

# Economic Discomfort and Consumer Sentiment<sup>1</sup>

Michael C. Lovell and Pao Lin Tien  
Wesleyan University  
Middletown, CT 06459  
July 12<sup>th</sup>, 1999

mlovell@wesleyan.edu  
ptien@wesleyan.edu

## 1. Introduction

Let us look at the relation between two important economic indicators, the Economic Discomfort Index 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 in the January 4, 1971, *Wall Street Journal*.

“...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...”

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

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

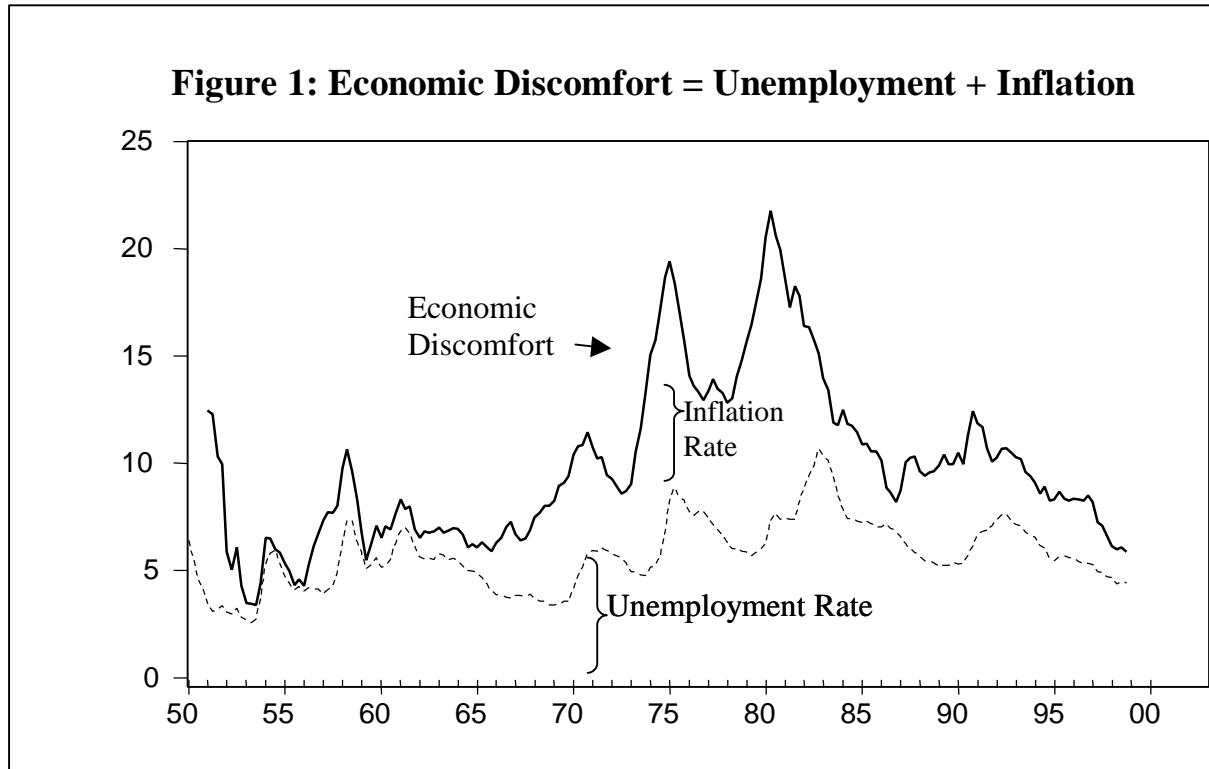
where  $U$  is the unemployment rate and  $\dot{p}$  the annual rate of inflation. The absolute value of  $\dot{p}$  will be used in this paper in recognition of the fact that deflation may be just as painful as inflation itself.<sup>2</sup>

---

<sup>1</sup> We are indebted to Richard Curtin of the University of Michigan Survey Research Center for providing helpful background information about the Index of Consumer Sentiment. Helpful comments were provided by William J. Barber, Alberto E. Isgut, Joyce Jacobsen, James W. McGuire, and David D. Selover.

<sup>2</sup> 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.

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 Okun’s Economic Discomfort Index out of hand as a gross oversimplification. Okun’s index can be regarded as a crude (dis)utility function with only the rate of inflation and unemployment as arguments. 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.

