1984

Core Inflation: A Review Essay

Michael Parkin

ISSN 0228-4235
ISBN 0-7714-0491-3

CENTRE FOR THE STUDY OF INTERNATIONAL ECONOMIC RELATIONS

WORKING PAPER NO. 8402C

CORE INFLATION: A REVIEW ESSAY

Michael Parkin

This paper contains preliminary findings from research still in progress and should not be quoted without prior approval of the author.

DEPARTMENT OF ECONOMICS
UNIVERSITY OF WESTERN ONTARIO
LONDON, CANADA
N6A 5C2

CORE INFLATION: A REVIEW ESSAY

by

Michael Parkin
Department of Economics
University of Western Ontario
London Canada

January 1984

I am grateful to but in no way seek to implicate Herschel Grossman, Peter Howitt, Douglas Purvis and Nicolas Rowe for comments on an earlier version of this paper.

I. Introduction

This paper has two objectives. First, to set out as clear a statement as possible of the neo Keynesian theory of inflation and of its empirical implementation proposed by Otto Eckstein in Core Inflation (1981). Second, to present a critique of this neo Keynesian theory and to expose it for what it is--false product differentiation verging on pure description.

Although Eckstein's book has now been published for more than two years, there does not appear to exist a thorough critical appraisal of it. Indeed, the only major review, by Alan Blinder (1982) concludes that "Otto Eckstein has written an important and provocative book that should help fuel the controversy over the sluggishness of inflation. And he has done a service by quantifying his concept of sluggishness and displaying it for all to see. Core inflation must now take its place alongside of a concept of inertial inflation in the contest of the right to take on the non-inertial concept of inflation so popular in the neo classical economics." (pp. 1308-9.) In fact, Blinder's most serious criticism of Eckstein's work is no more damning than a mild complaint about using strings of 30 letters and symbols having virtually no mnemonic content to define some of his variables! Far from having been subjected to deep scrutiny, Eckstein's "model" seems to have been accepted almost unquestioningly by the neo Keynesian school. Thus, for example, Richard Lipsey (1983) writes that "with one or two caveats I [am] prepared to take Otto Eckstein's 'model' in his book Core Inflation as the neo Keynesian main line price equation". I take it that Blinder's mild review and Lipsey's words imply that the neo Keynesian theory of inflation as it is stated by Eckstein is not a straw man and is indeed, if not the definitive statement of the theory, is one of its definitive statements.

In the next section I present a matter of fact statement of Eckstein's theory of core inflation. My main purpose in doing this is to have a compact account of both Eckstein's theory and empirical work that may be used as a basis for developing a critique of it in the next section. Section III develops that critique and Section IV presents some concluding remarks.

II. The Neo Keynesian Analysis of Core Inflation

(i) The Theory

The starting point for the Neo-Keynesian theory presented by Eckstein is a decomposition of the inflation rate into three components, core ($\dot{p}_c$), demand ($\dot{p}_d$), and shock ($\dot{p}_s$) inflation. That is;

$$\dot{p} = \dot{p}_c + \dot{p}_d + \dot{p}_s \qquad (1)$$

"The core rate of inflation...[is]...the rate that would occur on the economy's long-term growth path, provided the path were free of shocks, and the state of demand were neutral in the sense that markets were in long-run equilibrium. The core rate reflects those price increases made necessary by the increases in the trend costs of the inputs to production." (Eckstein, p. 8). "The demand inflation rate...depend[s]...on utilization rates of resources. ...[B]oth the unemployment rate and the operating rate of physical capital are pertinent, and the effects are non-linear." (Eckstein, p. 9). "The shock inflation rate is, by definition, exogenous to the analysis." (Eckstein p. 9).

It is worth emphasizing that the concept of the core inflation rate, as defined by Eckstein, is a steady-state concept. It is not that there is

a concept of the core in the steady state and another concept of the core out of the steady state. The core inflation rate and the steady-state inflation rate are, by definition, one and the same. Deviations from the steady state are generated either by demand fluctuations or by shocks.

Eckstein goes on to elaborate on these three elements of inflation starting with core inflation. In developing the analysis of the core inflation rate Eckstein assumes a Cobb-Douglas production function with Hicks-neutral technical change. This enables him to define the core inflation rate in terms of factor prices increases as:

$$\dot{p}_c = a_1\dot{q} + a_2\dot{w} - h \qquad (2)$$

where a_1 is the exponent on capital and a_2 the exponent on labour in the production function, h is the rate of Hicks-neutral technical progress, q is the rate of change of the rental price of capital and w is the rate of change of money wages.

