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Procyclical Prices: A Demi-Myth?

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Economic fashion follows long cycles. After a half-century lull, the empirical analysis of business cycles has again become fashionable. Cherished beliefs, having quietly matured from conjecture to stylized fact, are coming under attack. In a recent provocative article, for example, Finn Kydland and Edward Prescott (1990) claim that the popular assertion of a procyclical price level for the postwar U.S. economy is one of these unfounded beliefs, a "myth." Examining the data for the period since the Korean War, they instead find U.S. prices to be strongly countercyclical.

This finding, if robust, suggests that traditional demand-driven models of the business cycle are inadequate representations of reality. A rendezvous between theory and evidence, then, requires a significantly enhanced role for supply-side shocks in business cycle modeling or a shift toward models of (locally) increasing returns to scale.

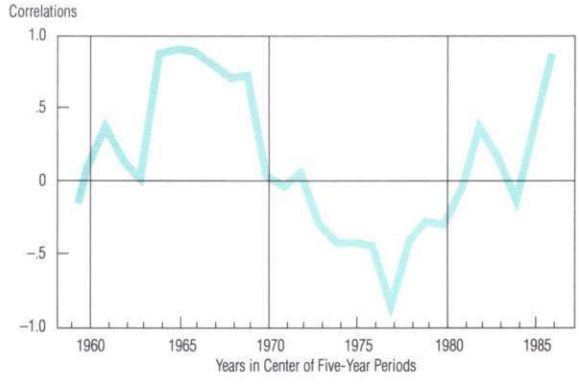
The implications of the Kydland-Prescott result warrant further study of the data. I here assume the role of devil's advocate, attempting to punch a hole in countercyclicality. I succeed—halfway: The strong countercyclicality hypothesis needs to be qualified in two directions. First, countercyclicality is a post-1973 rather than a post-1953 phenomenon. Second, countercyclicality is significantly more pronounced for negative than for positive output innovations. Except for these two quibbles, Kydland and Prescott's result is sturdy: Across a broad range of indexes, prices exhibit substantial countercyclicality.

Timing Matters . . .

In performing their calculations, Kydland and Prescott implicitly treat the entire postwar period as a single realization of an unchanging data generation process. Temporal disaggregation casts doubt on the validity of this assumption.

A Closer Look at Correlations Between U.S. Output and Prices: Across Periods of Time . . .

Average Contemporaneous Correlations Between Deviations From Trend of the Industrial Production Index and the Producer Price Index in Overlapping Five-Year Periods From 1957 to 1988



Source of basic data: International Monetary Fund data base

Table 1

. . . And Types of Product . . .

Correlation Between Deviations From Trend of the Real Gross National Product and the Prices of Various Wholesale Products in Two Sample Periods*

Type of Wholesale Product x	Sample Period	Correlation of Real GNP With Price of								
		$x(t-4)$	$x(t-3)$	$x(t-2)$	$x(t-1)$	$x(t)$	$x(t+1)$	$x(t+2)$	$x(t+3)$	$x(t+4)$
Farm and Food Products	1957–72	.07	.04	.02	.03	.10	.24	.38	.46	.50
	1973–89	−.42	−.27	−.13	.02	.11	.18	.24	.27	.30
Industrial Products										
Chemicals	1957–72	.03	−.02	−.07	−.08	−.06	.12	.28	.44	.51
	1973–89	−.39	−.54	−.65	−.69	−.66	−.53	−.37	−.21	−.03
Fuels	1957–72	−.01	−.05	−.06	−.18	.02	.14	.21	.29	.34
	1973–89	−.53	−.58	−.56	−.51	−.44	−.31	−.20	−.06	.10
Crude Petroleum	1957–72	−.00	−.08	−.11	−.10	−.07	.10	.23	.35	.42
	1973–89	−.50	−.49	−.43	−.36	−.32	−.26	−.20	−.11	.02
Machinery and Equipment	1957–72	−.18	−.24	−.31	−.33	−.29	−.05	.14	.29	.34
	1973–89	−.30	−.47	−.63	−.73	−.75	−.64	−.49	−.32	−.12
Metals	1957–72	−.20	−.19	−.14	−.08	−.01	.11	.21	.26	.32
	1973–89	−.41	−.52	−.54	−.46	−.32	−.14	.02	.15	.26
Lumber and Wood	1957–72	−.10	.11	.29	.42	.52	.46	.33	.16	−.00
	1973–89	.19	.37	.57	.70	.75	.64	.49	.32	.15
Pulp and Paper	1957–72	−.13	−.17	−.15	−.07	.03	.25	.40	.48	.47
	1973–89	−.46	−.62	−.71	−.70	−.61	−.42	−.24	−.08	.06
Rubber and Plastics	1957–72	−.20	−.20	−.19	−.16	−.08	.10	.21	.29	.41
	1973–89	−.39	−.57	−.68	−.70	−.63	−.47	−.29	−.12	.04
Textiles, Apparel, and Leather Products	1957–72	−.16	−.14	−.10	−.03	.03	.20	.30	.36	.38
	1973–89	−.53	−.63	−.66	−.62	−.53	−.37	−.23	−.07	.09
Household Durables	1957–72	−.18	−.23	−.27	−.29	−.24	−.04	.14	.27	.34
	1973–89	−.31	−.49	−.63	−.71	−.68	−.56	−.40	−.24	−.05
All Wholesale Products	1957–72	−.05	−.06	−.04	.01	.09	.26	.39	.46	.49
	1973–89	−.62	−.64	−.60	−.51	−.40	−.23	−.09	.04	.20

*All basic data are quarterly and have been detrended using the Hodrick-Prescott filter.

