

High Frequency Data and a Weekly Economic Index During the Pandemic

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These views do not necessarily represent those of the Federal Reserve Bank of New York, the Federal Reserve Bank of Dallas, or the Federal Reserve System.

The Weekly Economic Index

In early March, economic activity began to deteriorate rapidly.

- Conventional data would be unavailable until April.
- Evolution from one week to the next would be important.

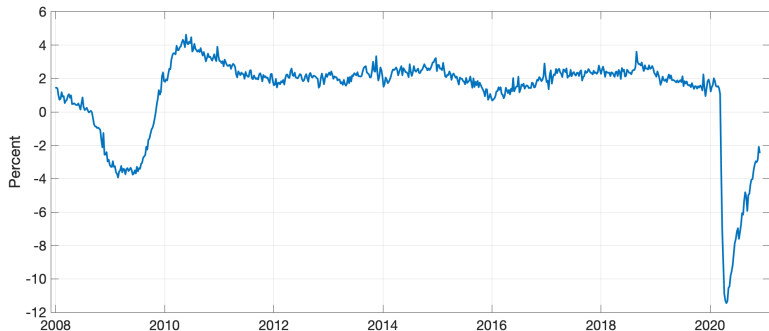
We developed the Weekly Economic Index (WEI) to measure real economic activity:

- ① at a higher frequency and
- ② closer to real time.

The WEI was first published by the NY Fed on March 30th.

- Biweekly publication began on April 27th.
- The WEI is now also published by Dallas Fed, FRED, Haver, Bloomberg, and others.

The Weekly Economic Index



What is the WEI?

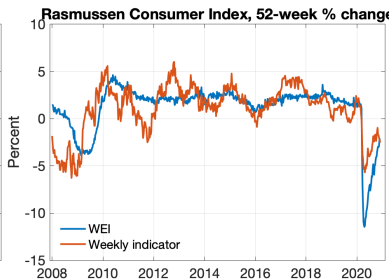
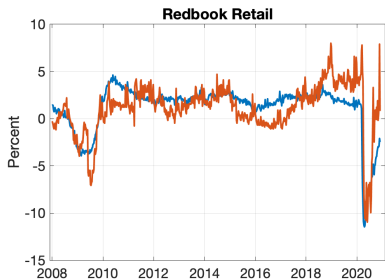
The WEI is the first principal component of 10 daily and weekly indicators

- These span consumer activity, labor markets, and industrial production.
- Criteria: timely, long enough time-series to be confident of correlations, stable definition and survey instrument, provides signal value
- These criteria eliminate many interesting series, including popular non-traditional data!
- Weekly seasonal adjustment is hard – we use 52-week log changes.
- The WEI gives readings in annual percentage changes.
- The index is scaled to 4-quarter GDP growth.

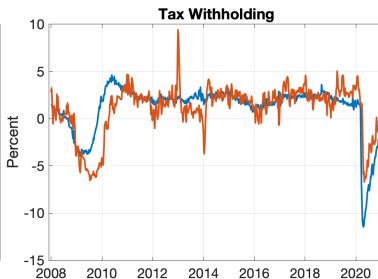
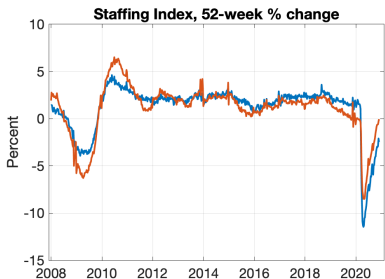
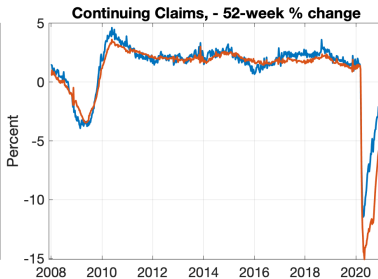
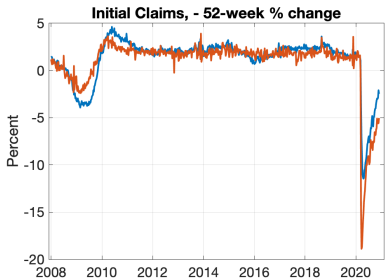
The 10 indicators