He proceeds from here to develop propositions about the behaviour of the rate of change of the rental price of capital and money wages. Specifically, he postulates that the rate of change of the rental price of capital depends upon "a composite cost of financial capital variable" (r) and "a composite tax variable on capital and its income" (J_q): Thus,

$$\dot{q} = \alpha(r, J_q) \qquad (3)$$

The financial cost variable (r) "is determined by the long-term inflation expectations embodied in nominal interest rates and equity yields" $\dot{p}^e$, (Eckstein p. 9) so that

$$\dot{q} = \alpha(\dot{p}^e_q, J_q) \tag{4}$$

"Similarly, wages on the equilibrium path are determined by the price expecations underlying wage claims ($\dot{p}^e$) and possible tax effects J_w" (Eckstein p. 9), i.e.

$$\dot{w} = \beta(\dot{p}^e_w, J_w) \tag{5}$$

"Price expectations are formed on the basis of inflation experience as measured by distributed lags on actual prices and need not be the same for bond buyers as for workers." Eckstein p. 9) i.e.

$$\dot{p}^e_q = \sum_{t=o}^{-\infty} \lambda_t \dot{p}_t \tag{6}$$

$$\dot{p}^e_w = \sum_{t=o}^{-\infty} \mu_t \dot{p}_t \tag{7}$$

Using (6) in (4) and (7) in (5) and substituting the results into (2) gives

$$\dot{p}_c = a_1\alpha(\sum_{t=o}^{-\infty}\lambda_t\dot{p}_t,\ J_q) + a_2(\sum_{t=o}^{-\infty}\mu_t\dot{p}_t,\ J_w) - h \tag{8}$$

Eckstein goes on to observe that "since the actual inflation of a period...is composed of the three components,....[core, demand and shock inflation]...., and the core inflation rate is affected by the actual record of inflation as processed into current expectations, the core inflation rate can be written in terms of previous demand and shock inflation, productivity, and taxes," (Eckstein, p. 9) i.e.

$$\dot{p}_{c_t} = \delta(\dot{p}_{d_t}, \dot{p}_{d_{t-1}}, \ldots, p_{s_t}, p_{s_{t-1}}, \ldots, h_t, h_{t-1}, \ldots, J_{q_t}, J_{q_{t-1}}, \ldots \tag{9}$$
$$J_{w_t}, J_{w_{t-1}}, \ldots)$$

This completes the theory of core inflation.

Demand inflation is determined by the utilization rates of labour (u_ℓ) and of capital (u_{cap}) that is

$$\dot{p}_a = \gamma(u_\ell,\ u_{cap}) \qquad \gamma_1,\ \gamma_2 < 0 \tag{10}$$

Using these determinants of demand inflation to eliminate the history of demand inflation from equation (9) gives the final statement concerning the

determination of core inflation as

$$\dot{p}_{c_t} = f(u_{\ell_t}, u_{\ell_{t-1}}, \ldots, u_{cap_t}, u_{cap_{t-1}}, \ldots, \dot{p}_{s_t}, \dot{p}_{s_{t-1}}, \ldots, h_t, h_{t-1}, \ldots, J_{q_t}, J_{q_{t-1}}, \ldots, J_{w_t}, J_{w_{t-1}}, \ldots) \quad (11)$$

By combining equation (11) and (10) together with the current period's shock inflation we obtain a statement about the actual rate of inflation as:

$$\dot{p}_t = f(u_{\ell_t}, u_{\ell_{t-1}}, \ldots, u_{cap_t}, u_{cap_{t-1}}, \ldots, \dot{p}_{s_t}, \dot{p}_{s_{t-1}}, \ldots, h_t, h_{t-1}, \ldots, J_{q_t}, J_{q_{t-1}}, \ldots, J_{w_t}, J_{w_{t-1}}, \ldots) + \gamma(u_{\ell_t}, u_{cap_t}) + \dot{p}_{s_t} \quad (12)$$

Thus, the current period rate of inflation will be equal to the core rate that in turn depends upon the entire history of the utilization rates of labour and capital, of shock inflation, productivity growth, and of capital and labour taxes as well as the current utilization rates of labour and capital and the current inflationary shock.

(ii) Empirical Implementation

Although Eckstein states his theory of core inflation in just two pages, it takes virtually the rest of his book (approximately a further one-hundred pages) to describe the way in which the theory is implemented empirically and the way in which it may then be used to decompose inflationary history (of the United States) into its core, demand, and shock components. The description of the empirical work is not quite complete, though with care, it is possible to piece together the empirical counterparts of most of the

parameters that appear in the theoretical statement of the model. What follows is my best effort to produce a succinct summary of those parameters.

The equations requiring estimation are those listed as (2) through (7), and (10) above. In addition, although shock inflation is exogenous, it is, for empirical purposes, decomposed into five separate shock sources each of which are analyzed as exogenous processes. I shall review each of these equations and propositions in order.

First, consider equation (2). It requires Cobb-Douglas production function exponents together with a productivity growth trend. The production function parameters are taken from average factor shares and are .35 for capital and .65 for labour. I could not find the productivity growth trend assumed but one may presume that it is some long-term average (which possibly declined in the second half of the seventies).

Equation (3), the behaviour of the rental price of capital is derived analytically from a Jorgensen (1963) type analysis and is not, therefore, estimated empirically. In order to make the transition, however, from equation (3) to equation (4) a proposition linking inflationary expectations to the market rate of interest is required. This provides the first estimated empirical relationship in the model. The easiest way to summarize this interest rate equation is in tabular form and Table 1 provides the relevant details. Since that table uses readily interpreted descriptions of the dependent and independent variables there is no need to provide further elaboration of the equation here.

