EXPECTATIONS AND ADVICE

1. THE LUCAS CRITIQUE OF 1960'S ECONOMETRIC POLICY MODELS

$$\text{non-policy}: \quad \begin{cases} u_t = \bar{u} - \alpha(\pi_t - \hat{E}_{t-1}\pi_t) + \varepsilon_t \\ \hat{E}_t \pi_{t+1} = \sum_{i=0}^{k} \omega_i \pi_{t-i} \end{cases}$$

$$\text{policy}: \quad \pi_t = \sum_{i=0}^{\ell} \gamma_{1i}\pi_{t-i} + \gamma_{2i}u_{t-s} + v_t$$

- In the 60's, economists were beginning to experiment with systems like this using engineering control theory. The "non-policy" part was treated as a "linear system" and $\vec{\gamma}$ chosen optimally.
- Lucas: Actually, we should write $\omega_i(\vec{\gamma})$ (thus using past u as well as π to predict π if policy behavior makes this optimal).
- In this simple system, rational expectations makes $\vec{\gamma} = \vec{\omega}$, so we get the classic conclusion that "only surprise changes in inflation matter".

2. AN EQUIVALENT, BUT MORE REALISTIC, DESCRIPTION OF MODEL-BASED POLICY

- At each date t, the policy board has its modelers prepare a menu of projections for $u_{j,t+s}$, $s = 0,\ldots,h$, each conditional on a different time path for the policy variable $\pi_{j,t+s}$.
- Policy-makers have an objective function that ranks projected paths, or else some other mechanism for choosing among paths.
- Since the projected paths are themselves functions of the observed state of the economy at t, the procedure implies a mapping from the current state of the economy to the current policy action — this is the "rule".
- This description of the policy rule (as a system for choosing among projected paths) is arguably better — see Rudebusch and Svensson (1999). We'll come back to this point.

3. THE NAIVE EXIT FROM THE LUCAS CRITIQUE: ONLY POLICY "RULES" MATTER, AND THEY'RE NOT RANDOM

$$\text{non-policy}: \quad y_t = F(x_t, \alpha, \gamma)$$

$$\text{policy}: \quad x_t = G(y_t, \gamma)$$

- This system, nonlinear in γ if derived from a '60's-style model, implies a stochastic process ("probability law") for the joint behavior of x, y.

- If one has a social welfare function, one can evaluate expected welfare under the probability law implied by each possible value of γ, choose the max.
- To this day, most macroeconomists think this pattern of analysis avoids the "Lucas critique" and is indeed the only way to avoid it.

4. EVERYTHING HAS A PROBABILITY DISTRIBUTION

- If change in γ is possible, then it has different values at different dates and needs a t subscript.
- But then it what sense is it fundamentally different from x_t, the "policy variable"?
- Answer: In *no* sense. Anything that affects the economy that policy-makers control and can change must be treated by rational economic agents as uncertain in the future.
- For anything about which agents are uncertain they will, if they are rational decision makers, have a probability distribution, including for γ_t, if that is uncertain now or in the future.
- Correct rational expectations analysis of the effects of changing γ must recognize that agents will have a probability distribution over possible changes *ex ante*, and they will have a probability distribution over possible future changes or reversions to the old value of γ_t *ex post*.

5. SARGENT: THE ZENO'S PARADOX OF ECONOMIC POLICY: DO POLICY-MAKERS HAVE FREE WILL?

Sargent's characterization of my view:

- Policy makers are always optimizing, possibly subject to complex constraints.
- Therefore there is no role for advice from economists about how to improve policy.

His conclusion: Though the naive formulation of the Lucas critique is internally contradictory, my viewpoint as an alternative is so nihilistic about the possibilities for useful criticism and advice on monetary policy that Sargent prefers the flawed naive formulation.

My characterization of my view:

- As laid out in section 4, my view is that there is always a probability distribution for policy makers' actions, not that this distribution is necessarily derived from an optimization.
- It is indeed true, then, that in a complete rational expectations formulation there is no possibility of changing the "probability law" governing the evolution of the economy — which Sargent might think is a nihilistic conclusion.

