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Lecture 11: Rules vs. Discretion

I. OVERVIEW

- The basic framework for evaluating monetary policy showed that expectations about future inflation, and the manner in which those expectations are formed have a critical role to play in determining macroeconomic outcomes in the economy. In other words, the current state of the economy depends on expectations of future inflation, which presumably would be affected by expected policy changes in the future.
- The impact of expected future policy changes on current macroeconomic variables led to the idea that there were clear gains to transparency in conducting monetary policy: the less uncertainty there was about future policy, the easier it would be for agents to form expectations about the future. Furthermore, policy makers would not be able to systematically pursue policies that produced unexpected inflation because individuals would quickly catch on.
- The increased role of expectations led to some economists arguing that it would be best to force monetary policy makers to commit to following a policy rule instead of allowing them to pick the appropriate policy at their discretion. The basic intuition was that under a rule, the policy maker would be able to credibly commit to a sequence of policy decisions that would bring about the best long run outcome.
- Under discretion, the policymaker could always deviate to satisfy some short run objective, hence it would be harder for individuals to form expectations about policy decisions in the future. This distinction between monetary policy under a rule and monetary policy under discretion was explored in a couple of groundbreaking papers by Barro and Gordon, which we shall study in the next two lectures.

II. INTRODUCTION TO THE BARRO/GORDON PAPER

- Let's focus initially on the first, and simpler, Barro/Gordon (BG) paper. The motivation for the paper, according to BG, comes from two stylized facts: average rates of inflation and money growth were high in most countries (recall that BG were writing in the early 1980s) and that countries had a tendency to pursue "activist, countercyclical monetary policies" (i.e. countries tended to use contractionary policy to slow down the economy in good times and use expansionary monetary to speed up the economy in times of recession.)
- Putting these two observations together, BG suspect that the activist, discretionary monetary policy may be contributing to the high rates of money growth and inflation. They want to develop a model that can explain the link between the discretionary policy and the high inflation.
- BG develop a model in which individuals act rationally and anticipate the actions of the monetary policy maker. In the context of this model, BG compare the economic outcomes when the monetary policy maker is acting under discretion with the outcome when the monetary policy maker follows a rule.

- BG find that, under discretion, the monetary policy maker picks a rate of money growth that is high and as a result inflation rates become high as well. The actual inflation rate that prevails in the economy under discretionary policy depends on the natural rate of unemployment and the parameters of the Phillips curve that describe the tradeoff between inflation and unemployment. The model also shows that the monetary policy maker acts in a countercyclical fashion, thus replicating the last of the stylized facts mentioned earlier.

- Finally, the unemployment rate (or the real economy) is unaffected by changes in monetary policy. This makes sense because the model BG are using has no nominal rigidities: if inflation is free to adjust then monetary policy will not have any impact on the economy. Monetary policy doesn't have an impact in this model unless it takes individuals completely by surprise: only surprise inflation matters.

- The basic structure of the paper is that BG first describe the model, then describe the preferences of the monetary policy maker and finally spend a lot of time clarifying the two solutions of the model: the case where the monetary policy maker can commit to a rule and the case where the monetary policy maker is allowed to use her discretion.

- The equilibrium concepts they apply in the model are somewhat sophisticated and hard to grasp unless you have taken a course on game theory. The model they use is also quite complicated, adding a couple of seemingly unnecessary complications. I will present a stripped down version of the model that has most of the key features but is easier to work with.

- The basic idea is that the commitment solution looks at the case where the policy maker can credibly commit her actions and her successors actions to following a specific policy rule: i.e. the ability to actively conduct monetary policy is taken away from the policy makers. If the policy maker can credibly commit to a specific rule, then the expectations of individuals will also be consistent with the rule, and policy makers recognize this when forming policy decisions.