Equation (5), the wage equation, is the second behavioural equation that is estimated by Eckstein and it is summarized in Table 2. Like Table 1, it also is sufficiently detailed in its description of the dependent and independent variables to require no further elaboration.

In the empirical formulation, inflation expectations--equations (6) and (7)--are specified to possess geometrically declining, rather than unrestricted, weights. The single parameter characterizing those weights is estimated simultaneously with the other parameters in the wage and price equations as that which maximizes the coefficient of determination. Writing the resulting equations in their equivalent "adaptive expectations" form these equations, with their estimated coefficients are:

$$\dot{p}^{e}_{q_t} = 0.79\dot{p}_t + 0.21\dot{p}^{e}_{q_{t-1}} \tag{13}$$

$$\dot{p}^{e}_{w_t} = 0.86\dot{p}_t + 0.14\dot{p}^{e}_{w_{t-1}} \tag{14}$$

Additionally, in the interest rate equation, the expected Standard and Poor's (S & P) stock index appears (not specified in the theoretical statement of the model). That expectation is also generated by a geometric distributed lag of the actual value of the index and is estimated simultaneously with the other parameters in the interest rate equation. The estimated parameters, written in 'adaptive' form are:

$$(S\&P)^{e}_{t} = 0.34(S\&P_2)_t + 0.66(S\&P)^{e}_{t-1} \tag{15}$$

To estimate equation (10), the demand inflation equation, Eckstein subtracts core inflation from the actual rate of inflation and also subtracts the shocks to inflation (see below). He then regresses the calculated demand inflation on adjusted unemployment and capacity utilization rate variables together with dummy variables for controls as follows:

$$\dot{p}_{d_t} = -7.7 + \sum_{i=-7}^{-1} \alpha_i \; (1/(\text{Unemployment } \underline{\text{less}} \text{ an adjustment for demographic factors}))$$

$$+ \sum_{i=-7}^{-1} \beta_i \; (1/(1.1 \; \underline{\text{less}} \text{ capacity utilization rate in manufacturing}) \qquad (16)$$

$$+ 0.2 \quad (\text{Price control dummy} - 0.05 \text{ another price control dummy})$$

$$\Sigma \alpha_i = 13.8, \; \Sigma \beta_i = 1.1 \; , \; \bar{R}^2 = 0.91 \; , \; DW = 0.75$$

The shock rate of inflation, although exogenous, is modelled in a considerable amount of detail. "In order to isolate the components of the shock variable, full...[DRI]...model simulations were run to measure reduced-form impacts on the price level...[of changes in energy prices, food prices, the exchange rate, the social security tax rate, and the minimum wage rate]....The relationships identified through the model runs yield[ed] time series which...[were]...combined with historical values of the exogenous variables to derive the shock effects." (Eckstein, p. 17). The exogenous processes driving these five shock effects are:

$$\dot{p}_s \text{ energy} = a(L) \quad \text{Percentage change in wholesale price index for fuels, etc.} \qquad (17)$$

$$a(L) = 0.008 + 0.013L + 0.014L^2 + 0.015L^3$$

$$\dot{p}_s \text{ food} = b(L) \quad \text{Percentage change in wholesale price index for farm products} \qquad (18)$$

$$b(L) = 0.007 + 0.012L + 0.014L^2 + 0.014L^3$$

$$\dot{p}_s \text{ exchange rate} = c(L) \quad \text{Percentage change in Morgan Guaranty Trust trade-weighted index of U.S. dollar exchange rate} \qquad (19)$$

$$c(L) = -.001 - .003L - .005L^2 - .008L^3$$

$$\dot{p}_s \text{ social security} = d(L) \quad \text{Percentage change in Federal Social Security Contributions} \tag{20}$$

$$d(L) = 15.4 + 16.8L + 9.5L^2 + 0.9L^3$$

$$\dot{p}_s \text{ minimum wage} = e(L) \quad \text{Percentage change in Federal minimum wage} \tag{21}$$

$$e(L) = 0.0004 + 0.001L + 0.002L^2 + 0.003L^3$$

The above constitutes an almost complete description of the way in which the neo-Keynesian theory of inflation has been implemented empirically by Eckstein. It is incomplete in that it has not described the way in which taxes are modelled as influencing the rental price of capital and wages, nor has it explained the way in which the model (the DRI model) generates the rates of unemployment and capacity utilization. To embark upon a description of that detail would divert me too far from my present objective.

Using the equations described above (together with the additional inputs just noted) it is possible to calculate a decomposition of actual inflation into its core, demand and shock components. Eckstein does that and provides an extensive commentary upon the decomposition. This historical review is summarized in Table 3.

This completes my factual summary of the neo-Keynesian theory of inflation as developed by Eckstein. I now turn to a critical appraisal of that theory.