Sources of basic data: International Monetary Fund and Citicorp data bases

The accompanying chart provides one perspective. It plots the average correlations between innovations in industrial production and prices for five-year periods, starting with 1957–61 and ending with 1984–88.† Rather than exhibiting uniform countercyclicality, postwar prices appear to have been mildly procyclical until the late 1960s and to have become highly countercyclical only in the early 1970s. Most recently, prices have returned to mild

†The same statistical methodology as in Kydland and Prescott 1990 is used. However, the qualitative results are fairly robust with respect to the detrending method employed: first-differenced series and residuals from exponential trends yield very similar results.

Table 2

. . . And Directions of Shock

Correlation Between Deviations From Trend of the Industrial Production Index and Various Measures of Prices in Two Sample Periods and After Positive (+) and Negative (–) Output Shocks*

Price Measure x	Sample Period	Sign of Output Shock	Correlation of Industrial Production Index With								
			$x(t-4)$	$x(t-3)$	$x(t-2)$	$x(t-1)$	$x(t)$	$x(t+1)$	$x(t+2)$	$x(t+3)$	$x(t+4)$
Consumer Price Index	1957–72	+	–.01	.01	.01	.00	.03	.25	.16	.05	.02
		–	–.14	–.15	–.21	–.29	–.32	–.22	–.13	–.01	.16
	1973–89	+	–.14	–.21	–.25	–.24	–.19	–.06	.06	.20	.34
		–	–.31	–.36	–.38	–.34	–.27	–.21	–.14	–.06	–.01
Producer Price Index	1957–72	+	–.02	.05	.05	.08	.11	.24	.12	–.00	–.02
		–	.00	.04	.02	–.00	.00	.06	.11	.12	.24
	1973–89	+	–.07	–.13	–.13	–.09	–.04	.09	.22	.38	.53
		–	–.41	–.45	–.45	–.36	–.27	–.21	–.15	–.07	–.03
GNP Deflator**	1957–72	+	.04	.07	.04	.11	.19	.28	.19	.06	–.13
		–	–.12	–.14	–.09	–.06	–.06	–.10	–.14	–.13	–.10
	1973–89	+	–.13	–.17	–.18	–.17	–.14	–.10	–.07	–.00	.10
		–	–.21	–.34	–.45	–.45	–.40	–.32	–.26	–.15	–.09

*All basic data are quarterly and have been detrended using the Hodrick-Prescott filter.

**The GNP deflator is calculated as the ratio of nominal to real gross national product.

Source of basic data: International Monetary Fund data base

procyclicality.

The same conclusion emerges from an examination of the cyclicality of particular product prices. Table 1 reports output/price correlations for the major wholesale price subindexes. With the exception of lumber, every subindex examined, as well as the aggregate index, has been strikingly more countercyclical since 1973 than in the previous 20-year period. Indeed, one period ahead, 10 out of 12 output/price correlations are positive for the earlier period. Postwar procyclicality thus merits at least the rank of demi-myth.

. . . And So Does Direction

Linear models driven by a single forcing variable generate pro- or countercyclical prices regardless of the sign of the forcing shock. Calculating the correlations separately for positive (+) and negative (–) output innovations thus provides a natural informal test of single-source stories. Table 2 reports the results of such a test.

The statistics suggest a fairly strong asymmetry: prices are markedly more countercyclical for negative than for positive output innovations. Single-shock business cycle models thus would seem to provide inadequate representations of reality. The dependence of the correlation on the sign of the output innovation, furthermore, casts doubt on the ability of no-frills increasing-returns models to provide a convincing rationale for the cyclical behavior of prices.

Conclusion

Kydland and Prescott (1990) have recently argued that the "perceived fact" of procyclical prices is but a myth for the postwar United States. A more detailed examination of the data leaves their fundamental conclusion intact, but suggests two qualifications. The countercyclicality appears to be of more recent origin than Kydland and Prescott suggest: before 1973, U.S. prices display substantial procyclicality. In addition, the cyclical behavior of prices exhibits a significant asymmetry: the countercyclicality is considerably more pronounced for negative than for positive output innovations.

These findings imply that if real business cycle models

are to provide a convincing representation of reality, then demand-side shocks have to be assigned a more exalted role than they usually are. [This point has been stressed by Prescott (1986, p. 29).] Furthermore, the evidence suggests that the common assumption of linearity, while convenient, may be a misleading simplification. Needless to say, both points merit further quantitative research.

References

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