# What do business surveys tell us about the position of the economy in the business cycle?

- Knowing the position of the economy in the business cycle is important for implementing economic policy. It makes it possible, for example, to draw up a medium-term growth scenario: an overheating economy is likely to slow down whereas a demand deficient economy could beat its potential growth rate. Similarly, it makes it possible to identify the structural component of the general government balance and the efforts needed to achieve structural fiscal balance.

- The position of the economy in the business cycle is often identified by the output gap, which cannot be measured with certainty. The output gap tracks the surplus or lack of demand, relative to the economy's potential output.

- Estimates by international organisations showed that the output gap remained negative on average in the leading European economies in 2017, but to varying degrees. This seems consistent with the lack of inflationary pressures, but is difficult to reconcile with the production capacity constraints that some major European economies have experienced.

- This paper presents an approach that is complementary to the ones international organisations use to estimate the output gap, and which relies solely on survey data about production capacity constraints. The findings of this "direct" approach are less likely to be revised than the results of more conventional methods. Therefore, these findings may supplement those of the standard analysis and provide real-time information about the position of the economy in the business cycle.

- However, this complementary approach does not account for structural factors, such as changes in prices, wages or unemployment rates, which are used by the standard approaches to assess how fully factors of production are utilized. Furthermore, the direct approach cannot help to interpret the past potential growth path, nor forecast a medium-term one. This makes interpreting the output gap level a delicate exercise.

- If we are to believe the indicators showing increasing pressure on production capacity in Germany and France, and, to a lesser degree, in Spain, these economies are further along in the business cycle than the international organisations' estimates seem to show.

- This method is not intended to replace the existing methods, but to provide a broader range of tools for tracking phases in the business cycle. It could be used as a robustness check of standard estimates and to enhance short-term economic analysis.

Estimates of the major euro-area economies' output gaps using the direct approach
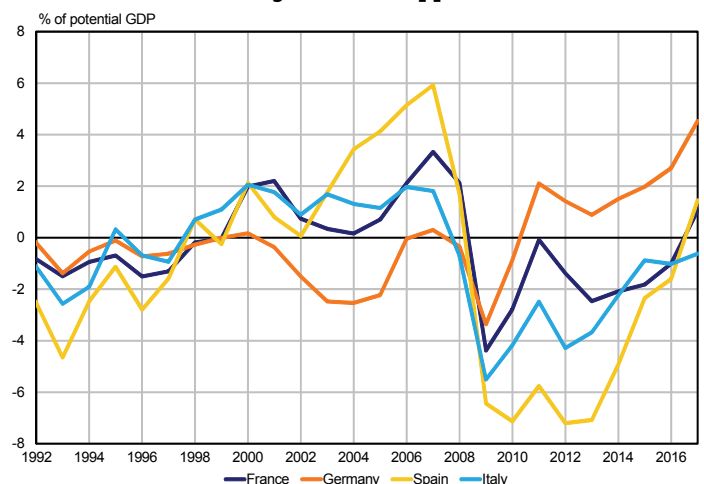
Source: European Commission, DataInsight, DG Trésor estimates.

1. Business surveys provide information about the position of the economy in the cycle, which is a key element for economic analysis

1.1 The position of the economy in the cycle cannot be observed directly or measured with certainty

The position of the economy in the cycle is generally identified by the output gap. Potential GDP is defined as the level of output that the economy can sustain with full utilisation of its production capacity and without increasing inflation. Potential growth, meaning the potential GDP growth rate, corresponds to balanced growth that can be sustained in the long term without economic strain, particularly inflationary pressure. However, observing economic growth does not enable us to discern this sustainable trend, since short-term shocks cause gaps between demand and the level of potential supply. The excess or lack of demand compared to potential supply is called the output gap. It is expressed as percentage points of potential GDP and it indicates the position of the economy in the cycle. For example, a negative output gap can be used to assess the capacity for GDP growth to catch up, meaning that the economy would temporarily have to grow more quickly than its potential growth rate in order to close the output gap.