III. A CRITIQUE OF THE NEO-KEYNESIAN THEORY

The neo-Keynesian theory of core inflation as presented by Eckstein certainly fits the fact. What exactly is it, however, that fits the facts? That is, what is the <u>theory</u> that fits the facts? Any theory that is to be useful must satisfy at least two requirements. First, its predictions must

be the logical consequences of its assumptions and second, it must represent an abstraction from the world that identifies parameters that are stable and provide a stable relationship amongst the variables so that it may be used to generate predictions that are reliable in a wide variety of circumstances and, in particular, under a variety of alternative policy regimes. The neo Keynesian theory of inflation suffers on both these counts. First, I want to investigate its logical coherence.

(i) A Critique of the Core Inflation Theory

It will be convenient to ignore taxes. It turns out that the incorporation of taxes makes only a slight difference and gets in the way of a clear-headed presentation of the central relationships involved.

I shall follow Eckstein and assume a Cobb-Douglas production function with Hicks-neutral technical change so that the relationship between the core inflation rate and rate of change of factor prices is given by

$$\dot{p}_c = \alpha\dot{q} + (1 - \alpha)\dot{w} - h \qquad (22)$$

The parameter α is the share of capital in GNP and $1 - \alpha$ is the share of labour.

To investigate the way in which the rates of change of factor prices are generated when the conditions for the core rate of inflation are satisfied it is necessary to recall what the core inflation rate is. Eckstein's definition (quoted above) states that "the core rate of inflation...[is] ...the rate that would occur on the economy's long-term growth path, provided the path were free of shocks and the state of demand were neutral in the sense

that markets were in long-run equilibrium." (Eckstein, p. 8.) For emphasis, let me note that I am not here analyzing the core rate of inflation in a steady state in order to avoid some complexities that arise from analyzing the core inflation rate out of a steady state. The concept of the core is a steady state concept. It has no meaning in any other context. To calculate the factor price movements that would obtain in a steady state so that we may arrive at the core rate of inflation, let us begin by considering the rental price of capital. Using the standard definition of that rental price (obtained from the Euler equation) we know that

$$Q = P_Q(R + \delta - \dot{P}_Q/P_Q) \tag{23}$$

Differentiating equation (23) with respect to time it is apparent that

$$\dot{q} = \dot{p}_q + \dot{r}/r \tag{24}$$

where

$$\dot{q} \equiv \dot{Q}/Q, \ \dot{p}_Q = \dot{P}_Q/P_Q, \ r \equiv (R + \delta - \dot{P}_Q/P_Q)$$

Thus, the rate of change of the rental price of capital is equal to the rate of inflation of the price of capital goods plus the proportionate rate of change of the real rate of interest. Notice the contrast between this and Eckstein's equation. He makes the rate of change of the rental price of capital depend upon "the composite cost of financial capital". In long-run equilibrium, when the economy is on its long-term growth path (the conditions for the core inflation rate), the rate of inflation of capital goods prices ($\dot{p}_Q$) will be equal to the core rate of inflation plus the Hicks-neutral rate of technical progress. That is,

$$\dot{p}_Q = \dot{p}_c + h \tag{25}$$

Further, the real rate of interest will be constant so that

$$\dot{r}/r = 0 \tag{26}$$

Using these two conditions in equation (24) gives

$$\dot{q} = \dot{p}_c + h \tag{27}$$

The contrast with Eckstein's equation is quite remarkable. Using (27) in (22) (in the definition of core inflation) gives

$$\dot{p}_c = \dot{w} - h \tag{28}$$

Evidently the core inflation rate is in no way restricted by the rate at which rental prices are changing for those rental price changes are themselves uniquely determined by the core inflation rate. We have not, however, finished.

As written in equation (28) it appears as if the core rate of inflation is the rate of growth of unit labour costs. As a matter of definition that is clearly so. It would be wrong, however, to conclude that the core inflation rate is <u>determined by the rate of growth of unit labour costs</u>. All that can be said from manipulating these identities is that, in a steady state, the inflation rate will equal the rate of growth of unit labour costs. Empirical content could be achieved by adding the additional hypothesis that the rate of growth of money wages is exogenous (or predetermined) and that appears to be implicit in Eckstein's approach.

The concept of the core inflation rate may be seen in a different light by taking a slightly different approach. In the spirit of Eckstein's analysis let us suppose that the rate of increase in capital rental rates is determined not by the core inflation but by the expected inflation rate, that is

$$\dot{q} = \dot{p}^{e} + h \ . \tag{29}$$

This emphasizes the fact that, in long run equilibrium, factor prices fully reflect underlying inflation expectations. Further, suppose that wages were growing in the steady state at a rate reflecting those same inflation expectations, that is,

$$\dot{w} = \dot{p}^{e} + h \tag{30}$$

I have specified the inflation expectations in equations (29) and (30) to be the same reflecting the idea that in long-run equilibrium, when the economy is on its long-term growth path, (a phrase which I keep repeating to remind the reader that these are Eckstein's declared conditions under which the core inflation concept is relevant) any disparate expectations would give rise to continuing divergences of relative factor prices and, therefore, could not be consistent with the concept of core inflation.

