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Some Background on GDPNow

-Pat Higgins

October 13, 2019

Note: The views expressed here are mine and do not necessarily reflect those of anyone else in the Federal Reserve System.

- GDPNow is a statistical model that nowcasts real GDP, and its subcomponents for the next quarter for which the BEA has not yet released a published GDP estimate.

- Real-time forecasts stored since August 2011; online forecasts have been posted since July 2014.

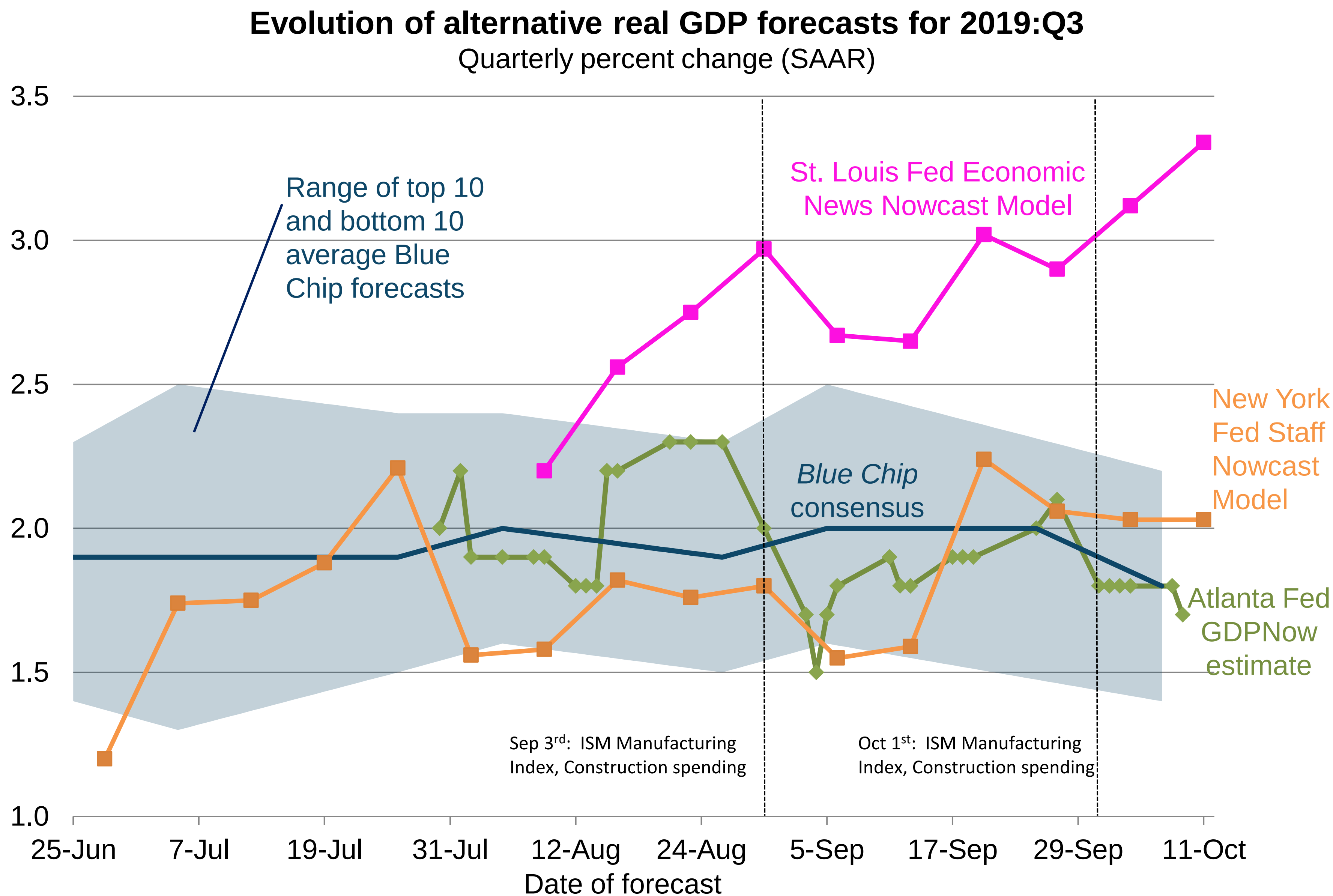
- Current/historical nowcasts available on the Atlanta Fed's website, along with a spreadsheet with all of the numerical details showing exactly how the most recent nowcast is built up.

Sources for GDP nowcasts

Source	Timing/frequency	GDP subcomponents	# of panelists	Individual forecasts available	Free?
Atlanta Fed GDPNow	13-14 updates a month; 6-7 releases a month	13 components (complete partition)	#N/A	#N/A	Yes
CNBC Rapid Update	About 12 releases per month	None	Between 5 and 10	No	Yes
Survey of Professional Forecasters (SPF)	Quarterly (70-75 days before GDP release)	7 components (complete partition)	40 to 45	Yes	Yes
Wall Street Journal Forecasting Survey	Middle of each month (77, 46 and 16 days before GDP)	None	About 70	Yes	Yes
Blue Chip Economic Indicators	10th of each month (77, 47 and 17 days before GDP)	Consumption, net exports, inventories.	About 50	No, but average of top and bottom 10 forecasts.	No
FRBNY Staff Nowcast (Model)	Every Friday	None	#N/A	#N/A	Yes
St. Louis Fed Economic News Index model nowcast	Every Friday	None	#N/A	#N/A	Yes

Other resources not listed: Blue Chip Financial Forecasts, Bloomberg Monthly Forecasting Survey, Consensus Forecasts (Monthly), Proprietary forecasts

GDPNow can differ significantly from other commonly used nowcasts of real GDP growth, though its forecasts of 2019:Q3 growth have been fairly similar to the *Blue Chip* survey consensus and the New York Fed model for much of the quarter. The GDPNow forecast fell 0.3 percentage points on the first business day of both September and October following sub-50 readings on the composite ISM Manufacturing Index.



Sources: Aspen Publishers, Federal Reserve Bank of Atlanta, Federal Reserve Bank of New York, Federal Reserve Bank of St. Louis and Haver Analytics.

The GDPNow nowcast ticked up on September 25 after several Census Bureau housing releases boosted the forecast of residential investment. It fell on October 1 after the model's dynamic factor, used to forecast yet-to-be released GDP source data, fell after a subpar ISM Manufacturing report. The construction spending release on the same day also fed into downgrades in the forecasts of structures investment with a partly offsetting increase in the government spending forecast.

Atlanta Fed GDPNow estimates for 2019: Q3, growth rates and changes

Date	Major Releases	GDP	PCE	Equip-ment	Intell. prop. prod.	Nonres. struct.	Resid. inves.	Govt.	Exports	Imports	Change in net exp.	Change in CIPI
30-Jul	Initial nowcast	2.0	2.6	5.6	6.5	-2.7	0.6	2.7	4.6	5.9	-22	-28
30-Aug	Adv Econ Indicators (8/29), GDP (8/29), Personal income and outlays	2.0	3.2	-0.5	6.3	-5.8	1.7	1.7	3.8	4.9	-19	-16
11-Sep	PPI, Wholesale Trade	1.9	3.1	-1.2	6.3	-7.1	1.7	1.5	3.2	5.0	-23	-9
12-Sep	CPI, Monthly Treasury Statement	1.8	3.1	-1.2	6.3	-7.1	1.7	1.2	3.2	5.0	-23	-10
13-Sep	Retail trade, Import/Export prices	1.8	3.1	-1.1	6.3	-7.0	2.9	1.2	3.1	5.1	-24	-11
17-Sep	Industrial production	1.9	3.1	-0.6	6.3	-6.8	3.6	1.2	3.5	5.5	-26	-11
18-Sep	Housing starts	1.9	3.1	-0.5	6.3	-6.8	5.3	1.2	3.5	5.5	-26	-11
19-Sep	**Existing-home sales**	**1.9**	**3.1**	**-0.5**	**6.3**	**-6.8**	**5.2**	**1.2**	**3.5**	**5.5**	**-26**	**-11**
25-Sep	**New-home sales/prices/costs**	**2.0**	**3.1**	**-0.5**	**6.3**	**-6.9**	**7.4**	**1.2**	**3.5**	**5.5**	**-26**	**-11**
27-Sep	**Adv Econ Indicators (9/26), GDP (9/26), Pers Inc/PCE, Adv dur manuf, NIPA underlying detail**	**2.1**	**2.6**	**0.3**	**6.3**	**-7.0**	**7.4**	**1.2**	**2.7**	**4.9**	**-25**	**7**
1-Oct	**ISM Manufacturing Index, Construction spending**	**1.8**	**2.5**	**-0.1**	**6.3**	**-12.2**	**4.5**	**1.5**	**2.5**	**4.7**	**-25**	**7**
2-Oct	Light vehicle sales (10/1)	1.8	2.6	0.2	6.3	-12.2	4.5	1.5	2.5	4.7	-25	7
3-Oct	M3-2 Manufacturing, ISM Nonmanufacturing Index	1.8	2.6	-0.2	6.3	-12.2	4.5	1.5	2.4	4.6	-25	4
4-Oct	Employment situation, Foreign trade (Total goods)	1.8	2.6	-1.2	6.3	-12.1	4.7	1.7	2.8	5.1	-26	5
8-Oct	PPI, Foreign trade (Svcs, Cap goods, 10/4)	1.8	2.7	-0.7	6.3	-12.0	4.9	1.8	2.3	4.9	-28	6
9-Oct	Wholesale Trade	1.7	2.7	-0.7	6.3	-12.0	4.9	1.8	2.3	4.9	-28	1
Maximum forecast of real GDP growth												
21-Aug	Existing-home sales	2.3	3.4	5.2	6.4	-5.9	2.9	1.7	4.1	5.6	-23	-25
Minimum forecast of real GDP growth												
4-Sep	International trade	1.5	2.8	-2.4	6.2	-7.4	0.5	1.3	2.7	4.4	-21	-15

Note: CIPI is "change in private inventories." Changes in net exports and CIPI are both in billions of 2012 dollars (SAAR). All other numbers are quarterly percent changes (SAAR). Table does not necessarily include all estimates for the quarter; see tab "TrackingHistory" in the online excel file for the entire history.

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This contributions table, posted to our website after each GDPNow update, shows that most of the decline in the nowcast on October 1 was concentrated in residential and nonresidential structures investment.

