Perils of Taylor rules

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What we have concluded so far

- In the model we looked at last lecture, we identified two possible sources of explosive behavior.

- With primary surplus τ fixed, the government budget constraint, combined with the equilibrium relation $r = \beta + \pi$, gave us the conclusion that real debt b exploded at the rate β unless $b \equiv \tau/\beta$.

What we have concluded so far

- With a Taylor rule and $\theta > 1$, so the "Taylor principle" is satisfied, inflation grows exponentially at the rate $\gamma(\theta - 1)$ unless $\pi \equiv 0$.

- The initial price level, we concluded, was uniquely determined by the fact that explosive behavior of b at the rate β violated the private agent's TVC.

- However with the $r \equiv \bar{r}$ policy this delivered constant inflation, while with the Taylor rule and $\theta > 1$ the unique equilibrium had exponential growth in inflation, which did not violate the TVC.

The conventional policy rule combination

- The standard assumption in much macro modeling has been that fiscal policy, rather than setting a fixed path for τ, makes τ react to the level of real government debt b.

- The simplest form of fiscal policy of this type sets

$$\tau = -\phi_0 + \phi_1 b\,.$$

- If we substitute this expression for τ into the GBC $\dot{b} = \beta b - \tau$, we arrive at

$$\dot{b} = (\beta - \phi_1)b + \phi_0\,.$$

Implications of $\phi_1 > 0$

- If $\phi_1 > \beta$, this has eliminated the instability.

- Indeed if $\phi_1 \in (0, \beta)$, even though there is an explosive root, it is less than β and hence is not ruled out by the TVC.

- The convention was, indeed still is in much of the literature, to assume that policy sets τ by a rule that can be written in real terms (i.e. that makes the behavior of b invariant to the time path of prices) and that guarantees that b does not grow as fast as $e^{\beta t}$.

- Modelers then discuss the determination of the price level with the remainder of the system. The variables B and b disappear from the equation system determining inflation or the price level.

Implications of the conventional policy pair

- If policy guarantees stable b regardless of the time path of inflation or the price level, as is implied by $\phi_1 > \beta$, and if $\theta > 1$, then our analysis of the $\theta > 1$ case with $\tau \equiv \bar{\tau}$ applies, except that . . .

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- We can't invoke the TVC to deliver a unique initial price level.

- There is only one non-explosive equilibrium — that with $\pi \equiv 0$ — and the conventional literature has made it respectable to proceed as if that were the equilibrium that must prevail, despite the fact that there is nothing within the model to rule out the explosive equilibria.

What about a Taylor rule with $\theta < 1$?

- In this case the equation we derived from the FOC and the policy rule, $\dot{\pi} = (\theta - 1)\pi$, is stable.

- If we combine such a policy rule with the $\tau \equiv \bar{\tau}$ rule, there is again just one unstable root in the system, that associated with the GBC, so we have a determinate initial price level, because of the TVC.

- Inflation then follows the path implied by the stable equation above.

- If we combine a $\theta < 1$ Taylor rule with a $\phi_1 > 0$ rule for τ, then there is no unstable root in the system. Inflation is stable and b is stable. From any initial price level, and thus any initial level of b, the economy evolves without violating any TVC. The price level and the inflation rate at time 0 are indeterminate.

Objection: "non-Ricardian" fiscal policy rules are impossible.

- But because these results conflict with some standard ideas and notions of sound policy, there are strongly felt objections to the results on the part of some economists.

- One form of objection is a claim that it is impossible for a government to commit to a $\tau \equiv \bar{\tau}$ policy rule.

- This is sometimes expressed informally, invoking the idea that a government that issued nominal debt without changing the stream of future τ values would find that at least eventually no one would accept the newly issued debt.

- Another version of the same idea is that there is an "intertemporal budget constraint" on the government that forces it to follow policy rules that guarantee bounded real debt regardless of the time path of prices.

The intertemporal government budget constraint

- The equation that people refer to as the government intertemporal budget constraint is
$$b_t = \int_0^\infty e^{-\beta s} \tau_{t+s} \, ds \, .$$
- This equation holds in equilibrium in all the versions of our simple model that we have discussed.
- But it is not a constraint on government behavior.
- The instantaneous GBC $\dot{B} = rB - P\tau$ is an accounting identity and is a constraint on the government.

- The "intertemporal government budget constraint" is derived from the accounting identity by combining it with two conditions that arise from private sector optimization: $r = \beta + \pi$ and the private TVC.

- Treating this condition as a constraint on the government is like observing that the supply of corn is 40 bushels, then claiming that the demand for corn can never exceed 40 at any possible price.

Objection: Even economists don't understand the TVC. Ordinary people certainly don't

- The TVC does play a big role in these results, and it assumes the private agents look far ahead and react optimally to what they see.
- It's true that real people don't do this, at least not precisely and swiftly.
- But the TVC's role in this model is to make it clear that if private agents grow extremely wealthy in holdings of government bonds, while their consumption is stable, they will eventually decide to spend this wealth.
- A more realistic model, in which agents disagree about, and have uncertain and/or mistaken views about, future fiscal policy, would still have such wealth effects.