These variables are important tools for implementing economic policy, especially monetary policy and fiscal policy.[1] Knowing where the economy is in the business cycle enables us to steer public finances by breaking down the fiscal balance into cyclical and structural components. The structural balance is the balance that would be observed with GDP at its potential level. For example, with a negative output gap, the growth rate is below its potential level and government revenues decrease. In this case the cyclical balance is negative and the structural balance is larger than the actual balance.

However, since these variables are not directly observable, the usual estimates are surrounded by uncertainty. The conventional approach involves deriving the output gap from potential growth estimates, but estimates vary

significantly depending on the details of the methods used.[2] More specifically, the various international organisations' estimates are different. For example, in the case of Spain, the estimates for 2017 range from −3.0 percentage points of GDP (according to the OECD's November 2017 estimate) to −0.2 percentage points of GDP (according to the European Commission's May 2018 estimate, see Chart 1).

Chart 1: Different institutions' output gap estimates for the major European economies in 2017
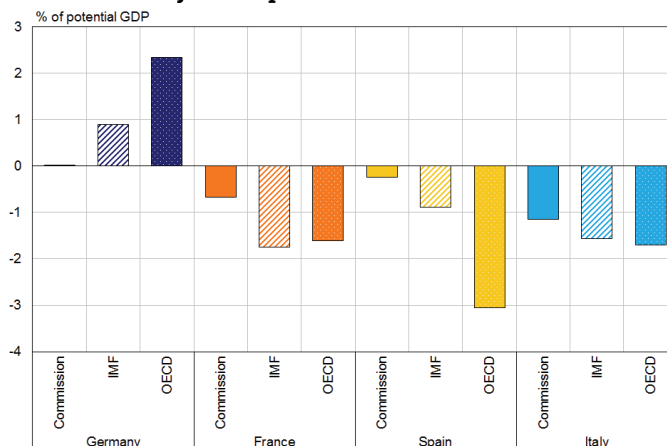
Source: European Commission (May 2018 forecast), IMF (April 2018 forecast), OECD (November 2017 forecast).

Subsequent revisions may also be consequential[3], because of (i) revisions of national accounts, most often for the recent past; (ii) smoothing filters used by the estimation methods, where results at the end of the period depend heavily on the latest available data and may be substantially revised when new data are included.[4] Therefore, the position of the economy in the cycle at the end of the estimate period is very likely to be revised and it is surrounded by great uncertainty. This is particularly problematic since the most recent data points are the most important for implementing economic policy. For example, the European Commission's estimate in the spring of 2008 showed that France had a slightly negative output gap in 2007, whereas this gap is now estimated at +2.9

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(1) The European Commission's estimates for potential growth rate and the output gap, for example, are used for fiscal surveillance in the euro area. See Guyon, T. and S. Sorbe (2009) « Solde structurel et effort structurel : vers une décomposition par sous-secteur des administrations publiques », DGTPE *Working Paper* No. 2009/13.

(2) The potential growth rate underpinning France's budget bill and Stability Programme has also been estimated using a conventional approach. See Herlin, A. and A. Gatier (2017), "Potential growth in France", *Trésor Economics* No. 206 and Lequien, M. and A. Montaut (2014), « Croissance potentielle en France et en zone euro : un tour d'horizon des méthodes d'estimation », Insee *Working Paper*, G2014/09.

(3) See Grigoli *et al.* (2015), "Output gap uncertainty and real-time monetary policy", IMF, *Working paper* N° 15/14.

(4) Forecasting errors stemming from the use of medium-term forecasts to extrapolate the most recent observed data and to restrict the edge effect of statistical filters could also be a major source of estimates' revisions.

percentage points of GDP. However, such large discrepancies are exceptional (see Chart 9 below).

1.2 Indicators of capacity constraints are closely correlated to the cyclical position of the economy

In addition to the standard output gap measurements, the cyclical position of the economy can also be approximated by short-term indicators that show a relationship with the business cycle. Business surveys, especially the quarterly surveys published by the European Commission, provide information about current level of capacity utilisation and factors that businesses report as restricting the growth of their production[5] (insufficient demand, labour shortages, equipment and/or material shortages, financial constraints, other factors, absence of production constraints). These indicators describe demand and supply[6] pressures on production capacity in the different business sectors (manufacturing, services, construction). These cyclical variables are highly volatile, but historically, they are strongly correlated with the output gap (see Charts 2 to 4 for France). These variables provide helpful information

about the position of the economy in the cycle, since production capacity constraints generally appear at the peak of the economic cycle and suggest that production cannot accelerate sustainably to meet growing demand.