Atlanta Fed GDPNow estimates for 2019: Q3, contributions to growth

Date	Major Releases	GDP	PCE	Equip-ment	Intell. prop. prod.	Nonres. struct.	Resid. inves.	Govt.	Net exports	CIPI
30-Jul	Initial nowcast	2.0	1.78	0.33	0.30	-0.08	0.02	0.48	-0.33	-0.53
30-Aug	Adv Econ Indicators (8/29), GDP (8/29), Personal income and outlays	2.0	2.19	-0.03	0.29	-0.18	0.06	0.29	-0.29	-0.30
11-Sep	PPI, Wholesale Trade	1.9	2.09	-0.07	0.29	-0.22	0.06	0.25	-0.35	-0.18
12-Sep	CPI, Monthly Treasury Statement	1.8	2.09	-0.07	0.29	-0.22	0.06	0.21	-0.35	-0.18
13-Sep	Retail trade, Import/Export prices	1.8	2.07	-0.07	0.29	-0.22	0.11	0.21	-0.38	-0.21
17-Sep	Industrial production	1.9	2.09	-0.03	0.29	-0.21	0.13	0.22	-0.40	-0.21
18-Sep	Housing starts	1.9	2.09	-0.03	0.29	-0.21	0.19	0.22	-0.40	-0.21
19-Sep	**Existing-home sales**	**1.9**	**2.09**	**-0.03**	**0.29**	**-0.21**	**0.19**	**0.22**	**-0.40**	**-0.21**
25-Sep	**New-home sales/prices/costs**	**2.0**	**2.09**	**-0.03**	**0.29**	**-0.21**	**0.27**	**0.21**	**-0.40**	**-0.21**
27-Sep	**Adv Econ Indicators (9/26), GDP (9/26), Pers Inc/PCE, Adv dur manuf, NIPA underlying detail**	**2.1**	**1.79**	**0.02**	**0.29**	**-0.22**	**0.27**	**0.22**	**-0.40**	**0.13**
1-Oct	**ISM Manufacturing Index, Construction spending**	**1.8**	**1.71**	**0.00**	**0.29**	**-0.38**	**0.16**	**0.27**	**-0.39**	**0.13**
2-Oct	Light vehicle sales (10/1)	1.8	1.75	0.01	0.29	-0.38	0.17	0.27	-0.39	0.13
3-Oct	M3-2 Manufacturing, ISM Nonmanufacturing Index	1.8	1.74	-0.01	0.29	-0.38	0.16	0.27	-0.39	0.08
4-Oct	Employment situation, Foreign trade (Total goods)	1.8	1.77	-0.07	0.29	-0.38	0.17	0.31	-0.42	0.09
8-Oct	PPI, Foreign trade (Svcs, Cap goods, 10/4)	1.8	1.80	-0.04	0.29	-0.38	0.18	0.31	-0.45	0.12
9-Oct	Wholesale Trade	1.7	1.80	-0.04	0.29	-0.38	0.18	0.31	-0.45	0.01
Maximum forecast of real GDP growth										
21-Aug	Existing-home sales	2.3	2.31	0.30	0.30	-0.18	0.11	0.30	-0.35	-0.47
Minimum forecast of real GDP growth										
4-Sep	International trade	1.5	1.91	-0.14	0.29	-0.23	0.02	0.23	-0.33	-0.28

Note: CIPI is "change in private inventories." All numbers are percentage-point contributions to GDP growth (SAAR). The table does not necessarily include all estimates for the quarter; see tab "ContribHistory" in the online excel file for the entire history.

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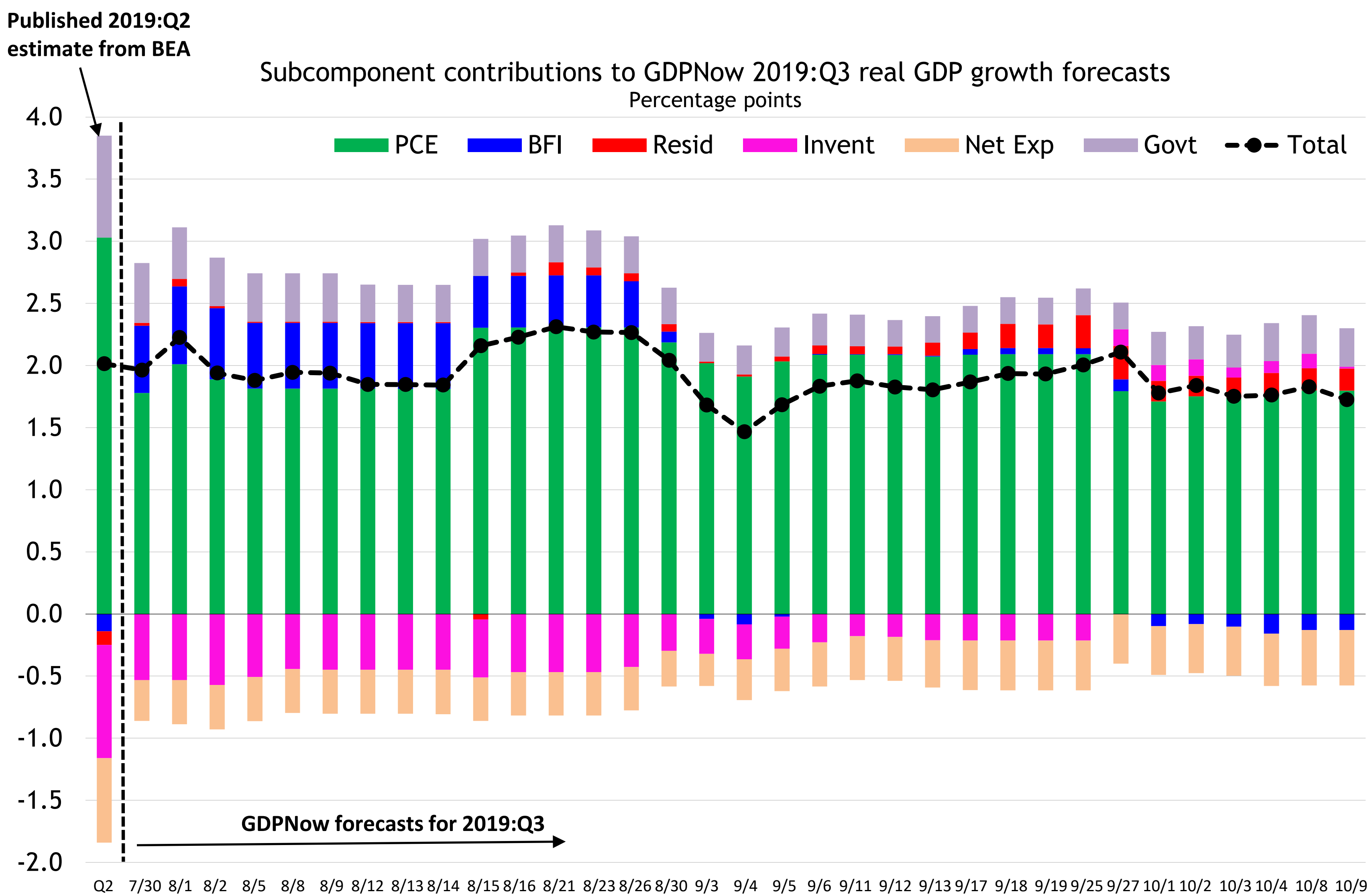
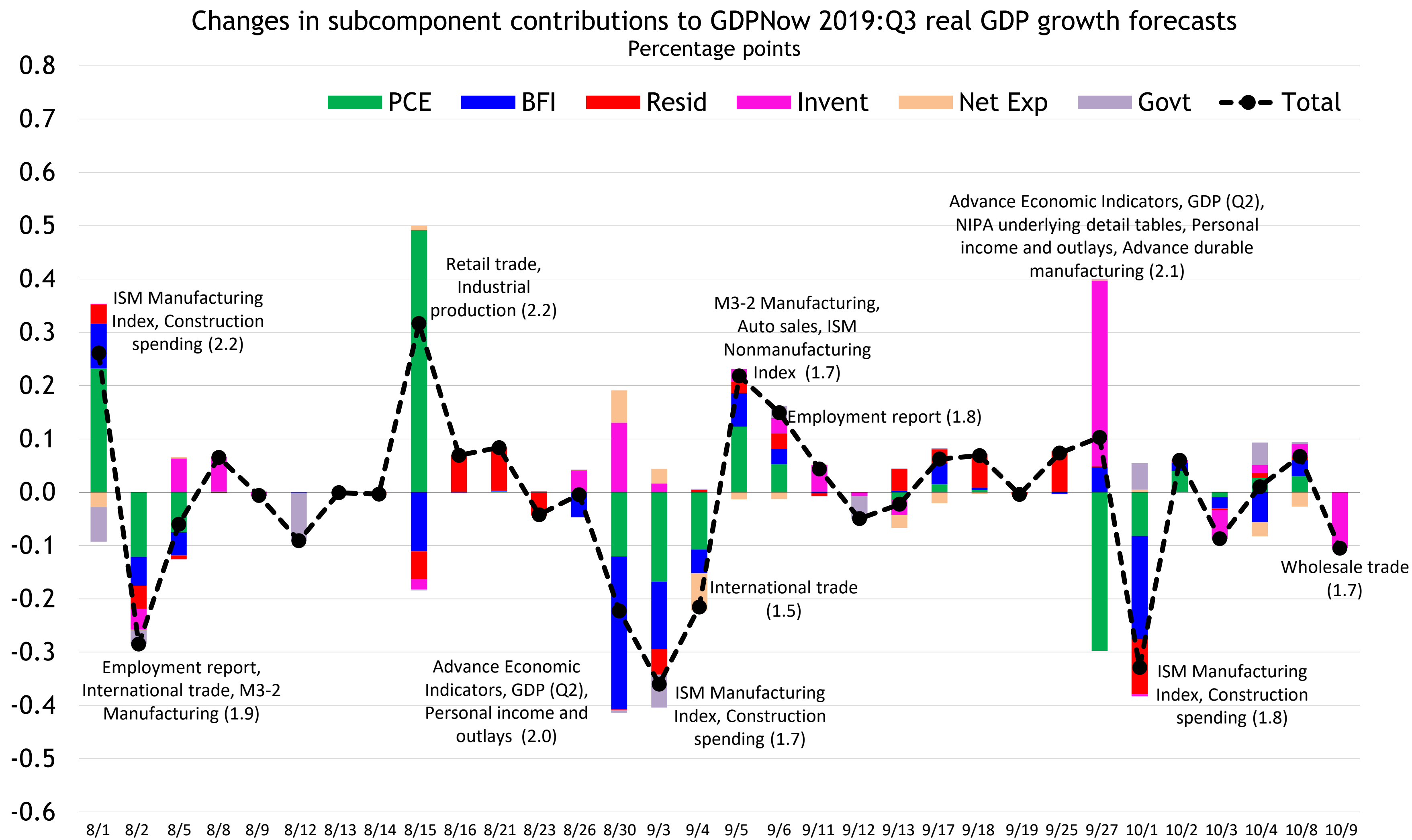
GDPNow forecasts of third-quarter real GDP growth have been fairly stable. Relative to the initial July 30th projection, a moderate drag from inventory investment is now forecasted to be neutral. And the modest boost from business fixed investment forecasted on July 30th is now projected to be a slight drag.



