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# Recently Asked Questions

MA by IHS Markit versus Fed Trackers                    December 20, 2017

*How does the accuracy of your GDP tracking compare to that of the Atlanta Fed's GDPNow and the New York Fed's Nowcasting Report?*

*There is a relatively short period over which all three can be compared directly, but over this period, our GDP tracking is more accurate than both.*

## Background

GDP tracking is the practice of using incoming high-frequency data to adjust one's forecast of current-quarter GDP growth in the month's leading up to BEA's "advance" estimate. We have been publishing our GDP tracking dating back to 1998 and, as a result, have a long and established track record. Beginning in July 2014, the Atlanta Fed began publishing a GDP tracker called "GDPNow."[1] In April 2016, the New York Fed began publishing a GDP tracker in their "Nowcasting Report."[2] In this RAQ, we compare the forecasting performance of these Fed trackers to ours.[3]

## Brief Overview of Methodologies

There are similarities and differences among the methodologies employed in the three trackers highlighted in this RAQ. GDPNow employs a dynamic factor model to (i) extract a single common factor from over 120 monthly indicator series and (ii) project the common factor into the forecast months. The projected common factor is used to project monthly indicator series into the forecast months. Estimated bridge equations then translate projected quarterly growth of the monthly indicator series to projected quarterly growth of GDP components.

The projected GDP components are then blended with projections from a Bayesian Vector Autoregression and aggregated up to a projection of GDP.[4]

The New York Fed nowcasting model is a mixed-frequency dynamic factor model which includes real GDP growth as one of the observed data series. In addition to real GDP, the NY Fed model includes 36 data series covering "hard" data on manufacturing, construction, consumption, income, and labor markets and "soft" data from surveys. The NY Fed's nowcast is the projection of GDP growth that comes out of the dynamic factor model.[5]

We use elements from both Fed methodologies. At the core of our approach is a high-level reproduction of BEA's methodology for producing estimates of GDP. That is, we (i) assemble much of the same monthly source data that BEA uses, (ii) project those monthly source data into the current quarter using a suite of monthly models and judgment, (iii) estimate GDP components using the projected monthly source data, and (iv) aggregate up to GDP in much the same way BEA does. Our methodology is similar to the Atlanta Fed's in that we both project monthly source data and aggregate up to GDP. Our approach is different from the NY Fed's in that they estimate GDP directly as a function of the common factors extracted from their panel; they do not aggregate up to GDP from projected GDP components.

What makes our approach *similar* to that of the NY Fed (and the Atlanta Fed) is that we have recently developed a dynamic factor model to aid us in our tracking. But

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[1] See https://www.frbatlanta.org/cqer/research/gdpnow.aspx.

[2] See https://www.newyorkfed.org/research/policy/nowcast.

[3] We compared our GDP tracker to GDPNow in "The Atlanta Fed's GDPNow and MA GDP Tracking," *Macroeconomic Advisers Macro Musing*, May 21, 2015 and in "The Atlanta Fed's GDPNow and MA GDP Tracking: An Update," *Macroeconomic Advisers Macro Focus*, November 5, 2015.

[4] A thorough exposition of GDPNow can be found on the GDPNow website noted above.

[5] The white paper is here: https://www.newyorkfed.org/research/staff_reports/sr830.

Please see the important disclaimer on the last page of this report.

rather than using our model to project GDP directly (as the NY Fed does), and rather than using solely our model to produce our assumptions for the monthly indicators (as the Atlanta Fed does), we use our model to assess the risks around our assumptions for the monthly source data that feed into our GDP projection. We run our dynamic factor model once a week and make adjustments to our monthly indicator projections to address and otherwise balance the risks identified by the dynamic factor model. Judgment and small-scale econometric models remain central to our tracking.[6]

