Monetary Policy and Business Cycle

(Jaromir Hurnik, Viktor Kotlan)

Lecture VI

Institutional framework for monetary policy: 'rules versus discretion'

”Motto”

”Even a knowledgeable government intent on serving the public interest may systematically do the wrong thing.”

(Blinder, 1987)

Outline

- Rules versus discretion in monetary policy (traditional debate)
  - Limiting central bank's discretion ...
  - Outside imposed rules
- The theory of 'time inconsistency'
  - Basic model
  - Economic policy implications

Rules versus discretion in monetary policy

- in order to fulfil its macroeconomic and microeconomic tasks, a central bank needs an adequate institutional framework

- a natural point of discussion about an optimum framework for monetary policy is the traditional debate on 'rules versus discretion'

- this focuses on the very general question of
  - whether central bank should be given the power of deciding or acting without other control than one's own judgement, or
  - whether it is preferable to lay down some procedural 'rules' (in a central bank statutes) in the sense of 'an established guide or regulation for action'

- for better understanding it is important to note that:
  - in this Lecture, a *'rule'* is defined as a regulation that is imposed on a central bank from outside and its main function is to limit the discretion of policy-makers

- while in the Lecture VII , a *'rule'* is defined as an heuristic, which facilitates the policy decision processes; in this sense it helps to reduce the complexity of the world to a simple and frugal heuristic
- in the sense of this Lecture, an example of *'rule'* is a commitment to maintain price stability that is put on the central bank via constitution and the central bank act

Limiting central banks's discretion ...

- a good example of a central bank constitution that provides high degree of discretion is the US Federal Reserve Act, which simply enumerates different macroeconomic targets and leaves it up to the discretion of the members of the Board of Governors to give specific weights to these targets

- consequently, the US monetary policy after the Second World War can be split into several periods with completely different preferences of the Board members (and different outcomes regarding the average inflation)

- what are the arguments for the adoption of 'rules' ?

- it is necessary to differentiate between:
  - a *traditional debate* based on the assumption of policy makers who are
    - not well qualified
    - facing the reality they cannot control perfectly (transmission lags, etc.)
    - not interested in maximizing social welfare at all

  - and a more recent debate about *time inconsistency* of optimal strategies

- Eucken (1952) expressed the traditional arguments very concisely: *... lack of knowledge, weakness in the face of pressure from interest groups and public opinion, and false theories can all influence their judgment and prove a major obstacle to achieving the task designed to them ...*

- this statement makes two important assumptions:
  - the central bank might be unable to use its margin of discretion so as to achieve the target in a satisfactory manner: *As a result, we cannot predict at all accurately just what effect a particular monetary action will have on the price level and, equally important, just when it will have that effect.* (Friedman, 1968)
  - even if a central bank was able to manage the economy perfectly, it cannot in principle be expected to take its decisions with the economy's welfare as a whole in mind

- given this justification for rules, the institutional arrangement has to meet different requirements
  - a rule must be *simple* as it is to be enshrined in a law

- a rule must be *stable*, it must be drafted so as to last
- and it should be *flexible* enough to cope with various shocks

Outside imposed rules

- over the history there are very few concrete examples of strict externally imposed rules in monetary policy (except the exchange rate arrangements as you may see below)

- at the level of *final targets* we have seen that in many countries price stability is regarded as the main target of monetary policy
  - as a result many constitutions explicitly state the dominance of this target
  - however, there are no examples where a constitution defines a concrete target value for a concrete price index and a concrete target period
  - thus, the *price stability rules* that are laid down in constitutions do not represent a very strict limitation
  - for instance, when the Deutsche Bundesbank, while operating under the obligation of the former Bundesbank Act to 'safeguard the currency', accepted an inflation rate of 7.0% in 1973 and 1974, it was never criticized for doing so

- at the level of *intermediate targets*, a rule could be defined for either monetary target or an exchange rate target

- in the early 1970s, monetarists pleaded for a strict monetary targeting: *My own impression is still that the monetary authority goes all the way avoiding such wings by adopting publicly the policy of achieving a steady rate of growth in a specified monetary total. The precise rate of growth, like the precise monetary total, is less important than the adoption of some stated and known rate* (Friedman, 1968)
- however, no country has ever decided to formulate a central bank law that obliges a central bank to follow a concrete target for a monetary aggregate