Sources: Bureau of Economic Analysis, Federal Reserve Bank of Atlanta, and and Haver Analytics.

The largest one day moves in the third-quarter GDPNow growth forecast were on August 15, when the change in the consumption contribution to GDP growth surged nearly ½ percentage point after the retail sales report and the 0.3 percentage point declines on September 3rd and October 1st following consecutive sub-50 readings on the composite ISM Manufacturing PMI.



Note: The real GDP growth forecast is indicated in parentheses after the indicated reports. The initial 2019:Q3 forecast was for 2.0% real GDP growth.

- Goal: Forecast 13 subcomponents that comprise GDP with much of the monthly "source data" that the BEA uses to form its estimates. Willing to sacrifice some internal model consistency for forecast accuracy.

- Borrows heavily from several approaches used in the nowcasting literature:

  - Factor models: [Stock and Watson (2002, JBES); Giannone, Reichlin and Small (2008, JME)]. GDPNow adapts their techniques to forecast the yet-to-be released monthly source data. The latter paper is one of the building blocks for the FRBNY Staff GDP Nowcasting model that uses a dynamic factor model to forecast GDP directly.

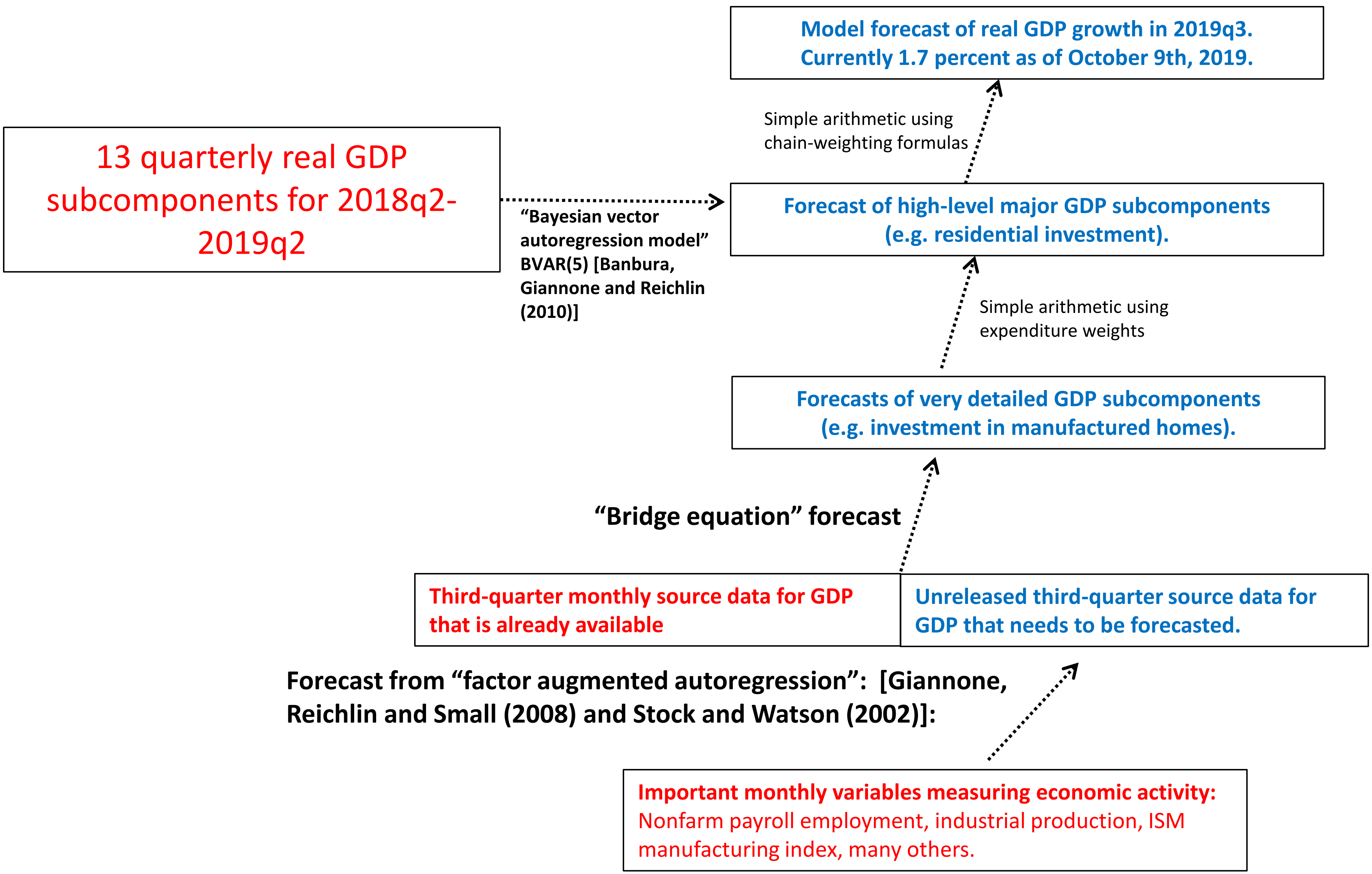
  - Miller and Chin (1996, FRB-Minn. Review): For most subcomponents, statistically combine a "bridge-equation" forecast that uses monthly GDP source data and a quarterly BVAR forecast that does not. The weight on each of the two models depends on the GDP subcomponent and how much monthly source data has been released.

Even though consumer spending comprises nearly 70% of GDP, the standard deviation of it's contribution to GDP growth since 2000 is lower than either inventory or total investment. Moreover the monthly data on consumer spending has a closer correspondence to its related GDP subcomponent than the monthly data on inventory investment does. These two facts imply that inventory investment is a larger source of GDPNow's forecast error than consumer spending.

Subcomponents of GDP forecasted by GDPNow

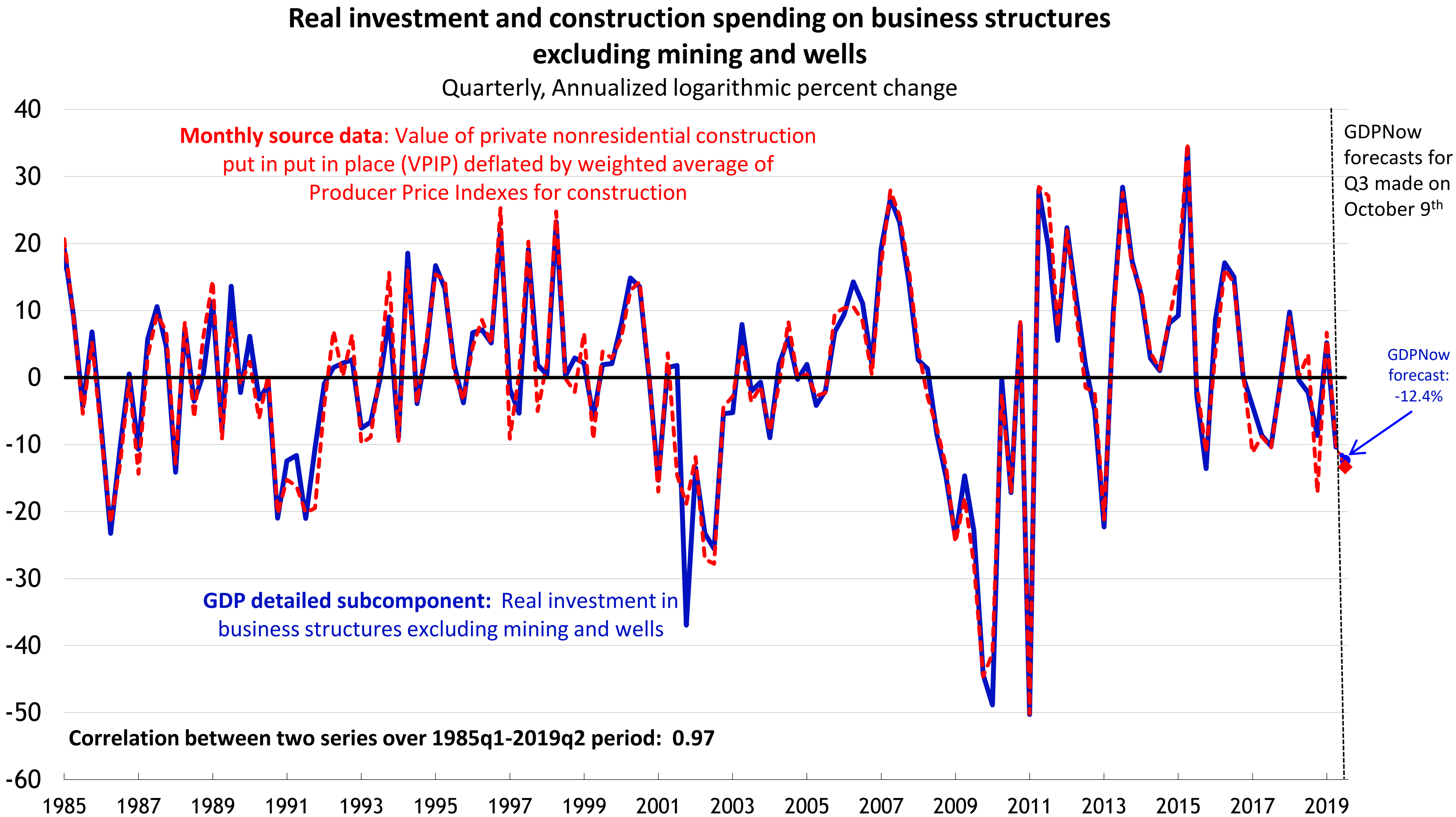
	Share of 2019:Q2 nominal GDP (%)	Standard deviation of contribution to quarterly GDP growth since 2000	Correspondence between monthly source data and GDP subcomponent	Selected monthly data releases used by GDPNow to forecast subcomponent
Real GDP	100.0	2.31		
Consumption	**68.0**	**1.21**		**Personal income and outlays**
Goods	21.1	0.85	Very High	**Retail sales**, CPI, Auto sales
Services	46.9	0.58	Very High	Retail food service sales, IP electric & gas utilities, Imports/Exports of travel services
Investment	**17.6**	**2.02**		
Business Fixed	13.5	1.01		
Structures	3.0	0.44	High	Construction spending, Oil drilling from Industrial production
Equipment	5.9	0.67	Medium	**Manufacturers' shipments**, Capital goods exports/imports, Producer Price Index
Intellectual Property Products	4.7	0.20	Low	Payroll employment in related industries
Residential	3.7	0.58	High	Housing starts, New/existing home sales, Construction spending, Selected retail sales
Change in Private Inventories	0.4	1.36	Medium	**Wholesale+retail+manufacturer inventories in various monthly reports**
Net Exports	**-3.1**	**0.89**	**Medium**	**Monthly foreign trade**, Import/Export prices
Exports	11.7	0.96		
Goods	7.7	0.81		
Services	4.0	0.28		
Imports	-14.8	1.25		
Goods	-12.0	1.16		
Services	-2.8	0.20		
Government spending	**17.5**	**0.51**		
Federal	6.6	0.37	Medium to Low	Treasury Statement, Fed. Govt. Employment
State+Local	10.9	0.30	Medium to High	S+L Government employment, Construction spending

High level flow chart of how GDPNow model forecast of real GDP growth is assembled.



