



FEDERAL  
RESERVE  
BANK  
*of* ATLANTA

# The Atlanta Fed's GDPNow model during the pandemic

October 19, 2021

The views expressed in this presentation do not represent those of the Federal Reserve Bank of Atlanta, the Federal Reserve System, or anyone other than the presenter.

# GDPNow model

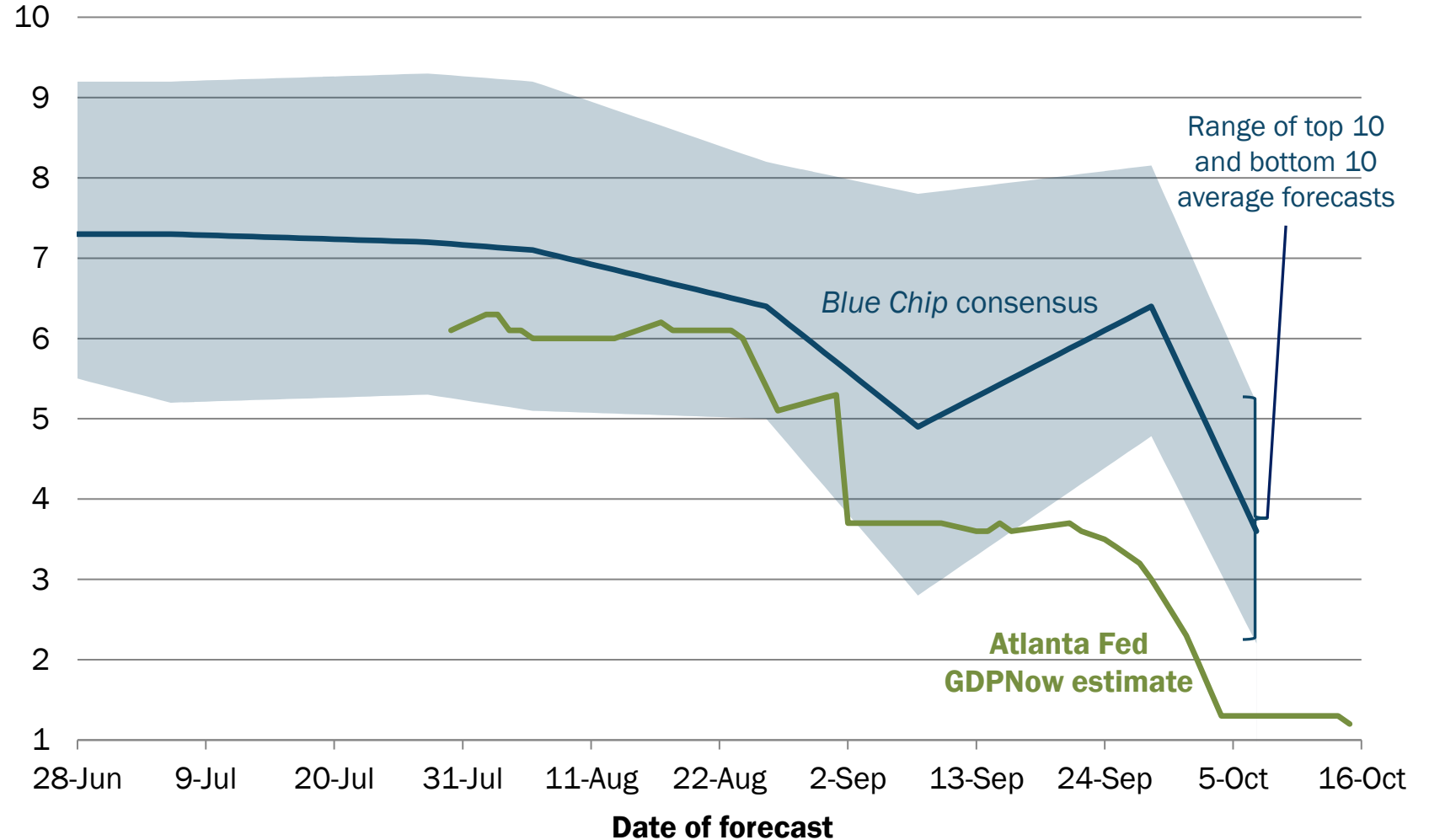
- Goal: Forecast 13 subcomponents that comprise GDP with much of the monthly “source data” that the BEA uses to form its estimates. Willing to sacrifice some internal model consistency for forecast accuracy.
- Borrows heavily from several approaches used in the nowcasting literature:
  - **Factor models**: [Stock and Watson (2002, JBES); Giannone, Reichlin and Small (2008, JME)]. Use this to forecast monthly data that has not been released yet.
  - **Bridge equations** [Miller and Chin (1996, FRB-Minn. Review)]: Use the monthly data that has been released and forecasted monthly data that has not been released to produce a nowcast of **GDP subcomponent**. Some GDP subcomponents are hard to pin down with this approach [e.g. investment in intellectual property products]. So also form an alternative (B)VAR subcomponent forecast that only uses previously released quarterly GDP subcomponent data. Form weighted average of the two forecasts with weights determined by historical accuracy. The weight on bridge-equation based forecast generally increases as more monthly data is released.

**GDPNow is not an official forecast of the Atlanta Fed.** Rather, it is best viewed as a running estimate of real GDP growth based on available economic data for the current measured quarter. There are no subjective adjustments made to GDPNow—the estimate is based solely on the mathematical results of the model.

In particular, it **does not capture the impact of COVID-19 and social mobility** beyond their impact on GDP source data and relevant economic reports that have already been released. It does not anticipate their impact on forthcoming economic reports beyond the standard internal dynamics of the model.

### Evolution of Atlanta Fed GDPNow real GDP estimate for 2021: Q3

Quarterly percent change (SAAR)



Sources: Blue Chip Economic Indicators and Blue Chip Financial Forecasts (Wolter Kluwer)

Note: The top (bottom) 10 average forecast is an average of the highest (lowest) 10 forecasts in the Blue Chip survey.