- this does not apply when the exchange rate targeting is adopted; here we can find several historical examples
  - *The international gold standard* (1876-1914) constituted a worldwide fixed exchange rate system in which individual currencies were set in the national coinage legislation in terms of their equivalent in gold
  - The international exchange rate system of *Bretton Woods* (1946-73) that obliged member countries to maintain a fixed parity for their own currency against the US dollar; the national authorities were only allowed to make small parity changes while large adjustments required aprooval of the IMF

  - *European Monetary System I* (1979-98) where the parities were decided by the finance ministers of the member countries; central banks were assumed to adjust their policy to meet these targets

- however, the exchange rate rules have proved themself as being quite unstable as all the above mentioned system eventually collapsed

- it is worth to mention that there exists one strict rule that combines a rule at the level of intermediate target (exchange rate) with a rule at the level of operating target (monetary base): *currency board*
  - under currency board central bank is obliged by national law to maintain a fixed exchange rate between the national currency and an 'anchor' currency
  - in order to enhance the credibility of the commitment a 'Currency Board' is required to ensure that the monetary base is fully covered by foreign exchange reserves
  - it follows that the central bank is directly or indirectly forbidden to engage in any form of lending to domestic borrowers and hence is prevented from using any of the traditional monetary policy instruments

- changes in the monetary base are therefore possible only if surpluses are generated in the central bank's foreign exchange account
- an example of the law establishing the currency board provides *The Law of the Republic of Estonia on Security Estonia Kroon* (20 May 1992)
  * The Estionia Kroon (cash in circulation and currency in current accounts) is isued fully secured by the gold and convertible foreign exchange reserve of the Eesti Pank.
  * The official rate of Estonian Kroon will be determined by Eesti Pank with respect to German Mark. Eesti Pank has no right to devaluate Estonian Kroon.
  * Eesti Pank guarantees to the Republic of Estonia the free exchange of the Estonian Kroon to convertible currencies for current needs of customers, according to the official rate of Eesti Pank.
  * Eesti Pank has no right to change the amount of Estonian Kroons in circulation only according to a change in its gold and foreign exchange reserve.
- it is evident that the currency board works in similar way as *gold standard* where the currency

in circulation is either directly gold and silver or the banknotes are fully covered by gold and silver reserves hold by the central bank

- despite their importance the traditional arguments for 'rules' do not play an important role in present debate on monetary policy
  - the 'transmission' issue is diminished by the voluntarily use of relatively simple rules for decision making by central banks
  - while the risk of 'unqualified' decision makers and their 'incentives' is solved by relatively large decision bodies

- however, the latter would certainly not become the true if the theory of 'time inconsistency' has not been developed ...

Time inconsistency

- a completely new argument in support for monetary policy rules was developed by the theory of *time (or dynamic) inconsistency of optimal monetary policy*, which originates with seminal contribution of Kydland and Prescott (1977) and Barro and Gordon (1983)

- the main outcome is the preference for rules even under conditions where the arguments for rules in the traditonal debate would no longer exist:
  - the central bank is at all times perfectly able to manage the economy - there are no lag problems of countercyclical policy
  - the central bank decisions are geared exclusively to a social welfare function

- and it is concluded that even under such ideal conditions it is advisable for a monetary policy authority to follow strict rules

- this conclusion is due to the phenomenon of the 'time inconsistency' of optimal strategies ...
  - *'a strategy is time-inconsistent if it is optimal at a point of time t_0 but no longer optimal at a point of time t_1'*

- ... in conection with rational expectations and game theory

- before we move to the basic model it is worth to mention that when the models were developed for the first time, the central banks were usually fully controled by the government (politicians)

- and that today's generally adopted independence of central banks is, in fact, an direct outcome of the development of time incosistency theory ...