Category	Series	Native Units	Availability	Notes
Consumer activity	Redbook Research Retail Sales	NSA, Y/Y % Chg.	1st Tuesday, 9:00am (3 days)	Sales-weighted, year-over-year same-store sales growth, 9,000 stores (80% of the retail sales)
	Rasmussen Consumer Index	Index, 3-day MA	Friday of reference week, 6:00pm (0 days)	Daily survey of 1500 American adults Sun-Thurs.
Labor market	Initial Claims	NSA, Thous.	1st Thursday, 8:30am (5 days)	US DOL
	Continued Claims	NSA, Thous.	2nd Thursday, 8:30am (12 days)	US DOL
	American Staffing Association Staffing Index	NSA, Jun-12-06=100	2nd Tuesday, 8:30am (10 days)	Stratified panel of small, medium, and large staffing companies (American Staffing Association)
	Federal Withholding Tax Collections	Y/Y % Chg.	1st Tuesday, 4:00pm (5 days)	Treasury receipts of income and payroll taxes withheld from paychecks, adjusted (Taxtracking.com)
Industrial production	Raw Steel Production	NSA, Thous. Net Tons	1st Monday, 4:00pm (2 days)	50% weekly production provided, 50% monthly production (American Iron & Steel Institute)
	US Railroad Traffic	NSA, car-loads	1st Wednesday, 9:00am (4 days)	Total carloads and intermodal units (Association of American Railroads)
	US Fuel Sales to End Users	NSA, EOP, Thous. barrels/ day	1st Wednesday 10:30am (4 days)	Weekly product supplied of finished gasoline and distillate fuels (US EIA)
	Electric Utility Output	NSA, Gigawatt Hours	1st Wednesday, 1:00pm (4 days)	US (ex Alaska and Hawaii) investor-owned electric companies (Edison Electric Institute)

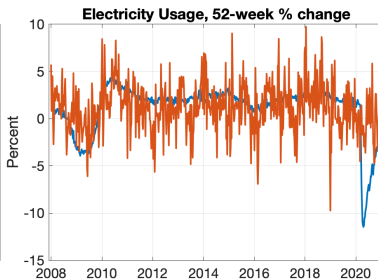
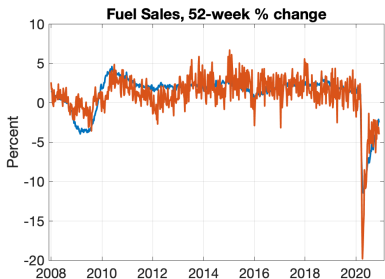
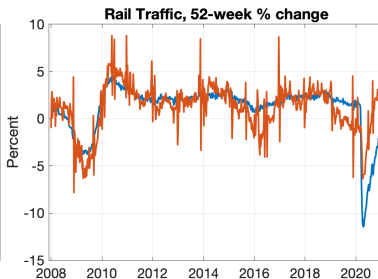
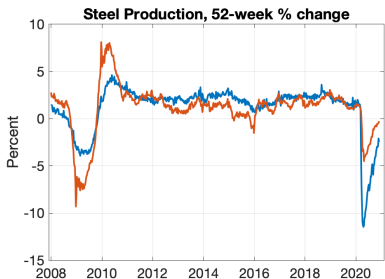
The WEI and constituent series