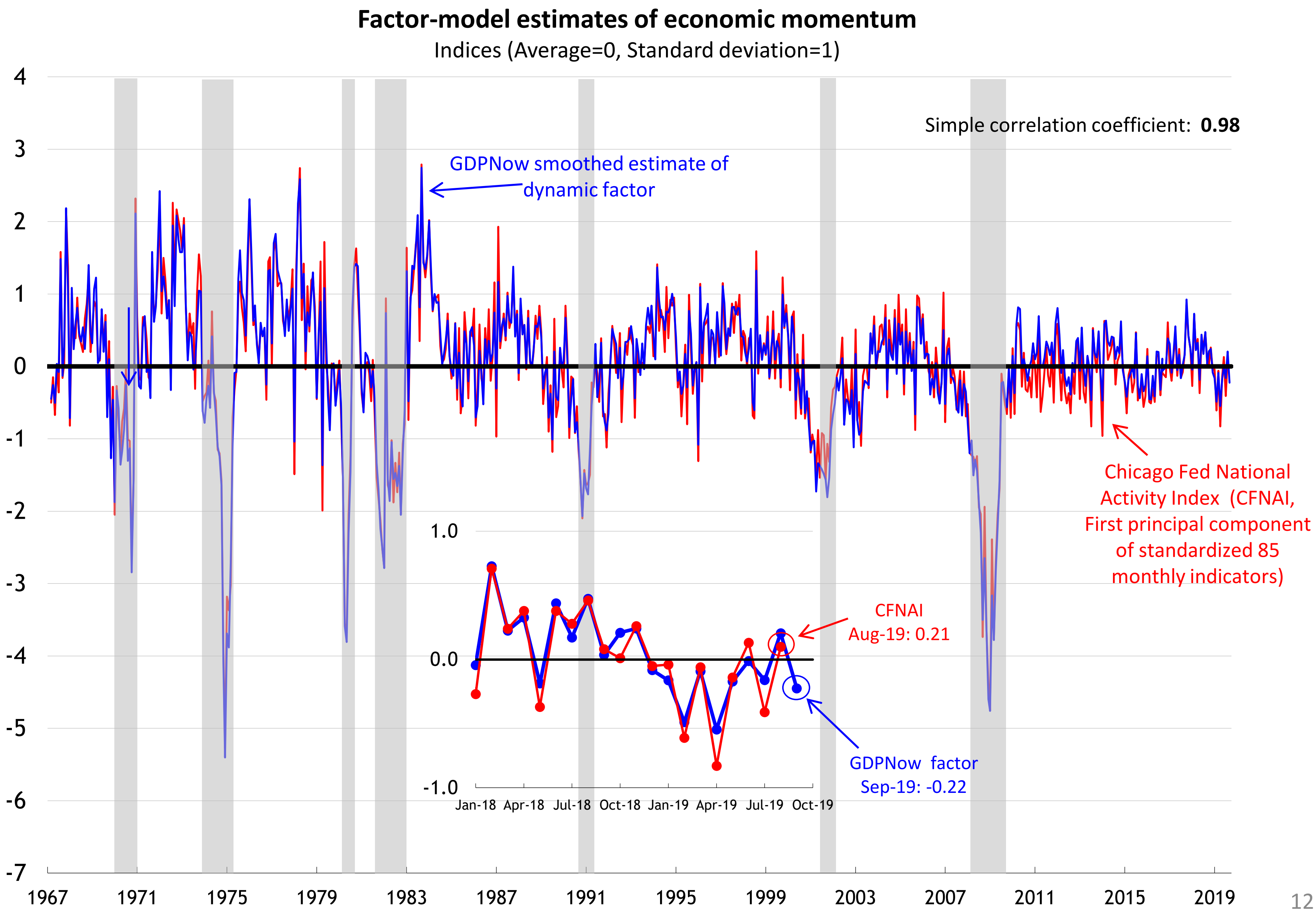
Note: The text in red are inputs to the model. The text in blue are outputs of the model.

The chart below illustrates that the growth rate for real business structures investment excluding mining and wells is very highly correlated with the growth rate constructed from the monthly source data. Since we get most of the latter before the first GDP release we can make a fairly accurate forecast of the former using a so-called simple "bridge equation".



Sources: Bureau of Economic Analysis, U.S. Census Bureau, Bureau of Labor Statistics and Haver Analytics.

GDPNow uses a dynamic factor – similar to the Chicago Fed National Activity Index (CFNAI) – to forecast yet-to-be released monthly GDP source data. Both factors are standardized to have mean 0 and standard deviation 1. The GDPNow estimate/forecast of the factor in September fell from to 0.01 to -0.40 on October 1 after the soft ISM manufacturing before rebounding to -0.23 after the employment report on October 4. The September factor will be revised further as additional data is released while the CFNAI for September will not be released until October 28th, just two days before the initial 2019:Q3 GDP release.



Sources: Federal Reserve Bank of Chicago, Federal Reserve Bank of Atlanta and Haver Analytics.

Dynamic factor model (Giannone, Reichlin and Small 2008): Estimated with PCA, OLS, Kalman filter/smoother

Example: October 9th forecast of real nonresidential structures excluding mining and wells

Sep-19: 0.04 Aug-19: -0.10 Jul-19: -0.43

Oct-19 Forecast: -0.06 [This will be needed when GDPNow forecasts Q4]

$$f_{t+1} = 0.39 f_t + 0.27 f_{t-1} + 0.16 f_{t-2} + u_{t+1}$$

[Factor Dynamics]

September 2019 value goes here (It's -0.22)

Factor augmented autoregressions (Stock and Watson 2002):

Forecast June's real value of private nonresidential construction put in place (VPIP)

$$1200\Delta\log(\hat{y}_t^{VPIPreal}) = 0.37 + 5.42 f_t + \sum_{j=1}^{4} \rho_j 1200\Delta\log(y_{t-j}^{VPIPreal})$$

Predicted growth rate for Sep-19: It's -2.0% SAAR. Cumulate to level.

Autoregressive coefficients sum to 0.21.

Bridge equation (Klein and Sojo 1989, Chin and Miller [Minneapolis Fed] 1996):

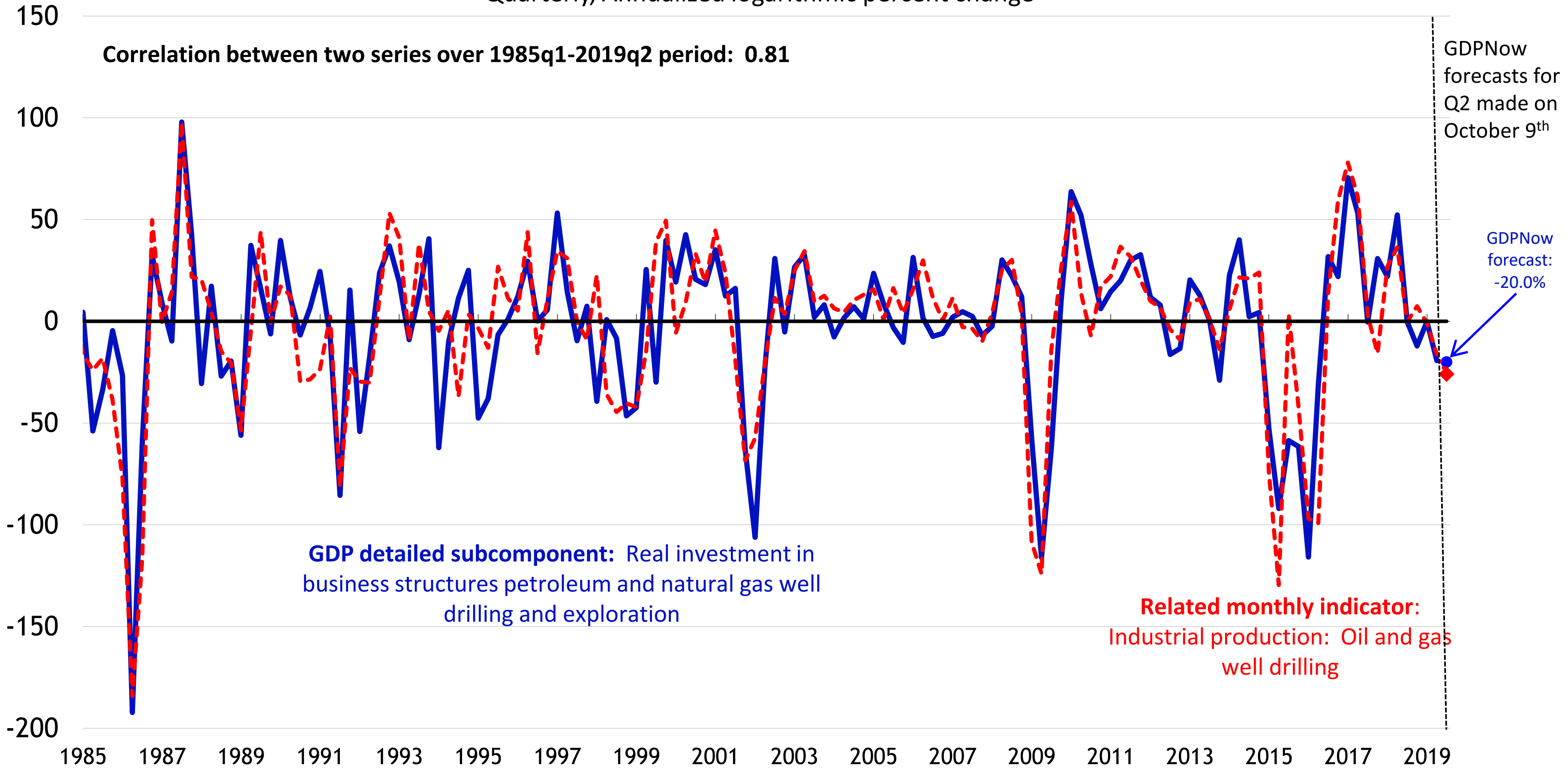
Predict 3rd quarter growth rate of real nonresidential structures investment excluding mining and wells

$$\underbrace{400\Delta\log(\widehat{INV}_{19q3}^{StrExMineWell})}_{-12.4 \text{ in } 2019q3} = 0.45 + 0.96\underbrace{\left[400\log\left(\frac{y_{Jul19}^{VPIPreal} + y_{Aug19}^{VPIPreal} + \hat{y}_{Sep19}^{VPIPreal}}{y_{Apr19}^{VPIPreal} + y_{May19}^{VPIPreal} + y_{Jun19}^{VPIPreal}}\right)\right]}_{-13.3 \text{ in } 2019q3}$$

The other important piece of nonresidential structures investment is oil and gas well drilling. The Fed's industrial production measure – based on active rotary rig counts from Baker Hughes – is usually a good proxy for the investment series. The BEA also uses proprietary drilling data from the American Petroleum Institute to estimate their investment series that GDPNow cannot use.

