

Technical appendix to *Chicago Fed Letter* No. 490

Persistently pessimistic: Consumer and small business sentiment after the Covid recession

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Here, we present additional results for our [Chicago Fed Letter](#) examining the recent behavior of consumer and small business sentiment indexes for the U.S.

Figure A1 displays a list of data series used in the Bayesian linear regressions.

Figures A2–A4 display the regression results for each of the three sentiment indexes.

Figure A5 breaks down the predicted values in figure 1 of the main article into contributions from subsets of economic indicators.

A1. Data

Name	Description	Haver Analytics code
<i>A. Inflation variables</i>		
Core Consumer Price Index	Consumer Price Index excluding food and energy prices, all urban consumers	yryr% (pcuslfe@usecon)
Food Consumer Price Index	Consumer Price Index for food at home, all urban consumers	yryr% (pcufh@usecon)
Gas prices	U.S. retail gasoline price: Regular grade	yryr% (pzrgus@usecon)
Inflation expectations	University of Michigan one-year inflation expectations	cinf1@usecon
<i>B. Labor variables</i>		
Unemployment rate (one-month lagged)	One-month lag of the civilian unemployment rate, people 16 years and older	lag(lr@usecon, 1)
Change in unemployment rate	Monthly difference in the civilian unemployment rate, people 16 years and older	diff(lr@usecon)
Real disposable income	Real disposable personal income	yryr% (ypdhm@usecon)
Real wages	Real average hourly earnings for production and nonsupervisory employees	yryr% (lzhac@usecon)
<i>C. Asset price variables</i>		
Real trade-weighted U.S. dollar index	Real Federal Reserve Board trade-weighted U.S. dollar index	fxtwbdc@usecon
House prices	S&P CoreLogic Case-Shiller Home Price Index: U.S. National	yryr% (casusxrm@usecon)
Stock prices	Stock price index: S&P 500 Composite Stock Price Index	yryr% (sp500@usecon)
Ten-year U.S. Treasury yield	Ten-year U.S. Treasury note yield at constant maturity	fcm10@usecon
<i>D. Sentiment variables</i>		
University of Michigan Index of Consumer Sentiment	Average of the University of Michigan Index of Current Economic Conditions and Index of Consumer Expectations	csent@usecon
Conference Board Consumer Confidence Index	Average of the Conference Board Present Situation Index and Expectations Index	ccin@usecon
NFIB Small Business Optimism Index	Composition of questions to small businesses on expectations for the economy, sales, and earnings; current inventories, employment, and credit conditions; and future plans for inventory expansions, employment, and capital expenditures	nfib@surveys

Notes: S&P stands for Standard and Poor's. NFIB stands for National Federation of Independent Business.

Sources: Haver Analytics.

A2. University of Michigan Index of Consumer Sentiment regression results

Variable	Pre-April 2020 sample		Full sample without level shift		Full sample with level shift		Full sample with level and slope shifts	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	0.06	0.04	0.00	0.02	0.09	0.03	0.05	0.03
Core (excluding food and energy) CPI	-0.29	0.08	-0.43	0.04	-0.26	0.06	-0.29	0.07
Food CPI	-0.10	0.04	-0.13	0.03	-0.07	0.03	-0.10	0.04
Unemployment rate	-0.33	0.08	-0.12	0.02	-0.11	0.02	-0.32	0.09
Change in unemployment rate	-0.53	0.05	-0.50	0.03	-0.41	0.04	-0.53	0.04
Real wages	0.01	0.07	-0.02	0.05	0.09	0.05	0.00	0.07
Real trade-weighted U.S. dollar index	0.13	0.05	0.12	0.05	0.18	0.05	0.13	0.05
House prices	0.12	0.04	0.16	0.03	0.20	0.03	0.12	0.04
Stock prices	0.26	0.03	0.26	0.03	0.31	0.03	0.26	0.03
Inflation expectations	-0.15	0.04	-0.18	0.04	-0.14	0.04	-0.15	0.04
Gas prices	-0.08	0.06	-0.09	0.05	-0.03	0.05	-0.09	0.06
Real disposable income	0.17	0.05	0.04	0.03	0.08	0.03	0.15	0.05
Ten-year U.S. Treasury yield	0.28	0.04	0.36	0.03	0.27	0.03	0.29	0.04
Covid-19					-0.80	0.19	-0.11	0.60
Covid-19 × Core CPI							0.21	0.18
Covid-19 × Food CPI							0.06	0.15
Covid-19 × Unemployment rate							0.38	0.09
Covid-19 × Change in unemployment rate							0.73	0.14
Covid-19 × Real wages							-0.30	0.17
Covid-19 × Real trade-weighted U.S. dollar index							-0.58	0.40
Covid-19 × House prices							0.04	0.20
Covid-19 × Stock prices							0.04	0.21
Covid-19 × Inflation expectations							0.04	0.15
Covid-19 × Gas prices							-0.20	0.26
Covid-19 × Real disposable income							-0.13	0.06
Covid-19 × Ten-year U.S. Treasury yield							-0.02	0.26

Notes: The full sample period is August 1991–August 2023. CPI stands for Consumer Price Index. The Covid-19 indicator is discussed in the notes of figure 2 and note 7 of the main article. Coefficients reported are calculated as the median of the posterior distribution, and standard errors (S.E.) are calculated as the mean absolute deviation approximation for the standard deviation (definitions for regression coefficient and standard error are in note 3 of the main article).

