ECONOMIC DISCOMFORT AND CONSUMER SENTIMENT

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INTRODUCTION

Let us look at the relation between two important economic indicators, the Economic Discomfort Index (the sum of the unemployment and inflation rate) and the Index of Consumer Sentiment. How well does the Economic Discomfort Index explain consumer sentiment? Conversely, does the study of the Index of Consumer Sentiment help to validate the Economic Discomfort Index?

The Economic Discomfort Index was brought to the attention of business pundits in an article by Richard F. Janssen:

> ...a year like 1970 [is] difficult to sum up — you wish for one number that would tell all. Although it can be criticized as whimsically simplistic, there is such an index. It is offered by Arthur M. Okun, who was Lyndon Johnson's top economist... Mr. Okun constructs a "discomfort factor" for the economy. It is derived by simply lumping together the unemployment rate and the annual rate of change in consumer prices - apples and oranges, surely, but it is those two bitter fruits which feed much of our economic discontent... The higher this index, the greater the discomfort — we're less pained by inflation if the job market is jumping, and less sensitive to others' unemployment if a placid price level is widely enjoyed... [4 January 1971, *The Wall Street Journal*]

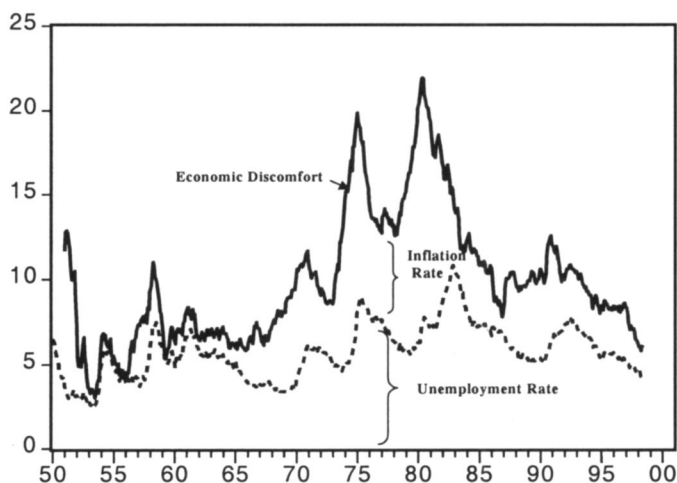The Economic Discomfort Index (EDI) purports to provide a remarkably simple objective measure of economic malaise:

(1) $$EDI = |\dot{p}| + U,$$

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FIGURE 1
**Economic Discomfort = Unemployment + Inflation**

where U is the unemployment rate and $\dot{p}$ the annual rate of inflation. The absolute value of $\dot{p}$ will be used in this paper in recognition of the fact that deflation may be just as painful as inflation itself.[1]

This index has been found useful, particularly by politicians. McGovern used the Economic Discomfort Index in deriding Nixon during the 1972 campaign. Then Carter used it in deriding Ford in 1976. Reagan renamed it the "Economic Misery Index" in deriding Carter in 1980. Mondale invoked the index in deriding Reagan in 1984 and Clinton in deriding Bush in 1992. The *Economic Report of the President* for 1997 displayed the Misery Index on its first chart.

It is tempting to reject Arthur Okun's Economic Discomfort Index out of hand as a gross oversimplification. With only the rate of inflation and unemployment as arguments, Okun's index can be regarded as a crude (dis)utility function. It might seem more reasonable to suppose that economic discomfort would be influenced by additional measures of economic performance, such as the rate of economic growth and/or stock market performance. Furthermore, Okun was implicitly assuming that the indifference curves showing the representative citizen's aversion to inflation and unemployment are straight lines with slope minus one(i.e., the marginal rate of substitution between the pain of inflation and the pain of unemployment is unity). In contrast to Okun's simple linear indifference curves, Duncan MacRae [1977], William Nordhaus [1989] and other investigators of the political business cycle have usually assumed that the utility function is a quadratic function of inflation and unemployment.

In this paper we investigate the validity of Okun's Economic Discomfort Index as a practical measure of economic malaise by asking how well it explains the Index of Consumer Sentiment. The Index of Consumer Sentiment, compiled by the Michigan Survey Research Center since the mid-1950s, is based on the qualitative answers provided by telephone respondents to five questions: [2]