Real structures investment on petroleum and natural gas well exploration and IP oil and gas well drilling

Quarterly, Annualized logarithmic percent change



Sources: Bureau of Economic Analysis, Federal Reserve Board of Governors and Haver Analytics.

GDPNow is projecting third-quarter declines in both of the major subcomponents of nonresidential structures investment: petroleum and natural gas well exploration (drilling), and the part that is linked to the Census Bureau's monthly construction spending report released at the beginning of each month.

Pieces of real nonresidential structures investment forecast on October 9th

	A: Bridge Equation Model Forecast For 2019q3 (Annualized logarithmic growth rate)	B: 2019q2 expenditure share of nonresidential structures investment	Product of A and B
Total excluding mining and wells	-12.4	78.8%	-9.7
Monthly Source Data: "Real" private nonresidential construction put-in-place			
Petroleum and natural gas wells	-20.0	20.1%	-4.0
Monthly Source Data: Industrial production: Oil and gas well drilling			
Mining	23.8	1.1%	0.3
None used, forecast with simple statistical model using past values			

Sum of expenditure share weighted forecasts.

Weights, estimated by restricted least squares, must sum to 100%.

	C: Forecast for 2019q3, (Annualized logarithmic growth rate)	D: Model Weight	Product of C and D
Expenditure-share weighted sum of bridge equation forecasts	-13.5	93.8%	-12.68
Quarterly real GDP subcomponent from alternative BVAR model with past values of GDP subcomponents	-2.4	6.2%	-0.15
Weighted sum of forecasts (GDPNow model forecast)	**-12.8**		

Sum of model weighted forecasts.

Note: Annualized logarithmic growth rate is 400Δlog.

GDPNow forecasts of GDP subcomponents are a weighted average of a "bridge equation" forecast and a quarterly BVAR forecast. This is similar to the approach used by Miller and Chin (1996) from the Minneapolis Fed.

Model weights and forecasts for 2019q3 real GDP subcomponent growth rates

	October 9th					July 30th	
	Forecasts			Model Weights		Model Weights	
	Combined	Bridge Equations Model	Quarterly BVAR	Bridge Equations Model	Quarterly BVAR	Bridge Equations Model	Quarterly BVAR
Personal Consumption Expenditures							
Goods	5.9	6.0	5.1	1.00		1.00	
Services	1.2	1.2	2.9	1.00		1.00	
Gross private domestic investment							
Fixed nonresidential investment							
Equipment	-0.7	-1.3	2.9	0.85	0.15	0.82	0.18
Intellectural property products	6.1	6.2	5.9	0.58	0.42	0.35	0.65
Structures	-12.8	-13.5	-2.4	0.94	0.06	0.25	0.75
Residential investment	4.8	4.8	0.3	0.98	0.02	1.00	0.00
Inventory investment ($Bil 09)	70	79	29	0.82	0.18	0.51	0.49
Net exports							
Goods exports	3.5	3.7	3.2	0.62	0.38	0.40	0.60
Goods imports	5.0	4.3	6.0	0.62	0.38	0.40	0.60
Services exports	-0.1	-0.5	3.7	0.93	0.07	0.27	0.73
Services imports	3.8	3.7	6.1	0.93	0.07	0.27	0.73
Government spending							
Federal	2.8	2.8	3.3	0.91	0.09	0.72	0.28
State+local	1.1	1.1	1.8	0.95	0.05	0.87	0.13

Weights, estimated by restricted least squares, sum to 1.0.

The weights on the monthly "bridge equation" models generally go up as we approach the date of the GDP release.

Note: All forecasts are annualized quarterly log growth rates [400Δlog] except inventories.

The forecast error at time *t* is the difference between the actual and forecasted value

$$e_t = Actual_t - Forecast_t$$

Suppose there are *T* time periods

Two common measures of forecast accuracy

Average absolute forecast error:

$$\frac{1}{T}(|e_1| + |e_2| + \cdots + |e_{T-1}| + |e_T|)$$

Root Mean Square Forecast Error (RMSFE):

$$\sqrt{\frac{1}{T}[(e_1)^2 + (e_2)^2 + \cdots + (e_{T-1})^2 + (e_T)^2]}$$

A simple example

Actual Data	Forecasted Data
2	0
-6	0

Average absolute forecast error:

$$\frac{1}{2}(|2-0| + |-6-0|) = \frac{8}{2} = 4.0$$

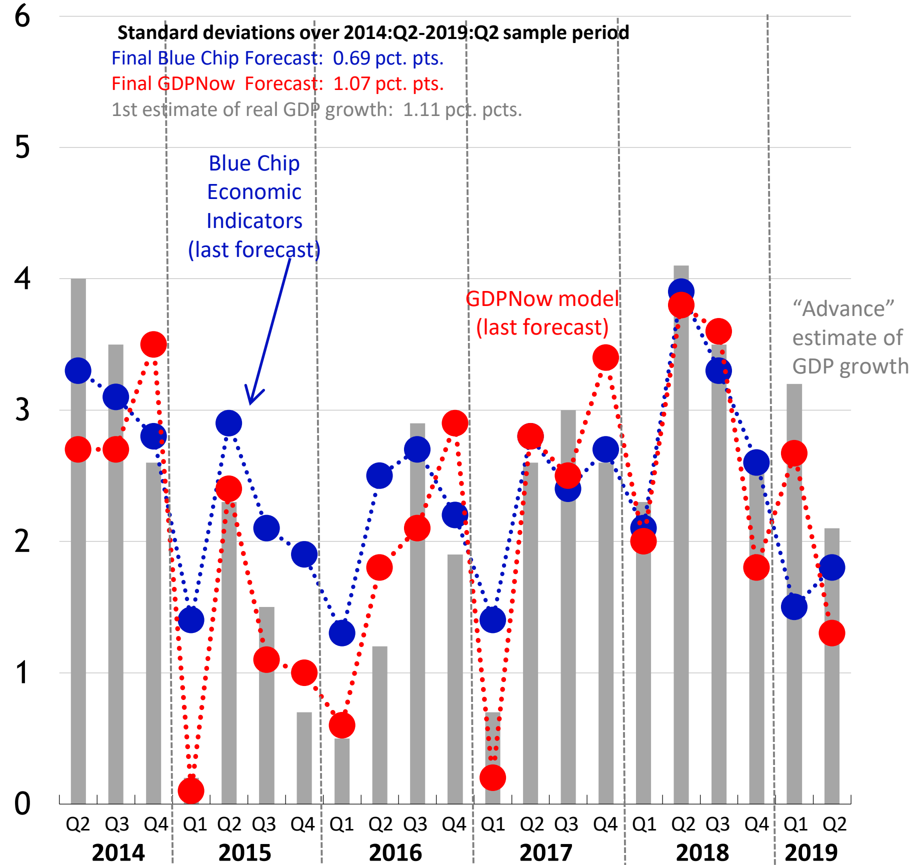
Root Mean Square Forecast Error (RMSFE):

$$\sqrt{\frac{1}{2}[(2-0)^2 + (-6-0)^2]} = \sqrt{\frac{40}{2}} = 2\sqrt{5} \approx 4.47$$

Since GDPNow went live in mid-2014, its forecasts have been more volatile than the *Blue Chip Economic Indicators* consensus. Final GDPNow forecasts have had a slightly smaller average absolute error than *Blue Chip* over the past five years, but the latter is generally produced about 3 weeks before GDPNow.

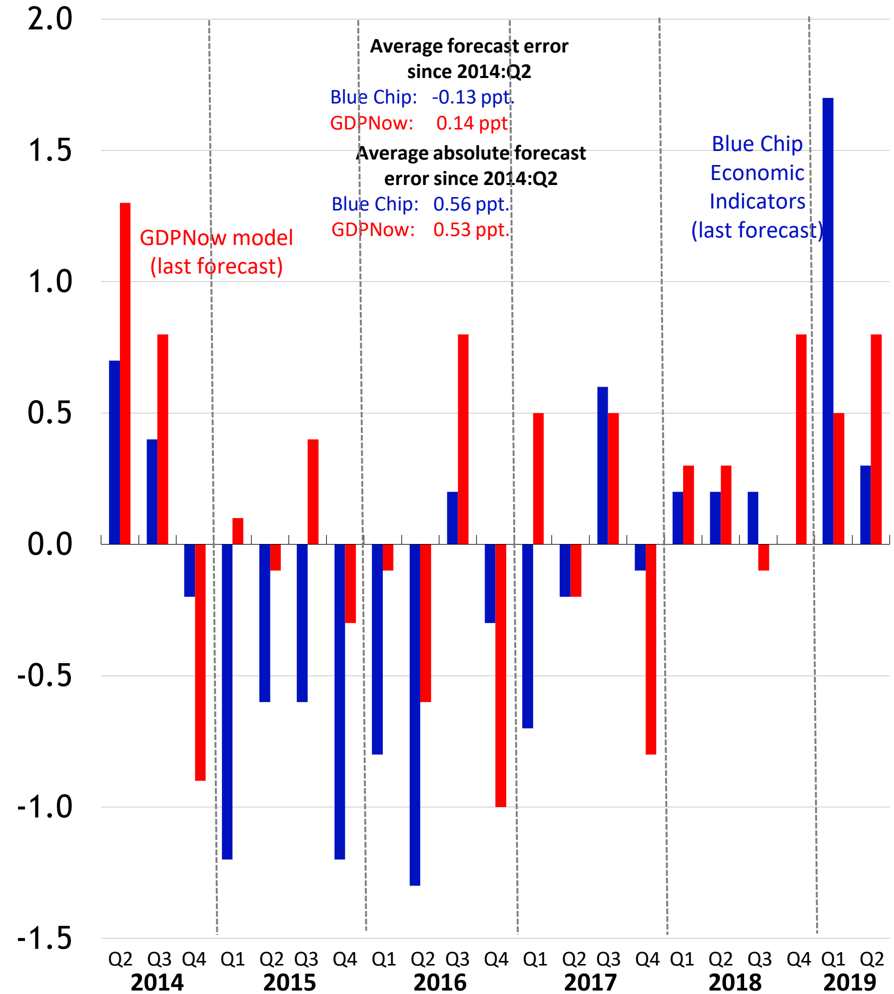
Actual and final forecasted values of initial BEA estimates of quarterly GDP growth