- The discretionary solution looks at the case where the monetary policy maker has no binding rule to follow and has the ability to actively intervene in the economy. Under this case, since the policy maker has no credible commitment mechanism, individuals in the economy will not expect any rate of inflation that provides incentives for the policy maker to deviate. Therefore policymakers, have to take individual expectations as being given in calculating their optimal policy, and individuals form their expectations consistent with this optimal policy decision.

- In more simple terms think about the following scenario. Suppose that 0% inflation is the optimal inflation rate for the economy, but that policy makers would prefer to create more inflation (to try and exploit the short run output-inflation tradeoff) whenever individuals expect 0% inflation. The only way for the economy to obtain 0% inflation is if the monetary policy maker credibly committed to following a rule that produced 0% inflation. Discretionary policy would not work: people will not continue to expect 0% inflation because they know the policy maker has incentive to deviate from the chosen policy.

III. THE SETUP OF THE BARRO/GORDON MODEL

- The first thing to keep in mind in looking at the model presented in the BG paper is that their model is just a transformed version of the approach we have studied thus far in class.

- In class, we assumed that the policy maker controlled unemployment through the aggregate demand channel and that the impact of policy decisions on inflation worked through the Phillips Curve. In the BG model, the policy maker directly controls inflation and the unemployment rate is then affected through a modified version of the Phillips curve.

- More explicitly, the unemployment rate in the economy is assumed to be determined by the following equation: $u_t = u_t^n - \alpha(\pi_t - \pi_t^e)$. Note that this is just a rearranged version of the expectations augmented Phillips curve: $\pi_t = \pi_t^e - \lambda(u_t - u_t^n)$ where $\alpha = \frac{1}{\lambda}$.

- This equation is usually interpreted as telling a story where unexpected changes in inflation (positive values of $(\pi_t = \pi_t^e)$ reduce real wages and stimulate economic activity, helping to lower unemployment below the natural rate.

- In the BG paper, the natural rate of unemployment is assumed to shift over time because of shocks, but is assumed to always adjust slowly back to a constant rate. The evolution of the natural rate of unemployment is given by the following equation

$$u_t^n = \gamma u_{t-1}^n + (1-\gamma)\bar{u}^n + e_t$$

- Here $(1-\gamma)$ is the speed of the adjustment of the natural rate back to its mean, and $\bar{u}^n$ is the long run mean of the natural rate of unemployment. Therefore, a low value of γ signals that the economy will move quickly to the long run mean of the natural rate.

- Since this specification is confusing, we will follow BG's argument by looking at the special case of $\gamma = e = 0$. This will greatly simplify the analysis by making the natural rate of unemployment equal to a constant $u_t^n = \bar{u}^n$

- The monetary policy maker's preferences in a given period are given by the function $Z_t = a(u_t - ku_t^n)^2 + b\pi_t^2$. In this function, the parameters a and b are the weights that the policy maker attaches to inflation and unemployment fluctuations.

- If $k = 1$ then we would say that the policy maker is just trying to keep unemployment at the natural rate. However, in this case $k < 1$. This means that the unemployment rate that the policymaker is targeting is actually lower than the natural rate of unemployment, i.e. the policy maker is concerned about keeping fluctuations of unemployment to a minimum, but that the mean she is shooting for is an unemployment rate that is below the natural rate of unemployment.

- Essentially the monetary policy maker is always assumed to try and drive the economy below the NAIRU. This is not how we typically think of the actions of Alan Greenspan today, and is a very strong assumption. In fact, this assumption turns out to be critical in driving the conclusions that BG reach. BG try to provide some arguments justifying the assumption that $k < 1$ by appealing to the idea that the government, not the monetary policy maker, is trying to push unemployment lower than the natural rate. The monetary policy maker then has to take this value of k as an external constraint in picking monetary policy decisions.

- The policy maker is assumed to directly control a variable that has a direct connection to inflation: therefore, she can be thought of as picking the inflation rate in the economy at a given period. This is also a strong assumption: we saw in most of the prior analysis that the policymaker controls interest rates directly and that interest rates affect inflation only indirectly, working through the output gap channel of the Phillips curve.