## Measures of Forecast Accuracy

There are many ways to measure forecast accuracy. Each way at least implicitly weights forecast errors at every horizon with some weighting scheme. For example, one measure of forecast accuracy is the mean absolute one-day-out forecast error; i.e., the average absolute error of forecasts produced on the final business day prior to the release of GDP. This implicitly applies a weight of zero to forecast errors at longer horizons. Another example is the RMSE of the thirty-day-out forecast error, which implicitly assigns a weight of zero to forecast errors at every horizon other than thirty days.
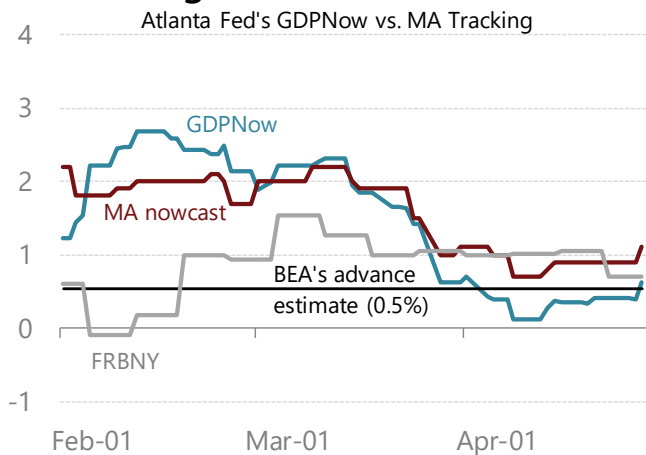
We think the best forecast is one that is correct at all forecast horizons. That is, if the advance estimate of GDP growth for a given quarter turns out to be 2.0%, the ideal forecast is one that is equal to 2.0% on every business day leading into the advance estimate. To this end, we consider the average absolute daily error, which is calculated as the average absolute difference between the advance estimate and the GDP tracking forecast on every business day leading into the advance estimate.[7]

Consider, for example, the chart above right, which shows, for the first quarter of 2016, our GDP tracking (MA Nowcast), the Atlanta Fed's tracking (GDPNow), and the New York Fed's tracking (FRBNY) on every business
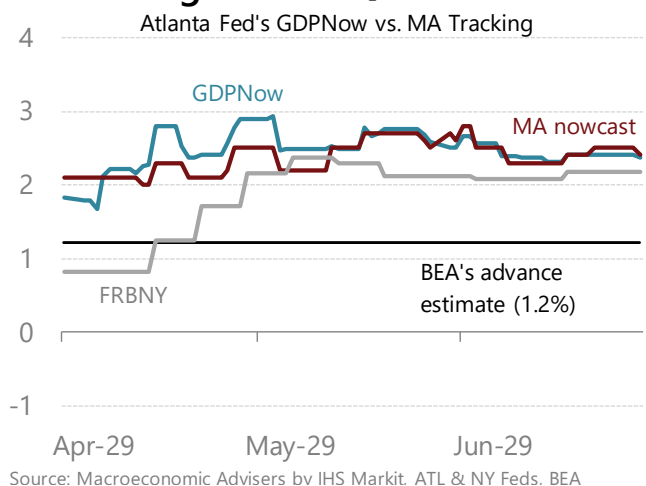
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[6] An exposition of our dynamic factor model and how we have integrated it into our GDP tracking can be found in "Introducing MA's Dynamic Factor Model," *Macroeconomic Advisers Macro Brief*, April 26, 2017 and in "MA's Dynamic Factor Model," *Macroeconomic Advisers Macro Focus*, May 18, 2017.

[7] This implicitly assigns equal weights to absolute daily errors throughout the period leading into the advance estimate.
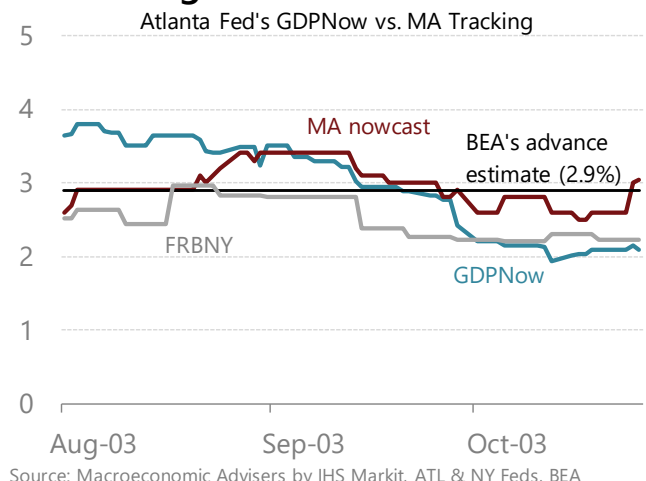
### Tracking of 2016:Q1 GDP Growth
Atlanta Fed's GDPNow vs. MA Tracking



Source: Macroeconomic Advisers by IHS Markit, ATL & NY Feds, BEA

### Tracking of 2016:Q2 GDP Growth
Atlanta Fed's GDPNow vs. MA Tracking



Source: Macroeconomic Advisers by IHS Markit, ATL & NY Feds, BEA

### Tracking of 2016:Q3 GDP Growth
Atlanta Fed's GDPNow vs. MA Tracking



Source: Macroeconomic Advisers by IHS Markit, ATL & NY Feds, BEA

day of the roughly three-month period leading into BEA's advance estimate.[8]  Also shown for reference is BEA's advance estimate.  We chose this (roughly) three-month window because this is the longest period over which all three trackers have projections for the first quarter of 2016.  Averaged over every business day in this period, the absolute difference between our GDP tracking and BEA's advance estimate was 1.0 percentage point, lower than the average absolute daily error of