Chart 3: Insufficient demand by business sector and output gap of the French economy
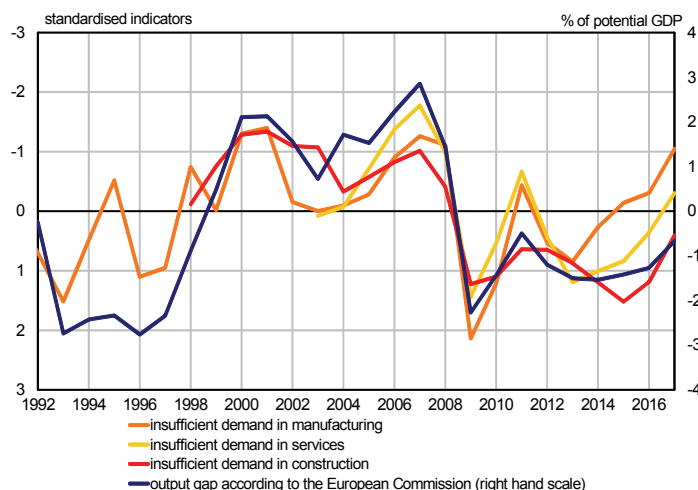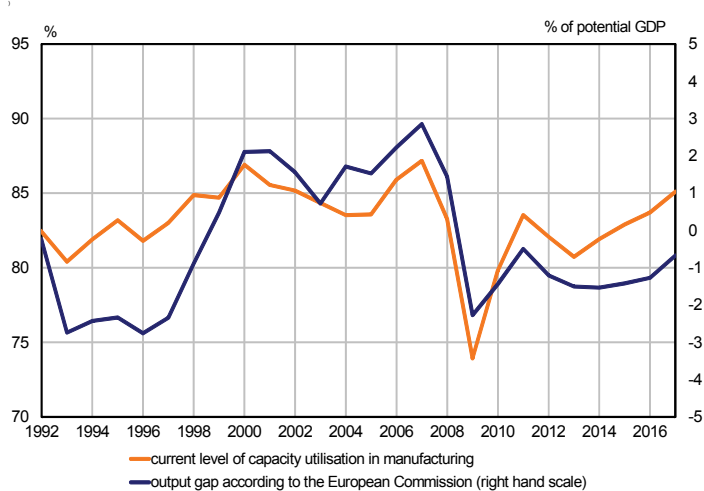
Source: European Commission, DataInsight.

Chart 2: Labour shortages by business sector and output gap of the French economy
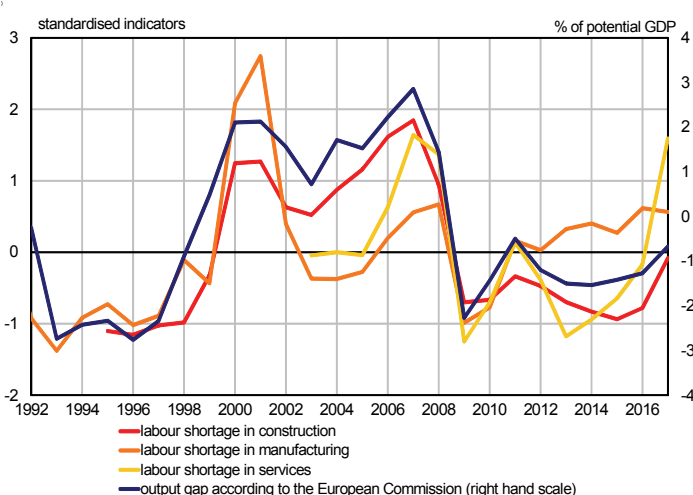
Source: European Commission, DataInsight.

Chart 4: Current level of capacity utilisation and output gap of the French economy

Source: European Commission, DataInsight.