Quarterly percent change (SAAR)



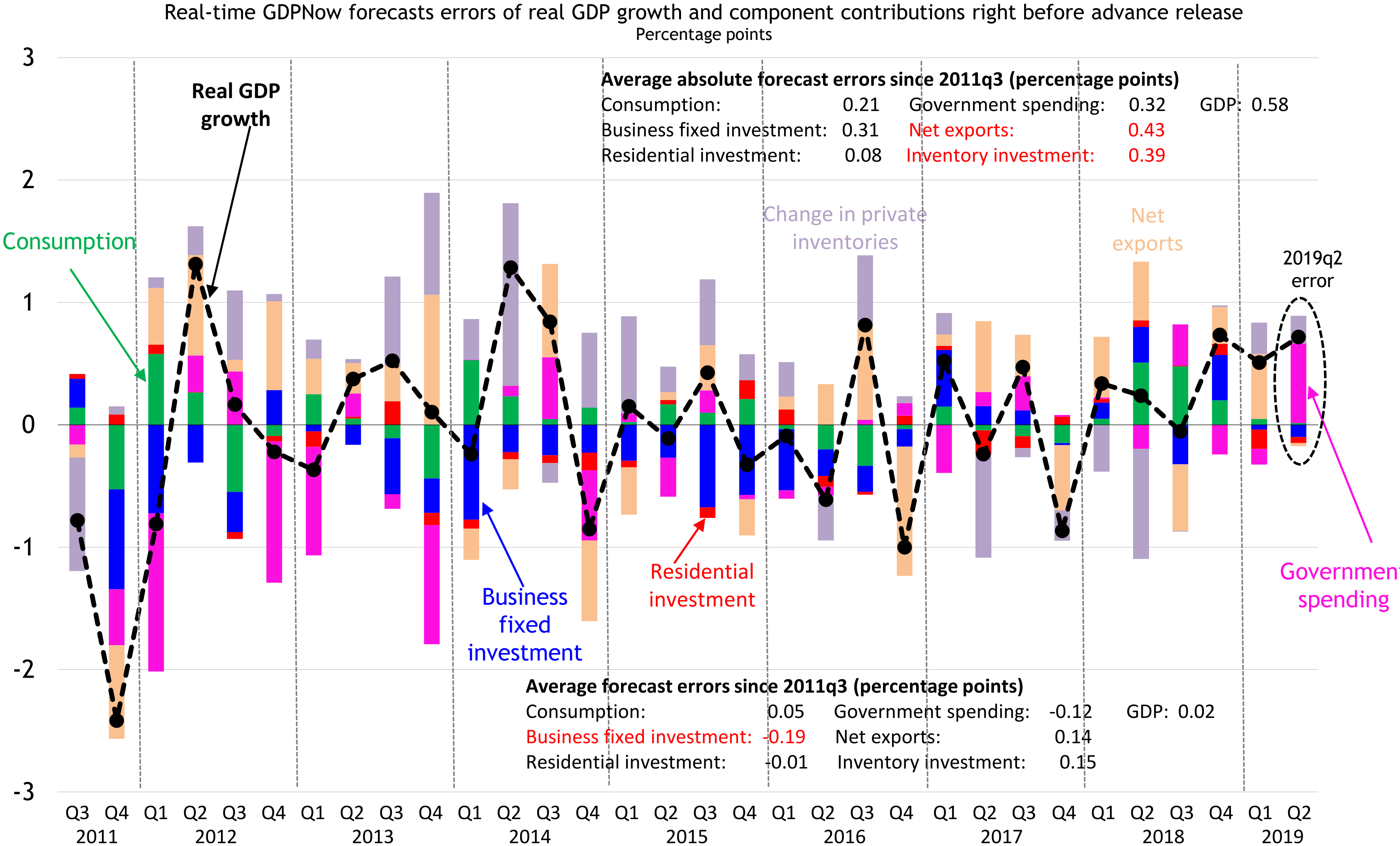
Forecast errors of initial BEA estimates of quarterly GDP growth

Percentage points



Sources: Bureau of Economic Analysis, Aspen Publishers, Federal Reserve Bank of Atlanta and Haver Analytics.

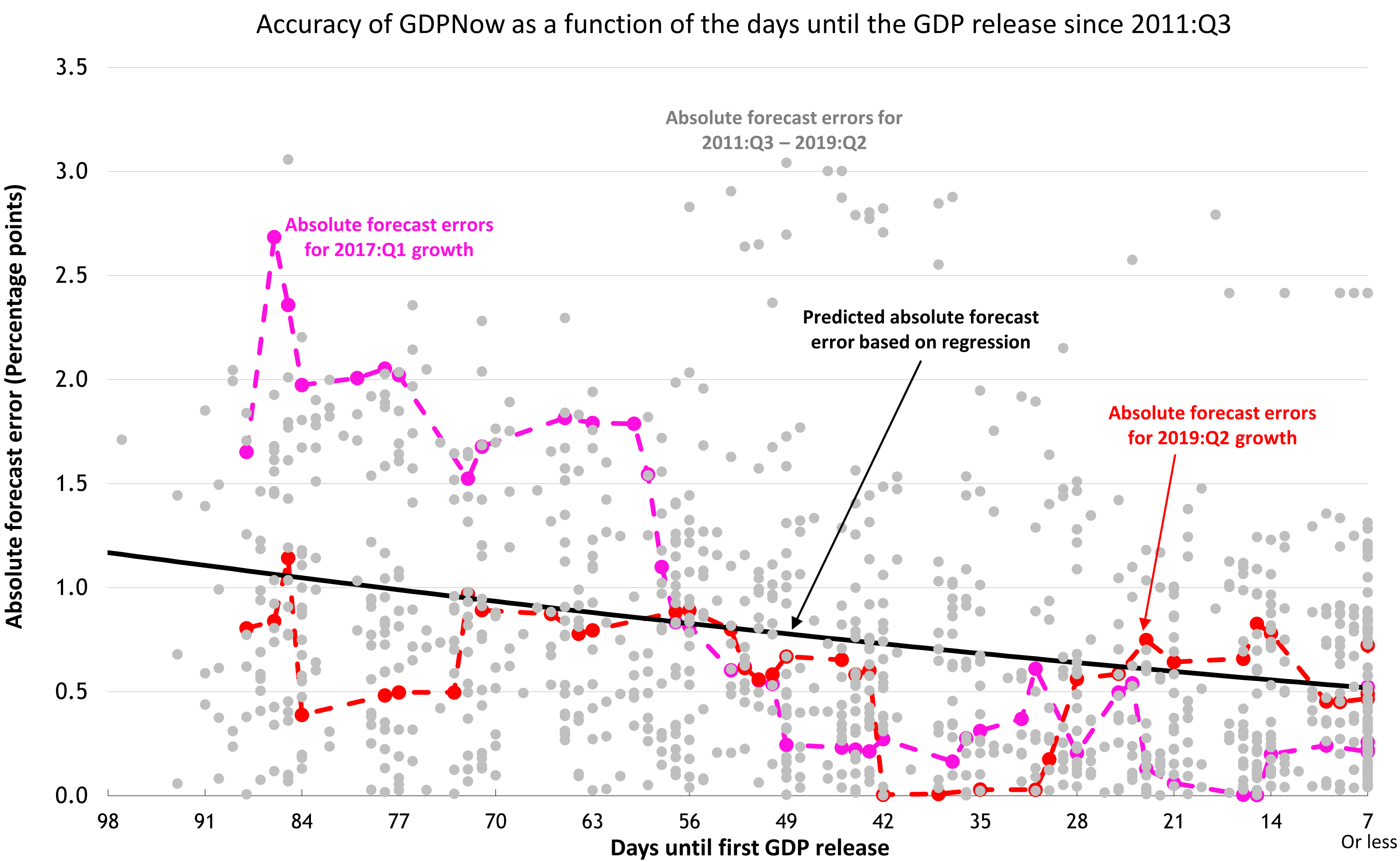
Just before the each GDP release, the top-line GDP growth forecast has been nearly unbiased, on average, since 2011. The least accurate subcomponent contribution forecasts on average have been inventory investment and net exports. There has been a tendency for the subcomponent forecast errors to partially cancel each other out. A similar cancellation has occurred with professional forecasts. Former Federal Reserve Governor Larry Meyer has attributed this fortuitous cancellation to "Saint Offset". Unfortunately "Saint Offset" did not bless GDPNow's forecast of 2019:Q2 real GDP growth; the forecast error for government spending largely attributable to "payback" from the partial federal government shutdown was not offset by the small forecast errors for the other GDP subcomponents.



Note: Each GDPNow forecast is the final one made before the advance (first) release of GDP growth.