GDPNow (1.1 percentage point), but larger than that of FRBNY (0.5 percentage point).  That is, by this metric, FRBNY performed best ... but this is just one quarter

## And the Winner Is ...

The remaining charts show the daily performance of the three trackers over the remaining quarters of this three-way comparison.[9]  The first three columns of Table 1 show the associated average absolute daily errors.  In four of the seven quarters when all three trackers were

### Tracking of 2016:Q4 GDP Growth
Atlanta Fed's GDPNow vs. MA Tracking



Source: Macroeconomic Advisers by IHS Markit, ATL & NY Feds, BEA
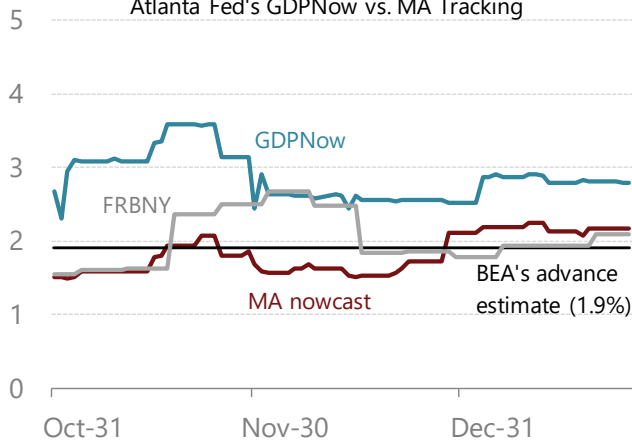
### Tracking of 2017:Q1 GDP Growth
Atlanta Fed's GDPNow vs. MA Tracking



Source: Macroeconomic Advisers by IHS Markit, ATL & NY Feds, BEA
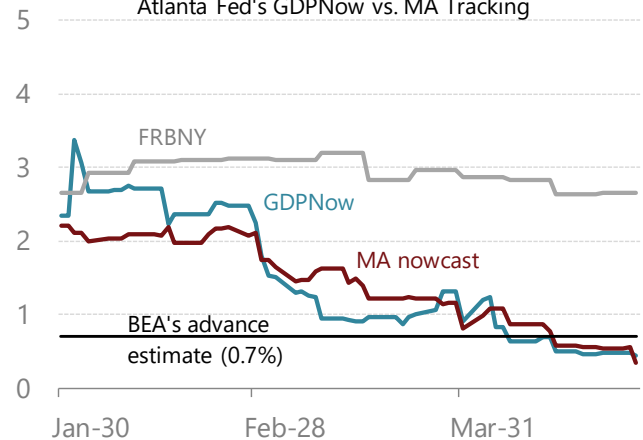
### Tracking of 2017:Q2 GDP Growth
Atlanta Fed's GDPNow vs. MA Tracking



Source: Macroeconomic Advisers by IHS Markit, ATL & NY Feds, BEA
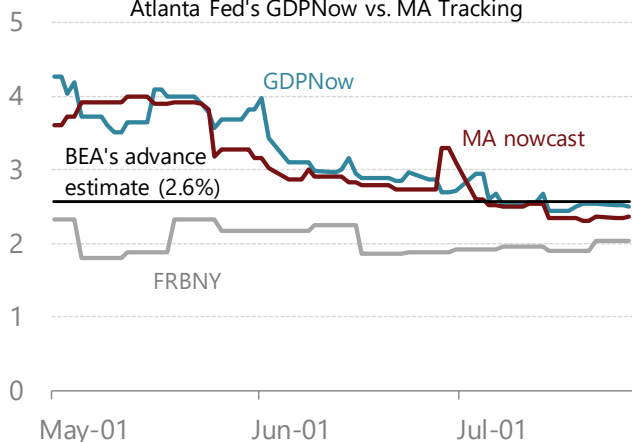
### Tracking of 2017:Q3 GDP Growth
Atlanta Fed's GDPNow vs. MA Tracking