# Evolution of Atlanta Fed GDPNow real GDP growth estimates for 2021: Q3

Date	Major Releases	GDP*	Date	Major Releases	GDP*	Date	Major Releases	GDP*
30-Jul	Initial nowcast	6.1	27-Aug	GDP (8/26), Pers Inc/PCE, NIPA tables, Adv Econ Indicators	5.1	1-Oct	GDP (9/30), Pers Inc/ PCE, NIPA tables, ISM Manuf., Constr Spending	2.3
2-Aug	ISM Manuf., Construction spending	6.3	1-Sep	ISM Manuf., Construction spending	5.3	4-Oct	M3-2 Manufacturing, Auto sales	1.3
3-Aug	M3-2 Manufacturing	6.3	2-Sep	Int trade, M3-2 Manuf, Auto Sales	3.7	5-Oct	Int trade, ISM Nonmanuf. Index	1.3
4-Aug	Auto sales, ISM Nonmanuf. Index	6.1	3-Sep	Employment situation, ISM Nonmanufacturing Index	3.7	8-Oct	Employment situation, Wholesale trade	1.3
5-Aug	International trade	6.1	10-Sep	Wholesale trade, Producer Price Index	3.7	13-Oct	Consumer Price Index	1.3
6-Aug	Employment situation, Wholesale trade	6.0	13-Sep	Monthly Treasury Statement	3.6	14-Oct	Producer Price Index	1.3
11-Aug	Consumer Price Index, Monthly Treasury Statement	6.0	14-Sep	Consumer Price Index	3.6	15-Oct	Retail Trade, Import/Export Prices	1.2
12-Aug	Producer Price Index	6.0	15-Sep	Import/Export Prices, Ind Production	3.7			
13-Aug	Import/Export Prices	6.0	16-Sep	Retail Trade	3.6			
17-Aug	Industrial Production, Retail Trade	6.2	21-Sep	Housing starts	3.7			
18-Aug	Housing starts	6.1	22-Sep	Existing-home sales	3.6			
23-Aug	Existing-home sales	6.1	24-Sep	New-home sales	3.5			
24-Aug	New-home sales	6.0	27-Sep	Advance durable manufacturing	3.2			
25-Aug	Advance durable manufacturing	5.7	28-Sep	Advance Econ Indicators	3.0			

\*Note: Annualized quarterly growth rate of real GDP.

# Atlanta Fed GDPNow estimates for 2021: 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	6.1	3.2	5.5	9.3	3.7	2.3	2.8	10.8	17.4	-86	185
	GDP (8/26), Pers Inc/PCE, NIPA tables,											
27-Aug	Adv Econ Indicators	5.1	2.2	-3.9	9.5	2.0	0.0	3.3	9.2	13.0	-59	176
21-Sep	Housing starts	3.7	2.2	-11.0	9.8	-0.4	-1.5	2.2	9.0	16.3	-86	168
22-Sep	Existing-home sales	3.6	2.2	-11.0	9.8	-0.4	-3.1	2.2	9.0	16.3	-86	168
24-Sep	New-home sales	3.5	2.2	-11.0	9.8	-0.4	-4.8	2.2	9.0	16.3	-86	168
27-Sep	Advance durable manufacturing	3.2	2.2	-12.3	9.8	-0.5	-4.8	2.2	8.9	16.2	-86	157
28-Sep	Advance Econ Indicators	3.0	2.2	-13.4	9.8	-0.5	-4.8	2.2	6.8	14.0	-80	147
	GDP (9/30), Pers Inc/ PCE, NIPA tables,											
1-Oct	ISM Manuf., Constr Spending	2.3	1.4	-8.4	9.7	-3.4	-6.2	2.2	7.0	14.1	-80	127
4-Oct	M3-2 Manufacturing, Auto sales	1.3	0.7	-12.3	9.7	-3.5	-6.3	2.2	6.8	13.9	-79	119
5-Oct	Int trade, ISM Nonmanuf. Index	1.3	1.1	-12.0	9.7	-3.4	-6.2	2.2	6.0	15.6	-97	119
8-Oct	Employment situation, Wholesale trade	1.3	1.0	-12.1	9.6	-3.5	-6.1	2.1	5.9	15.5	-97	121
13-Oct	Consumer Price Index	1.3	1.0	-12.1	9.6	-3.5	-6.1	2.1	5.9	15.5	-97	122
14-Oct	Producer Price Index	1.3	1.0	-12.1	9.6	-3.5	-6.2	2.1	5.9	15.5	-97	121
15-Oct	Retail Trade, Import/Export Prices	1.2	0.9	-12.1	9.6	-3.5	-6.4	2.1	5.9	15.5	-97	121
	<b>Maximum forecast of real GDP growth</b>											
2-Aug	ISM Manuf., Construction spending	6.3	3.9	6.9	9.6	-0.7	3.8	2.7	11.3	17.9	-87	172
	<b>Minimum forecast of real GDP growth</b>											
15-Oct	Retail Trade, Import/Export Prices	1.2	0.9	-12.1	9.6	-3.5	-6.4	2.1	5.9	15.5	-97	121