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(5) The question is, "are you currently prevented from raising your production to the desired level because of" the factors cited. Respondents are distinguished by their business sector and offered a choice of six answers. The survey findings for each of the six answers are published as a percentage of the total respondents in each business sector. The result can be more than 100%, since respondents may choose more than one answer.

(6) Demand constraints correspond to the share of respondents reporting insufficient demand as a drag on their production. Supply constraints lump together the share of respondents reporting labour shortages, shortages of equipment and/or material, other factors or financial constraints. The economy is deemed to be under pressure when supply constraints are strong and demand deficiency is weak.

2. Growing pressure on production capacity according to business surveys indicates a more advanced cyclical position of several European economies than international organisations' estimates show

2.1 The "direct" approach indicates a more advanced cyclical position in Germany, France and, to a lesser extent, in Spain in 2017 than the standard approach does

The European Commission's business surveys have shown significant growing pressure on production capacity since the middle of 2016 in Germany, France and, to a lesser extent, Spain.[7] The survey data track supply constraints that restrict businesses' capacity to meet increasing demand. These constraints point to a substantial rise of labour shortages in the different business sectors (manufacturing, services, construction).

Germany's current level of capacity utilisation in manufacturing stood at 87% at the end of 2017, matching the levels seen in 2006 and 2007. Labour shortage indicators have been above their mean value since 2011, hitting historic highs, with 21% of manufacturers, 27% of service businesses and 16% of construction businesses reporting lack of personnel as a factor limiting production in October 2017. In contrast, the percentage of businesses constrained by a lack of demand has continued to drop sharply since 2013.

In France, labour shortages affected 10% of manufacturers, 20% of service businesses and 26% of construction businesses in October 2017. The current level of capacity utilisation in manufacturing stood at 85%, which is higher than the long-term mean of 83% since 1991, but still lower than the historic peak reached at the end of 2007. At the same time, the number of businesses in the three sectors reporting insufficient demand has fallen by 10% on average since the middle of 2016. The number of businesses coping with supply constraints is now greater than the number of businesses coping with demand constraints. Such a situation has not been seen since the 2000-2001 and 2007-2008 periods.

In Spain, all three business sectors are also coping with increasing pressure on production capacity, but not to the same extent as in France and Germany: 7% of manufacturers, 6% of service businesses and 6% of construction businesses report labour shortages as a factor limiting production. The current level of capacity utilisation in manufacturing stood at 79% at the end of 2017, which is still lower than the historic peak in the middle of 2007, and more than a third of businesses are still coping with insufficient demand.

The "direct" method recently used in the literature[8] makes it possible to estimate the output gap from business survey data (see Box 1). Even though the direct approach is very different from the standard approach used by the European Commission, which relies on a production function, the results of each method on past data are fairly consistent. But in 2017, the direct-approach estimate shows the German, French and Spanish economies at more advanced phases in the cycle than the European Commission's conventional estimates do (see Charts 5, 6 and 7).

Chart 5: Direct-approach and conventional-approach output gap estimates in Germany
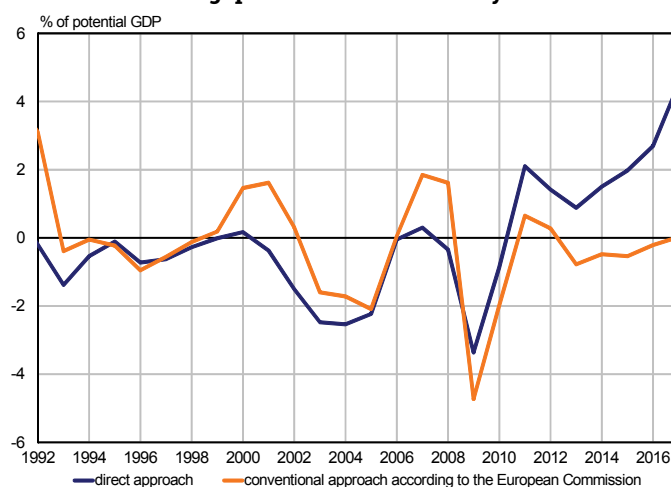
Source: European Commission, DataInsight, DG Trésor estimates.