Source: Macroeconomic Advisers by IHS Markit, ATL & NY Feds, BEA

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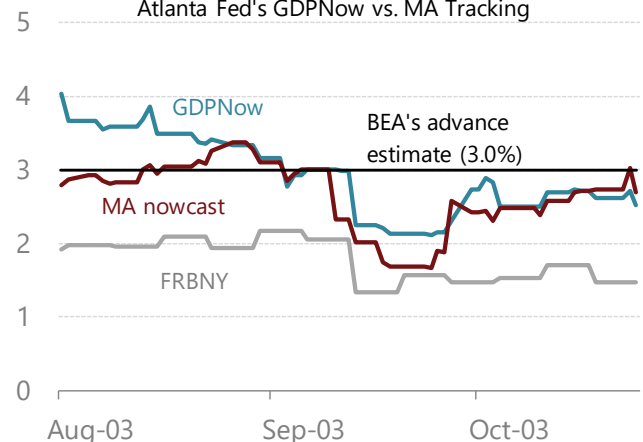
[8] Shown are the extant forecasts; i.e., the latest published forecast as of that business day.

[9] Because the New York Fed Nowcasting Report begins in the first quarter of 2016, this is as far back as we can go for a direct comparison of the three trackers.  However, we show comparisons with GDPNow dating back to the tracking for 2014:Q2 in the tables.  This is when GDPNow went live to the public.

live ('16:Q1 – '17:Q3), our average absolute daily error was the smallest of the three. In the other three quarters, the FRBNY was the smallest.

Also shown in Table 1 is the comparison to GDPNow since it has been live. In 11 of the 14 quarters, our average absolute daily error was smaller.[10]

Aggregating the absolute daily errors across quarters into a single (combined) average, our forecast performance is the best. Over the period since GDPNow has been live, the single, combined average absolute daily error of our GDP tracking was 64 basis points, 12 basis points lower than that of GDPNow (76 basis points). Over the period since FRBNY has also been live (since the first quarter of 2016), the single, combined average absolute daily error of our tracking was 64 basis points

(same as the larger sample), lower than GDPNow (83 basis points) and FRBNY (85 basis points). That is, on any given day, our tracking forecast can be expected to be closer to the mark than both GDPNow and FRBNY.[11]

While we don't think the measure is as important, some observers are interested in the one-day-out forecasting error; i.e., the final absolute error. In the sample covered here, there are only 14 observations common to our tracking and GDPNow and only 7 common to all three. Over the period common to our tracking and GDPNow, our average (combined) final absolute error is 44 basis points, below GDPNow (55 basis points). Over the shorter period common to all three, our average final absolute error is 35 basis points, below that of GDPNow (53 basis points) and even further below FRBNY (85 basis points).[12] By both measures investigated here, our

## Table 1: Average Absolute Daily Error

| | MA | GDPNow | FRBNY | Fed | All |
|---|---|---|---|---|---|
| | | | | \*Averages | |
| 2014 Q2 | 0.5 | 1.0 | | 1.0 | 0.8 |
| Q3 | 0.3 | 0.5 | | 0.5 | 0.4 |
| Q4 | 0.4 | 0.5 | | 0.5 | 0.4 |
| 2015 Q1 | 1.5 | 0.8 | | 0.8 | 1.2 |
| Q2 | 0.3 | 0.8 | | 0.8 | 0.5 |
| Q3 | 0.5 | 0.4 | | 0.4 | 0.3 |
| Q4 | 1.0 | 0.9 | | 0.9 | 0.9 |
| 2016 Q1 | 1.0 | 1.1 | 0.5 | 0.6 | 0.8 |
| Q2 | 1.2 | 1.2 | 0.8 | 0.9 | 1.0 |
| Q3 | 0.2 | 0.6 | 0.4 | 0.4 | 0.3 |
| Q4 | 0.3 | 1.0 | 0.3 | 0.5 | 0.3 |
| 2017 Q1 | 0.8 | 0.9 | 2.2 | 1.5 | 1.2 |
| Q2 | 0.6 | 0.6 | 0.5 | 0.3 | 0.3 |
| Q3 | 0.4 | 0.5 | 1.2 | 0.6 | 0.5 |
| **Combined** | | | | | |
| '14:Q2 - '17:Q3 | 0.64 | 0.76 | N/A | 0.70 | 0.64 |
| '16:Q1 - '17:Q3 | 0.64 | 0.83 | 0.85 | 0.71 | 0.66 |

\* Fed average comprises GDPNow only prior to 2016:Q1 and both Fed trackers from 2016:Q1 forward. All includes MA and GDPNow prior to 2016:Q1 and all three trackers from 2016:Q1 forward.