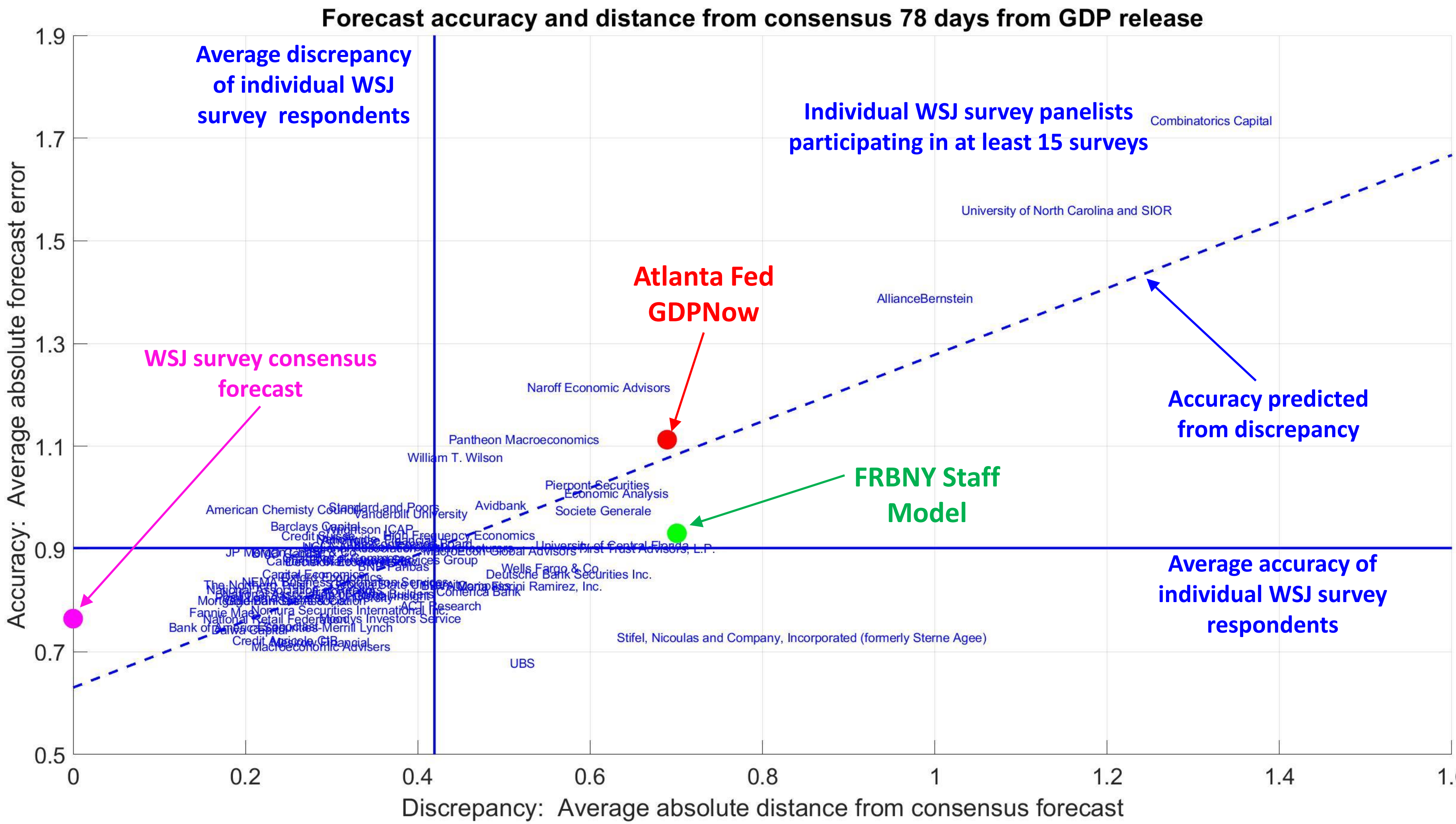
Sources: Bureau of Economic Analysis, Federal Reserve Bank of Atlanta and Haver Analytics.

On average, GDPNow becomes more accurate as it gets closer to the first GDP release date. 90 days before the first release, it's average absolute error has been about 1.1 percentage points while just before the release it's average absolute error has been about 0.5 percentage points. But it doesn't always follow this pattern; sometimes it has converged closer to the first estimate (2017:Q1) but sometimes it has not (2019:Q2).



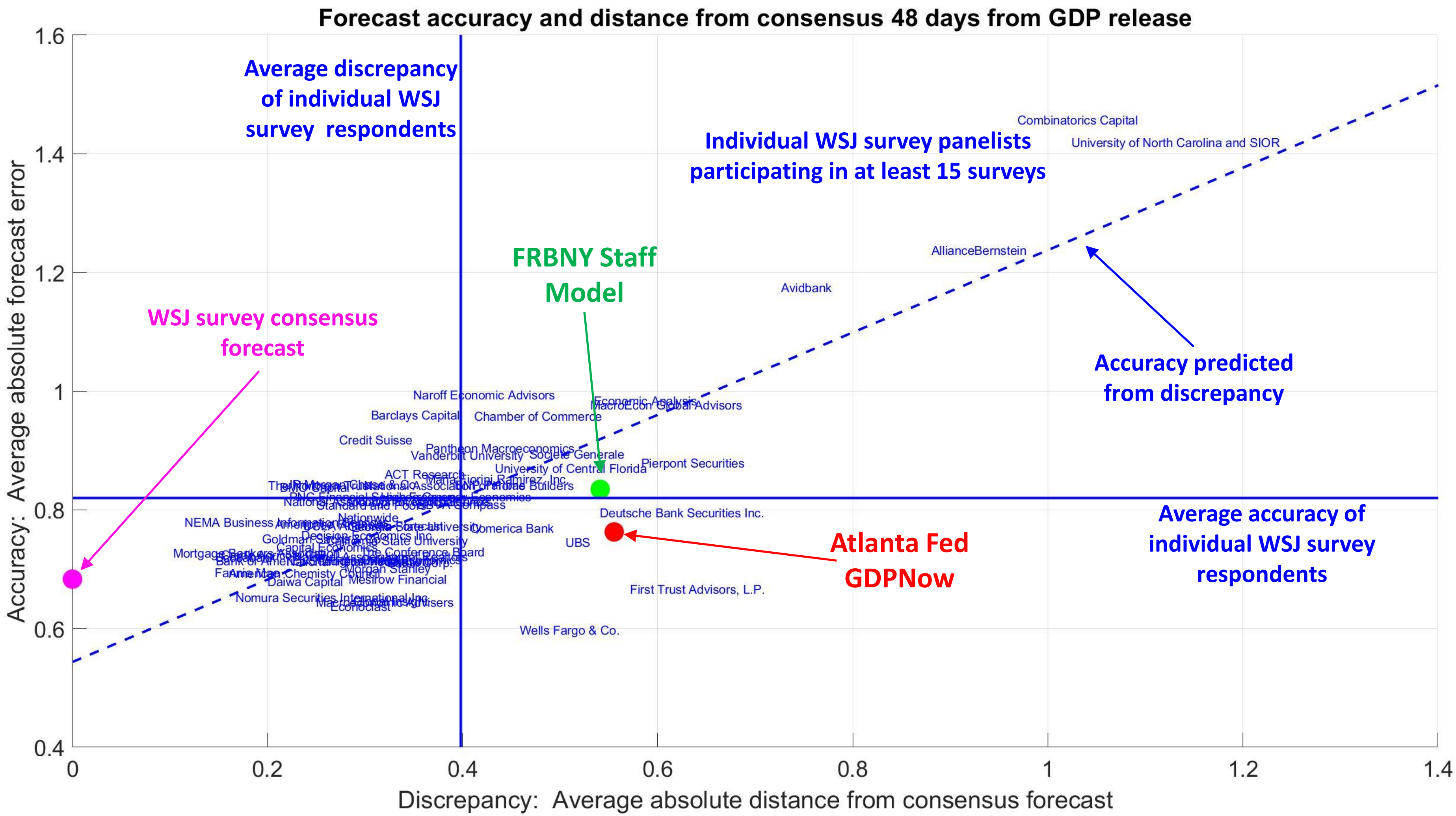
Sources: Bureau of Economic Analysis, Federal Reserve Bank of Atlanta and Haver Analytics.

GDP nowcasts: Accuracy and distance from consensus forecast of both GDPNow and individual panelist forecasts from the Wall Street Journal Forecasting Survey (WSJ) over the 2011q3-2019q2 period. GDPNow is further away from the consensus WSJ survey forecast, on average, than the individual panelist forecasts in the survey about 78 days from a GDP release. However, unlike the forecasts 18 days from the GDP release, GDPNow has been less accurate, on average, than most WSJ survey panelists and much less accurate than the consensus. Its also been inferior to the New York Fed model 78 days before the release.



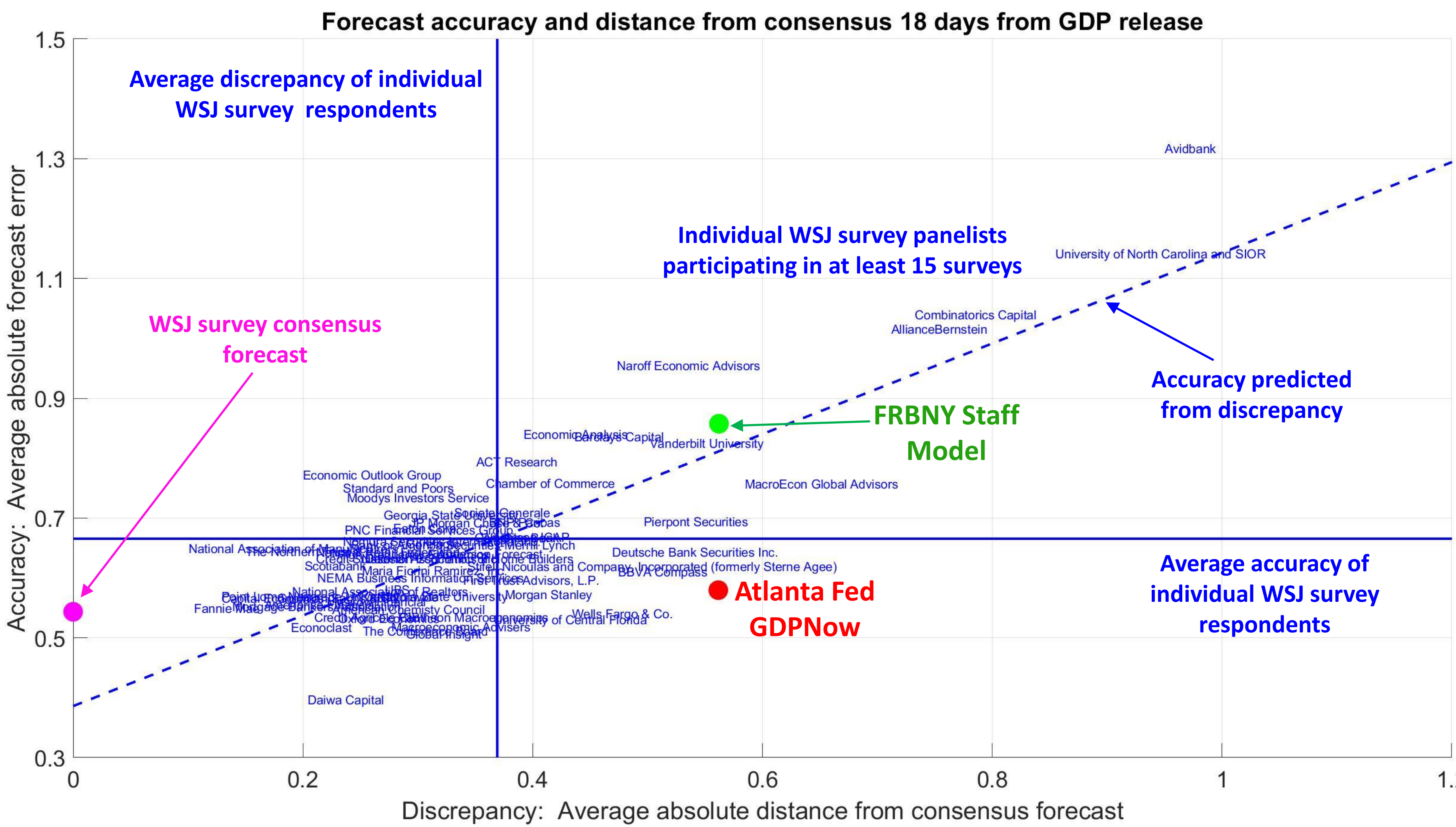
Sources: Bureau of Economic Analysis, Wall Street Journal Economic Forecasting Survey, Federal Reserve Bank of Atlanta, Federal Reserve Bank of New York and Haver Analytics.