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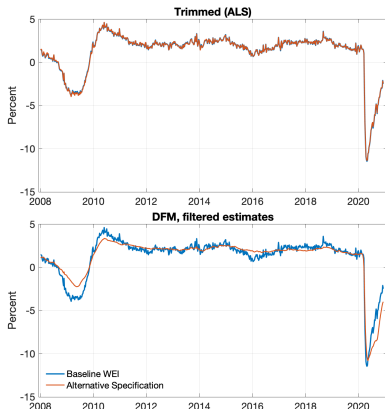
The WEI and constituent series



Estimates and methodology

Series	Weights
Same-Store Retail Sales	0.28
Consumer Confidence	0.23
Initial Claims	-0.37
Continued Claims	-0.41
Staffing Index	0.40
Tax Withholding	0.30
Steel Production	0.36
Fuel Sales	0.22
Railroad Traffic	0.34
Electricity Output	0.12
Total variance explained	55.4

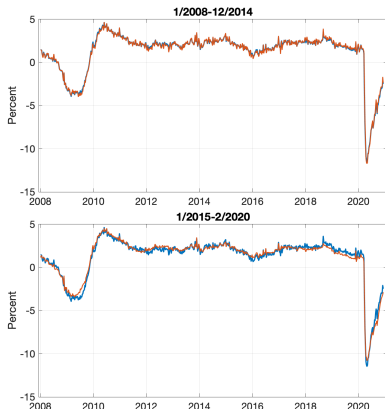
Notes: Estimation sample is first week of 2008 through last week of February 2020.



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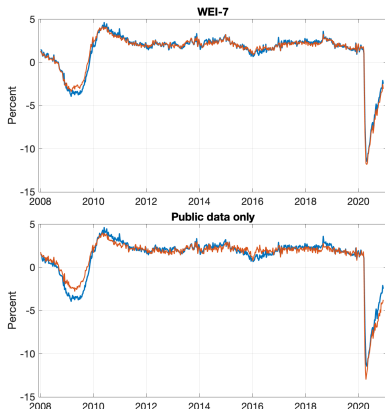
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Updating procedure

The WEI is updated four times:

- ① Initial estimate (Tuesday following, 3 days): retail, consumer index, steel
- ② First revision (Thursday, 5 days): electricity, rail, IC, tax withholding, fuel
- ③ Second revision (next Tuesday, 10 days): staffing index
- ④ Final (Thursday, 12 days): CC

For update d , the WEI is updated using predicted values from

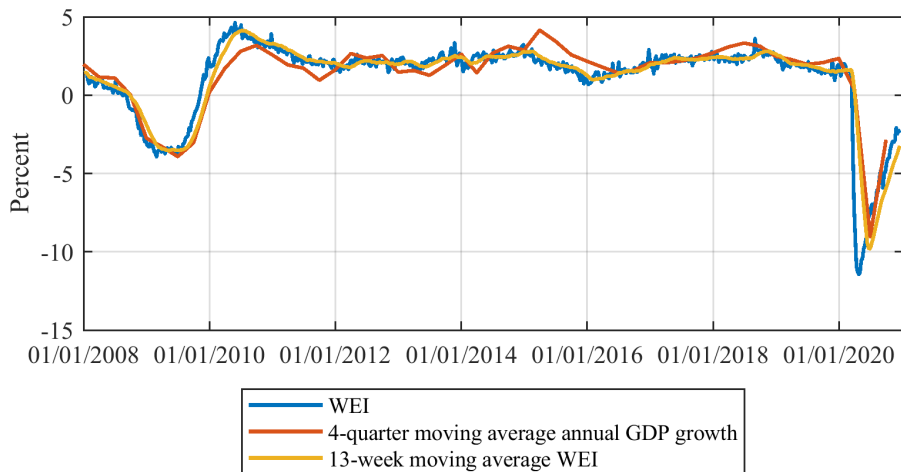
$$WEI_t = \mu^d + \theta_1^d WEI_{t-1}^d + \theta_2^d WEI_{t-2}^d + \sum_{j \in J^d} \delta_j^d X_{jt} + v_t^d,$$

where J^d is the set of releases available for update d .

