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Economic Research
Global Data Watch
May 20, 2016

J.P.Morgan

Economic Research Note

Nowcasting the Euro area business cycle and GDP

- **Nowcasting can be used to gauge the underlying state of the economy or to track GDP**
- **We propose a framework that does both and compare it to our current method; both methods perform well**
- **All nowcasters point to downside risk in 2Q16**

Nowcasting refers to the use of high-frequency economic information, such as surveys and official activity data, to update our understanding of the underlying state of the economy and/or where GDP is likely to print. In terms of technique, nowcasting can be done in a variety of ways, including traditional bridging equations and dynamic factor models (DFM). But, either way, it is important to be clear about the objective of any given nowcaster: is it designed to provide an estimate of the underlying state of the economy or to track current quarter GDP? The former is likely to be quite smooth, while the latter will likely be affected by noise in the data and by temporary distortions, which policymakers and financial markets may want to look through. In this note we lay out our approach to nowcasting in both of these ways and expand our toolkit to include a nowcaster based on a dynamic factor model.

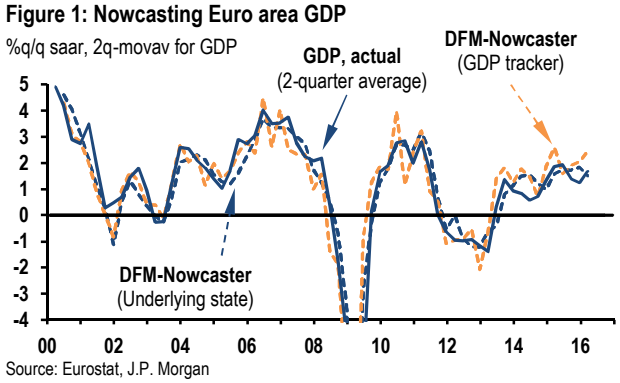
Introducing a new nowcaster

Nowcasting tries to address a key problem in business cycle analysis, namely that the broadest measure of economic activity, GDP, is published with a long lag and only at a quarterly frequency. Fortunately, more timely indicators are available at a monthly frequency in the form of business and consumer surveys, and official activity data (e.g., IP, retail sales). It is the information content of these indicators that nowcasting techniques exploit.

Dynamic factor models are particularly well suited to this task. J.P. Morgan first applied a version to the global economy in Lupton et al. (2012), following the work of Stock and Watson (1991). In general terms, this technique has a number of useful features. First, it creates a single indicator that summarizes the co-movement across a range of growth indicators (e.g., the PMI, IP) and can be seen as a measure of the underlying "state of the economy". Second, it provides a framework for interpreting and forecasting the high-frequency growth indicators. In particular, each growth indicator is decomposed into the part related to the common component and the part unrelated to it, and both of these are then projected forward in a unified framework. This is useful because it allows judgments to be made about growth in, for example 2Q16, when many monthly indicators for even April are not available yet. Third, the Kalman filter can be applied to the dynamic factor model, providing an attractive framework for processing "news". When IP becomes available for April, this actual value is compared to what the Kalman filter had previously predicted. The "surprise" is then used to update the estimate and forecast of the common and idiosyncratic components of the growth indicators. In practice, a PMI surprise is given a much larger weight than a surprise in the noisier car registrations data.

These results can be linked to GDP in a separate second step. As noted above, the objective can be to obtain a measure of the underlying state of the economy or a contemporaneous GDP tracker. If the objective is to derive an estimate of the underlying state, it is more appropriate to regress GDP only on the common component. If the objective is to track GDP, then GDP can be regressed on both the common component and on some of the idiosyncratic parts of the growth indicators. For example, this noisy part of IP may not say much about the "underlying state of the economy", but it may nevertheless help to track where current-quarter GDP will print. Figure 1 shows that the nowcaster measuring the underlying state correlates closely with a two-quarter average of GDP growth, while the nowcaster designed to track contemporaneous GDP is less smooth.

Figure 1: Nowcasting Euro area GDP

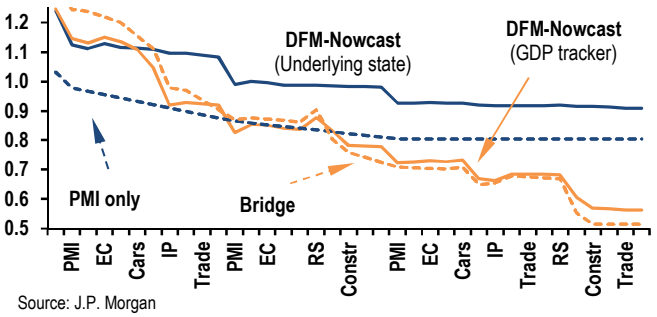


Source: Eurostat, J.P. Morgan

The impact of the different growth indicators on the nowcaster depends not only on how closely they reflect the co-movement across all indicators, but also on the order in which the data becomes available. For example, if the PMI surprises on the upside, the Kalman filter adjusts the forecasts for the other variables, reducing the subsequent "surprises". The fact that the PMI is the first data report in a given month amplifies its impact in improving the current-quarter GDP forecast (i.e. reducing the root mean squared error (RMSE) of the current-quarter GDP forecast). This is especially true when only the common component is considered (Figure 2). Figure 2 also shows that the accuracy of the current-quarter

