are used to compile the aggregate on private consumption in the quarterly national accounts.

5.3. Employment

As to the results obtained for the employment in the private sector, the predictions rely mainly on survey indicators, even in the presence of a sufficient number of hard indicators after the end of the target quarter. The only hard indicator that appears in the list of the best predictors is the number of job seekers, but it is ranked below survey indicators.

Remarkably, the selection procedure tends to choose indicators related to the developments in activity (in particular the assessment of the total order book in manufacturing or the intention of placing orders in the retail trade) over those more directly connected to employment, although employment expectations in manufacturing gradually move to the second position in the ranking for subsequent data scenarios. It can however be argued that there is a strong causal link between the developments in activity and in employment. As the former usually precede the later, this might explain why indicators related to activity perform better when it comes to providing early information on employment developments. While the services sector contributed strongly to employment creation over the sample period according to the national accounts statistics, no indicator from the retail industry or the business related services were retained in the selection.

BOX 2 – Can Belgian survey data contribute to estimating euro area GDP?

To be developed.

6. CONCLUSION

National accounts data are not available in real time. Even the earliest vintages of quarterly data are only released one month or more after the end of the quarter considered. In addition, they are often revised in subsequent vintages. Hence, policy institutions that monitor the cyclical situation of the economy need to turn to higher-frequency data. Of those, the so-called hard data pertain to actual observations that are related to parts of the production process (industrial production, turnover or value added statistics, etc.) or certain demand components (car sales, building starts, etc.). While such monthly data are published earlier than the national accounts, they also come with significant delays and are sometimes revised. Data coming from specific monthly business cycle surveys are typically available at an earlier stage but are obviously affected by the respondents' subjective assessments.

Policy institutions now routinely use tools that can extract information from these hard and survey data in order to have a timely and accurate understanding of the cyclical conditions of the economy. Different models are used with Dynamic Factor Models and bridge models among the most popular. In this paper we use BREL, a new bridge equation platform that is part of the National Bank of Belgium's tools for short-term projections of GDP and other macroeconomic aggregates. BREL uses the indicator selection algorithm that is proposed by Zou and Hastie (2005) and refined by Bessec (2013) to take into account different scenarios of data availability. As regards the latter, it considers different specifications for six scenarios for the estimates of a quarterly aggregate, ranging from the period just before the start of the quarter to two months after the end of the quarter. We consider a very broad data set and specifically look into the importance of survey data for the projections in each of the six data scenarios.

Different conclusions can be drawn from our empirical results. First, BREL provides reasonably accurate estimates of Belgian quarterly GDP: the average error obviously declines when more information becomes available and is, towards the end of the quarter, not very different from the first flash estimate by the Belgian National Accounts Institute. Second, survey data clearly help to predict Belgian GDP developments. In line with the intuition, their importance is larger in the course of the quarter that has to be estimated, i.e. when no or very few actual hard data are already available. However, even after the quarter has ended and hard data are available for all months in the quarter, certain survey data continue to be selected by the model as relevant predictors of GDP. This latter result suggests that they capture some of the relevant information that is not covered by the range of intra-quarter hard data, because of problems related to either their statistical quality or their exhaustiveness. Third, forecasters should go beyond the synthetic survey indicators: results for individual survey questions are shown to contribute to the GDP estimate. While the exact selection differs according to the data scenario considered, a limited number of specific survey data, including, in particular, indicators of demand in the manufacturing industry, as well as unemployment expectations in the consumer survey appear to have a greater predictive power for GDP. Finally, we also present some preliminary evidence that our results on the role of survey data for short-term projections, do not only hold for GDP but also for supply-side aggregates, private consumption and employment.

Our results illustrate in particular that two of the drawbacks of intra-quarter hard data, a lack of timeliness and, to a lesser extent, quality and exhaustiveness, can be addressed by making appropriate use of survey data. One dimension that is not explicitly covered in this paper is the importance of the revisions in the hard data. While we have excluded the trade data from our data set, as they are subject to the largest revisions, our empirical results are based upon the current and not the initial vintage of other hard data. Our initial observations suggest that, in the particular case of Belgium, these revisions tend to be rather small.