Combining equations (29) and (30) with equation (22) gives

$$\dot{p}^{c} = \dot{p}^{e} \tag{31}$$

Thus, on this interpretation of the core theory, the core rate of inflation is identical to the expected rate of inflation.

Why does Eckstein not get this result? The answer is that he obscures the relationships between inflation expectations (or the core inflation rate) and the factor price movements that will occur when the conditions defining a core situation are satisfied. His equations (4), (5) and (6) (equations (3), (4) and (5) in the presentation earlier in this paper) are specified with insufficient precision. In relating the rate of change of the rental price of capital to a "composite cost of capital" variable (Eckstein's equation (4), equation (3) above) simply obfuscates the correct relationship. Failing to impose equality of expectations and failing to impose the appropriate relationships between core inflation rates, productivity growth rates and factor price changes on the functions $\alpha(\cdot)$ and $\beta(\cdot)$ results in a failure to take account of restrictions that are implied by Eckstein's own theory. A failure to take account of those restrictions leads to a misleadingly general statement of the determination of core inflation.

I have shown that the core rate of inflation is nothing other than a new name for the expected rate of inflation. Clearly Eckstein has something like this in mind for he says "the cost increases...[that underlie the core rate of inflation]...are largely a function of underlying price expectations" (Eckstein, p. 8). On this interpretation the core inflation rate and the expected inflation rate are identical and we are no further forward until we have a <u>theory</u> (and I emphasize theory) of inflation expectations.

It may be objected that by ignoring taxes I have lost the essence of Eckstein's theory of core inflation. A moment's reflection will reveal that not to be so. Incorporating taxes into the analysis presented above would

leave everything exactly as it is if those taxes were not changing on the steady-state growth path. If taxes were changing then the rate of change of taxes would appear in the relevant equations. The levels of taxes would not appear.

When the core rate of inflation is interpreted as the expected rate of inflation it is clear that the neo-Keynesian theory becomes nothing other than the traditional expectations-augmented Phillips curve. Core inflation itself is the expected rate of inflation, demand inflation is the short-run Phillips curve and shock inflation is the random disturbance that would normally appear on an expectations-augmented Phillips curve. In order to complete that theory, a theory of expectations is required and the shocks themselves would have to have a zero mean. In Eckstein's formulation, there is no theory of expected inflation and the shocks, as we shall see in the next section, far from having a zero mean, are the principal source of upward movement in inflation in the 1970s.

Let me now turn, however, to a fuller appraisal of the way in which Eckstein has estimated his neo-Keynesian model.

(ii) A Critique of the Empirical Implementation of the Neo-Keynesian Core Theory

Reviewing the empirical work reported in the previous section, it appears that the best interpretation that may be placed upon it is that it constitutes a description of the phenomenon to be explained and not an explanation. This claim is based primarily on the excessive greediness of the theory in terms of the degrees of freedom it swallows. On my count I was able to identify

(and find values of) 76 parameters. I was not able to find the detailed parameters concerning the tax structure that influences the rental rate of capital. Nor was I able to identify and count the parameters used to adjust the unemployment rate for demographic factors. Finally, I was not able to count all the zeros that were imposed as a result of experimentation to find the "best equation". When one recognizes that only slightly more than 100 data points (in quarterly data) are being explained--approximately twenty-six years--it becomes clear that this so-called theory of inflation is nothing other than an alternative way of representing the time series.

If we need 76 (at least) parameters to "explain" (i.e. to "understand") twenty-six years of inflation behavior for one country, how many parameters should we need to understand the inflation behavior of all the major countries and over a more lengthy and varied time period? I leave the question in rhetorical form. The question serves to underline the inevitable conclusion that this so-called neo-Keynesian theory of inflation is not a theory at all. It is an obfuscating description. A time-series graph would be more revealing and give greater insight into the inflationary process in the United States in the last twenty-five years than does what can only be described as a heap of computer print-out masquerading as an explanation.

If these considerations are not sufficient there is a further one that must be severely disquieting for anyone seeking to understand the inflation of the 1970s and it concerns the role played by so-called shocks in this analysis. First it is instructive to notice what the shocks are. One of them is the price of oil, another is the price of food. A third one

is the behavior of the exchange rate. In treating these as shocks to the inflation rate we seem to be losing sight of the fundamental problem to be explained. Inflation is, by definition, the percentage rate of change of the price level. The price level is a weighted average of the money prices of all goods. Some prices rise faster than others and it is the average that we seek to explain. Now it is, of course, a historical fact that the average has been increasing at an increasing rate during the decade of the 1970s. To select items from the average whose behavior has been substantially above the average and to call those items sources of shock and therefore a "source" of inflation is mischievously fallacious. Evidently, if the inflation rate had been declining rather than rising during the 1970s it would be because of the negative shocks being injected from the price of computing equipment and related electronic gadgetry!

The same remarks apply with even greater force to the behavior of the exchange rate. The foreign exchange rate being the relative price of domestic to rest-of-world money is itself a price. It is true that it is not a price that directly forms part of the weighted average whose behavior we seek to explain. It almost gets into that average directly however through its effects upon the money prices of internationally traded commodities that appear in the index.