Source: Authors' calculations based on data from Haver Analytics.

A3. Conference Board Consumer Confidence Index regression results

Variable	Pre-April 2020 sample		Full sample without level shift		Full sample with level shift		Full sample with level and slope shifts	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	-0.04	0.03	0.00	0.02	0.01	0.03	-0.05	0.03
Core (excluding food and energy) CPI	-0.12	0.08	-0.10	0.04	-0.08	0.06	-0.15	0.07
Food CPI	-0.06	0.04	-0.01	0.03	0.00	0.03	-0.06	0.04
Unemployment rate	-0.76	0.04	-0.64	0.03	-0.63	0.04	-0.77	0.04
Change in unemployment rate	-0.30	0.08	-0.15	0.02	-0.15	0.02	-0.29	0.08
Real wages	0.22	0.07	0.25	0.04	0.27	0.05	0.20	0.06
Real trade-weighted U.S. dollar index	0.15	0.04	0.27	0.04	0.27	0.05	0.13	0.05
House prices	0.03	0.04	0.05	0.03	0.06	0.03	0.03	0.03
Stock prices	0.26	0.03	0.33	0.03	0.33	0.03	0.26	0.03
Inflation expectations	-0.03	0.03	0.02	0.03	0.02	0.04	-0.04	0.04
Gas prices	0.17	0.06	0.14	0.04	0.15	0.05	0.14	0.05
Real disposable income	0.20	0.05	0.08	0.03	0.08	0.03	0.19	0.05
Ten-year U.S. Treasury yield	0.07	0.04	0.09	0.03	0.08	0.03	0.09	0.04
Covid-19					-0.11	0.19	0.20	0.54
Covid-19 × Core CPI							0.35	0.16
Covid-19 × Food CPI							-0.07	0.14
Covid-19 × Unemployment rate							0.81	0.13
Covid-19 × Change in unemployment rate							0.30	0.09
Covid-19 × Real wages							-0.30	0.15
Covid-19 × Real trade-weighted U.S. dollar index							0.02	0.33
Covid-19 × House prices							0.04	0.19
Covid-19 × Stock prices							-0.02	0.21
Covid-19 × Inflation expectations							-0.01	0.15
Covid-19 × Gas prices							-0.18	0.24
Covid-19 × Real disposable income							-0.15	0.06
Covid-19 × Ten-year U.S. Treasury yield							0.01	0.22

Notes: The full sample period is August 1991–August 2023. CPI stands for Consumer Price Index. The Covid-19 indicator is discussed in the notes of figure 2 and note 7 of the main article. Coefficients reported are calculated as the median of the posterior distribution, and standard errors (S.E.) are calculated as the mean absolute deviation approximation for the standard deviation (definitions for regression coefficient and standard error are in note 3 of the main article).

Source: Authors' calculations based on data from Haver Analytics.

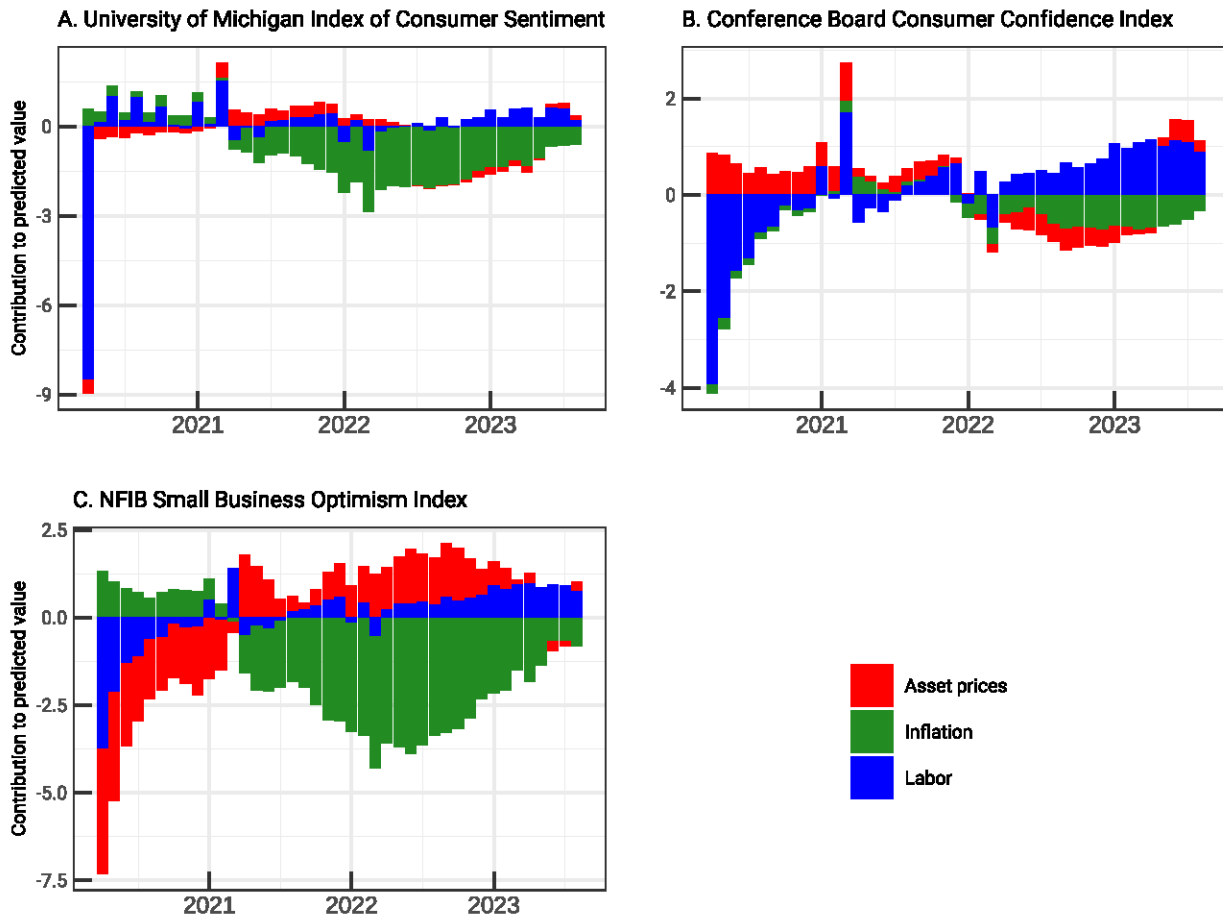
A4. NFIB Small Business Optimism Index regression results