Other than a more in-depth analysis of these data revision effects, several avenues for further research can be pointed out. First, one could apply the same methodology to short-term inflation projections and assess, in particular whether those can be improved by taking into account data on expected price changes drawn from both the producer and consumer sentiment survey. Second, in addition to using the net balances as we do in this paper, one may explore the information content of other features of the distribution of the survey replies. In this connection, preliminary indications suggest that the distribution of the replies to certain questions in the consumer sentiment survey may capture the respondents' uncertainty which may weigh on consumption. This would be in line with what the European Commission (2013) finds at the level of the euro area. Third, as suggested by de Antonio (2014), we could also take into account more

specifically data vintages of the GDP statistics and develop separate bridge models for the flash estimates and the final-vintage GDP data in the national accounts.

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Annex Table 1 Predictors taken into account in the selection procedure

VARIABLE	SOURCE	DATA CATEGORY	LOGARITHM	DIFFEREN-TIATIONS	FREQUENCY CONVERSION	USED AS A POTENTIAL PREDICTOR FOR: GDP	V.A. IN INDUSTRY	V.A. IN CONSTRUCTION	V.A. IN MARKET SERVICES	PRIVATE CONSUMPTION	PAYROLL IN THE PRIVATE SECTOR
A. The NBB's producer sentiment survey											
Manufacturing industry											
trend in the production rate	NBB	soft	no	0	average	X	X				X
trend in orders from the domestic market	NBB	soft	no	0	average	X	X				X
trend in export orders	NBB	soft	no	0	average	X	X				X
trend in prices	NBB	soft	no	0	average	X	X				X
assessment of total order book	NBB	soft	no	0	average	X	X				X
assessment of export order book	NBB	soft	no	0	average	X	X				X
assessment of the level of stocks of finished products	NBB	soft	no	0	average	X	X				X
employment expectations	NBB	soft	no	0	average	X	X				X
demand expectations	NBB	soft	no	0	average	X	X				X
price expectations	NBB	soft	no	0	average	X	X				X
Construction											
trend in activity	NBB	soft	no	0	average	X		X			X
trend in orders	NBB	soft	no	1	average	X		X			X
trend in equipment	NBB	soft	no	1	average	X		X			X
trend in employment	NBB	soft	no	1	average	X		X			X
trend in prices	NBB	soft	no	1	average	X		X			X
demand expectations	NBB	soft	no	1	average	X		X			X
assessment of order book	NBB	soft	no	1	average	X		X			X
employment expectations	NBB	soft	no	1	average	X		X			X
price expectations	NBB	soft	no	1	average	X		X			X
Retail trade											
trend in sales	NBB	soft	no	0	average	X			X	X	X
trend in prices	NBB	soft	no	0	average	X			X	X	X
assessment of sales	NBB	soft	no	0	average	X			X	X	X
assessment of the level of stocks	NBB	soft	no	0	average	X			X	X	X
demand expectations	NBB	soft	no	0	average	X			X	X	X
intentions of placing orders	NBB	soft	no	0	average	X			X	X	X
employment expectations	NBB	soft	no	0	average	X			X	X	X
price expectations	NBB	soft	no	0	average	X			X	X	X
Business-related services											
trend in activity	NBB	soft	no	1	average	X			X		X
trend in employment	NBB	soft	no	1	average	X			X		X
trend in prices	NBB	soft	no	0	average	X			X		X
assessment of activity	NBB	soft	no	1	average	X			X		X
activity expectations	NBB	soft	no	1	average	X			X		X
general demand expectations	NBB	soft	no	1	average	X			X		X
employment expectations	NBB	soft	no	1	average	X			X		X
price expectations	NBB	soft	no	0	average	X			X		X
Civil engineering and roadworks											
trend in activity	NBB	soft	no	0	average	X		X			X
trend in number of tenders	NBB	soft	no	0	average	X		X			X
trend in number of contracts concluded	NBB	soft	no	0	average	X		X			X
trend in amount of work to be done	NBB	soft	no	0	average	X		X			X
trend in prices	NBB	soft	no	0	average	X		X			X
assessment of order book	NBB	soft	no	1	average	X		X			X
demand expectations	NBB	soft	no	0	average	X		X			X
employment expectations	NBB	soft	no	1	average	X		X			X
price expectations	NBB	soft	no	0	average	X		X			X
B. The NBB's consumer survey											
Economic situation in Belgium (forecasts for the next 12 months)	NBB	soft	no	0	average	X		X	X	X	
Unemployment in Belgium (forecasts for the next 12 months)	NBB	soft	no	1	average	X		X	X	X	
Financial situation of households (forecasts for the next 12 months)	NBB	soft	no	0	average	X		X	X	X	
Saving of households (forecasts of saving for "next" 12 months)	NBB	soft	no	0	average	X		X	X	X	

Annex Table 1 (continued)