Rescuing the conventional framework

- That equilbria in which inflation grows exponentially forever are "unrealistic" is a reasonable view.
- But if so, we need to say what stops the economy from following such a path. Nothing inside the model as specfied does so.
- One idea, invoked informally by careful New Keynesian modelers (e.g. Michael Woodford) is that people believe that fiscal policy would eventually change in response to high inflation, even if at low inflation rates inflation does not influence τ.
- Upward explosions of the inflation rate are not equilibrium paths if, e.g., people believe that at some high "trigger" level of inflation, fiscal policy would bump up the discounted present value of future τ_t.

Deflationary spirals

- Ruling out downward explosions of inflation requires recognizing that a Taylor rule with $\theta > 1$ can't be maintained as $\pi \to -\infty$ if it implies an r too much below zero.

- Being explicit about this is the point of "The Perils of Taylor Rules", Benhabib, Schmitt-Grohé, and Uribe (2001).

The main idea in BSU, in one figure

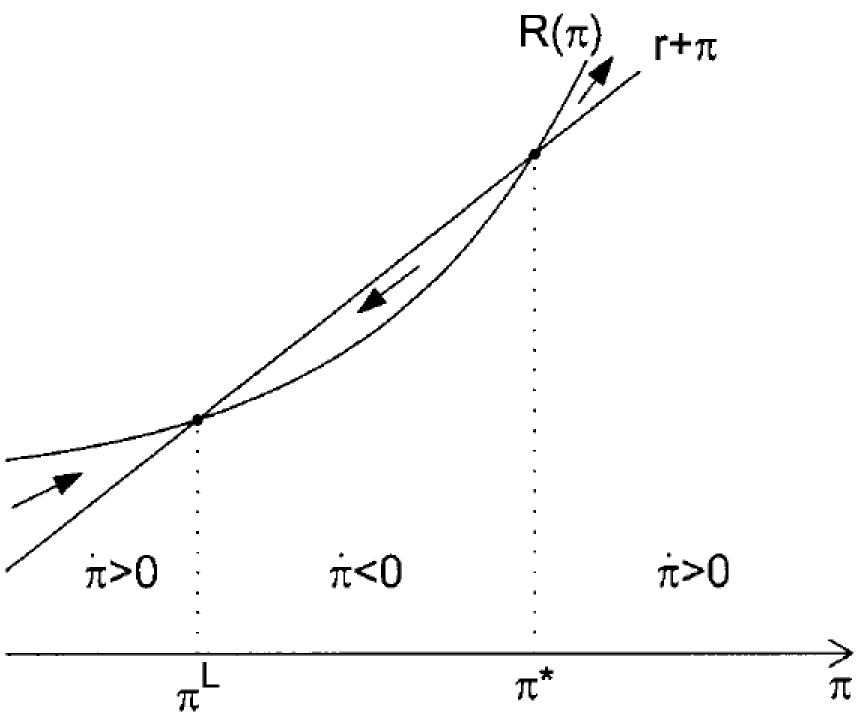

FIG. 2. The liquidity trap in a flexible price model.

Interpreting the figure

Our simple model maps into this figure differently than BSU's simple model. In our model, the right-hand-side of the policy rule is the $R(\pi)$ function in the figure. Policy sets $\dot{r}$ to be zero along $R(\pi)$, positive for $\pi > R(\pi)$, and negative for $\pi < R(\pi)$. The "r" in BSU's figure is our discount rate and real interest rate, β.

In our model, $\pi = r - \beta$ at all times, so r is always on the straight line on the graph. The arrows in the graph therefore correspond to the directions of movement of π and r.

The steady states

$R(\ )$ has slope $R' > 1$ at its upper intersection with the $r = \beta + \pi$ line, so it behaves locally there like a Taylor rule satisfying the Taylor principle. That upper steady state is unstable, as we expect in a Taylor rule model with $\theta > 1$.

The lower intersection, though, must have $R' < 1$. It is locally stable. If π starts at any value less than π^*, it converges toward the low-inflation, low-r steady state. There is no way to avoid this as long as the policy rule is continuous, respects the zero lower bound, and has slope increasing to a value above 1 as π increases.

Determinacy?

- Since any initial $\pi < \pi^*$ delivers a stable time path thenceforth for π, even if we assume exponential upward or downward growth in π is impossible, we can't reduce the equilibria to a single one.

- On the stable paths, inflation just drifts downward toward whatever the minimum for r is, minus β. It does not explode.

- But BSU do not consider the TVC or the possibility that fiscal policy could rule out the lower equilibrium.

- They assume throughout (and most of their paper deals with a more elaborate, sticky-price model) that fiscal policy guarantees bounded total government liabilities (in their model, debt plus currency) regardless of the path of prices.

Fiscal policy to exit a liquidity trap?

- Our simple model has a naively simple solution to being at the low-r, low-π equililbrium: raise and peg r at some higher level, while pegging τ at a level that does not require any large jump in P.

- Schmitt-Grohe and Uribe have in fact argued for exactly such a policy to get Japan, the Euro area, and the US out of their current liquidity-trap like conditions.

- Making this work, though, in an economy that has been in the low inflation equilibrium for a long time, may be difficult. We'll discuss the difficulties in a later lecture.

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References

Benhabib, J., S. Schmitt-Grohé, and M. Uribe (2001): "The Perils of Taylor Rules," *Journal of Economic Theory*, 96, 40–69.