FIGURE 2
Index of Consumer Sentiment
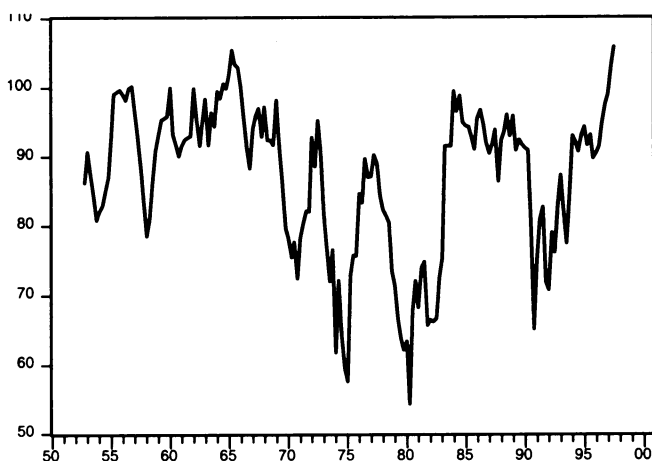
1. "Would you say you (and your family) are *better off* or *worse off* financially than you were *a year ago*?
2. "Now looking ahead — do you think that *a year from now* you will be *better off* financially, or *worse off*, or just about the same as now?
3. "Now turning to business conditions in the country as a whole — do you think that during the *next 12 months* we'll have *good* times financially, or *bad* times, or what?
4. "... which would you say is more likely — that in the country as a whole we will have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what?
5. "...do you think now is a good or bad time for people to buy major household items?"

Responses to these five questions receive equal weights in the Consumer Sentiment Index.[3]

The Michigan Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index are frequently cited by economic journalists. Some economists have found these indices helpful in explaining fluctuations in consumption and other economic variables.[4] Further, the Michigan Index of Consumer Expectations, based upon the responses to questions #2, #3 and #4, is included in the official list of leading economic indicators.[5]

TABLE 1
Summary Statistics

	Mean	Maximum	Minimum	Std. Dev
$\dot{p}$ (annual rate of change, CPI)	4.3	14.4	-.06	3.1
U (unemployment rate)	5.9	10.7	2.7	1.5
EDI (Economic Discomfort Index)	10.2	21.8	3.5	3.8
CS (Index of Consumer Sentiment)	87.2	107.8	54.4	11.4
GDP (annual rate of real GDP growth)	3.1	9.8	-3.1	2.6
S & P (annual rate of change, S&P 500)	9.2	45.4	-32.1	14.6

ESTIMATES

How well does the Economic Discomfort Index explain consumer sentiment?

The Time Dimension

The use of the *annual* rate of inflation is one arbitrary feature of Okun's *EDI* that arises from a dimensionality problem in constructing the *EDI*: $\dot{p}$ but not U has a time dimension. The index would look rather different, and be dominated more by the unemployment component, if instead of measuring inflation at annual rates we chose to measure inflation at a quarterly or monthly rate.[6] As defined by Okun with the annual rate of inflation, the *EDI* has a standard deviation of 3.8. The standard deviation is 1.9 when the *EDI* is calculated with the quarterly rate of inflation. With inflation measured at the monthly rate, as is the custom in many high inflation countries, the standard deviation drops to 1.6 and the role of the unemployment rate is paramount. While this may suggest that the economic discomfort index is an arbitrary construct, it turns out that Okun's decision to use the *annual* rate of inflation was a happy choice in that it yields an index that is more closely related to the public's sense of economic well-being, at least as measured by the Index of Consumer Sentiment. Specifically, the simple correlation of *EDI* with Consumer Sentiment is −0.80 when the Economic Discomfort Index is calculated with the annual rate of inflation; but this drops to only −0.65 when the quarterly rate of inflation is used or to −0.52 with the monthly inflation rate.

Relative Significance of Inflation and Unemployment

Was it appropriate for Okun to assign equal weights to unemployment and the annual rate of inflation in designing his Economic Discomfort Index? The second regression on Table 2 suggests that in retrospect it might have been better for Okun to have assigned slightly more weight to inflation than to unemployment.[7] The relevant F test establishes that the observed difference between the two regression coefficients in Regression #2 is significant at the 5 percent level.