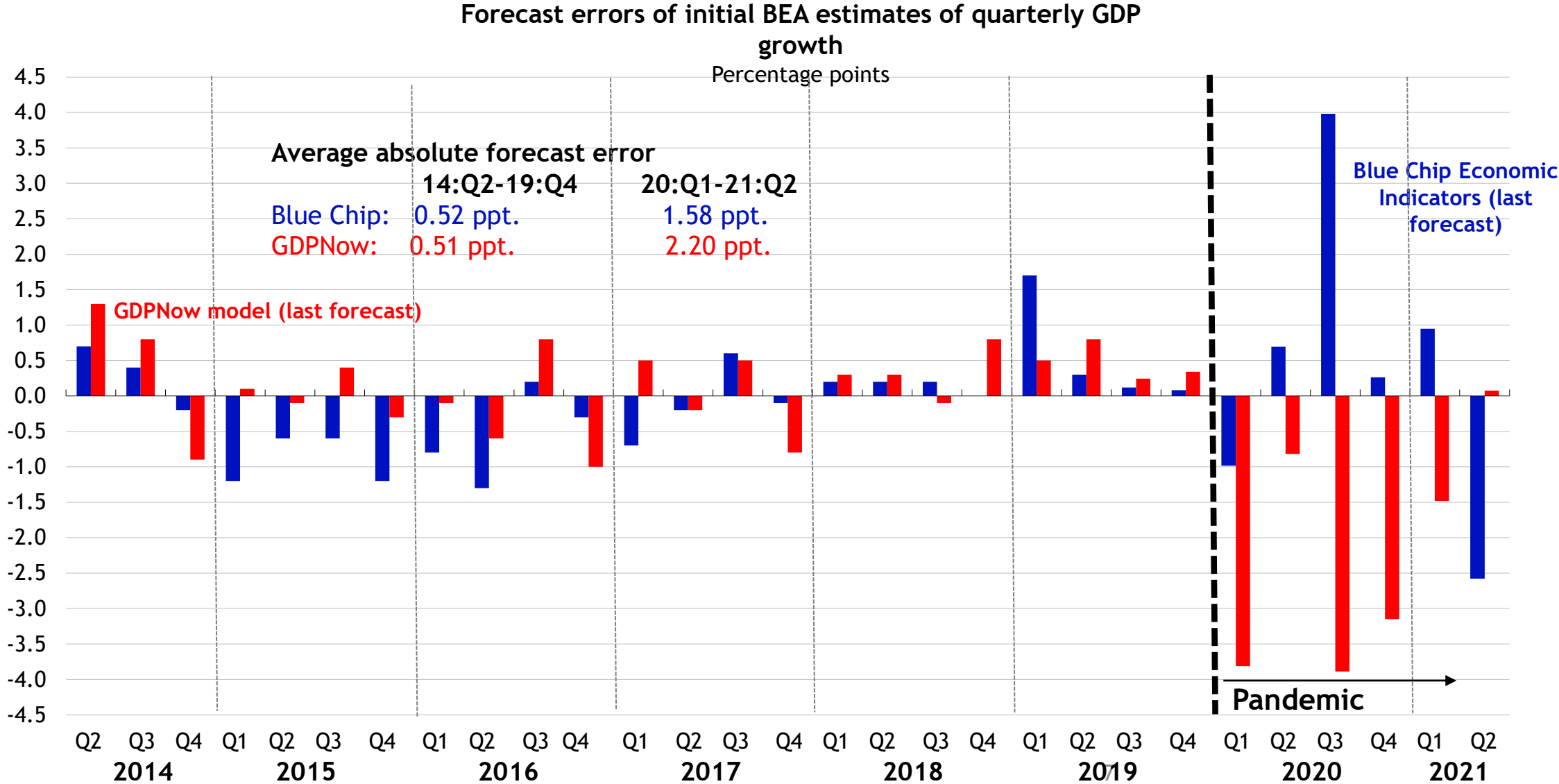
Note: CIPI is “change in private inventories.” Changes in net exports and CIPI are both in billions of 2012 dollars (SAAR). All other numbers are quarterly percent changes (SAAR). Table does not necessarily include all estimates for the quarter; see tab “TrackingHistory” in the [online excel file](#)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

## Atlanta Fed GDPNow estimates for 2021: 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	6.1	2.23	0.30	0.48	0.09	0.11	0.51	-1.36	3.72
	GDP (8/26), Pers Inc/PCE, NIPA tables,									
27-Aug	Adv Econ Indicators	5.1	1.54	-0.22	0.49	0.05	0.00	0.58	-0.90	3.52
21-Sep	Housing starts	3.7	1.53	-0.64	0.50	-0.01	-0.07	0.39	-1.37	3.34
22-Sep	Existing-home sales	3.6	1.52	-0.65	0.50	-0.01	-0.15	0.39	-1.37	3.34
24-Sep	New-home sales	3.5	1.52	-0.65	0.50	-0.01	-0.23	0.38	-1.37	3.34
27-Sep	Advance durable manufacturing	3.2	1.51	-0.73	0.50	-0.01	-0.24	0.38	-1.36	3.11
28-Sep	Advance Econ Indicators	3.0	1.49	-0.80	0.50	-0.01	-0.24	0.38	-1.28	2.93
	GDP (9/30), Pers Inc/ PCE, NIPA tables,									
1-Oct	ISM Manuf., Constr Spending	2.3	1.00	-0.49	0.49	-0.09	-0.30	0.39	-1.27	2.53
4-Oct	M3-2 Manufacturing, Auto sales	1.3	0.49	-0.72	0.49	-0.09	-0.31	0.39	-1.26	2.35
5-Oct	Int trade, ISM Nonmanuf. Index	1.3	0.77	-0.70	0.49	-0.09	-0.30	0.39	-1.57	2.35
8-Oct	Employment situation, Wholesale trade	1.3	0.71	-0.71	0.49	-0.09	-0.30	0.38	-1.57	2.39
13-Oct	Consumer Price Index	1.3	0.71	-0.71	0.49	-0.09	-0.30	0.38	-1.57	2.41
14-Oct	Producer Price Index	1.3	0.71	-0.71	0.49	-0.09	-0.30	0.38	-1.57	2.38
15-Oct	Retail Trade, Import/Export Prices	1.2	0.60	-0.71	0.49	-0.09	-0.31	0.38	-1.58	2.39
	<b>Maximum forecast of real GDP growth</b>									
2-Aug	ISM Manuf., Construction spending	6.3	2.70	0.38	0.49	-0.02	0.18	0.49	-1.36	3.46
	<b>Minimum forecast of real GDP growth</b>									
15-Oct	Retail Trade, Import/Export Prices	1.2	0.60	-0.71	0.49	-0.09	-0.31	0.38	-1.58	2.39

