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Ignoring the Lucas Critique

The Lucas critique

This essay resurrects econometric and policy evaluation procedures that Lucas decisively criticized. I emphasize a neglected aspect of Lucas's Critique: drifting coefficients. In the adaptive models below, the government ignores the Critique. The government's econometric and policy procedures make coefficients drift, which in turn affects outcomes.

Outline

An econometric model is a collection of stochastic difference equations, parts of which describe private agents' behavior rules for setting prices and quantities. Econometric policy evaluation in the Tinbergen-Theil tradition fixes those parts and superimposes an objective function that orders government preferences over sequences of macroeconomic outcomes. The Tinbergen-Theil government rule maximizes that objective function.

This procedure holds private agents' behavior rules fixed while the government considers variations of its rule. Lucas noted that if private agents solve intertemporal optimization problems, then their decision rules depend on the government's behavior rule.

Because it misses the dependence of the some of the constraints (i.e., parts of the econometric model) on the government's choice, the Tinbergen-Theil formulation incorrectly translates the government's preference over macroeconomic outcomes into an ordering over government decision rules. Therefore, it will not give reliable policy advice. Lucas warned that

the Tinbergen-Theil method would not produce the outcomes it promised.[1]

The appeal to drifting coefficients

Lucas wrote the Critique when Keynesian macroeconometric models were highly regarded as tools for quantitative policy evaluation. The models were being refined to enhance their fits to historical data and their forecasting accuracy. Lucas conceded the impressive forecasting records of Keynesian econometric models, while arguing that good forecasting provided no evidence for the invariance under policy intervention assumed by Tinbergen-Theil. He stressed that typical econometric forecasting practice belied the invariance assumption by frequently adjusting constant terms in important equations. He interpreted those adjustments as approximating Cooley and Prescott's (1973) adaptive coefficients model, and imputed much of the forecasting success to them. The intertemporal instability of estimated relationships, presumably even under stable operating rules for government policy, undermined treating the relationships as invariant with respect to systematic changes in those operating rules.

Lucas raised the issue of parameter drift to distinguish praise for Keynesian econometric models as unconditional[2] forecasting tools from his judgment that they are not suitable for quantitative policy evaluation. However, he did not interpret the observed intertemporal coefficient drift as confirming the theoretical principle that the econometric decision rules of private agents would vary across economies with different government

[1] Lucas and Sargent (1981) gave in to the temptation to say 'I told you so', noting that instead of the of $(4, 4)$ unemployment-inflation rate pair promised by econometric models of the late 1960's, in the late 1970's the U. S. attained $(10, 10)$.

[2] For some reason, the Keynesian econometric literature referred to expectations, conditioned on an observed history, as unconditional forecasts. Unconditional forecasts thus corresponded to conditional expectations. The term conditional forecast meant conditioning on an assumed path of future policy variables.

decision rules. Indeed, each of Lucas's three examples compared hypothetical outcomes across different stationary environments indexed by decision rules for government policy. These examples are silent about drifting coefficients.[3]

A loose end

Lucas left the drift in coefficients unexplained. Neither the macroeconomic theory nor the rational expectations econometrics constructed after Lucas's Critique explains such drift. Each of these traditions focused on environments with time-invariant transition functions. Observations drawn from rational expectations equilibria for such environments would not provide significant evidence of parameter drift, even for misspecified models.[4,5] As emphasized in Chapter 7, such stationary environments are general enough to comprehend governments that choose policy in the erroneous way that Lucas criticized.

Yet coefficients continue to drift for macroeconometric models. Forecasting methods based on vector autoregressions incorporate explicit priors in the form of stochastic laws of motion for the coefficients.[6] The literature on unit roots in macroeconomics also can be interpreted as modeling drifting constants. Thus, the forecasting literature has taken coefficient drift increasingly seriously, but with little help from the rational expectations

[3] Lucas (1972) and Sargent (1971) described a test for the predicted outcome–policy rule dependence. That test does not use a random coefficients model. I recall that many early readers of Lucas's Critique misunderstood his reference to drifting coefficients as supporting his basic theoretical point.

[4] See Halbert White (1982), Sims (1993), and Hansen and Sargent (1993) for studies of classes of specification errors in stationary stochastic environments.