6. AN INTERNALLY CONSISTENT WAY TO THINK ABOUT REAL-TIME POLICY ANALYSIS

- Our policy choices are always realizations of random variables.
- Realizations of random variables can have large consequences, even if they don't change probability laws.
- Choices of actions at t, that do not change the stochastic process that the economy follows, nonetheless change the conditional distribution of the future of the economy given its current state.

- Simple example: A ballot proposition will determine whether an economically inefficient regulation will be imposed. The outcome is unpredictable in advance, and the probability that the proposition will pass is p. If it does not pass, income from date $t = 1$ onwards will be $y_0(1.02)^t$, while if it does pass, income will be $y_0(1.01)^t$. No one would argue that it does not matter what the outcome of the random variable determining the passage of the proposition turns out to be, even though the realization of that random variable does not change the stochastic process followed by income.

7. SOURCES OF UNCERTAINTY ABOUT POLICY

- Policy-makers may be influenced by information not observable by the public
- The public may know which types of information the policy-makers look at, but not know which sources are most important or how they impact policy decisions.
- The public may know that there are competing views of which policy choices are best and be unable to predict with certainty which view will prevail.
- None of these sources of uncertainty imply that policy-makers see their own actions as involving random elements.

8. STATIONARITY

- The appeal of the single-objective-probability assumption is in the context of stationary phenomena: sources of uncertainty that are observable repeatedly, being drawn from the same distribution with weak dependence over time. For such sources of uncertainty it is reasonable that people will at least not persist in using clearly incorrect probability distributions.
- Policy interventions of some types — e.g. creation of new central banks, or central bank constitutions — occur very infrequently.
- For rare events it is less natural to assume that there is a single shared probability distribution. This does not mean that the probability distributions that agents must have can be ignored, just that the rational expectations convention that they will all have the same distribution must be treated with caution.

9. THE UNIQUE OBJECTIVE PROBABILITY ASSUMPTION

- If we consider the possibility that, given the same information as is being used by policy-makers, private agents still have a more uncertainty about policy-maker acts than do the policy makers themselves, or if we consider the possibility that beliefs about rare events might differ across rational agents, we do have to relax the part of the rational expectations equilibrium concept that assumes all agents share the same, "true", probability distribution.
- But decision theory does not tell us what probability distribution rational agents must have, only that rational agents making decisions under uncertainty must act as if they have *some* probability distribution (and perhaps also that it must not put probability zero on events that can in fact occur).

10. Choosing policy using conditional projections

- The correct model of the effects of our choices will usually have a local linear approximation.
- There is therefore nothing internally contradictory in thinking of policy makers as choosing values of policy variables on the basis of preferences over conditional distributions of the future given their policy choices. even if this is done on the basis of linear models.
- Policy rules may be best announced in the form of preferences over conditional projections. Svensson and Rudebusch (and others) have argued that it is easier to explain to the public, and more credible, to describe policy in terms of preferences over future paths for the economy, rather than in terms of how the history of the economy maps in to current policy choices.
- So what is left of the Lucas critique?

11. The Lucas critique reformulated

- Everyone has long understood, even at the time Lucas wrote, that linear models can only be expected to be valid locally, and will be less accurate when used to project conditions far outside the range observed in the sample period to which they have been fit.
- In a stationary linear model, the effects on Ey_{t+s}, $s = 0, \ldots, T$ from perturbing x_t by Δx_t are given as $\Delta y_{t+s} = \alpha_s \Delta x_t$, $s = 0, \ldots, T$. The effects of 10 such perturbations in a row are given by

$$\Delta y_{t+s} = \begin{cases} \sum_{j=0}^{s} \alpha_j \Delta x_t, & s \leq 9 \\ \sum_{j=s-9}^{s} \alpha_j \Delta x_t & s > 9. \end{cases}$$

That is, we just add up right-translations of the time paths of a one-time disturbance to obtain the effect of the 10 successive disturbances.
- Lucas's point was that even if the 10 disturbances are all fairly small, if they are associated with sustained changes in the inflation rate, they are likely to imply a nonlinear response of the economy via their effects on expectations-formation.
- This is an important point that had not been well articulated or widely understood before Lucas wrote about it.

References

RUDEBUSCH, G. D., AND L. E. O. SVENSSON (1999): "Policy Roles for Inflation Targeting," in *Monetary Policy Rules*, ed. by J. B. Taylor, chap. 5, pp. 203–262. University of Chicago Press, Chicago and London.