None of this perhaps would matter were it not for the fact that shock inflation has been sizeable and persistently positive during the decade of the 1970s. Inspection of Table 3 shows that, the accumulated shocks through the 1970s amounted to 14.5 percent. Since, on the open admission of the neo-Keynesians, the shocks are exogenous, this amounts to saying that there

is no explanation within this theory for the rising inflation of the 1970s.

IV. Conclusions

The overall conclusion that I reach--and that seems to me to be the only conclusion that a disinterested scholar could reach--is that there is no neo-Keynesian theory of inflation. What has been presented as a new theory is in fact an old one--the expectations-augmented Phillips curve. The empirical implementation of that theory presented in Core Inflation is an unconvincing and obfuscating description.

BIBLIOGRAPHY

Blinder, Alan S., "Review of Core Inflation by Otto Eckstein," Journal of Political Economy, 90, 1982, 1306-9.

Eckstein, Otto, Core Inflation, Englewood Cliffs, NJ, Prentice-Hall, 1982.

Fortin, Pierre, "Why has Inflation been so High and Persistent in Canada? (And What Can Be Done About It?)," mimeograph, Groupe de recherche en politique economique, Universite Laval, March 1983.

Jorgensen, Dale W., "Capital Theory and Investment Behavior," American Economic Review Papers and Proceedings, 53, 1963, 247-59.

Lipsey, Richard G., "Comments on Why has Canada's Inflation been so Stubborn," mimeograph, Department of Economics, Queen's University, 1983.

Table 1

Interest Rate Equation

Average Yield on New Issues of High Grade Corporate Bonds

Equals:

Coefficient	t-statistic	Independent Variable
-13.3	1.3	Constant
- 5.2	6.0	Real per capita adjusted monetary base
+ 0.15	2.1	A measure (unspecified) of bank liquidity
+ 0.27	1.9	Vietnam War dummy
+ 6.7	13.0	Real per capita GNP (1972 prices)
+ 3.9	1.1	Percentage change in real per capita stock of non-financial corporate bonds
+ 0.43	5.6	Lagged stock of tax exempt bonds (apparently nominal aggregate rather than real per capita)
-17.5	6.3	Percentage change in real per capita stock of life insurance reserves outstanding
+ 0.79	6.6	Expected rate of inflation of PCE deflator
- 0.06	5.3	Product of previous variable and average unemployment rate in preceding year
+ 0.006	3.2	Expectation of Standard and Poor's stock price index
+ a(L)	4.3	Growth rate of real per capita monetary base

$$a(L) = -5.8 - 5.3L - 4.8L^2 - 4.4L^3 - 3.9L^4 - 3.4L^5 - 2.9L^6 - 2.4L^7 - 1.9L^8 - 1.5L^9 - 1.0L^{10} - 0.5L^{11}$$

$\bar{R}^2 = 0.99$ DW = 1.89 T = 1954:1 to 1979:3 103 observations.

Note: Source, Eckstein (Table 9.4, p. 81).

Table 2

Wage Equation

(Allowing for Structural Changes After 1973)

Percentage Change (At Annual Rate) in Index of Hourly Earnings of Private Non-Farm Production Workers

Equals:

Coefficient	t-statistic	
1.7	1.2	Constant
+7.0	4.1	1/(Actual unemployment less full employment unemployment rate)
+a(L)	4.5	Percentage change in minimum wage ($a(L) = 0.02 + 0.01L + 0.01L^2 + 0.005L^3$)
+0.3	1.3	Guidepost dummy
+2.6	4.1	Phase I of Nixon controls dummy
-2.9	3.9	Dummy in 1964(1) for "apparent data error"
+0.01	3.7	Percentage change in ratio of after-tax profits to GNP
+0.7	5.3	Actual percent change in PCE deflator over previous year (entered up to 1973 only)
-1.7	1.5	Dummy = 0 up to 1973, = 1 after 1973
+0.4	2.6	Expected rate of inflation of PCE deflator

$\bar{R}^2 = 0.88$ DW = 1.78 T = 1956:1 to 1980:1 97 observations

(OLS)

Expected Rate of Inflation = 0.86 Actual Rate + 0.14 Expected Rate in previous period.

Note: Source, Eckstein (Table 9.2, p. 78).

Table 3

Historical Review

	$\dot{p}$	$\dot{p}_c$	$\dot{p}_d$	$\dot{p}_s$
1957	3.4	3.6	-0.6	0.6
8	2.7	3.3	-0.5	0.1
9	0.9	2.6	-1.2	-0.3
1960	1.5	3.1	-1.6	0.1
1	1.1	2.1	-1.1	0.0
2	1.2	1.3	-0.3	0.1
3	1.2	1.1	0.2	-0.1
4	1.3	1.0	0.5	-0.2
5	1.6	0.6	0.7	0.3
6	3.0	0.9	1.4	0.7
7	2.8	1.6	1.2	0.0
8	4.2	1.9	2.1	0.2
9	5.4	3.0	2.0	0.5
1970	5.9	4.1	1.4	0.4
1	4.3	4.3	-0.7	0.7
2	3.3	4.2	-1.7	0.8
3	6.2	4.4	-1.1	2.9
4	11.0	6.0	1.2	3.8
5	9.2	7.9	0.1	1.2
6	5.7	7.7	-2.6	0.6
7	6.5	7.7	-1.9	0.8
8	7.7	7.8	-1.2	1.0
9	11.2	8.2	0.7	2.3

Note: Source, Eckstein (Tables 4.1; 4.2; 4.3; 4.4; 4.5: pp. 25, 27, 29, 31, 33).