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(7) See Insee (2017) "France keeps up the pace", Conjoncture in France, December, and Boisset, L., L. François, C. Hentzgen, J. Lecumberry and Y. Osman (2018), "World economic outlook in spring 2018: growth still strong", *Trésor Economics* No. 218.
(8) See Pybus, T. (2011), "Estimating the UK's historical output gap", Office for Budget Responsibility, *Working paper* No. 1, and Lequien, M. and A. Montaut (2014), op. cit.

Box 1 : Estimating the output gap with the direct approach

The direct approach is a statistical method intended to estimate the output gap directly from business cycle indicators, with no modelling of dynamic relations between economic variables. It differs from standard output gap estimation methods, which usually identify the output gap from a potential GDP estimate that relies on the use of a production function. The direct approach avoids the use of statistical smoothing filters and ad hoc judgments about the impact of the crisis on potential growth: this is accounted for directly by the impact of the crisis on the survey data. The method relies on principal component analysis (PCA), which uses a set of correlated variables to summarise the information in a smaller number of dimensions called principal components. When applying this method to a set of indicators linked with the position in the business cycle, the first principal component extracted is the linear combination of the indicators that accounts for the greatest variance of these cyclical indicators. This linear combination is assumed to provide a good direct estimate of the output gap. This assumes that the output gap is the foremost common determinant of the indicators.

This method is implemented using only the balances of opinion[a] from European business surveys. These surveys are made up of national surveys, which makes it possible to implement the method in nearly all of the European Union countries. The panel of indicators chosen relies on the use of a small number of variables. These variables are chosen for their correlation to the output gap, and not to GDP growth. They are chosen for the information they provide about surplus and insufficient demand in various markets, such as the labour market and the market for goods and services, and in the different business sectors (manufacturing, services, construction). The panel is made up of seven indicators: current level of capacity utilisation in manufacturing, the three balances of opinion about labour shortages limiting production in manufacturing, services and construction, and the three balances of opinion about insufficient demand limiting production in each of the three sectors. The first principal component[b] extracted accounts for more than half of the variability of the indicators (see Table).

The standardised resulting series[c] is expressed as an annual mean, then is rescaled to be quantitatively comparable to standard output gap estimates by adjusting the mean and variance over the period to match the European Commission's output gap estimate used as a benchmark[d]. This analysis was performed for the period from 1991 to 2017[e].

Ultimately, this method is not intended to provide a single output gap estimate by replacing the existing methods. It cannot be used to forecast the potential growth path in the medium term, since there is no way of forecasting future business survey data. However, it could be use as a robustness check of international organisations' estimates and to enhance short-term economic analysis.
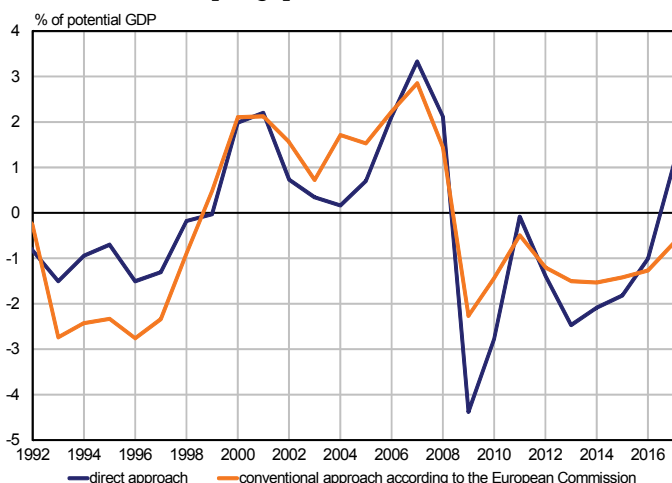
Table 1: Coefficients (weights) of indicators in first PCA axis

	France	Germany	Spain	Italy
Current level of capacity utilisation in manufacturing	0.42	0.27	0.43	0.43
Insufficient demand in manufacturing	−0.41	−0.28	−0.43	−0.40
Insufficient demand in services	−0.39	−0.43	−0.41	−0.36
Insufficient demand in construction	−0.37	−0.39	−0.40	−0.39
Labour shortages in manufacturing	0.28	0.43	0.35	0.39
Labour shortages in services	0.38	0.39	0.40	0.37
Labour shortages in construction	0.38	0.42	0.13	0.28
Share of the variance accounted for by the first principal component	64%	58%	57%	55%