VARIABLE	SOURCE	DATA CATEGORY	LOGARITHM	DIFFEREN-TIATIONS	FREQUENCY CONVERSION	USED AS A POTENTIAL PREDICTOR FOR: GDP	V.A. IN INDUSTRY	V.A. IN CONSTRUCTION	V.A. IN MARKET SERVICES	PRIVATE CONSUMPTION	PAYROLL IN THE PRIVATE SECTOR
C. Hard data											
Turnover at constant prices (based on the VAT returns)											
manufacturing	NAI	hard	yes	1	sum	X	X				X
construction	NAI	hard	yes	1	sum	X		X			X
retail trade	NAI	hard	yes	1	sum	X			X	X	X
hotels and restaurants	NAI	hard	yes	1	sum	X			X	X	X
business services	NAI	hard	yes	1	sum	X			X		X
total services	NAI	hard	yes	1	sum	X			X		X
total turnover	NAI	hard	yes	1	sum	X					X
Industrial production index											
manufacturing	FPSE	hard	yes	1	average	X	X				X
construction	FPSE	hard	yes	0	average	X		X			X
energy	FPSE	hard	yes	1	average	X	X				X
capital goods	FPSE	hard	yes	1	average	X	X				X
intermediate goods	FPSE	hard	yes	1	average	X	X				X
durable consumer goods	FPSE	hard	yes	1	average	X	X				X
non-durable consumer goods	FPSE	hard	yes	1	average	X	X				X
total industrial production, excluding construction	FPSE	hard	yes	1	average	X	X				X
Registration of new private cars	FPSE	early hard	yes	1	sum	X			X	X	
Work volume of temporary workers	Federgon	early hard	yes	1	sum	X	X	X	X	X	X
Unemployed job seekers	NEO	early hard	yes	1	average	X	X	X	X	X	X
Adjusted harmonised unemployment rate	EC	early hard	no	1	average	X	X	X	X	X	X
Permits for new residential buildings (in m2)	FPSE	hard	yes	0	sum	X		X			
Permits for new non-residential buildings (in m2)	FPSE	hard	yes	0	sum	X		X			
D. Financial data											
Ten-year government bond yield; Belgium	Th. R.	financial	no	1	average	X					
3-month Euribor	Th. R.	financial	no	1	average	X					
Brussels All Shares Index	Th. R.	financial	yes	1	average	X					
Euro Stoxx Broad Index	Th. R.	financial	yes	1	average	X					
Crude Oil-Brent Dated Free on Board	Th. R.	financial	yes	1	average	X	X				
Import prices of energy raw materials in international market	HWWI	financial	yes	1	average	X	X				
Commodity import prices in international market, excluding energy	HWWI	financial	yes	1	average	X	X				
Exchange rate or the euro against the U.S. Dollar	Th. R.	financial	yes	1	average	X	X				
Spot price of gold (Standard & Poors GSCI)	Th. R.	financial	yes	1	average	X					
E. International indicators											
Trade in goods (average of exports and imports of goods)											
euro area	CPB	hard	yes	1	average	X	X				
advanced economies	CPB	hard	yes	1	average	X	X				
emerging economies	CPB	hard	yes	1	average	X	X				
Industrial production index											
euro area	EC	hard	yes	1	average	X	X				
advanced economies	CPB	hard	yes	1	average	X	X				
emerging economies	CPB	hard	yes	1	average	X	X				
Germany	EC	hard	yes	1	average	X	X				
France	EC	hard	yes	1	average	X	X				
Industrial confidence indicator											
euro area	EC	soft	no	0	average	X	X				
Germany	EC	soft	no	0	average	X	X				
France	EC	soft	no	0	average	X	X				
Netherlands	EC	soft	no	0	average	X	X				
Consumer confidence indicator											
euro area	EC	soft	no	1	average	X	X				
Germany	EC	soft	no	1	average	X	X				
France	EC	soft	no	0	average	X	X				
Netherlands	EC	soft	no	1	average	X	X				

Source: NBB.
Note: - FPSE: Federal Public Service Economy.
- Th. R.: Thomson Reuters.