1981

8101C Markusen, James R. Factor Movements and Commodity Trade as Compliments: A Survey of Some Cases.

8102C Conlon, R.M. Comparison of Australian and Canadian Manufacturing Industries: Some Empirical Evidence.

8103C Conlon, R.M. The Incidence of Transport Cost and Tariff Protection: Some Australian Evidence.

8104C Laidler, David. On the Case for Gradualism.

8105C Wirick, Ronald G. Rational Expectations and Rational Stabilization Policy in an Open Economy

8106C Mansur, Ahsan and John Whalley Numerical Specification of Applied General Equilibrium Models: Estimation, Calibration, and Data.

8107C Burgess, David F., Energy Prices, Capital Formation, and Potential GNP

8108C D SU Jimenez, E. and Douglas H. Keare. Housing Consumption and Income in the Low Income Urban Setting: Estimates from Panel Data in El Salvador

8109C D SU Whalley, John Labour Migration and the North-South Debate

8110C Manning, Richard and John McMillan Government Expenditure and Comparative Advantage

8111C Freid, Joel and Peter Howitt Why Inflation Reduces Real Interest Rates

1982

8201C Manning, Richard and James R. Markusen Dynamic Non-Substitution and Long Run Production Possibilities

8202C Feenstra, Robert and Ken Judd Tariffs, Technology Transfer, and Welfare

8203C Ronald W. Jones, and Douglas D. Purvis: International Differences in Response to Common External Shocks: The Role of Purchasing Power Parity

8204C James A Brander and Barbara J. Spencer: Industrial Strategy with Committed Firms

8205C Whalley, John, The North-South Debate and the Terms of Trade: An Applied General Equilibrium Approach

8206C Roger Betancourt, Christopher Clague, Arvind Panagariya CAPITAL UTILIZATION IN GENERAL EQUILIBRIUM

8207C Mansur, Ahsan H, On the Estimation of Import and Export Demand Elasticities and Elasticity Pessimism.

8208C Whalley, J. and Randy Wigle PRICE AND QUANTITY RIGIDITIES IN ADJUSTMENT TO TRADE POLICY CHANGES: ALTERNATIVE FORMULATIONS AND INITIAL CALCULATIONS

8209C DSU Jimenez, E. SQUATTING AND COMMUNITY ORGANIZATION IN DEVELOPING COUNTRIES: A CONCEPTUAL FRAMEWORK

1982

8210C Grossman, G.M. INTERNATIONAL COMPETITION AND THE UNIONIZED SECTOR

8211C Laidler,D. FRIEDMAN AND SCHWARTZ ON MONETARY TRENDS - A REVIEW ARTICLE

8212C Imam, M.H. and Whalley, J. INCIDENCE ANALYSIS OF A SECTOR SPECIFIC MINIMUM WAGE IN A TWO SECTOR HARRIS-TODARO MODEL.

8213C Markusen, J.R. and Melvin, J.R. THE GAINS FROM TRADE THEOREM WITH INCREASING RETURNS TO SCALE.

8214C INDUSTRIAL ORGANIZATION AND THE GENERAL EQUILIBRIUM COSTS OF PROTECTION IN SMALL OPEN ECONOMIES.

8215C Laidler, D. DID MACROECONOMICS NEED THE RATIONAL EXPECTATIONS REVOLUTION?

8216C Whalley, J. and Wigle, R. ARE DEVELOPED COUNTRY MULTILATERAL TARIFF REDUCTIONS NECESSARILY BENEFICIAL FOR THE U.S.?

8217C Bade, R. and Parkin, M. IS STERLING M3 THE RIGHT AGGREGATE?

8218C Kosch, B. FIXED PRICE EQUILIBRIA IN OPEN ECONOMIES.

1983

8301C Kimbell, L.J. and Harrison, G.W. ON THE SOLUTION OF GENERAL EQUILIBRIUM MODELS.

8302C Melvin, J.R. A GENERAL EQUILIBRIUM ANALYSIS OF CANADIAN OIL POLICY.

8303C Markusen, J.R. and Svensson, L.E.O. TRADE IN GOODS AND FACTORS WITH INTERNATIONAL DIFFERENCES IN TECHNOLOGY.

8304C Mohammad, S. Whalley, J. RENT SEEKING IN INDIA: ITS COSTS AND POLICY SIGNIFICANCE.