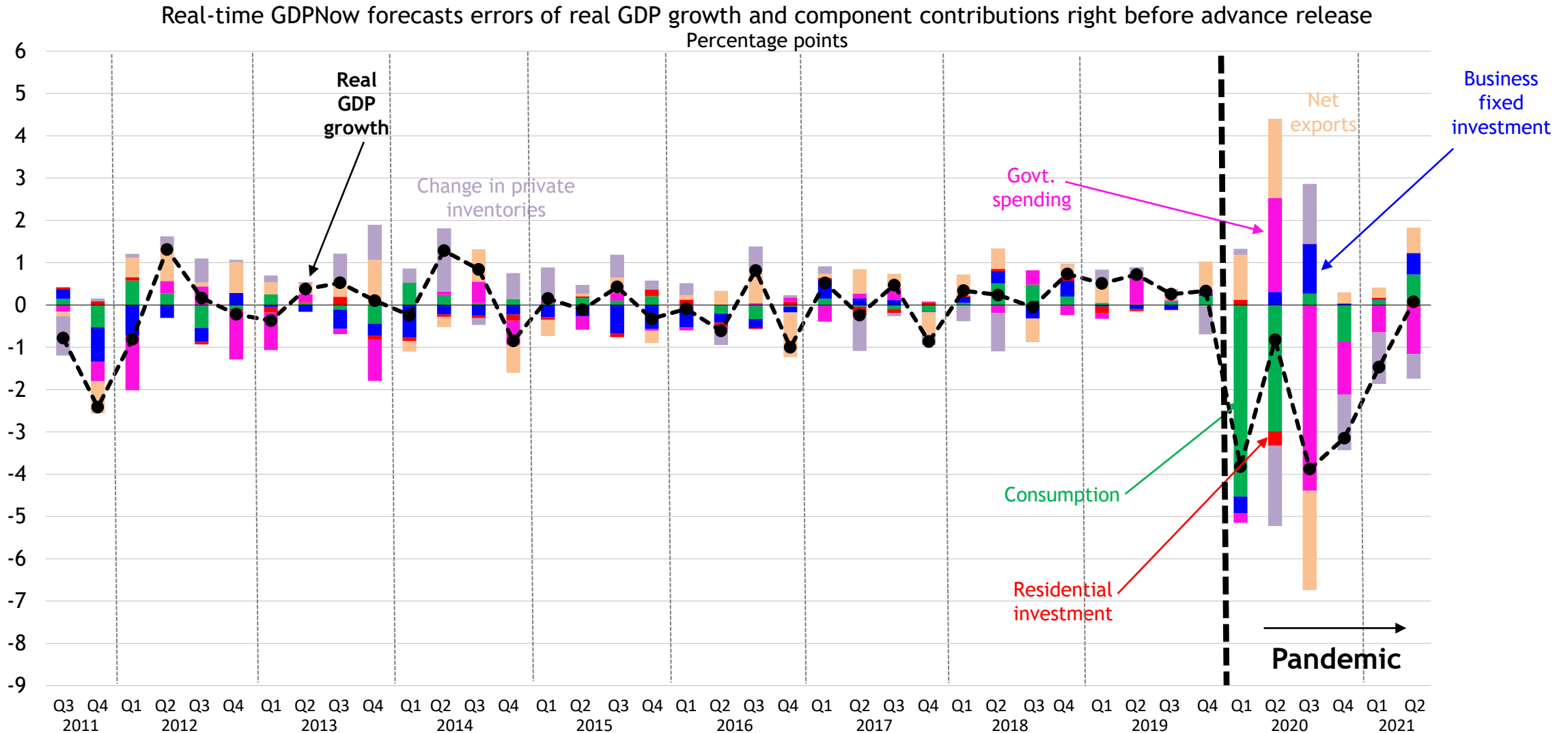
Note: CIPI is “change in private inventories.” All numbers are percentage-point contributions to GDP growth (SAAR). The table does not necessarily include all estimates for the quarter; see tab “ContribHistory” in the [online excel file](#) for the entire history.

Over the mid-2014 to 2019:Q4 period, the final nowcast of GDPNow was about as accurate as the final forecast from *Blue Chip Economic Indicators*. Both GDPNow and Blue Chip have been much less accurate during the pandemic, though the deterioration in accuracy has been more pronounced for GDPNow.



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

Prior to the pandemic, there had been a tendency for the subcomponent forecast errors to partially cancel each other out. A similar cancellation has occurred with professional forecasts. We can see that the subcomponent forecasts have been less accurate in the pandemic than in prior years, particularly for consumption, net exports and government spending.



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.



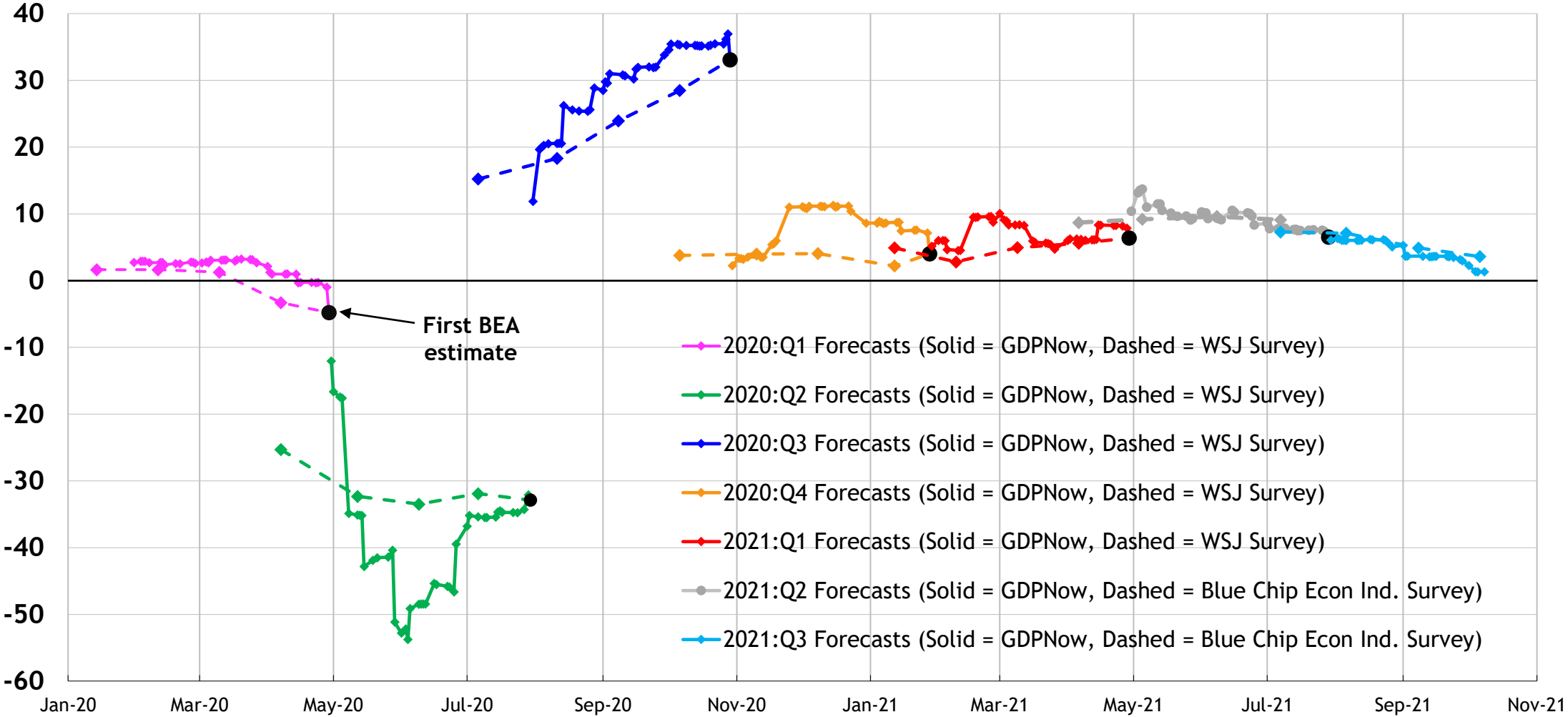
## Accuracy of final GDPNow forecasts of subcomponent contributions to real GDP growth

	Average absolute error of final GDPNow forecast of subcomponent (% points)		Change: Pandemic minus Prepandemic
	2014q2-2019q4	2020q1-2021q2	
Consumption	0.15	1.58	1.42
Business Fixed Investment	0.25	0.41	0.16
Residential Investment	0.07	0.10	0.02
Inventory Investment	0.40	1.09	0.69
Net exports	0.43	1.07	0.64
Government spending	0.20	1.64	1.44
Real GDP	0.51	2.20	1.69

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

Through April 2020, GDPNow underestimated the impact the pandemic would have on GDP growth. In May 2020 and June 2020, GDPNow underestimated how quickly GDP would recover. Since 2020:Q2, there has been a tendency for GDPNow to overestimate GDP growth.