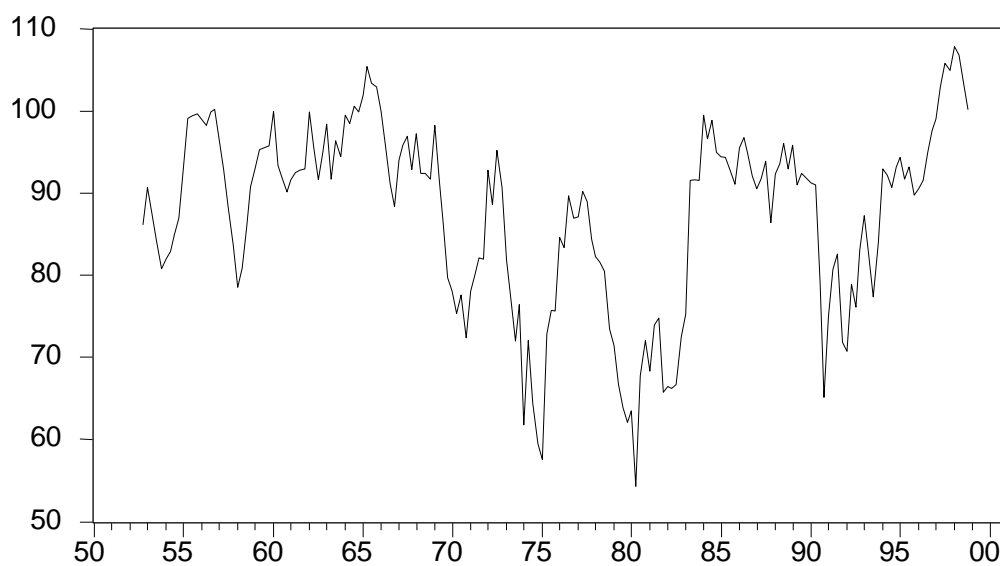
In this paper we find that credence in the validity of Okun’s Economic Discomfort Index as a practical measure of economic malaise may be obtained by asking how well it explains the Index of Consumer Sentiment. The Index of Consumer Sentiment,

compiled by the Michigan Survey Research Center since the mid 1950's, is based on the qualitative answers provided by telephone respondents to five questions:<sup>3</sup>

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 constructing the Consumer Sentiment Index.<sup>4</sup>

**Figure 2: Index of Consumer Sentiment**



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 eco-

<sup>3</sup> 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. See Curtin[1992].

<sup>4</sup> Cf. Bram and Ludvigson[1998] for a detailed explanation of how the index is calculated. The procedure for constructing the index ensures that  $2 < \text{Consumer Sentiment} < 150$ ; this means that the index, being bounded, cannot have a unit root.

conomic variables.<sup>5</sup> 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.<sup>6</sup>

## 2. Estimates

How well does the Economic Discomfort Index explain Consumer Sentiment?

### 2.1. The time dimension

The use of the *annual* rate of inflation is one arbitrary feature of Okun's EDI. This is because there is a dimensionality problem in constructing the EDI because  $\pi$  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. 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

**Table 1: Summary Statistics**

	Mean	Maximum	Minimum	Std. Dev.
$\pi$ (annual rate of change, CPI)	4.3	14.4	-0.6	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 50)	9.2	45.4	-32.1	14.6

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 wellbeing, at least as measured by the Index of Consumer Sentiment. Specifically, the simple correlation of ED with Consumer Sentiment is - 0.80 when the Economic Discomfort Index

<sup>5</sup> 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.

<sup>6</sup> 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>

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.

