

Is GDP Overstating Economic Activity?

Appendix

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This appendix provides details about the data series and prediction errors discussed in *FRBSF Economic Letter* 2018-14. <http://www.frbsf.org/economic-research/publications/economic-letter/2018/may/is-gdp-overstating-economic-activity/>

A1. Economic activity index (EAI) components

The following are the 90 series that constitute our economic activity index (EAI). We begin by finding the principle components across these series. We then construct our EAI as a weighted average of the first two components based on their contribution to the variance. We find that the first component accounts for 21% of the variance across the series and the second component accounts for 18% of the variance—these are the weights we use for each component. As in the case of our GDP and GDI data, all values are based on final reported data values.

Real output and income

1. Industrial Production: Final Products and Nonindustrial Supplies (seasonally adjusted, 2012=100)
2. Industrial Production: Final Products (SA, 2012=100)
3. Industrial Production: Consumer Goods (SA, 2012=100)
4. Industrial Production: Durable Consumer Goods (SA, 2012=100)
5. Industrial Production: Nondurable Consumer Goods (SA, 2012=100)
6. Industrial Production: Business Equipment (SA, 2012=100)
7. Industrial Production: Materials (SA, 2012=100)
8. Industrial Production: Durable Goods Materials (SA, 2012=100)
9. Industrial Production: Nondurable Goods Materials (SA, 2012=100)
10. Industrial Production: Manufacturing (SIC) (SA, 2012=100)
11. Industrial Production: Mining (SA, 2012=100)
12. Industrial Production: Electric and Gas Utilities (SA, 2012=100)
13. Industrial Production Index (SA, 2012=100)
14. Capacity Utilization: Manufacturing (SIC) (SA, percent of capacity)
15. Real Personal Income less Transfer Payments (SA annual rate, billions of chained 2009 dollars)
16. Real Personal Income (SAAR, Bil.Chn.2009\$)
17. ISM Manufacturing: Production Index (SA, 50+ = Econ Expand)

Employment and hours

18. Civilian Employment: 16 Years & Over (SA, Thous)
19. Civilian Employment: Nonagricultural Industries: 16 yr + (SA, Thous)
20. Civilian Unemployment Rate: 16 yr + (SA, %)
21. Average [Mean] Duration of Unemployment (SA, Weeks)
22. Civilians Unemployed for Less Than 5 Weeks (SA, Thous.)

23. Civilians Unemployed for 5-14 Weeks (SA, Thous.)
24. Civilians Unemployed for 15 Weeks and Over (SA, Thous.)
25. Civilians Unemployed for 15-26 Weeks (SA, Thous.)
26. All Employees: Total Nonfarm (SA, Thous)
27. All Employees: Total Private Industries (SA, Thous)
28. All Employees: Goods-producing Industries (SA, Thous)
29. All Employees: Mining (SA, Thous)
30. All Employees: Construction (SA, Thous)
31. All Employees: Manufacturing (SA, Thous)
32. All Employees: Durable Goods Manufacturing (SA, Thous)
33. All Employees: Nondurable Goods Manufacturing (SA, Thous)
34. All Employees: Private Service-providing Industries (SA, Thous)
35. All Employees: Trade, Transportation & Utilities (SA, Thous)
36. All Employees: Professional & Business Services (SA, Thous)
37. All Employees: Government (SA, Thous)
38. Average Weekly Hours: Production & Nonsupervisory: Manufacturing (SA, hrs)
39. ISM Mfg: Employment Index (SA, 50+ = Econ Expand)

Housing

40. Housing Starts (SAAR, Thous.Units)
41. Housing Starts: Northeast (SAAR, Thous.Units)
42. Housing Starts: Midwest (SAAR, Thous.Units)
43. Housing Starts: South (SAAR, Thous.Units)
44. Housing Starts: West (SAAR, Thous.Units)
45. New Private Housing Units Authorized by Building Permit (SAAR, Thous.Units)