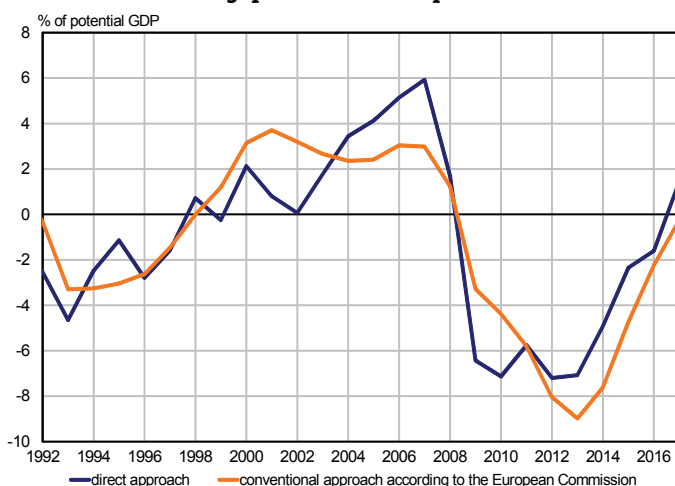*Source: European Commission, DataInsight, DG Trésor estimates.*

a. All of the survey data are standardised beforehand. In contrast to the Office for Budget Responsibility (2011) and INSEE (2014), we have excluded real variables (such as the unemployment rate, wages and prices) from the estimate, because they contribute little to determining the first principal component. Furthermore, real variables are more likely to be revised than survey data are.

b. The number of components chosen has little impact on the results, which are similar to those of the alternative solution estimated using the information from the first three components. These components are weighted by the regression coefficients of European Commission's output gap estimate (used as a benchmark) against them.

c. Not all of the balances are available since the early 1990s. In particular, business surveys in the service sector did not start until 2003. This leads to the assumption that the missing data are equal to zero, which assumes that these balances are at their long-term level. The results are very similar to the alternative solution used by the OBR and INSEE, which incorporate a wider estimated series prior to 2003 using a second estimate obtained from a reduced panel of indicators that excludes the service indicators. This makes it necessary to rely on hypotheses about the linking process for the principal components when the number of variables in the PCA increases.

d. The results from running the regression of the extracted series against the benchmark output gap are similar.

e. The latest available business survey data are from the fourth quarter of 2017.

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Chart 6: Direct-approach and conventional-approach output gap estimates in France

% of potential GDP

direct approach
conventional approach according to the European Commission

Source: European Commission, DataInsight, DG Trésor estimates.

2.2 Both approaches show that the output gap is still closing relatively slowly in Italy

In contrast to the other major countries in the euro area, Italian businesses' constraints stemming from labour shortages have been relatively stable under their historic average. Fewer than 3% of businesses in each of the three sectors report labour shortages affecting production, despite increasing demand and the rise of the capacity utilisation rate to 78% in manufacturing at the end of 2017. The absence of pressure on production capacity in Italy suggests that the country's GDP is still below its potential level. The direct-approach estimate of the position of the Italian economy in the business cycle is relatively consistent with the European Commission's estimate in 2017 (see Chart 8).

Chart 7: Direct-approach and conventional-approach output gap estimates in Spain

% of potential GDP

direct approach
conventional approach according to the European Commission

Source: European Commission, DataInsight, DG Trésor estimates.