## 2.2. 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.<sup>7</sup>

## 2.3. Additional Variables

The remaining regressions reported on Table 2 elaborate on the original Okun model. The change in the rate of inflation,  $|\pi_t - \pi_{t-1}|$ , is introduced as a measure of *unexpected* inflation. The public may adjust to anticipated inflation, but the coefficient of  $|\pi_t - \pi_{t-1}|$  should be negative under the assumption that it is *unexpected* inflation and deflation that hurt consumers. The change in unemployment,  $U_t - U_{t-1}$ , is included as a possible indicator of discomfort induced by the hysteresis effect. The annual rate of growth of Gross Domestic Product,  $\Delta \text{GDP}$ , 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, only the rate of change in unemployment rather than its level influences Consumer Sentiment, which may be consistent with the hysteresis hypothesis. Second, Consumer Sentiment is affected by inflation, but it is only the rate of inflation itself that matters rather than inflation surprises as indexed by  $|\pi_t - \pi_{t-1}|$ . Third,  $\Delta \text{GDP}$  does not appear to influence consumer sentiment.<sup>8</sup>

Regressions #3 includes the lagged value of Consumer Sentiment in order to allow for a possible time lag in the impact of current economic developments by distinguishing between the current and the equilibrium level of Consumer Sentiment.<sup>9</sup> The equilibrium level of Consumer Sentiment,  $CS_t^e$ , is unobservable, but it is assumed that

$$CS_t^e = \beta_0 + \beta_1 |\pi_t| + \beta_2 U_t + \beta_3 \text{S\&P} + \beta_4 \Delta \text{GDP} + \varepsilon_{t,1}. \quad (2)$$

It is also assumed that Consumer Sentiment gradually adjusts toward its equilibrium level, but subject to disturbances resulting from changes in the rate of inflation and unemployment as well as a random component:

$$CS_t - CS_{t-1} = \delta_1 (CS_t^e - CS_{t-1}) + \delta_2 |\pi_t - \pi_{t-1}| + \delta_3 (U_t - U_{t-1}) + \varepsilon_{t,2} \quad (3)$$

The term  $|\pi_t - \pi_{t-1}|$  may be interpreted as a rough measure of inflation surprises. Substitution yields:

<sup>7</sup> A regression based on monthly observations for the period 1978:01 to 1998:12 yields weights of -2.73 on  $\pi_t$  and -3.04 on  $U_t$ .

<sup>8</sup>  $\Delta \text{GDP}$  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.

<sup>9</sup> This procedure was used by Lovell [1975] in an earlier study of the determinants of Consumer Sentiment.

**Table 2: Regression Output**  
 Dependent Variable: Index of Consumer Sentiment

Regression	#1	#2	#3	#4	#5	#6	#7
R bar squared	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	111.49** (1.50)	107.79** (2.09)	40.70** (6.61)	105.32** (4.20)	113.95** (6.95)	105.31** (9.91)	113.30** (6.17)
EDI	-2.38** (0.14)						
$ p_t $		-2.67** (0.18)	-1.00** (0.18)	-2.30** (0.31)	-2.57** (0.38)	-2.09** (0.91)	-4.16** (1.11)
$ p_t - p_{t-1} $			-0.42 (0.95)	0.37 (0.85)	0.30 (0.90)	0.34 (0.87)	0.45 (0.86)
$U_t$		-1.55** (0.36)	-0.24 (0.28)	-1.78** (0.62)	-2.43** (0.72)	-1.91 (2.95)	-3.10** (0.97)
$U_t - U_{t-1}$			-3.62** (1.44)	-2.77** (1.38)	-2.23 (1.48)	-2.74 (1.40)	-3.24** (1.41)
GDP			0.13 (0.22)	0.70** (0.29)	0.70** (0.29)	0.69** (0.29)	0.70** (0.28)
S&P			0.07** (0.03)	0.08 (0.04)	0.08** (0.04)	0.08 (0.04)	0.08 (0.04)
$CS_{t-1}$			0.59** (0.06)				
AR(1)				0.66** (0.06)	0.57** (0.07)	0.66** (0.06)	0.63** (0.06)
$p_t^2$						-0.02 (0.06)	
$U^2$						0.01 (0.22)	
$U \times  p_t $							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)		

## Notes:

1. Standard errors in parenthesis. Double asterisks denote  $|t| > 2$ .
2. 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.
3. 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  $Abpdot^2$  are both zero in #6.

$$CS_t = \delta_1\beta_0 + \delta_1\beta_1|p_t| + \delta_1\beta_2U_t + \delta_1\beta_3S\&P + \delta_1\beta_4GDP + \delta_2|p_t - p_{t-1}| + \delta_3(U_t - U_{t-1}) + (1-\delta_1)CS_{t-1} + \varepsilon_t^*$$

$$\text{where } \varepsilon_t^* = \delta_1\varepsilon_{t,1} + \varepsilon_{t,2}. \quad (4)$$