Real inventories, orders, and unfilled orders

46. ISM Mfg: Inventories Index (SA, 50+ = Econ Expand)
47. ISM Mfg: New Orders Index (SA, 50+ = Econ Expand)
48. ISM Mfg: Supplier Deliveries Index (SA, 50+ = Slower)

Stock prices

49. Stock Price Index: Standard & Poor's 500 Composite (1941-43=10)
50. Stock Price Index: Standard & Poor's 500 Industrials (1941-43=10)
51. S&P: 500 Composite, Price/Earnings Ratio (Ratio)
52. S&P: Composite 500, Dividend Yield (%)

Exchange rates

53. Foreign Exchange Rate: Switzerland (Franc/US\$)
54. Foreign Exchange Rate: Japan (Yen/US\$)
55. Foreign Exchange Rate: Canada (C\$/US\$)
56. Foreign Exchange Rate: UK (US\$/Pound)

Interest rates

57. Federal Funds [effective] Rate (% per annum)
58. 3-Month Treasury Bills, Secondary Market (% p.a.)
59. 6-Month Treasury Bills, Secondary Market (% p.a.)
60. 1-Year Treasury Bill Yield at Constant Maturity (% p.a.)
61. 5-Year Treasury Note Yield at Constant Maturity (% p.a.)
62. 10-Year Treasury Note Yield at Constant Maturity (% p.a.)
63. Moody's Seasoned Aaa Corporate Bond Yield (% p.a.)

64. Moody's Seasoned Baa Corporate Bond Yield (% p.a.)
65. Bank Prime Loan Rate (% p.a.)

Money and credit quantity aggregates

66. Money Stock: M1 (SA, Bil.\$)
67. Money Stock: M2 (SA, Bil.\$)
68. C & I Loans in Bank Credit: All Commercial Banks (SA, Bil.\$)
69. Nonrevolving Consumer Credit Outstanding (EOP, SA, Bil.\$)
70. Ratio: Consumer Credit to Personal Income (SA, %)
71. Ratio: Consumer Installment Credit to Disposable Personal Income (SA, %)
72. Adjusted Monetary Base including Deposits to Satisfy Clearing Balance Contracts (SA, Bil.\$)