48 days before the GDP release, GDPNow has done slightly better than the "average" WSJ panelist, though it has still been inferior to the WSJ consensus. It has performed slightly better than the New York Fed model forecast 48 days before the release.



Sources: Bureau of Economic Analysis, Wall Street Journal Economic Forecasting Survey, Federal Reserve Bank of Atlanta, Federal Reserve Bank of New York and Haver Analytics.

18 days before the GDP release, both GDPNow and the New York Fed model tend to be further from the WSJ consensus forecast than the "average" panelist from that survey. However, GDPNow has been more accurate than the "average" panelist while the New York Fed model has been less accurate.



Sources: Bureau of Economic Analysis, Wall Street Journal Economic Forecasting Survey, Federal Reserve Bank of Atlanta, Federal Reserve Bank of New York and Haver Analytics.

If one were to use a weighted average of the GDPNow and consensus WSJ survey forecasts to forecast the advance estimate of real GDP growth, the "optimal" weight on GDPNow in terms of historical accuracy 78 days from the GDP release is 0.00, consistent with GDPNow's inferior track record this far away from the release. When the GDP release is either 18 or 48 days away, the "optimal" weight on GDPNow increases to around 0.4 and there is borderline statistically significant evidence that optimal weight on GDPNow is above 0.00. When combining GDPNow's forecast with the New York Fed forecast, the weight on GDPNow increases from 0.38 for 78 days before the GDP release to 0.57 for 48 days before the GDP release to 0.70 for 18 days before the GDP release.

Does GDPNow add information to consensus or New York Fed model forecasts?

Suppose we are *D* days away from the next Advance GDP release for quarter *t* and we want to nowcast real GDP growth with a weighted average of the GDPNow forecast and the consensus (average) forecast from the *Wall Street Journal* Economic Forecasting Survey and/or the New York Fed model forecast?

$$\widehat{GD\dot{P}_t^D} = \alpha_D^{GDPNow} GDPNow_{t,D} + (1 - \alpha_D^{GDPNow}) WSJ_{t,D}$$

$$\widetilde{GD\dot{P}_t^D} = \rho_D^{GDPNow} GDPNow_{t,D} + (1 - \rho_D^{GDPNow}) NY_{t,D}$$

$$\widetilde{GD\dot{P}_t^D} = \phi_{1,D}^{GDPNow} GDPNow_{t,D} + \phi_{2,D}^{WSJ} WSJ_{t,D} + (1 - \phi_{1,D}^{GDPNow} - \phi_{2,D}^{WSJ}) NY_{t,D}$$

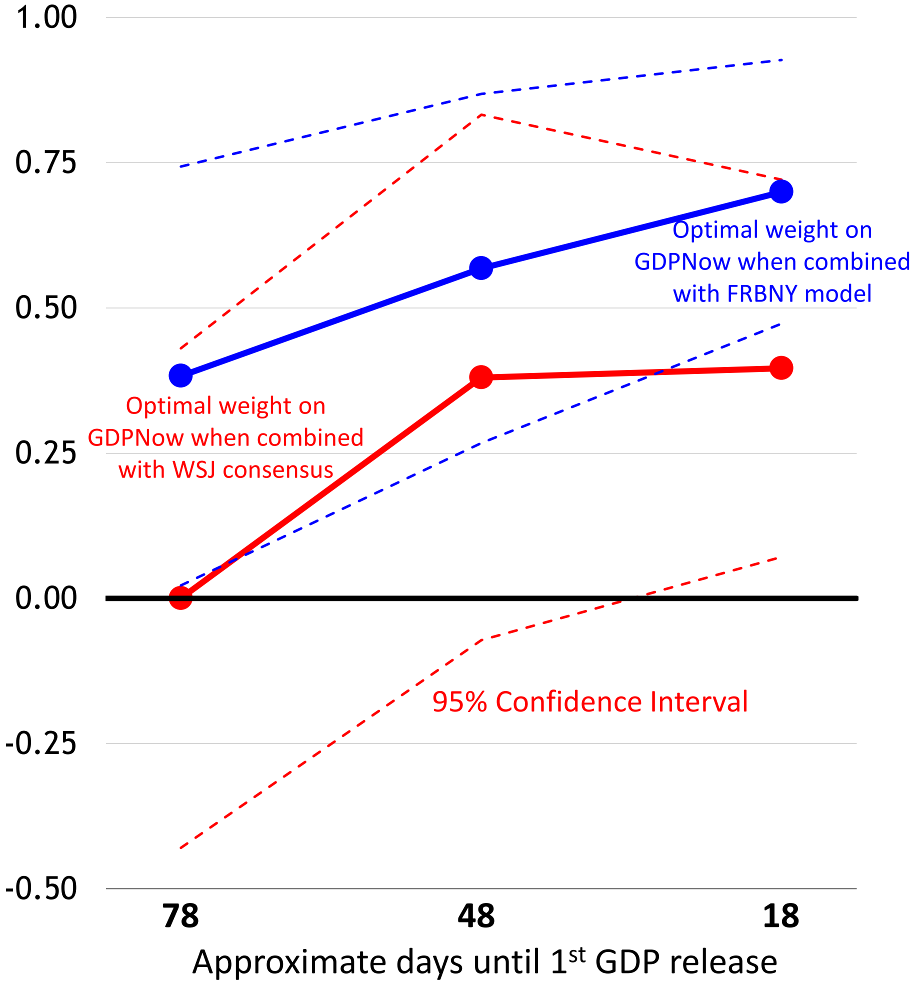
In the top equation, we want to choose the weight on GDPNow, α_D^{GDPNow} , to minimize the historical mean-squared error of the weighted average forecasts:

$$min_{\alpha_D^{GDPNow}}\{\sum_{t=2011q3}^{2019q2} \{ GD\dot{P}_t^{BEA} - [\alpha_D^{GDPNow} GDPNow_{t,D} + (1 - \alpha_D^{GDPNow}) WSJ_{t,D}]\}^2\}$$

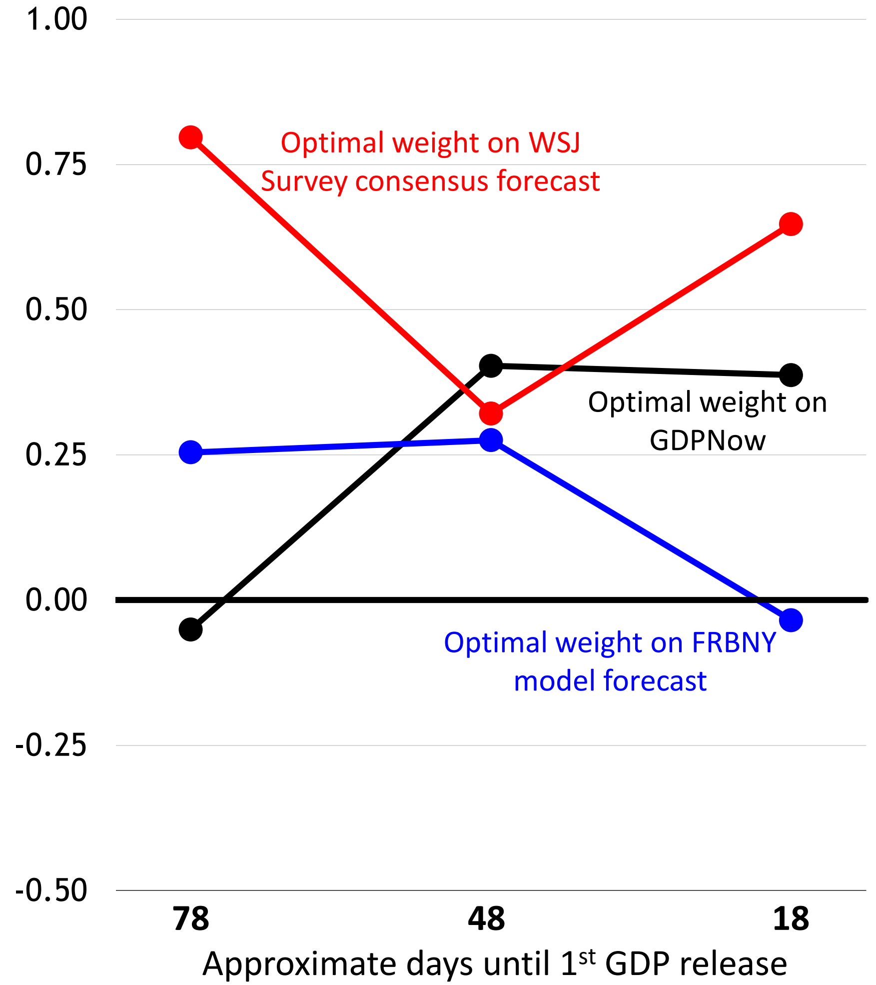
The minimization problems for the subsequent two equations are analogous. The optimal weights for D = 18, 48 and 78 days are plotted in the figures on the next slide:

If one were to use a weighted average of the GDPNow and consensus WSJ survey forecasts to forecast the advance estimate of real GDP growth, the "optimal" weight on GDPNow in terms of historical accuracy 78 days from the GDP release is 0.00, consistent with GDPNow's inferior track record this far away from the release. When the GDP release is either 18 or 48 days away, the "optimal" weight on GDPNow increases to around 0.4 and there is borderline statistically significant evidence that optimal weight on GDPNow is above 0.00. When combining GDPNow's forecast with the New York Fed forecast, the weight on GDPNow increases from 0.38 for 78 days before the GDP release to 0.57 for 48 days before the GDP release to 0.70 for 18 days before the GDP release.

Optimal weight on GDPNow forecast when using in weighted average with either consensus from WSJ Forecast Survey or FRBNY Staff Nowcast Model to forecast 1st estimate of real GDP growth



Optimal weights on GDPNow, FRBNY model and WSJ Survey consensus forecasts when combining with weighted average to forecast 1st estimate of real GDP growth



Sources: Bureau of Economic Analysis, Wall Street Journal Economic Forecasting Survey, Federal Reserve Bank of Atlanta, Federal Reserve Bank of New York and Haver Analytics.

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Some Background on GDPNow

-Pat Higgins

October 13, 2019

Note: The views expressed here are mine and do not necessarily reflect those of anyone else in the Federal Reserve System.