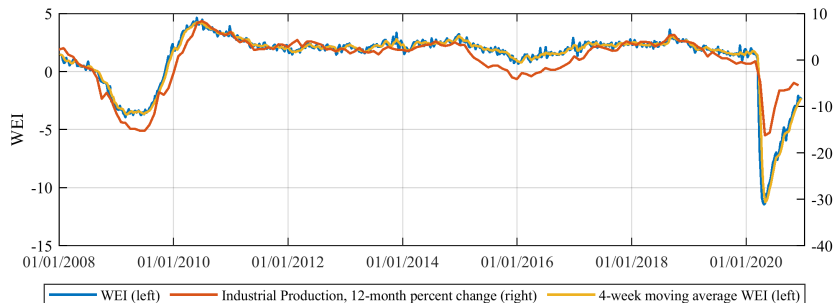
Relationship between updates

	RMSE			Correlation		
	First revision	Second revision	Final	First revision	Second revision	Final
Initial estimate	0.66	1.06	0.73	0.99	0.98	0.98
First revision	–	0.55	0.43	–	1.00	0.99
Second revision	–	–	0.77	–	–	0.99

Tracking conventional measures of real activity



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Nowcasting GDP

Regressors	(I)	(II)	(III)	(IV)
$WEI_q^{quarterly}$	0.57*** (0.13)			
WEI month 3				-0.14 (0.36)
WEI month 2			1.07*** (0.32)	1.24** (0.51)
WEI month 1		0.51*** (0.13)	-0.55* (0.32)	-0.59* (0.33)
F-test: monthly coefficients= 0		15.01 (0.00)	15.02 (0.00)	9.94 (0.00)
F-test: monthly coefficients equal			3.25 (0.05)	1.94 (0.14)
SER	0.51	0.54	0.48	0.48
Adjusted R^2	0.89	0.88	0.90	0.90

Notes: All regressions include 2 lags of four-quarter GDP growth. Results starred at the 1%, 5%, and 10% levels, ***, **, *. Estimation sample is 2008:Q1-2019:Q4 using the latest vintage of WEI and GDP data. Standard errors are given in parentheses for coefficients and p-values are given in parentheses for F-statistics.

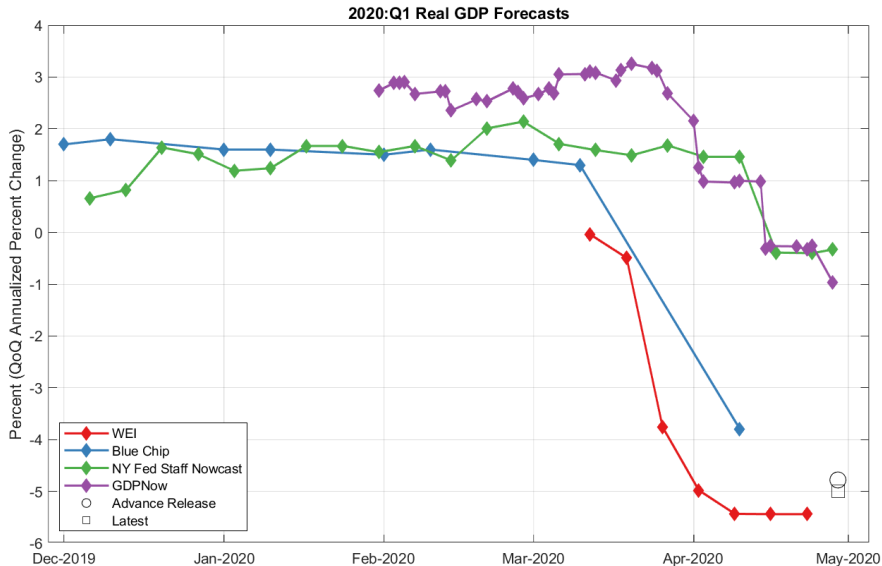
Nowcasting GDP in 2020

The WEI provided an accurate signal of GDP growth, both in 4-quarter and annualized quarterly rates, in early 2020.