Variable	Pre-April 2020 sample		Full sample without level shift		Full sample with level shift		Full sample with level and slope shifts	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	-0.11	0.05	0.00	0.03	-0.01	0.04	-0.11	0.05
Core (excluding food and energy) CPI	-0.44	0.10	-0.22	0.06	-0.24	0.08	-0.45	0.10
Food CPI	-0.20	0.05	-0.08	0.04	-0.08	0.05	-0.20	0.05
Unemployment rate	-0.65	0.06	-0.34	0.04	-0.36	0.05	-0.64	0.06
Change in unemployment rate	-0.28	0.11	-0.14	0.03	-0.14	0.03	-0.26	0.11
Real wages	-0.69	0.09	-0.21	0.06	-0.22	0.07	-0.71	0.09
Real trade-weighted U.S. dollar index	0.25	0.07	0.20	0.06	0.19	0.07	0.25	0.06
House prices	0.02	0.05	0.26	0.05	0.26	0.05	0.02	0.05
Stock prices	0.18	0.04	0.23	0.04	0.23	0.05	0.18	0.04
Inflation expectations	-0.20	0.05	-0.20	0.06	-0.20	0.06	-0.20	0.05
Gas prices	-0.37	0.07	-0.08	0.05	-0.08	0.06	-0.40	0.07
Real disposable income	0.17	0.06	0.14	0.04	0.13	0.04	0.16	0.06
Ten-year U.S. Treasury yield	0.38	0.05	0.26	0.04	0.27	0.05	0.38	0.05
Covid-19					0.09	0.29	-2.73	0.93
Covid-19 × Core CPI							0.36	0.23
Covid-19 × Food CPI							-0.12	0.19
Covid-19 × Unemployment rate							0.44	0.20
Covid-19 × Change in unemployment rate							0.13	0.12
Covid-19 × Real wages							0.33	0.20
Covid-19 × Real trade-weighted U.S. dollar index							0.88	0.57
Covid-19 × House prices							0.27	0.28
Covid-19 × Stock prices							-0.09	0.26
Covid-19 × Inflation expectations							0.03	0.20
Covid-19 × Gas prices							0.11	0.29
Covid-19 × Real disposable income							-0.14	0.09
Covid-19 × Ten-year U.S. Treasury yield							-1.90	0.49

Notes: The full sample period is August 1991–August 2023. NFIB stands for National Federation of Independent Business. CPI stands for Consumer Price Index. The Covid-19 indicator is discussed in the notes of figure 2 and note 7 of the main article. Coefficients reported are calculated as the median of the posterior distribution, and standard errors (S.E.) are calculated as the mean absolute deviation approximation for the standard deviation (definitions for regression coefficient and standard error are in note 3 of the main article).

Source: Authors' calculations based on data from Haver Analytics.

A5. Contributions to predicted values in figure 1



Notes: The three panels in this figure decompose the predicted values from the Bayesian linear regressions underlying the plots of figure 1 in the main article from April 2020 through August 2023. For illustrative purposes, we combine the contributions of the economic indicators to the predicted value for each sentiment index into three groups (asset prices, inflation, and labor). Each indicator's group is indicated in figure A1. Summing across the contributions in each month yields the predicted values shown in figure 1. NFIB stands for National Federation of Independent Business. Source: Authors' calculations based on data from Haver Analytics.