[5] See the discussion in Chapter 8 about how random-coefficients models are consistent with stationarity. Interpreting evidence of coefficient drift as evidence of model misspecification requires an alternative model that somehow causes the moments used in constructing estimators to depend on calendar time in a detectable way.

[6] See Doan, Litterman, and Sims (1984) and the RATS manual.

tradition. Like Lucas's Critique, the econometric forecasting literature typically offers no economic explanation for parameter drift, but it seeks to account for and exploit it in making forecasts.

Parameter drift as point of departure

I start with parameter drift, treating it as a smoking gun. It is the key piece of evidence that the government's beliefs about the economy and therefore its policy toward inflation have evolved over time. I form a model from two main components: a Tinbergen-Theil theory of government decision making (the Phelps problem discussed in Chapter 5); and a drifting-coefficients econometric procedure for the government that features the constant adjustments that Lucas wrote about. I study the quality of the outcomes that these policy procedures produce and compare them with historical outcomes and also with what would occur under rational expectations. I constrain the exercise by assuming that a rational expectations version of the natural-rate hypothesis is true. I do not examine unusual supply shocks and other plausible explanations of post-World War II U. S. inflation.

Relevance of the critique

In focusing on the government's learning behavior, I raise an issue discussed by Sargent and Wallace (1976), Sims (1982), and Sargent (1983) in the wake of Lucas's Critique. If the fundamentals of the environment are time-invariant (e.g., they are described by a stationary stochastic process), the forces underlying consistency proofs in econometrics cause the government's econometric estimates and its decision rule to converge.[7] In the limit, there can emerge a self-confirming equilibrium, where the government's estimates of its econometric model are reinforced

[7] The standard econometric proofs of consistency must be altered along lines described by Bray and Savin (1986) and Marcet and Sargent (1989a, 1989b).

jointly by its own behavior and the private sector's reactions to it.

Within a self-confirming equilibrium, the relevance of some aspects of the Lucas Critique vanish. First, although the invariance under intervention assumption used in the government's decision problem is wrong, the government is not disappointed in outcomes because they are statistically consistent with its beliefs.

Second, in addition to imposing rational expectations for private agents, a self-confirming equilibrium restricts the government's econometric model and its behavior. Free parameters describing the government's behavior disappear, thereby eliminating regime changes as an object of analysis. Sims (1982) implicitly appeals to a self-confirming equilibrium when he argues that regime changes are rare because existing policies are approximately optimal. Thus, a self-confirming equilibrium is a rational expectations equilibrium but one with fewer parameters than those in the models of Lucas (1972, 1976), which had parameters describing government policy. We would need those lost parameters to represent regime changes.[8, 9]

Third, to admit regime changes and drifting coefficients, convergence to a self-confirming equilibrium must be resisted. I arrest convergence by exchanging the government's least squares for an adaptive-coefficients algorithm like Cooley and Prescott's (1973). The adaptive-coefficients algorithm endows the government with a suspicion that the environment is unstable, which makes it overweight recent observations relative to least squares. This weakens the tendency of the economy to converge to a self-confirming equilibrium by strengthening a source of sustained dynamics along an escape route. Regime changes occur along the escape route.

[8] For the same reasons, Lucas and Stokey (1983) is not about regime changes.

[9] In 'The Ends of Four Big Inflations' (Sargent (1986)), I interpreted data from hyperinflations and their terminations in the Lucas (1972, 1976) tradition by shifting free parameters indexing the government's monetary-fiscal policies.

Rational expectations models

Ironically, the procedures that violate the Lucas Critique yield better outcomes than ones that respect it. To expand on this point, I begin by reviewing the kinds of models and procedures that respect the Critique. To summarize important developments in macroeconomic thinking from the 1980's and early 1990's, the next two chapters apply the Nash equilibrium concept to a model with a natural unemployment rate. The theory in these chapters carries through the vision of Sims (1982) that macroeconomic observations reflect purposeful and knowledgeable behavior by both the government and the private sector. These models prompt us to examine what we mean by regime changes.

The rational expectations models in the next two chapters respect the Lucas Critique. Models that challenge and extend the Lucas Critique appear later.