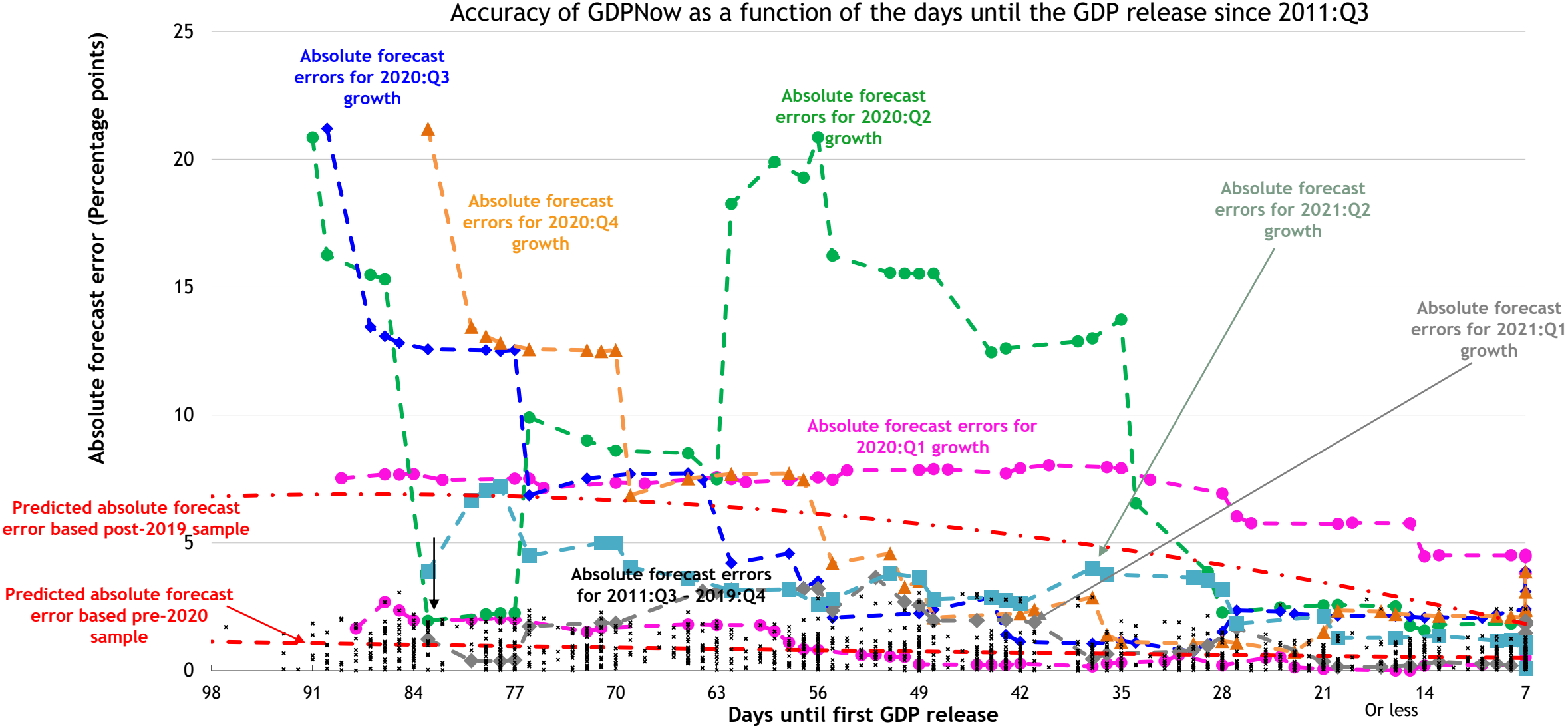
Forecasts and initial BEA estimates of quarterly real GDP growth  
 Percentage points, SAAR



Note: Points with final GDPNow and WSJ Survey forecasts of each quarter have been connected to initial BEA estimate.

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

The black crosses show pre-2020 absolute GDPNow forecast errors as a function of the days until the GDP release. The colored dashed lines (apart from red) show the evolution of the absolute forecast errors during the pandemic. These errors are substantially larger, on average, than the pre-2020 misses. But even during the pandemic, GDPNow is more accurate, on average, the closer it is to the GDP release.