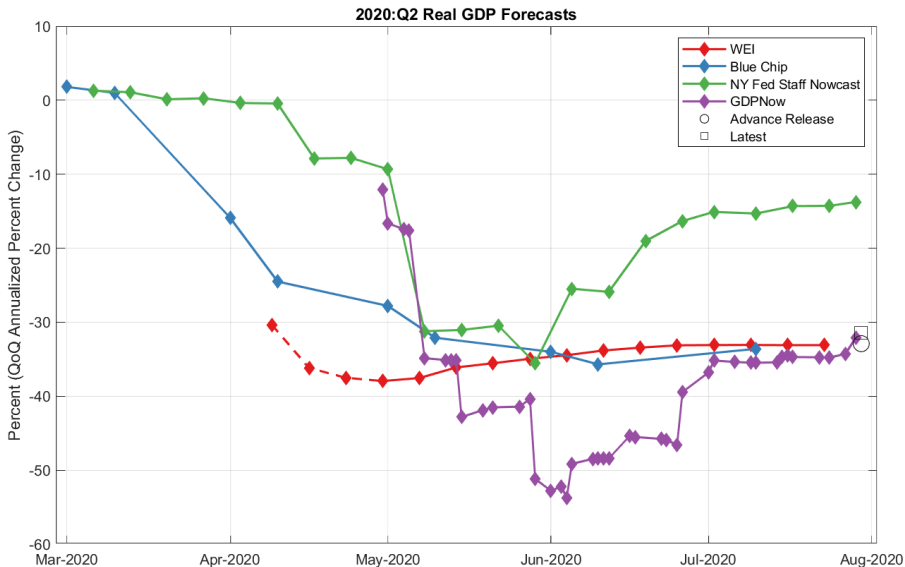
	4-quarter growth			1-quarter growth			
	Latest	Advance	WEI	Latest	Advance	Method 1	Method 2
2020: Q1	0.32	0.32	0.15	-4.96	-4.78	-5.44	-2.51
2020: Q2	-9.03	-9.71	-9.77	-31.40	-32.90	-33.10	-32.69
2020: Q3	-2.85	-2.91	-5.96	33.4	33.1	17.15	18.91

Weaker performance in Q3 is likely due to difficulty capturing effects of fiscal stimulus.