TABLE 2
Regression Output
Dependent Variable : Index of Consumer Sentiment

	#1	#2	#3	#4	#5	#6	#7
$\bar{R}^2$	0.636	0.647	0.869	0.876	0.874	0.875	0.878
Durbin Watson	0.46	0.48	2.03	2.18	2.15	2.18	2.19
Intercept	111.49ᵃ	107.79ᵃ	40.70ᵃ	105.32ᵃ	113.95ᵃ	105.31ᵃ	113.30ᵃ
	(1.50)	(2.09)	(6.61)	(4.20)	(6.95)	(9.91)	(6.17)
EDI	-2.38ᵃ						
	(0.14)						
$\lvert \dot{p}_t \rvert$		-2.67ᵃ	-1.00ᵃ	-2.30ᵃ	-2.57ᵃ	-2.09ᵃ	-4.16ᵃ
		(0.18)	(0.18)	(0.31)	(0.38)	(0.91)	(1.11)
$\lvert \dot{p}_t - \dot{p}_{t-1} \rvert$			-0.42	0.37	0.30	0.34	0.45
			(0.95)	(0.85)	(0.90)	(0.87)	(0.86)
U_t		-1.55ᵃ	-0.24	-1.78ᵃ	-2.43ᵃ	-1.91	-3.10ᵃ
		(0.36)	(0.28)	(0.62)	(0.72)	(2.95)	(0.97)
$U_t - U_{t-1}$			-3.62ᵃ	-2.77ᵃ	-2.23	-2.74	-3.24ᵃ
			(1.44)	(1.38)	(1.48)	(1.40)	(1.41)
$\dot{GDP}$			0.13	0.70ᵃ	0.70ᵃ	0.69ᵃ	0.70ᵃ
			(0.22)	(0.29)	(0.29)	(0.29)	(0.28)
$S \& P$			0.07ᵃ	0.08	0.08ᵃ	0.08	0.08
			(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
CS_{t-1}			0.59ᵃ				
			(0.06)				
AR(1)				0.66ᵃ	0.57ᵃ	0.66ᵃ	0.63ᵃ
				(0.06)	(0.07)	(0.06)	(0.06)
$\dot{p}_t^2$						-0.02	
						(0.06)	
U^2						0.01	
						(0.22)	
$U \times \lvert \dot{p}_t \rvert$							0.29
							(0.17)
Eisenhower					4.46		
					(4.20)		
Kennedy					-4.87		
					(4.26)		
Johnson					-5.36		
					(4.00)		
Nixon					-6.59		
					(3.36)		
Ford					-2.10		
					(3.00)		
Reagan					-1.41		
					(2.82)		
Bush					-6.06		
					(3.41)		
Clinton					-3.08		
					(3.72)		

a. denotes $\lvert t \rvert > 2$. Standard errors in parentheses. Regression #1 and #2 use 172 quarterly observations covering the period 1952:4-1998:4; the remainder use 159 observations, the first of which is for 1953:1. Some observations are lost in the earlier periods when the survey was not administered every quarter. The following null-hypotheses are not rejected with the relevant F tests: All presidential dummy coefficients are zero in regression #4. The coefficients of U^2 and $\lvert \dot{p}_t \rvert$ are both zero in #6.

Additional Variables

The remaining regressions reported on Table 2 elaborate on the original Okun model. The change in the rate of inflation, $\mid \dot{p}_t - \dot{p}_{t-1} \mid$, is introduced because pain may be induced by difficulties in adjusting to changes in the rate of inflation, particularly if they are unanticipated. The public may adjust to the rate of inflation, but the coefficient of $\mid \dot{p}_t - \dot{p}_{t-1} \mid$ should be negative under the assumption that it is inflation and deflation surprises that hurt consumers. The change in unemployment, $U_t - U_{t-1}$, is included because the public may interpret changes in unemployment as an indicator of what lies ahead. The annual rate of growth of gross domestic product, $\dot{GDP}$, is included in accordance with the literature on the political business cycle. Stock market performance, as measured by the rate of change in the S&P 500, is also included in these regressions.

Regression #3 has several surprises: first, the rate of change in unemployment rather than its level influences consumer sentiment. Second, while inflation affects consumer sentiment, it is only the rate of inflation itself that matters and not inflation surprises as indexed by $\mid \dot{p}_t - \dot{p}_{t-1} \mid$. Third, $\dot{GDP}$ does not appear to influence consumer sentiment.[8] This regression, following Lovell [1975], includes the lagged dependent variable in order to allow for a possible time lag in the impact of current economic developments. With the updated data set, however, it turns out that the remaining regressions incorporating a first-order autoregressive process to correct for autocorrelated error terms provide a tighter explanation of the determinants of consumer sentiment.[9] The AR(1) approach of Regression #4 yields significant coefficients for U and for $\dot{GDP}$.

Presidential Popularity

It may seem reasonable to expect that the popularity of the incumbent president might feed back and influence consumer sentiment. Regression #4 tests this hypothesis by adding dummy variables for seven presidents, omitting Jimmy Carter as the benchmark for comparison. While the signs of the presidential dummies may appear reasonable, the dummies are small in magnitude. Taken at face value, the two largest shifts, the changes from Eisenhower to Kennedy and from Nixon to Ford, explain swings of less than 10 points in the Consumer Sentiment Index; these are small movements by historical standards, as can be seen from Figure 2. But none of the presidential dummy coefficients is significant. Further, the F test suggests acceptance at the 5 percent level of the null-hypothesis that all presidential dummies have a zero coefficient (i.e., presidents don't matter, at least as a determinant of consumer sentiment).