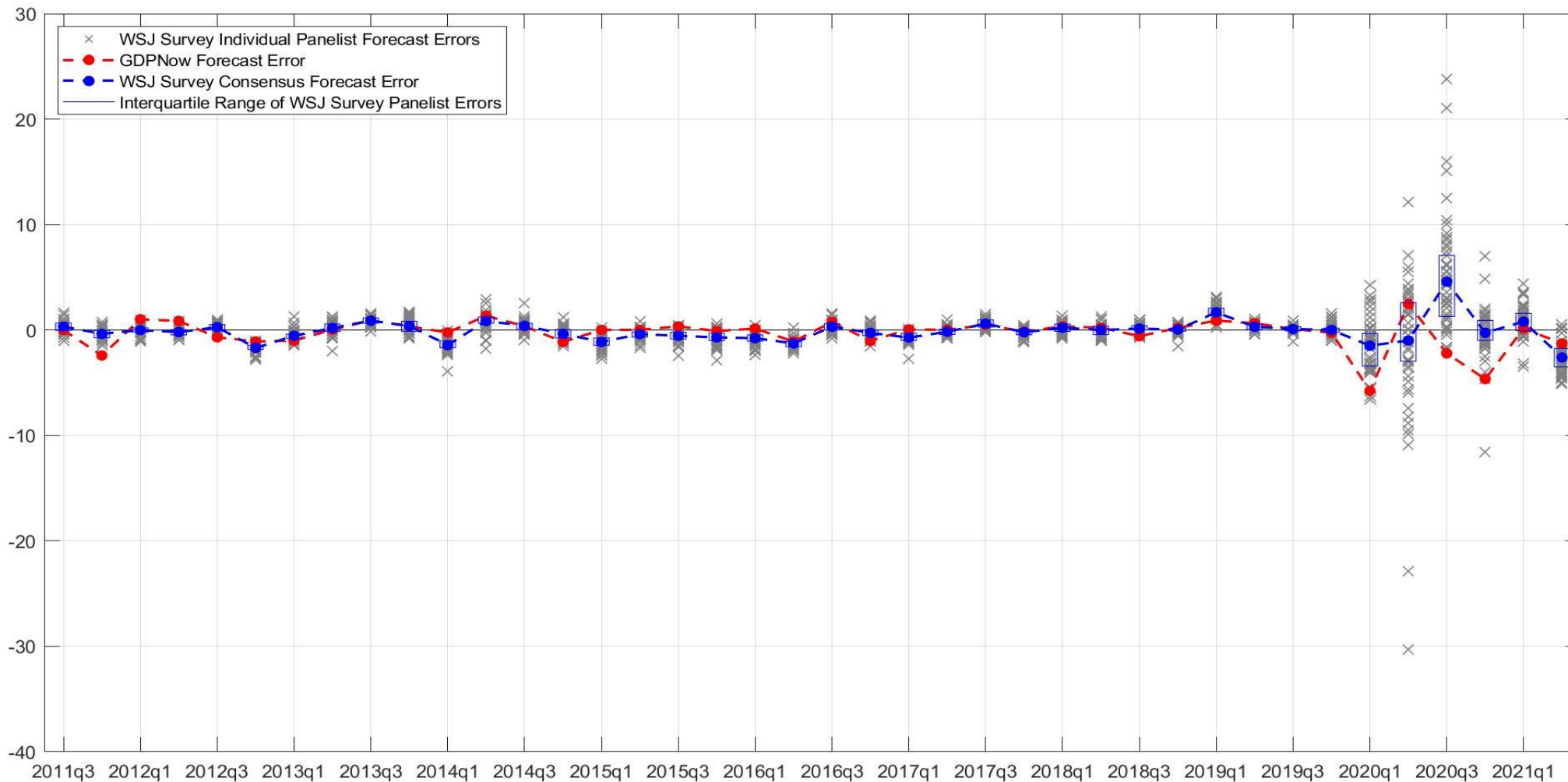


Sources: Bureau of Economic Analysis, Federal Reserve Bank of Atlanta and Haver Analytics.

Although GDPNow has not performed as well during the pandemic as the consensus of professional forecasters, that is perhaps an unfair comparison as the consensus is an average of around 40-60 forecasts. The gray cross marks in the chart below represent 20-day ahead forecast errors of panelists from the *Wall Street Journal* forecasting survey. Relative to these forecasts, GDPNow has not been such an outlier during the pandemic. Post-2019, the only quarters when GDPNow did especially poorly relative to the distribution of profession forecasters were 2020:Q1 and 2020:Q4. These were times where GDPNow was not able to anticipate that rising U.S. COVID cases would lead to lower mobility and economic activity.

### 20-day ahead GDPNow and WSJ Survey forecast errors of initial estimates of real GDP growth

Percentage points, SAAR

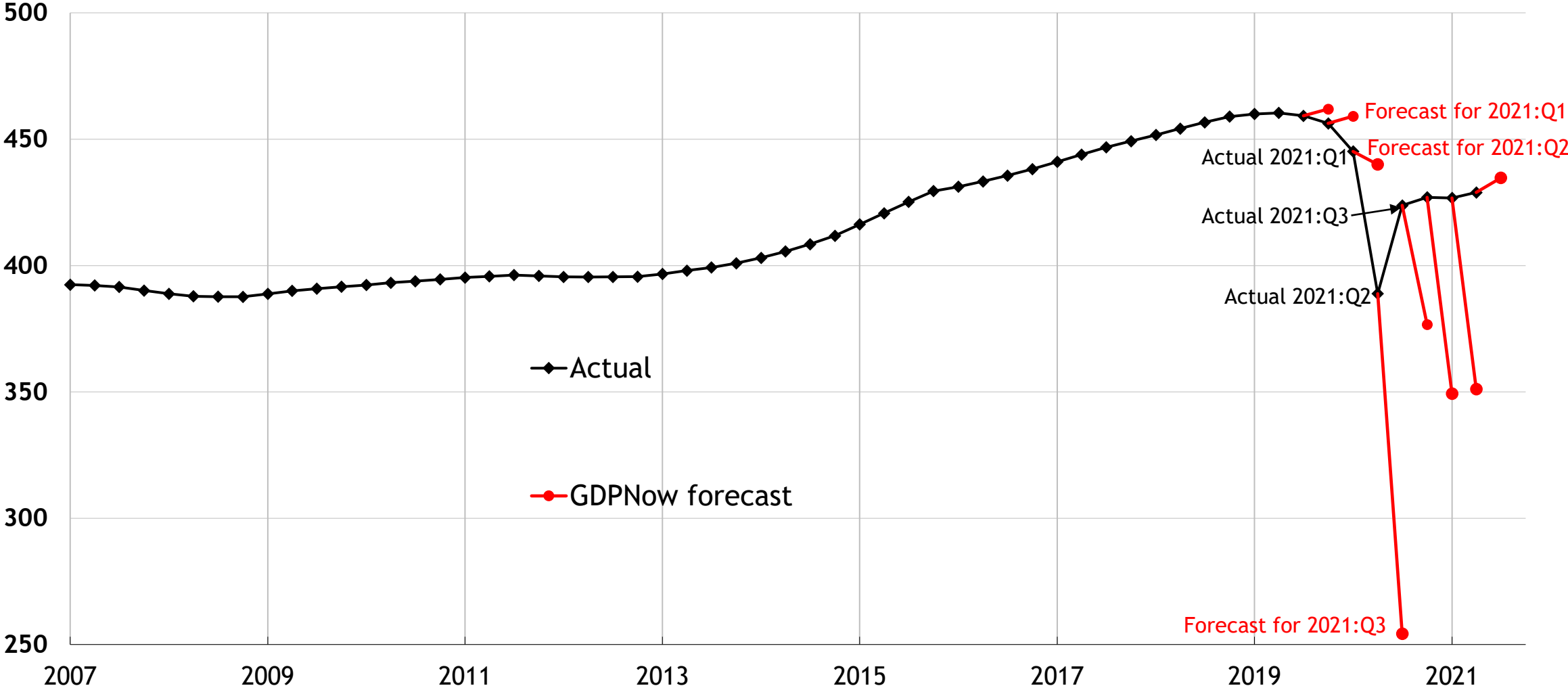


Note: Uses Wall Street Journal Survey released on first month of quarter to forecast GDP growth for prior quarter. Last GDPNow forecast made on or before the Tuesday after the employment report in the first month of quarter to match timing of WSJ Survey.

