Rules Rather Than Discretion: The Inconsistency of Optimal plans

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Purpose of the essay

• Optimal control theory is not an appropriate tool for economic planning

• A discretionary policy will not typically result in the social objective function being maximized.
Friedman (1948)

A. Price Rigidities

Under existing circumstances, when many prices are moderately rigid, at least against declines, the monetary and fiscal framework described above cannot be expected to lead to reasonably full employment of resources, even though lags in other kinds of response are minor. The most that can be expected under such circumstances is a moderately rising level of money income. As an reasonably stable monetary order since the competitive order cannot provide one for itself. (2) This monetary framework should operate under the “rule of law” rather than the discretionary authority of administrators.

B. Lags in Response

Our economy is characterized not only by price rigidities but also by significant lags in other types of response. These lags make impossible any definitive statement about the actual degree of stability likely to result from the operation of the monetary and fiscal framework described above. One could reasonably expect smaller fluctuations than currently exists, though our ignorance about lags and about
The first reason

- Dynamic economic systems not only depend upon current, past policy decisions and the current state
  - Agents consider their expectations of future policy action
  - Agents form the expectations by understanding the structure well
The second reason

• The underlying economic structure is not well understood

• Standard practice is to estimate an econometric model but as Lucas criticized it …
Lucas(1976)

This essay has been devoted to an exposition and elaboration of a single syllogism: given that the structure of an econometric model consists of optimal decision rules of economic agents, and that optimal decision rules vary systematically with changes in the structure of series relevant to the decision maker, it follows that any change in policy will systematically alter the structure of econometric models.

For the question of the short-term forecasting, or tracking ability of econometric models, we have seen that this conclusion is of only occasional significance. For issues involving policy evaluation, in contrast, it is fundamental; for it implies that comparisons of the effects of alternative policy rules using current macro-econometric models are invalid regardless of the performance of these models over the sample period or in ex ante short-term forecasting.

The argument is, in part, destructive: the ability to forecast the consequen-
Definitions

• Optimal policy
• Consistent policy

\[ \max S(X_1, \ldots, X_T, \pi_1, \ldots, \pi_T) \]

s.t.

\[ x_t = X_t(x_1, \ldots, x_{t-1}, \pi_1, \ldots, \pi_T) \quad t = 1, \ldots, T \]
Definitions

• Optimal policy

• Consistent policy
  – A policy $\pi$ is consistent if, for each time period $t$, $\pi_t$ maximizes $S$, taking as given previous decisions, $x_1, \ldots, x_{t-1}$, and that future policy decisions ($\pi_s$ for $s > t$) are similarly selected.
Inconsistency of the optimal plan
- A two-period example

Max $S (x_1, x_2, \pi_1, \pi_2 )$

s.t.

$x_1 = X_1(\pi_1, \pi_2 )$

$x_2 = X_2(x_1, \pi_1, \pi_2)$
First order condition

• Assuming differentiability and an interior solution:

• Consistent policy:

$$\frac{\partial S}{\partial x_2} \frac{\partial x_2}{\partial \pi_2} + \frac{\partial S}{\partial \pi_2} = 0$$

• Optimal decision rule:

$$\frac{\partial S}{\partial x_2} \frac{\partial x_2}{\partial \pi_2} + \frac{\partial S}{\partial \pi_2} + \frac{\partial x_1}{\partial \pi_2} \left[ \frac{\partial S}{\partial x_1} + \frac{\partial S}{\partial x_2} \frac{\partial x_2}{\partial x_1} \right] = 0$$
Optimality conditions for the consistent policy

\[ \frac{\partial X_1}{\partial \pi_2} = 0 \]

Or

\[ \frac{\partial S}{\partial x_1} + \frac{\partial S}{\partial x_2} \frac{\partial X_2}{\partial x_1} = 0 \]
Pollak’s solution for inconsistency

- Inconsistency arose because of the different preferences of different generations
- Backward induction
- T-period
Open-loop solution
Examples which illustrate Pollak’s procedure is suboptimal

• Flood control
Examples which illustrate Pollak’s procedure is suboptimal

- Patent policy
A special case

- Inflation-Unemployment

- Standard policy results in excessive rates of inflation without any reduction in unemployment

- Price stability is preferable
Rationalizing the trade-off between unemployment and inflation

• Philips curve

\[ u_t = \lambda (x_t^e - x_t) + u^* \]
In order to obtain a similar relationship, it doesn’t just need to rely upon imperfect information.

We can assume price rigidities.
Assumptions

• Price expectations depend upon past prices

• Policy decision in each period would consider:
  – Current outcome
  – A proper evaluation of the terminal price expectations
Violating control theory

A change in administration

A change in relative costs society

An immediate effect upon expectations
Agents have as much information as policymaker does

Their forecast of future policy will be related to actual policy

Agents have some information concerning objective function
• So we shall assume that the expectations are rational:

\[ x_t^e = E x_t \]
These two propositions will characterize models much more complicated than the one used here so long as expectations are assumed to be rational and aggregate supply is governed by an equation like (1). For example,
Hirsch and Lovell (1969)

• They used direct measures of expectations and found that forecast error were systematically related to lagged sales.
Max $S(x_t, u_t)$

s.t.

$u_t = \lambda(x_t^e - x_t) + u^*$

If the rationalization is not perfect a random term must be introduced.
Consistent and optimal equilibrium
Taylor(1975)

• The optimal monetary policy was random in a rational-expectations world.
References


References

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• Mankiw G. "Principles of Microeconomics" (2009)