GDP projection by the nowcaster designed to track GDP improves very significantly as more data becomes available for the current quarter. Once all information has become available for a quarter, the RMSE falls to around 0.55%-pts annualized, implying that it provides a significantly more accurate prediction than the one obtained with the nowcaster designed to gauge the underlying state of the economy.

Figure 2: RMSE of tracking Euro area GDP across data vintages
%-pt, %q/q ar, average RMSE from 1Q11 to 4Q15



Source: J.P. Morgan

A comparison with the current toolbox

Nowcasting based on the dynamic factor model is attractive because it interprets, forecasts and updates the whole system in a unified way. But, it is not necessarily more accurate than other approaches. Until now we have relied on two alternative methods. First, we have used the PMI as a timely gauge of the underlying state of the economy. And, second, we have used a multivariate bridge equation to project the GDP print. The bridge equation simply estimates a simple linear regression of the form: GDP = $\alpha + \beta$*IP + γ*Retail Sales + …, where all variables are in %q/q and only five variables are used overall.

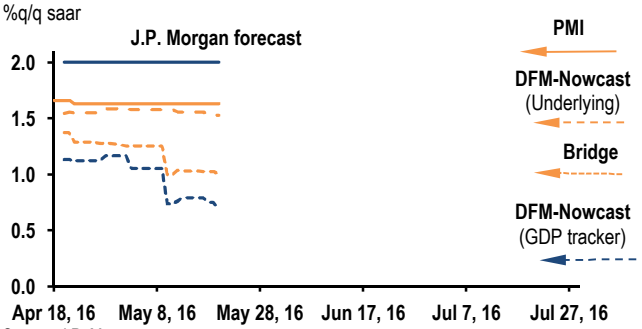
Yet to be released data points can be filled in for these PMI and bridge models. We tend to assume that the PMI simply remains stable at the latest value. And, in the bridging model, we can use simple time series models to predict the various inputs (e.g., IP). These models can even exploit the correlations across variables, for example by predicting %m/m IP not only with its own lag but also with the manufacturing PMI. Figure 2 shows that these two approaches perform well when compared to the computationally much more complex dynamic factor approach. We draw a number of conclusions:

- **Trust the PMI**. The PMI remains the single best advance indicator of current-quarter GDP. When no information is available for the current quarter, the value of the PMI in the last month of the previous quarter is the single best predictor of current GDP. However, it is also useful to monitor the nowcaster of the underlying state of the economy, as we use some adjustments to improve the GDP-PMI regression, such as controlling for the 2011-12 sovereign crisis, when sectors of the economy that are not covered by the PMI were particularly weak.
- **Lean towards PMI until the second month.** Eventually, as more data becomes available for the current quarter, the DFM-based GDP tracker and the bridge model catch up and overtake the PMI in terms of tracking current quarter GDP. The catch-up point is reached when the official activity data becomes available for the last month of the prior quarter. And, at first sight, these approaches edge ahead of the PMI when official activity data are available for the first month of the quarter. But, Figure 2 is based on the data as currently reported and therefore does allow for the fact that the data have been revised since their initial release. The impact of revisions, which are much larger for official activity data than for surveys, implies that the DFM Nowcast and Bridge tracker are less accurate in real time than Figure 2 suggests. Hence, we suspect that the GDP tracking approaches start to significantly outperform the PMI only when official activity data for the second month of the quarter have become available. This is consistent with the approach we have used: relying on the PMI for most of the quarter, to both gauge the underlying pace of growth and to track GDP, and switching to the bridge equation quite late in the quarter.
- **Combining the approaches**. We are inclined to continue relying mainly on the PMI for gauging the underlying state of the economy and for helping to track GDP early in the quarter. But, for tracking GDP later in the quarter, we are inclined to use both the bridging model and the DFM tracker. It will be important to monitor their performance in real time though, especially in response to data revisions.

Where are we "now"?

As we have noted, the PMI points to 1.6% ar growth at present, below our 2% official growth forecast. The two trackers (DFM and bridge) are even weaker, suggesting that 2Q16 growth is currently tracking around 1%q/q saar. But it is too early to put much weight on this projection.

Figure 3: Tracking Euro area 2Q16 GDP growth over time
%q/q saar



Source: J.P. Morgan

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