Chart 8: Direct-approach and conventional-approach output gap estimates in Italy

% of potential GDP

direct approach
conventional approach according to the European Commission
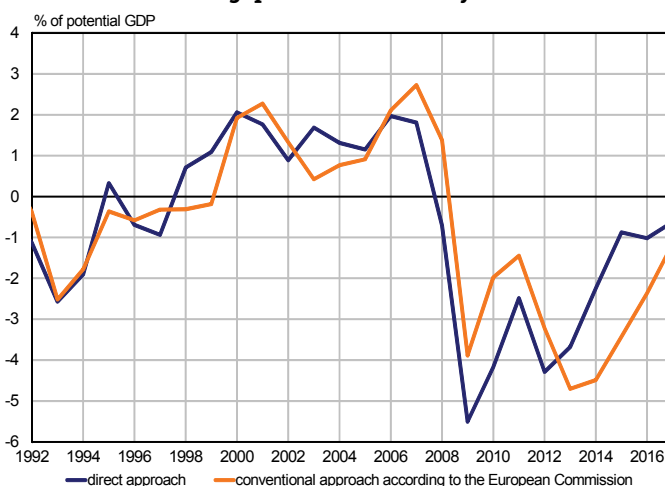
Source: European Commission, DataInsight, DG Trésor estimates.

3. In contrast to standard approaches, using survey data provides a real-time estimate of the position of the economy in the cycle

3.1 The direct-approach results are relatively robust at the end of the period

The direct approach proposed here relies solely on survey data. Consequently, it is not affected by revisions of national accounts or the edge effects of statistical smoothing procedures. Therefore, it has the advantage of providing a relatively robust output gap estimate at the end of the period, since it is very rarely revised when new observations become available.

However, there are still:

(i) two reasons for revising the source data: the inclusion of late responses to business surveys in the balances of opinion, which leads to a revision during the following quarter, and the revision of seasonal adjustment coeffi-

cients for the balances of opinion, which, in principal, has little impact on the annual averages;

(ii) two reasons for revising related to statistical procedures: revisions of the Commission's output gap estimates, which are used as benchmarks, and revisions of the PCA coefficients over time.

The impact of the latter two is small because of the limited variation of the mean and variance of the European Commission's estimate used to rescale our data, and the limited variation of the PCA coefficients. This can be illustrated using a pseudo real-time analytical framework (see Box 2).

The pseudo real-time estimate is very similar to the current estimate (see Chart 9). This confirms that the results found using the direct approach are relatively robust.

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Box 2 : Applying the direct approach in pseudo real-time

Pseudo real-time analysis consists of applying the direct approach using the information available on a given date. The results are then compared to the conventional real-time approach results available on the same date. Then they are compared to the "definitive" results, meaning the European Commission's application of its conventional approach to all of the ex post information available in May 2018. This enables us to identify the information provided by the direct approach on that date. The direct approach is applied to all of the available survey data at the end of fourth quarter of each year N from 2004 to 2017, which means running a succession of principal component analyses[a]. Then, each first principal component is rescaled using the conventional benchmark estimate available on the same date for the year N. This is the European Commission's estimate published in the spring[b] of the year N+1 (see Chart 9). The final series of direct-approach pseudo real-time estimates provides the output gap for each year N that is estimated in the spring of the year N+1.

In the case of France, the mean absolute difference between the pseudo real-time estimate and the "definitive" estimate by the European Commission stood at 0.7 points from 2004 to 2017. The mean absolute difference between the European Commission's conventional real-time estimates and

its "definitive" estimate available in May 2018 came to 1.5 points.

Chart 9: Direct-approach pseudo real-time output gap estimates and conventional-approach real-time output gap estimates in France
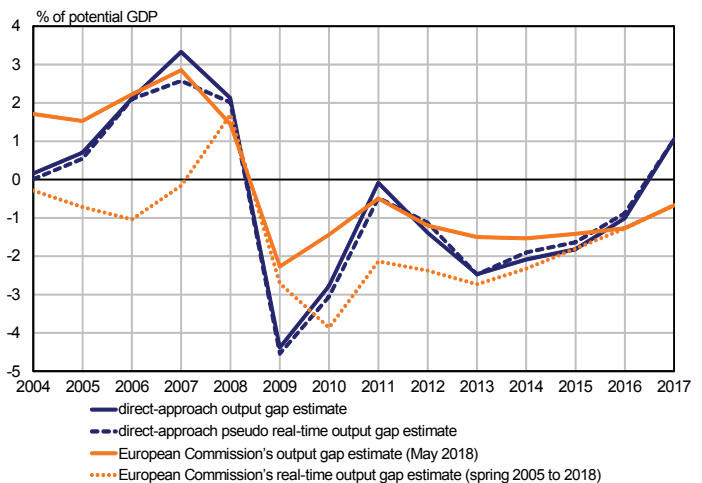
Source: European Commission, DataInsight, DG Trésor estimates.