Nonlinear complications

Regression #6 allows for a possible nonlinear effect of inflation and unemployment on consumer sentiment in order to relax Okun's assumption that the indifference curves between unemployment and inflation are linear. In a classic paper on the

political business cycle, C. Duncan MacRae [1977, 241] introduced non-linearity by arguing that the dissatisfaction of the electorate might be related to the sum of the squared unemployment rate plus the squared rate of inflation. Precisely this same functional form has been employed in studies of presidential popularity by Nordhaus [1989] and Smyth et al. [1994]. Regression #6 reveals that neither of the squared terms is significant in explaining consumer sentiment, which adds credence to Okun's assumption that economic discomfort is linearly related to the unemployment and inflation rates.[10] As an alternative strategy for allowing for a nonlinear relationship, the last regression includes the product of the unemployment rate times the rate of inflation as an interaction term. The coefficient of this interaction term is not quite twice its standard error and a plot of the implied indifference curves between unemployment and inflation revealed that the departure from linearity is of negligible magnitude.

CONCLUSION

Our investigation suggests that the Economic Discomfort Index, defined by Arthur Okun as the sum of the unemployment rate plus the annual rate of inflation, provides a rough and ready estimate of economic malaise as measured by the Survey Research Center's Index of Consumer Sentiment. Two of Okun's assumptions that appeared questionable when he advanced his measure in 1975 turn out in retrospect to be supported by the evidence:

1. The relationship is linear rather than of the quadratic form suggested by the literature on the political business cycle.
2. It is the annual rather than the quarterly or monthly rates of inflation that should be added to unemployment.

It would be reasonable for Okun to claim that his Economic Discomfort Index provides a reasonable first approximation summarizing the impact of adverse economic conditions on the consumer.

With the luxury of hindsight provided by twenty-five more years of observations, it is possible to advance a slightly more elaborate explanation of economic discomfort than Okun initially provided. A more precise explanation includes the change in the unemployment rate, the rate of change in the S&P 500 Index, and the growth rate of real GDP. Changes in the rate of inflation are not significant. Whether a Clinton or a Reagan happens to occupy the White House does not appear to alter the public's appraisal of economic conditions as measured by the Index of Consumer Sentiment.

NOTES

1. The most recently revised data available in March of 1999 are used throughout this study, which means that the Economic Discomfort Index differs somewhat from the contemporaneous index calculated at the time on the basis of preliminary data. The distinction between preliminary and revised data is particularly pronounced at seasonal frequencies for the unemployment rate. The use of revised data is appropriate to the extent that the economic discomfort citizens incur depends upon the economic circumstances of each individual and not upon anxieties raised by preliminary reports of the national unemployment rate and other variables as published at the time.

2. Interestingly enough, these attitudinal questions were not originally intended to elicit useful information. Rather, when Michigan Professor George Katona was developing the Survey of Income and Wealth for the Federal Reserve Board, he added the attitudinal questions in order to loosen up the respondents so that they would be more willing to answer the questions about their income and other personal financial details. [Curtin, 1992].

3. See Bram and Ludvigson [1998] for a detailed explanation of how the index is calculated. The procedure for constructing the index ensures that the Consumer Sentiment Index is between 2 and 150; this means that the index, being bounded, cannot have a unit root.

4. Bram and Ludvigson [1998] provide a detailed comparison of the Michigan and the Conference Board measures of consumer attitudes, concluding that the latter is more useful for predicting consumption behavior. The Michigan measure is used in this paper because it is available for a longer timespan.

5. The Leading Economic Indicators, originally developed in the 1930's by Arthur F. Burns and Wesley C. Mitchell at the National Bureau of Economic Research and published for many years by the Department of Commerce, is now compiled by the National Industrial Conference Board and reported on its web site: http://www.tcb-indicators.org/index.htm

6. For making the comparisons reported in this paragraph we used monthly consumer sentiment data. The monthly rate of inflation is $(p_t - p_{t-1})/p_{t-1}$; the quarterly rate is $(p_t - p_{t-4})/p_{t-4}$ and the annual rate $(p_t - p_{t-12})/p_{t-12}$.

7. A regression based on monthly observations for the period 1978:01 to 1998:12 yields weights of -2.73 on $\dot{p}$ and -3.04 on U.

8. GDP and the change in unemployment are highly collinear ($r = 0.698$). "Okun's law" [1962] implies that changes in unemployment are closely related to the rate of GDP growth.

9. Regressions paralleling the remaining AR(1) regressions on the table but with the lagged dependent variable yield quite similar results. They are available from the authors on request.

10. Neither Nordhaus nor Smyth included the change in the unemployment rate in their presidential popularity regressions. The Index of Consumer Sentiment is preferred to Gallop's Presidential Popularity Index as the dependent variable in determining the effect of economic conditions on the welfare of citizens because the presidential popularity variable is likely to be influenced by noneconomic as well as economic variables.

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