- The policymaker is assumed to minimize the sum of current and future fluctuations in unemployment and inflation: Min $\sum_{\tau=0}^{\infty} \frac{Z_{t+\tau}}{(1+r)^{\tau}}$. However, in this model there is no link between the current inflation rate and the future economic situation in the economy. If we assume that individual expectations are not backward looking, then there is no link between the inflation rate chosen in this period and economic outcomes in the future.
- Therefore, we can reduce the problem of minimizing the sum of current and future objective functions of the policy maker to a problem of minimizing the objective function in any given period.Basically, we have effectively severed the links between the current policy choice and future economic variables; this makes calculating the optimal policy in a given period easier because you do not have to consider the future consequences of policy actions.

The Rule Solution

- The general problem faced by the monetary policy maker can be described as the following:

$$\text{Min}_{\pi_t} Z_t = a(u_t - ku_t^n)^2 + b\pi_t^2$$

- By substituting in for the unemployment rate from the Phillips Curve equation, we get the following problem for the monetary policy maker

$$\text{Min}_{\pi_t} Z_t = a\left[\bar{u}^n - \alpha(\pi_t - \pi^e) - k\bar{u}^n\right]^2 + b\pi_t^2$$

- If the policy maker can credibly commit to a rule that commits the policy maker to produce a given rate of inflation in the economy, the individuals in the economy will anticipate this perfectly. Therefore, when policy makers decide on the optimal policy, they recognize that $\pi_t = \pi^e$. This simplifies the policy maker's decision to

$$\text{Min}_{\pi_t} Z_t = a\left[\bar{u}^n - k\bar{u}^n\right]^2 + b\pi_t^2$$

- The first order condition for this maximization is $0 = 2b\pi_t$. Define π^* as the solution to this first order condition, in which case $\pi^* = 0$
- When the policy maker can commit to a specific rule, then she will choose to commit to a rule where she picks an inflation rate of zero every period. Individuals expect the zero inflation that the policy maker supplies.
- The value of the objective function of the policy maker is given by

$$Z_t^* = a\left[\bar{u}^n - k\bar{u}^n\right]^2 + b(0)^2 = a(1-k)^2\left(\bar{u}^n\right)^2$$

- Note that this solution is dependent upon the existence of a commitment mechanism. Given that the individual expects 0 inflation, the policy maker is tempted to give surprise inflation. So individuals will not expect zero inflation unless they can be credibly convinced that the policy maker can't deviate from this value. This solution is calculated in the section below.

The Discretion Solution

- Without a credible commitment mechanism, the policy maker is able to indulge in discretionary monetary policy. Since the policy maker has this discretionary policy making ability, individuals will recognize that no announced path for future inflation will be credible. So the policy maker, even if she promises that inflation will always be zero, will not be able to influence individuals into expecting zero inflation.

- Since the policy maker can't influence expected inflation, she has to take their expectations of inflation as given in picking the best policy. So her decision becomes

$$\text{Min}_{\pi_t} Z_t = a\left[\bar{u}^n - \alpha(\pi_t - \pi^e) - k\bar{u}^n\right]^2 + b\pi_t^2$$

- The key difference from before is that the policy maker can no longer expect that expected inflation would equal any announced rate of inflation.

- The first order condition for this maximization is $2a\left[\bar{u}^n - \alpha(\pi_t - \pi^e) - k\bar{u}^n\right](-\alpha) + 2b\pi_t = 0$, which simplifies to $\alpha a\left[\bar{u}^n - \alpha(\pi_t - \pi^e) - k\bar{u}^n\right] = \pi_t$

- Define $\hat{\pi}$ as the solution to this model. Individuals in the economy, being rational, understand that policy makers choose inflation according to this first order condition. So they set $\pi^e = \hat{\pi}$. Therefore the equilibrium inflation rate in the economy, according to the above equation becomes $a\left[\bar{u}^n - k\bar{u}^n\right] = b\hat{\pi}_t$, or

$$\hat{\pi}_t = \frac{a\alpha(1-k)\bar{u}^n}{b}$$

- So when the policy maker can't commit to a specific rule, then she will choose an inflation rate that is > 0 every period. Individuals expect that the policy maker will supply this positive inflation rate as well.