How to read this chart: According to the European Commission's 2008 spring estimate, the 2007 output gap stood at −0.2 percentage points of GDP and according to the pseudo real-time direct-approach, the output gap stood at +2.6 points in 2007. The European Commission's estimate for 2007 now stands at +2.9 points.

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a. The lack of survey data, particularly for the service sector, means that estimates for the period prior to the crisis are less accurate. However, the pattern shown by the results has been confirmed by an estimate that excludes these indicators.
b. The European Commission's spring estimate has the advantage of factoring in the new annual national accounts for the year N, which are published at the end of May in the year N+1 in France's case.

3.2 The direct approach seems to anticipate coming revisions of conventional estimates

The direct approach seems to anticipate coming revisions of the European Commission's output gap estimates. In the past, the results of the pseudo real-time direct approach seem to be more in line with the European Commission's current estimates than its past estimates are (see Chart 9). In the case of France, the past estimates were not in line with the surveys, particularly in 2007 and 2011, but they have been revised since then. Furthermore, the direct-

approach estimate shows that the 2009 output gap was wider than shown by the European Commission's estimate.

The results of the pseudo real-time estimates show that the method seems to perform relatively well at detecting turning points in the cycle compared to standard output gap estimation approaches. Furthermore, the business survey data are available at the end of the first month of each quarter, several months earlier than the European Commission's output gap estimate published in the spring of year N+1. This makes it possible to obtain a closer to real-time estimate of the position of the economy in the cycle.

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4. However, the direct approach makes it difficult to measure the output gap precisely and cannot be used to measure potential growth

Using survey data to identify the position in the economic cycle with the direct approach has its limitations. First of all, the method depends on the modeller's choice of variables, the period considered and the rescaling benchmark. The results would be different using the OECD or IMF estimates as benchmarks.[9] Consequently, there is still uncertainty about the precise measurement of the output gap level. Variations in the estimated output gap provide helpful information that is comparable to conventional estimates.

In addition, the method does not account for headline or underlying inflation or for wage dynamics, which are conventionally considered when assessing the full utilisation of factors of production in an economy. The current paradox of persistent low underlying inflation in the leading European economies, combined with a closing of negative output gaps, as demand picks up and unemployment falls, is keeping European central bankers on high alert.[10] But inflation and wages may be affected by other factors than supply and demand, such as commodity prices, economic policy (indirect taxes, statutory minimum wage)[11], globalisation or sticky wages and prices. In addition, a flatter Phillips Curve[12] indicates a weakening link between wages or prices and the business cycle. Analysing inflation to identify the position of the economy in the cycle is a complex exercise and the choice made under the direct approach is to use other supplementary data about the business cycle. Finally, it must be stressed that this method cannot be used to calculate potential growth. If we use the estimated output gap and actual growth to derive potential growth, the resulting series would be too bumpy.

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(9) The estimated level may change when another benchmark (OECD or IMF) is used to rescale the estimate, but the conclusions do not change: the output gap estimated using the direct approach indicates a more advanced cyclical position than that estimated by the international organisations in the case of France, Germany and Spain, whereas it is in line with the international organisations' estimates in the case of Italy.

(10) Mario Draghi stressed the uncertainty surrounding the potential output growth path at the press conference held on 8 March 2018. See also "Scars that never were? Potential output and slack after the crisis", speech by Benoît Cœuré, member of the Executive Board of the ECB, at the CEPII 40th Anniversary conference, Paris, 12 April 2018.

(11) See for example, Jégou, N. and A. Testas (2013), "In the Eurozone, why is inflation not lower in the countries most affected by the crisis?" Insee, *Conjoncture in France*, March.

(12) See Bara, Y.E., J.B. Bernard, T. Blaize, B. Campagne, L. François and Y. Osman (2017), "Why is global inflation still so low?", *Trésor Economics* No. 208.

https://www.tresor.economie.gouv.fr/Articles/tags/Tresor-Economics

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