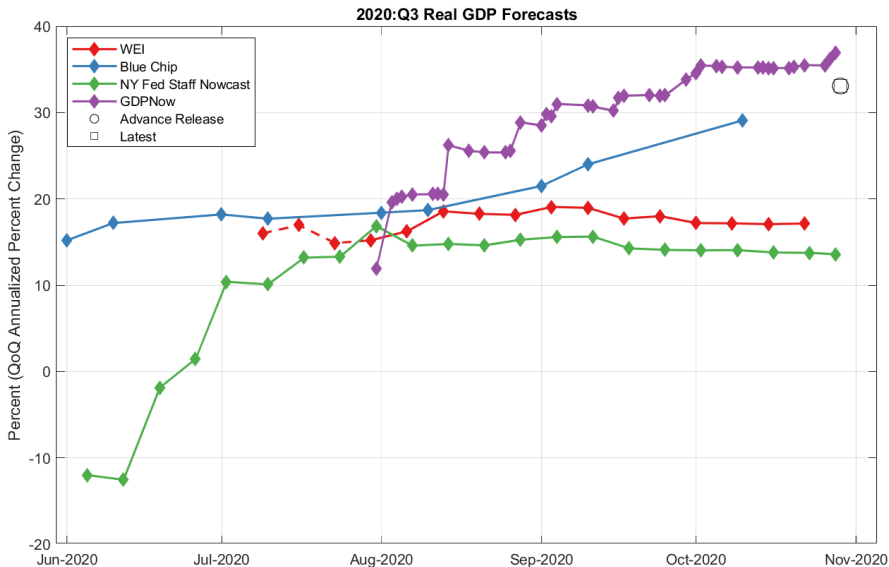
WEI vs nowcasts: Q1



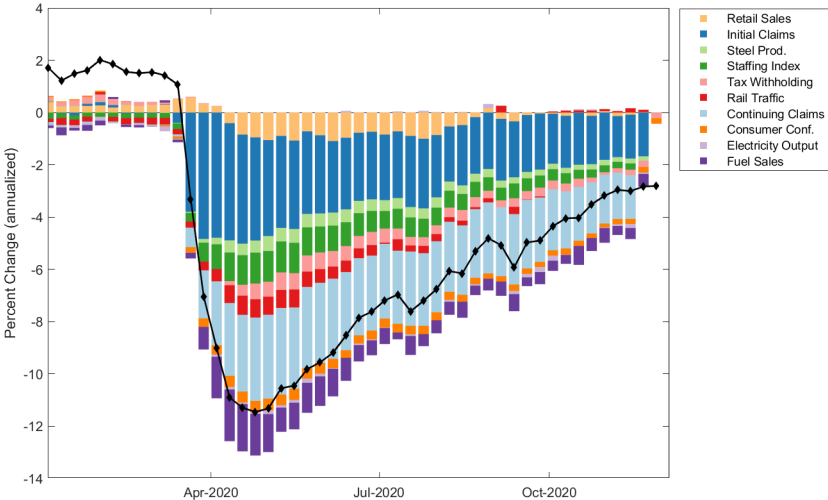
WEI vs nowcasts: Q2



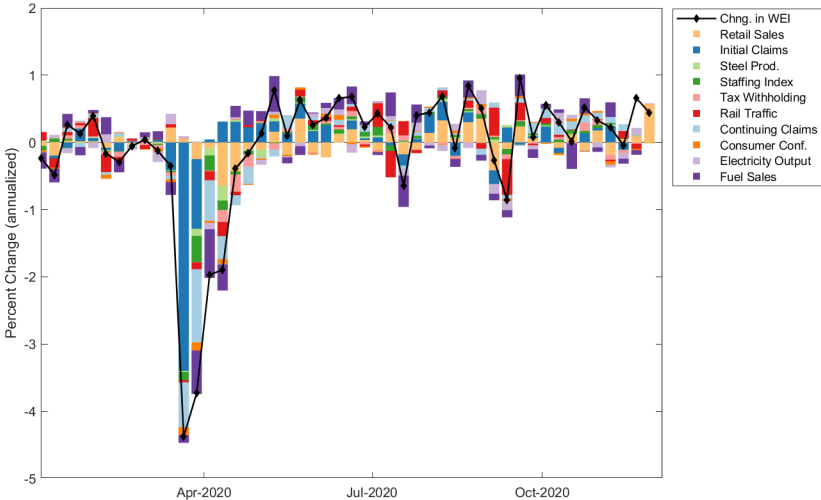
WEI vs nowcasts: Q3



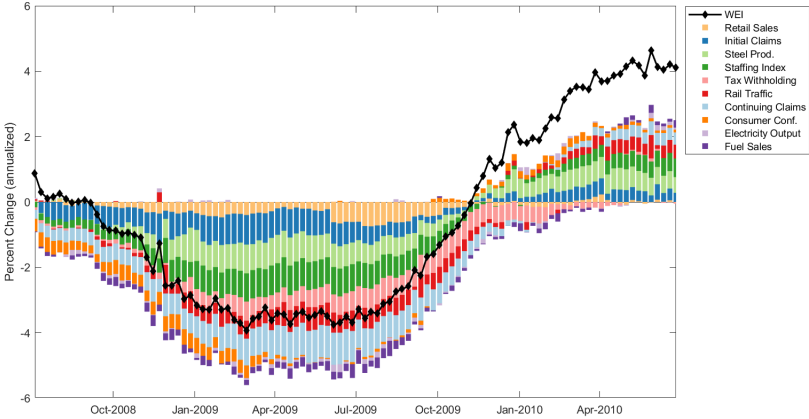
Contributions to the level of the WEI: 2020