Annex Table 2 – The NBB's consumer sentiment survey

1. Sex of respondent
   - male
   - female

2. How old are you?
   - 18 to 29 years
   - 30 to 49 years
   - 50 to 64 years
   - 65 or over

3. Do you work?
   - yes
   - no

4. In the case of "work" is it a full-time or a part-time job?
   - full-time
   - part-time

5a. In the case of "no work", how would you best describe your situation?
   - retired
   - on early retirement
   - on sick leave
   - student
   - housewife/house-husband
   - unemployed
   - other

5b. How would you best describe your occupational category?
   - white-collar worker or executive
   - skilled worker
   - blue-collar worker
   - self-employed or business manager (including company director)
   - farmer
   - other

6. In your opinion, over the past twelve months, has the general economic situation in Belgium become:
   - much better
   - slightly better
   - remained the same
   - slightly worse
   - much worse

7. How do you expect the general economic situation in Belgium to develop over the next twelve months?
   It will....
   - get a lot better
   - get a little better
   - stay the same
   - get a little worse
   - get a lot worse

8. How do you think that consumer prices have developed over the last twelve months?
   They have...
   - risen a lot
   - risen moderately
   - risen slightly
   - stayed about the same
   - fallen

9. By how many per cent do you think that consumer prices have gone up/down over the last twelve months? (Please give a single figure estimate).

   Consumer prices have

   increased/decreased by: □□□.□ %.

10. By comparison with the past twelve months, how do you expect that comsumer prices will develop in the next twelve months? They will...:
   - increase more rapidly
   - increase at the same rate
   - increase at a slower rate
   - stay about the same
   - fall

11. By how many per cent do you expect consumer prices to go up/down change in the next twelve months? (Please give a single figure estimate).

   Consumer prices will increase/decrease

   by □□□.□ %.

12. What do you think will happen to unemployment in Belgium over the next twelve months? Do you believe that it will rise, fall or remain steady?:
   - increase sharply
   - increase slightly
   - remain the same
   - fall slightly
   - fall sharply

13. As regards furniture, a washing machine, a television, a computer and other durables, do you think that now is a good or bad time for people to make such a major purchase, or neither good nor bad?
    - good
    - not good but not bad either
    - bad

14. As regards major purchases such as furniture, a washing machine, a television or other durables, do you think that over the next twelve months your household will be spending more, less or the same on such durable goods as over the past twelve months?
    - much more
    - a bit more
    - the same
    - a bit less
    - much less

15. Do you expect to buy a car within the next twelve months?
    - yes, definitely
    - yes, possibly
    - probably not
    - definitely not

16. Are you planning to buy or build a home over the next twelve months (to live in yourself, for a member of your family, as a holiday home, to let...)
    - yes, definitely
    - possibly
    - probably not
    - definitely not

17. How likely are you to spend any large sums of money on home improvements or renovations over the next twelve months?
    - very likely
    - fairly likely
    - not likely
    - not at all likely

18. Would you say that your financial situation has got better or worse or remained unchanged over the past twelve months?
    - much better
    - slightly better
    - remained unchanged
    - slightly worse
    - much worse

19. And what about your financial situation at the moment? Is your household in a financial situation where you are short of money, or have money to spare, or can just get by?
    - plenty over, saving
    - saving a bit
    - just getting by
    - using savings
    - getting into debt

20. How do you expect the financial position of your household to change over the next twelve months? It will...
    - get a lot better
    - get a little better
    - stay the same
    - get a little worse
    - get a lot worse

21. Do you think that you will be able to put any money by, i.e. save, over the next twelve months?
    - definitely
    - yes, possibly
    - probably not
    - definitely not

22. In view of the general situation, do you think that now is...?
    - a very good moment to save
    - a fairly good moment to save
    - not a good moment to save
    - a very bad moment to save

23. For a survey such as this we need to be able to place people in broad income groups. May I therefore ask you to class yourself in one of the following income groups (= total net household income per month in EUR)?
    - under EUR 1,000 per month
    - between EUR 1,000 and 2,500 per month
    - between EUR 2,500 and 4,000per month
    - over EUR 4,000 per month

24. And finally, what is the highest standard of education that you attained?
    - elementary school
    - lower intermediate
    - higher intermediate
    - higher non-university education
    - university

Source: NBB.