- The value of the objective function of the policy maker is given by $\hat{Z}_t = a\left[(1-k)\bar{u}^n\right]^2 + b\left[\frac{a\alpha(1-k)\bar{u}^n}{b}\right]^2$ This simplifies to

$$\hat{Z}_t = a\left[(1-k)\bar{u}^n\right]^2\left(1 + \frac{a\alpha}{b}\right)$$

- So the policy maker is worse off: the loss function is higher under discretionary policy.

IV. THE REST OF THE BARRO/GORDON MODEL

- This concludes the core of the Barro/Gordon paper. BG show that using a simple macroeconomic model, that monetary policy makers can be better off by following a rule for setting monetary policy rather than setting policy at their discretion. Individuals, in the absence of a credible rule for setting policy, always expect the policy maker to deviate from any announced policy: as a result the zero inflation outcome that is most desirable can only be achieved using a policy rule.

- BG also cite this result as a possible explanation for why inflation seemed to be too high in the real world where discretionary policy was widely prevalent. They suggest that countries with high inflation would be better off by committing to a specific rule rather than allowing their policy makers to set monetary policy in a discretionary fashion.

- The rate of inflation that prevails in the economy under discretionary policy $\hat{\pi}_t = \frac{a\alpha(1-k)\bar{u}^n}{b}$ is an increasing function of a and α and a decreasing function of b. BG point out that this implies that as the slope of the Phillips curve becomes larger (α becomes smaller), the average rate of inflation rises: this makes sense since the benefits from surprise inflation (in terms of reduced unemployment) become larger.

- Furthermore, the more weight the policy maker attaches to unemployment (the higher a is) and the less weight she attaches to inflation (the lower b is) the higher the inflation rate that prevails in the economy. This makes sense again, because the policy maker will be much more willing to undertake discretionary policy that moves inflation around to try and achieve the required unemployment rate.

- BG also discuss some other issues in the paper. These issues include possible extensions to the model, other reasons why the policy maker can value unexpected inflation and possible extensions to a multi-period world where the policy maker has to worry about the reputational aspects of particular policy decisions. These sections are not as important as the analysis of the BG paper we have done up to now. Nevertheless, it will be nice to have some idea about these other issues before moving on.

- BG explain that their model can be changed so that the money supply, rather than inflation, can be treated as the policy variable. This means that the somewhat puzzling assumption that the monetary policy maker directly controls the inflation rate is not central to the results of the paper. We could have used a more complicated model that included the money supply and couched the preceding argument in terms of contrasting the performance of an economy when the money supply is changed according to a rule with the case where the money supply is changed at the policy maker's discretion.

- BG also argue that the benefits of unexpected inflation do not have to be solely in terms of reducing unemployment. Other examples might be because the government wants to reduce the real value of outstanding government debt by a sudden increase in inflation. If this inflation is unexpected, then the people who lent money to the government would not have factored this increase into the interest rates they demand and therefore the government can reduce the real interest rate on public debt through surprise inflation.

- Finally, we have restricted our focus to situations where the monetary policy maker produced unnecessarily high inflation by going in search of short-term gains in terms of reduced unemployment. In this set up the policy maker will never be able to produce 0 inflation under discretionary policy, because the individuals in the economy will expect her to renege on the promise.

- However, in calculating these solutions, we ignored the fact that policy makers may suffer a reputational cost from extra inflation. So even under discretion, we can think of the policy maker as having incentive to provide 0 inflation because to not do so would destroy her reputation. BG explore the reputational issue in greater detail in another paper, which we will study in more detail next class.