## Table 2: Final Absolute Error

| | MA | GDPNow | FRBNY | Fed | All |
|---|---|---|---|---|---|
| | | | | \*Averages | |
| 2014 Q2 | 1.0 | 1.3 | | 1.3 | 1.2 |
| Q3 | 0.1 | 0.8 | | 0.8 | 0.4 |
| Q4 | 0.7 | 0.9 | | 0.9 | 0.8 |
| 2015 Q1 | 1.2 | 0.1 | | 0.1 | 0.5 |
| Q2 | 0.3 | 0.1 | | 0.1 | 0.2 |
| Q3 | 0.1 | 0.4 | | 0.4 | 0.2 |
| Q4 | 0.3 | 0.3 | | 0.3 | 0.0 |
| 2016 Q1 | 0.6 | 0.1 | 0.2 | 0.1 | 0.3 |
| Q2 | 0.8 | 0.6 | 1.0 | 0.8 | 0.8 |
| Q3 | 0.1 | 0.8 | 0.7 | 0.7 | 0.4 |
| Q4 | 0.4 | 1.0 | 0.2 | 0.6 | 0.5 |
| 2017 Q1 | 0.2 | 0.5 | 2.0 | 0.7 | 0.4 |
| Q2 | 0.0 | 0.3 | 0.5 | 0.1 | 0.1 |
| Q3 | 0.3 | 0.5 | 1.5 | 1.0 | 0.8 |
| **Combined** | | | | | |
| '14:Q2 - '17:Q3 | 0.44 | 0.55 | N/A | 0.58 | 0.47 |
| '16:Q1 - '17:Q3 | 0.35 | 0.53 | 0.85 | 0.58 | 0.47 |

\* Fed average comprises GDPNow only prior to 2016:Q1 and both Fed trackers from 2016:Q1 forward. All includes MA and GDPNow prior to 2016:Q1 and all three trackers from 2016:Q1 forward.

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[10] All of the comparisons are based on unrounded data.

[11] In data going back to the tracking beginning with 2005:Q1, our average absolute daily error is 70 basis points.

[12] In data going back to the tracking beginning with 1998:Q4, our average final absolute error is 51 basis points.

forecasting track record is the best of the three high-lighted in this RAQ

## What About an Average Tracker?

We are often asked if averaging over the available track-ers produces a better forecast than any single tracker. Intuitively, this would be the case if individual tracking forecasts tend to distribute around BEA's eventual ad-vance estimate (some above, some below). In this case, the average would tend to be closer to the mark than each individual tracker. If instead tracking forecasts tend to cluster on one side of the advance estimate, the average of the trackers might turn out to be better than some individual trackers and worse than others.

To investigate this, we calculated two different average trackers: one comprising only the Fed trackers, and the other comprising all three.[13] The final two columns of Tables 1 and 2 show the forecasting performance of these two average trackers. The (combined) average absolute daily error of the average Fed tracker is about 70 basis points over both the shorter and longer sam-ples, which is better than each individual Fed tracker, but worse than ours. That is, averaging over the two Fed trackers produces a better forecast than each individual Fed tracker, but it does not produce a forecast as accu-rate as ours. A similar story holds when considering the performance of the one-day-out forecast (Table 2); our one-day-out forecast, on average, is better than the av-erage Fed forecast.[14]

Adding our GDP tracking to the average tracker im-proves upon the average Fed tracker, but it does not improve upon our tracking alone. The final column of Tables 1 and 2 shows the performance of this combined tracker. The average absolute daily error of this com-bined tracker is 64 basis points in the longer sample and 66 basis points in the shorter sample, an improvement over the Fed-only tracker, but not over ours. For the one-day-out forecast, our forecasting performance is somewhat better than the average tracker, especially in the more recent sample.

## Concluding Thoughts

Our tracking forecast for fourth-quarter GDP growth currently is 2.9%, below that of GDPNow (3.3%) and well below FRBNY (4.0%). At this point in the data cycle, our historical mean absolute forecasting error for current-quarter GDP growth is about 0.7 percentage point. This would suggest that an advance estimate of fourth-quarter GDP growth of 3.3% (i.e., the current GDPNow forecast) would not be too surprising; i.e., it would be within one mean absolute error of our forecast. Howev-er, an advance estimate of 4.0% would be close to two mean absolute errors above our forecast and would in fact be surprising. While we accept that the fact that both alternative trackers are above ours may suggest some upside risk to our forecast, given our comparative track records, we are comfortable with our forecast.

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[13] Prior to availability of the New York Fed's tracker, the aver-age Fed tracker is simply GDPNow. From 2016 forward, the average Fed tracker is the average forecast of GDPNow and FRBNY.

[14] What's different from the result for average absolute daily error is that the average one-day-out forecast of the average Fed tracker is worse than GDPNow alone.

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