8305C DSU Jimenez, E. TENURE SECURITY AND URBAN SQUATTING.

8306C Parkin, M. WHAT CAN MACROECONOMIC THEORY TELL US ABOUT THE WAY DEFICITS SHOULD BE MEASURED.

8307C Parkin, M. THE INFLATION DEBATE: AN ATTEMPT TO CLEAR THE AIR.

8308C Wooton, I. LABOUR MIGRATION IN A MODEL OF NORTH-SOUTH TRADE.

8309C Deardorff, A.V. THE DIRECTIONS OF DEVELOPING COUNTRIES TRADE: EXAMPLES FROM PURE THEORY.

8310C Manning, R. ADVANTAGEOUS REALLOCATIONS AND MULTIPLE EQUILIBRIA: RESULTS FOR THE THREE-AGENT TRANSFER PROBLEM.

8311C DSU Mohammad, S. and Whalley, J. CONTROLS AND THE INTERSECTORAL TERMS OF TRADE IN INDIA.

8312C Brecher, Richard A. and Choudhri, Ehsan U. NEW PRODUCTS AND THE FACTOR CONTENT OF INTERNATIONAL TRADE.

8313C Jones, R.W., Neary, J.P. and Ruane, F.P. TWO-WAY CAPITAL FLOWS: CROSS-HAULING IN A MODEL OF FOREIGN INVESTMENT.

8314C DSU Follain, J.R. Jr. and Jimenez, E. THE DEMAND FOR HOUSING CHARACTERISTICS IN DEVELOPING COUNTRIES.

8315C Shoven, J.B. and Whalley, J. APPLIED GENERAL EQUILIBRIUM MODELS OF TAXATION AND INTERNATIONAL TRADE.

8316C Boothe, Paul and Longworth David. SOME IRREGULAR REGULARITIES IN THE CANADIAN/U.S. EXCHANGE MARKET.

8317C Hamilton, Bob and Whalley, John. BORDER TAX ADJUSTMENTS AND U.S. TRADE.

8318C Neary, J. Peter, and Schweinberger, Albert G. FACTOR CONTENT FUNCTIONS AND THE THEORY OF INTERNATIONAL TRADE.

8319C Veall, Michael R. THE EXPENDITURE TAX AND PROGRESSIVITY.

8320C Melvin, James R. DOMESTIC EXCHANGE, TRANSPORTATION COSTS AND INTERNATIONAL TRADE.

8321C Hamilton, Bob and Whalley, John. GEOGRAPHICALLY DISCRIMINATORY TRADE ARRANGEMENTS.

8322C Bale, Harvey Jr. INVESTMENT FRICTIONS AND OPPORTUNITIES IN BILATERAL U.S.-CANADIAN TRADE RELATIONS.

8323C Wonnacott, R.J. CANADA-U.S. ECONOMIC RELATIONS--A CANADIAN VIEW.

8324C Stern, Robert M. U.S.-CANADIAN TRADE AND INVESTMENT FRICTIONS: THE U.S. VIEW.

8325C Harrison, Glenn, H. and Kimbell, Larry, J. HOW ROBUST IS NUMERICAL GENERAL EQUILIBRIUM ANALYSIS?

8326C Wonnacott, R.J. THE TASK FORCE PROPOSAL ON AUTO CONTENT: WOULD THIS SIMPLY EXTEND THE AUTO PACT, OR PUT IT AT SERIOUS RISK?

8327C Bradford, James C. CANADIAN DEFENCE TRADE WITH THE U.S.
Conklin, David. SUBSIDY PACTS.
Rugman, Alan M. THE BEHAVIOUR OF U.S. SUBSIDARIES IN CANADA: IMPLICATIONS FOR TRADE AND INVESTMENTS.

1983

8328C Boyer, Kenneth D. U.S.-CANADIAN TRANSPORTATION ISSUES.

8329C Bird, Richard M. and Brean, Donald J.S. CANADA-U.S. TAX RELATIONS: ISSUES AND PERSPECTIVES.

8330C Moroz, Andrew R. CANADA-UNITED STATES AUTOMOTIVE TRADE AND TRADE POLICY ISSUES.

8331C Grey, Rodney de C. and Curtis, John. INSTITUTIONAL ARRANGEMENTS FOR U.S.-CANADIAN NEGOTIATIONS. PART I: CANADA-U.S. TRADE AND ECONOMIC ISSUES: DO WE NEED A NEW INSTITUTION? PART II: INSTITUTIONAL ARRANGEMENTS FOR MANAGING THE CANADA-U.S. ECONOMIC RELATIONSHIP.

1984

8401C Harrison, Glenn W. and Manning, Richard. BEST APPROXIMATE AGGREGATION OF INPUT-OUTPUT SYSTEMS.

8402C Parkin, Michael. CORE INFLATION: A REVIEW ESSAY.

8403C Blomqvist, Åke, and McMahon, Gary. SIMULATING COMMERICAL POLICY IN A SMALL, OPEN DUAL ECONOMY WITH URBAN UNEMPLOYMENT: A GENERAL EQUILIBRIUM APPROACH.