Annex Table 3 - Best predictors for the various aggregates, according to the data release scenario
(predictors that appear at least once in the top 5 of the ranking in one of the 6 scenarios, rankings under the 10th position not reported)

GDP	Data scenario					
	1	2	3	4	5	6
Financial indicators						
Commodity import prices in international markets, excluding energy	6	3	2	3	9	10
Brussels All Shares Index	5	5	6	9		
Survey indicators						
Consumer survey - expectations for unemployment in Belgium		2	4	1	2	3
Manufacturing industry - demand expectations		4	8	4	7	5
Consumer survey - financial situation of households (with 1 lag)	4					
Manufacturing industry - trend in export orders			1	8		
Construction - trend in prices			3	7		
Hard data						
Production of intermediate goods					8	1
Total turnover					5	6
Work volume of temporary workers	2			5	3	7
Indicators related to the international context						
Industrial production in the euro area	3			6	1	2
Trade in the euro area						4
Industrial production in the emerging economies	1	1	10	2	4	8
Industrial production in the advanced economies			5			

Value added in the manufacturing industry	Data scenario					
	1	2	3	4	5	6
Financial indicators						
Commodity import prices in international markets, excluding energy		6	4	6		
Survey indicators						
Manufacturing industry - trend in export orders		3	1	1	2	3
Manufacturing industry - demand expectations		5	7			
Hard data						
Production of intermediate goods					4	4
Work volume of temporary workers	5		3	5	5	5
Indicators related to the international context						
Trade in the euro area	2		5	3	3	1
Industrial production in the euro area	3			4	1	2
Industrial production in the advanced economies		1	2	2	7	7
Industrial production in France		4				8
Industrial production in the emerging economies	1	2			10	
Industrial confidence in the euro area (with 1 lag)	4					

Value added in construction	Data scenario					
	1	2	3	4	5	6
Survey indicators						
Construction - assessment of order book	3			1	1	1
Construction - trend in activity			2	2	2	2
Construction - trend in prices			3	3	3	3
Civil engineering and roadworks - trend in prices		6	5	4	4	4
Civil engineering and roadworks - assessment of order book		4	4	7	7	7
Construction - assessment of order book (with 1 lag)	1					
Civil engineering and roadworks - trend in number of contracts concluded (with 1 lag)	2	2				
Civil engineering and roadworks - trend in amount of work to be done (with 1 lag)	4		10			
Construction - price expectations		1	1			
Civil engineering and roadworks - trend in number of contracts concluded		5				
Hard data						
Permits for new residential buildings (in m2)		8		5	5	5
Unemployed job seekers (with 1 lag)	5					
Lagged dependent		3	6	6	6	6

Annex Table 3 (continued)

Value added in market services	Data scenario					
	1	2	3	4	5	6
Survey indicators						
Business-related services - employment expectations		2	2	1	1	1
Retail trade - intentions of placing orders	10	3	3	2	2	2
Business-related services - activity expectations	1	1	1	4	5	5
Business-related services - trend in activity		5	4	7	8	6
Consumer survey - expectations for unemployment in Belgium		6	8	5	6	9
Business-related services - general demand expectations	2		6			
Consumer survey - expecations for saving of households (with 1 lag)	3	9	10			
Retail trade - assessment of the level of stocks	4	10				
Business-related services - price expectations (with 1 lag)	5					
Hard data						
Turnover in services		7		3	3	3
Work volume of temporary workers					4	4
Lagged dependent		4	5	6	7	7

Private consumption	Data scenario					
	1	2	3	4	5	6
Survey indicators						
Retail trade - trend in prices (with 1 lag)	4	1	1	1	4	4
Consumer survey - expectations for unemployment in Belgium	3	7	6	3	6	5
Consumer survey - expectations for the financial situation of households		5	5	5	9	
Retail trade - employment expectations	7		3		10	
Retail trade - assessment of sales				4		
Consumer survey - expectations for the economic situation in Belgium			4			
Retail trade - price expectations (with 1 lag)	2	3	10			
Retail trade - assessment of the level of stocks	6	4				
Consumer survey - expectations for saving of households	5	10				
Retail trade - trend in prices	1					
Hard data						
Turnover in retail trade			7		3	1
Work volume of temporary workers				7	1	2
Registration of new private cars	8	5	8	6	7	10
Lagged dependent		2	2	2	2	3

Employment in the private sector	Data scenario					
	1	2	3	4	5	6
Survey indicators						
Manufacturing industry - assessment of total order book		2	2	1	1	1
Manufacturing industry - employment expectations	4	3	3	2	2	2
Retail trade - intentions of placing orders		9	4	3	3	3
Civil engineering and roadworks survey - trend in amount of work to be done	8	7	7	5	5	5
Manufacturing industry - assessment of export order book	1	1	1			
Manufacturing industry - demand expectations (with 1 lag)			5			
Construction - trend in activity		5				
Manufacturing industry - demand expectations	2					
Civil engineering and roadworks - trend in number of contracts concluded	3					
Hard data						
Unemployed job seekers	5		8	6	6	6
Lagged dependent		4	6	4	4	4