The misspecification involved in failing to include the delayed adjustment complication may explain why the error terms in Regressions #1 and #2 were autocorrelated, as was indicated by the extremely low Durbin-Watson statistics.<sup>10</sup>

Regression #3 of the table suggests that  $\delta_1 = 1 - 0.59 = 0.41$ ; i.e., consumer sentiment adjusts about 40% of the way toward its equilibrium level each quarter. The derived equation for the equilibrium level of Consumer Sentiment is

$$CS_t^e = 99.83 - 2.45|p_t| - 0.59U_t + 0.17S\&P + 0.30GDP + \varepsilon_{t,1} \quad (5)$$

Regression #4 is similar to #3 except that it uses a first order autoregressive process to correct for autocorrelated error terms instead of including the lagged dependent variable. This alternative model is appropriate if the distinction between  $CS_t$  and  $CS_t^e$  is negligible but the  $\varepsilon_t$  arise in part from the effect of small omitted variables which, like most economic time series, are highly autocorrelated. The AR(1) approach yields significant coefficients for  $U$  and for  $GDP$ , but the t-statistic for  $S\&P$  is now slightly less than 2.<sup>11</sup>

#### 2.4. 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 largest shifts, the changes from Eisenhower to Kennedy and from Nixon to Ford, amount to swings of less than 10 points in Consumer Sentiment; these are small movement by historical standards, as can be seen from Figure 2. But none of the presidential dummy coefficients is significant. Further, the F test

<sup>10</sup> The Durbin-Watson is biased toward two because of the inclusion of the lagged dependent variable. Breusch-Godfrey LM tests confirm that the disturbances in those regressions including the lagged dependent variable are not autocorrelated.

<sup>11</sup> It is fortunate that rather similar results are obtained with both the lagged dependent variable and the AR(1) regressions because it is hard to choose between them on statistical grounds. The remaining regressions on the table all use AR(1) but the corresponding regressions with lagged dependent variables are available from the authors on request.

suggests acceptance at the 5% 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.

## 2.5. Nonlinear complications

Regression #6 allows for a possible non-linear 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, p 241] introduced a non linearity by arguing that the dissatisfaction of the electorate might be related to the sum of the squares of the unemployment rate and inflation. 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.<sup>12</sup> As an alternative strategy for allowing for a non-linear 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.

## 3. 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 turn out 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 and (2) it is the annual rather than the quarterly or monthly rate 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 economic conditions on the consumer.

A more precise explanation of Consumer Sentiment includes the change in the unemployment rate, the rate of change in the S&P 500 Index, and the growth rate of real GDP. Inflation surprises as indexed by 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 have a direct effect on the public's appraisal of economic conditions as measured by the index of Consumer Sentiment.

---

<sup>12</sup> Neither Nordhaus nor Smyth included the change in the unemployment rate in their Presidential Popularity regressions. The Index of Consumer Sentiment is preferred to the Gallop Presidential Popularity 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 non-economic as well as economic variables.



## References:

- Bram, Jason and Sydney Ludvigson, "Does Consumer Confidence Forecast Household Expenditure? A Sentiment Index Horse Race," *Economic Policy Review*, Federal Reserve Bank of New York, June 1998, vol. 4 (2), pp. 59-78.
- Curtin, Richard T., "The Index of Consumer Sentiment at Forty," *The American Enterprise*, May-June, 1992, pp. 18-24.
- Lovell, Michael C., "Why is the Consumer Feeling So Sad?" *Brookings Papers on Economic Activity* [2:1975], pp. 473-9.
- MacRae, C. Duncan, "A Political Model of the Business Cycle," *Journal of Political Economy*, April 1977, pp. 239-63.
- Nordhaus, William, "Alternative Approaches to the Political Business Cycle," *Brookings Papers on Economic Activity*, 1989:2, pp 1-68.
- Okun, Arthur M, "Potential GNP: Its Measurement and Significance," *Proceedings of the Business and Economics Statistics Section of the American Statistical Association*, 1962.
- Smyth, David J., Pami Dua, Susan Washburn Taylor, "Voters and Macroeconomics: are They Forward Looking or Backward Looking?" *Public Choice*, March 1994, vol. 78 (3-4) pp. 283-93.