Price indexes

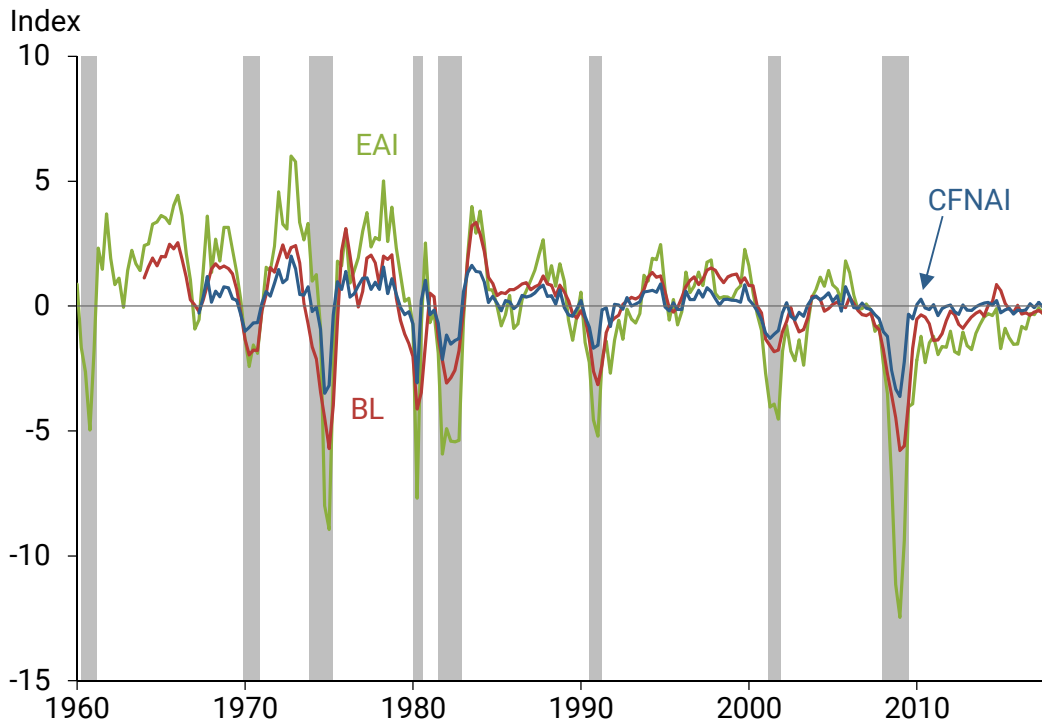
73. PPI: Finished Goods (SA, 1982=100)
74. PPI: Crude Materials for Further Processing (SA, 1982=100)
75. PPI: Intermediate Demand Processed Goods (SA, 1982=100)
76. CPI-U: All Items (SA, 1982-84=100)
77. CPI-U: Transportation Services (SA, 1982-84=100)
78. CPI-U: Medical Care Services (SA, 1982-84=100)
79. CPI-U: All Items Less Food (SA, 1982-84=100)
80. CPI-U: All Items Less Shelter (SA, 1982-84=100)
81. CPI-U: All Items Less Medical Care (SA, 1982-84=100)
82. CPI-U: Commodities Less Food & Energy Commodities (SA, 1982-84=100)
83. CPI-U: Services Less Energy Services (SA, 1982-84=100)
84. PCE: Chain Price Index (SA, 2009=100)
85. PCE: Durable Goods: Chain Price Index (SA, 2009=100)
86. PCE: Nondurable Goods: Chain Price Index (SA, 2009=100)
87. PCE: Services: Chain Price Index (SA, 2009=100)
88. ISM: Manufacturing: Prices Index (SA, 50+ = Econ Expand)

Average hourly earnings

89. Average Hourly Earnings: Production & Nonsupervisory: Construction (SA, \$/hr)
90. Average Hourly Earnings: Production & Nonsupervisory: Manufacturing (SA, \$/hr)

The values for the EAI and the Barigozzi and Luciani (2018, BL) indexes are shown in Figure A1, along with the Chicago Fed National Activity Index (CFNAI) used in the text. It can be seen that these indices track each other closely.

Figure A1: Economic Activity Measures
Demeaned growth rate, year-over-year growth, quarterly



Source: Chicago Fed, Barigozzi-Luciani, and authors' calculations.

A2. Results with alternative activity benchmarks

Tables A1 and A2 report our results for prediction errors, measured as root mean-squared errors, for our constructed EAI and the BL indexes, for the 1985:Q1-2015:Q4 sample used in the text as well as the extended samples, respectively. For comparison purposes, we repeat the results for the CFNAI and unemployment indexes. Full sample models using unemployment and our EAI series use a prediction sample starting in 1960:Q1, the BL index runs from 1964:Q1, and the CFNAI runs from 1967:Q2.

Table A1: Prediction error for 1985Q1-2015Q4 sample

Output Measure	CFNAI	U	EAI	BL
GDP	1	1	1	1
GDI	1.5	1.2	1.5	1.6
GDPplus	1.4	1.2	1.4	1.4

Note: RMSE normalized to 1 for GDP

Table A2: Prediction error for full sample

Output Measure	CFNAI	U	EAI	BL
GDP	1	1	1	1
GDI	1.4	1.1	1.3	1.6
GDPplus	1.4	1.1	1.3	1.5

Note: RMSE normalized to 1 for GDP.

Reference

Barigozzi, Matteo, and Matteo Luciani. 2018. "Do National Account Statistics Underestimate US Real Output Growth?" Board of Governors *FEDS Notes*, January 9.
<https://www.federalreserve.gov/econres/notes/feds-notes/do-national-account-statistics-underestimate-us-real-output-growth-20180109.htm>