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

The state and local government sales to other sector granular GDP subcomponent below is subtracted from GDP in the official GDP accounting. GDPNow's extrapolative forecast did not expect the large realized decline in 2021:Q2. Because of this 2021:Q2 decline, GDPNow expected an even larger decline in 2021:Q3, that was actually a partial reversal. The extrapolation method used by GDPNow also led to large forecast errors in this subcomponent for 2020:Q4 – 2021:Q2.

**Real State & Local General Government Sales to Other Sectors**  
Quarterly, Billions chained 2012\$, SAAR

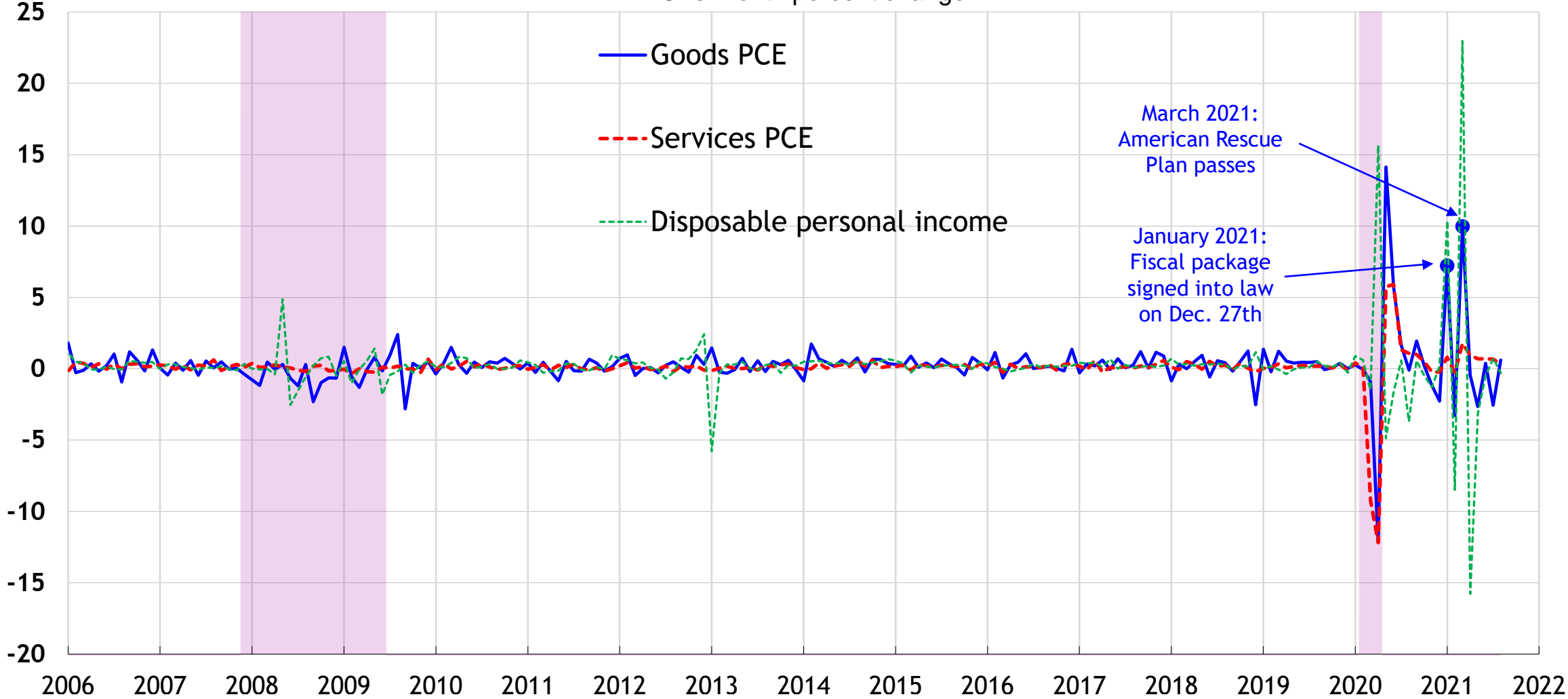


Sources: Bureau of Economic Analysis, Federal Reserve Bank of Atlanta, and Haver Analytics.

The volatility of monthly growth in real consumer spending on both goods and services has increased markedly since the onset of the pandemic. The volatility of spending on goods was exacerbated by boosts to disposable personal income resulting from fiscal stimulus. Unlike professional forecasters, GDPNow could not anticipate these increases in income.