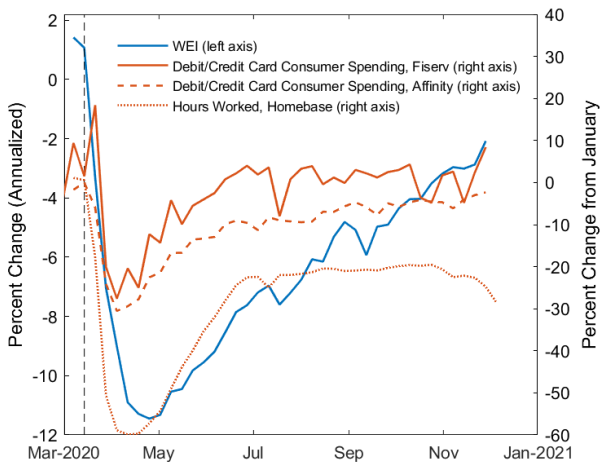
Contributions to changes in the WEI: 2020



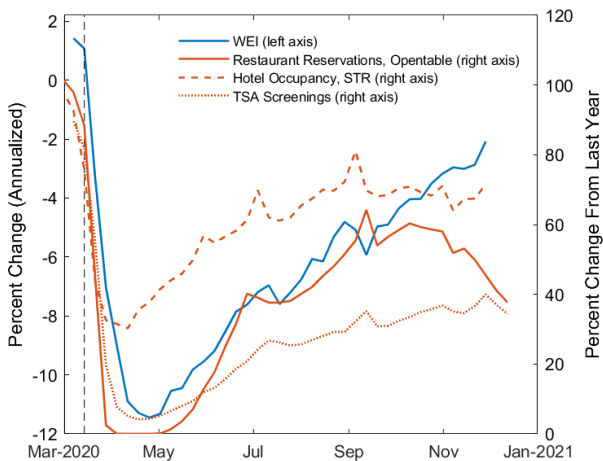
Contributions to the WEI: 2008



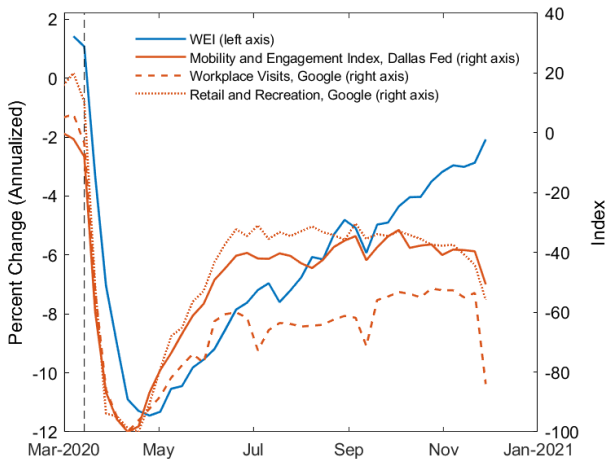
WEI vs. non-traditional data: spending and hours



WEI vs. non-traditional data: services and travel



WEI vs. non-traditional data: mobility and retail



Conclusion

The WEI has provided a timely signal of real economic activity during the pandemic.

- It highlights fluctuations from week to week...
- ... and also can be used to nowcast GDP growth.
- In 2020, the WEI tracks high- and low-frequency developments.
- The signal is similar to some non-traditional data series.
- But there are important differences!
- As alternative data mature, they may be useful for the WEI.