### Real personal consumption expenditures and disposable personal income

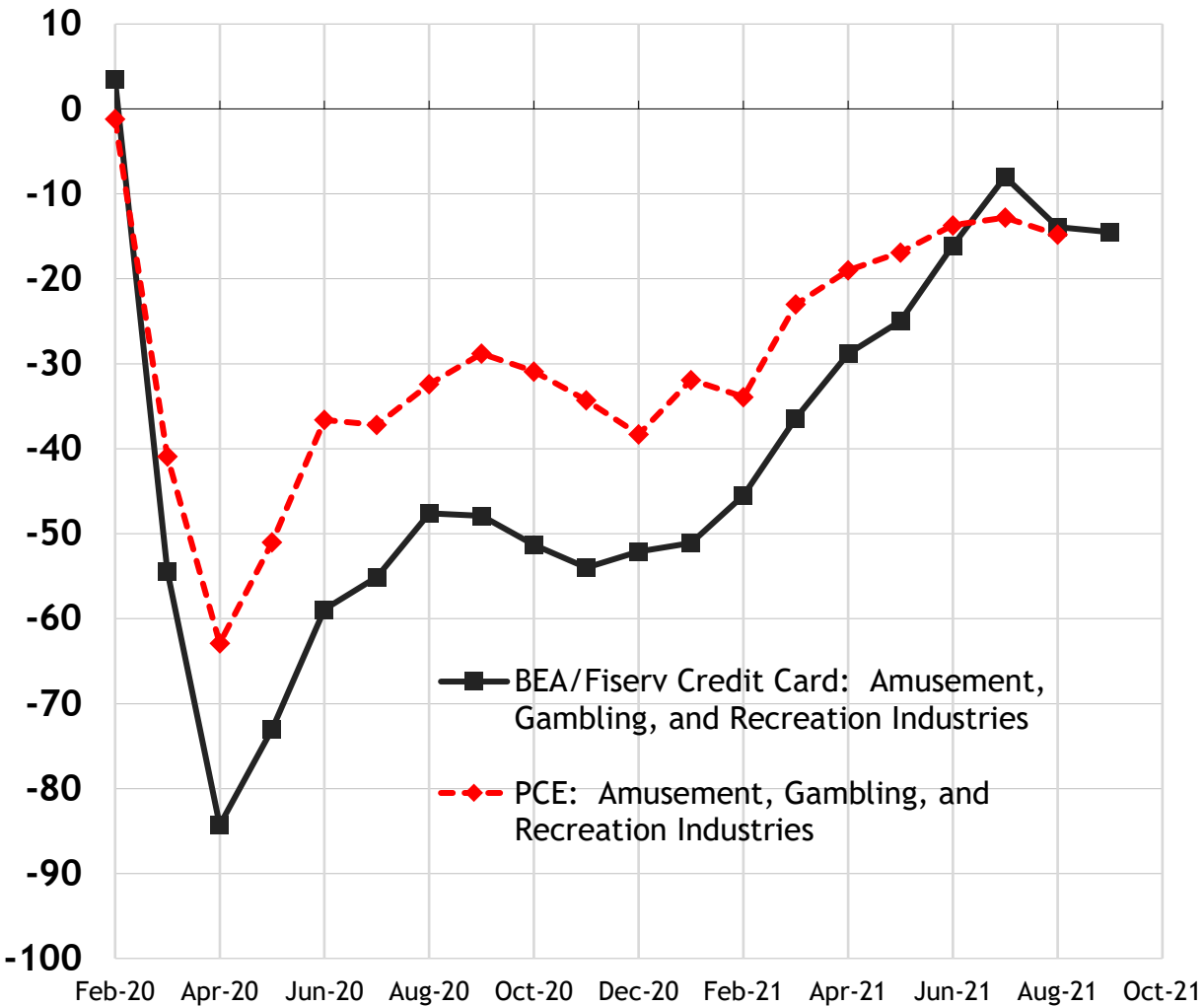
One-month percent change



The BEA, in partnership with Fiserv, releases weekly and monthly estimates of credit card spending on consumer goods and services that could perhaps be useful in nowcasting the data used for estimating certain types of consumer spending in the GDP accounts. But GDPNow does not use any of this (higher frequency) data. Nor does it use related higher frequency data like Google mobility measures, OpenTable restaurant dining, etc.

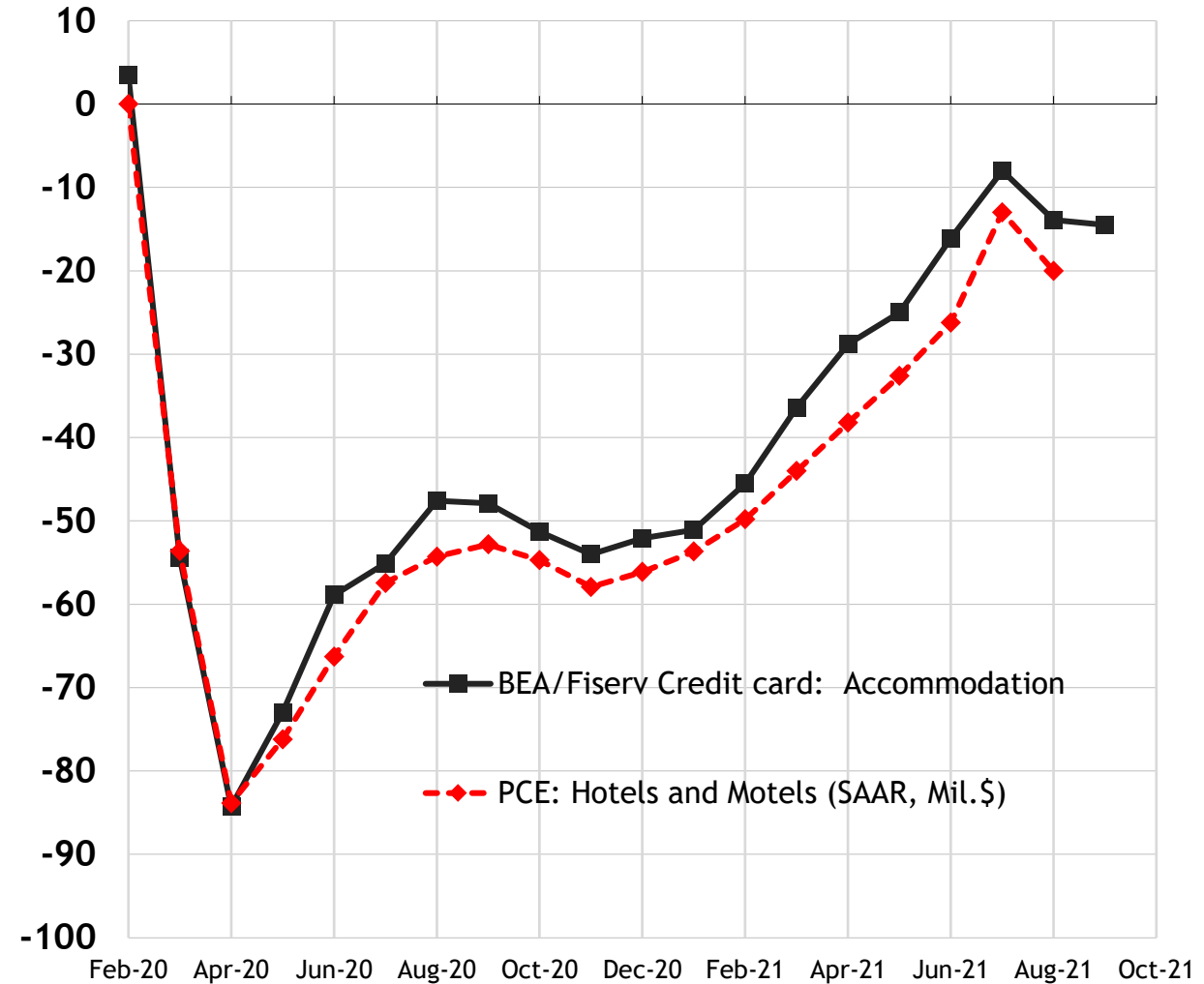
### Monthly nominal spending on recreation

Percent deviation from "trend" or "typical level" without COVID19



### Monthly nominal spending on accommodation

Percent deviation from "trend" or "typical level" without COVID19





FEDERAL  
RESERVE  
BANK  
*of* ATLANTA

# The Atlanta Fed's GDPNow model during the pandemic

October 19, 2021

The views expressed in this presentation do not represent those of the Federal Reserve Bank of Atlanta, the Federal Reserve System, or anyone other than the presenter.