Basic model

- the model heavily relies on the Lucas's business cycle model:
  - monetary policy is neutral in the long-run
  - economic agents form rational expectations
  - the supply side of the economy is described by the 'price surprise' supply curve

$$y = y^* + \gamma(\pi_t - E_{t-1}\pi_t) \tag{1}$$

- monetary authority (government) tries to minimise social welfare function that covers loss in terms of output and inflation variability

$$L = (y_t - ky^*)^2 + \omega\pi_t^2 \tag{2}$$

- where ω is a measure of the social cost of inflation relative to the social cost of unemployment, which are both measured as deviations about some target value

- the inflation target is for simplicity assumed to be zero and the output target is defined by ky^*

- it holds that if k is equal to unity the target level of output is simply the natural rate of output

- however, the model assumes that there is permanent temptation for the government to target higher level of output than is the natural rate, i.e. $k > 1$

- assume first that the central bank (government) and rest of economic agents play a one shot game
  - under the *'rule'*, the central bank credibly commits itself at the end of period $t-1$ to a certain rate of inflation (zero) for the period t
  - a key characteristic of the commitment is that it conditions expectations, thus
  - it follows from the aggregate supply equation that $y_t = y^*$
  - substituting these values into the loss function we obtain

$$L_{rule} = (1-k)^2 y^{*2} \tag{3}$$

  - under *'discretion'* the central bank treats inflation expectations as given and minimises the loss function by the choice of inflation
  - in fact, the central bank takes the opportunity of 'predetermined' inflation expectations and breakes its commitment (cheats)
  - since $\pi_t \neq E_{t-1}\pi_t$ it follows that $y_t \neq y^*$

- substitution of the aggregate supply equation (1) into the loss function (2) yields

$$L = (y^* + \gamma(\pi_t - E_{t-1}\pi_t) - ky^*)^2 + \omega\pi_t^2 \qquad (4)$$

- minimising the loss function (differentiating in respect to inflation) we get

$$\pi = \Big(\frac{\gamma^2}{\omega + \gamma^2}\Big)E_{t-1}\pi_t y^* + \Big(\frac{\gamma}{\omega + \gamma^2}\Big)(k-1)y^* \qquad (5)$$

- since the central bank commited itself to zero inflation, the inflation expectations equal zero and (5) simplifies to

$$\pi = \Big(\frac{\gamma}{\omega + \gamma^2}\Big)(k-1)y^* \qquad (6)$$

- equation (6) represents the 'optimal' inflation once the central bank has decided to behave discretionary

- substituting (6) into the aggregate supply equation we get the result for output under dicretionary policy

$$y = \Big(\frac{\gamma^2 k + \omega}{\omega + \gamma^2}\Big)y^* \qquad (7)$$

- finally, substitution of both results, inflation and output, into the loss function yields the loss function under discretion

$$L_{discretion} = \frac{(1-k)^2}{\omega + \gamma^2}\omega y^{*2} \qquad (8)$$

- it is evident that the difference between L_{rule} and $L_{discretion}$ represents the fraction $\frac{\omega}{\omega+\gamma^2}$ and since it holds that $\frac{\omega}{\omega+\gamma^2} < 1$ it follows that the $L_{rule} > L_{discretion}$
- so, it seems optimal for the central bank at time $t-1$ when the inflation expectations are formed to promise inflation equal to zero, and once the expectations are fixed to deliver inflation equal to $\left(\frac{\gamma}{\omega+\gamma^2}\right)(k-1)y^*$
- however, since the inflation expectations are formed rationally, the central bank's promise to deliver zero inflation is not believed by economic agents and their inflation expectations in fact equal inflation
- the latter follows the fact that rationally expecting agents are fully aware of the central bank's decision problem and the resulting 'optimality' of cheating
- then it holds that whereas

$$\pi = E_{t-1}\pi_t = \frac{\gamma}{\omega}(k-1)y^* \tag{9}$$

output equals its natural level, $y_t = y^*$ (there is no price surprise)

- substitution of these two into the loss function yields the *real* loss under discretion

$$L_{real} = \left(\frac{\gamma^2}{\omega} + 1\right)(k-1)^2 y^{*2} \qquad (10)$$

and as you may assume it holds that $L_{rule} < L_{real}$

- thus, the strategy, which seemed to be optimal from the perspective of the period $t-1$ is no more optimal at the end of period t and the only outcome of a discretionary monetary policy is an *inflationary bias*

- remember that the latter holds despite the assumptions of perfect control of the central bank over the economy and attempts to minimise the social welfare function

- the most common solution to the problem is to appoint a 'conservative' policy maker (Rogoff, 1985) with a strong dislike of inflation

- using the equations (9) and (10) it is easy to show how an increase in ω alters the both the inflation rate and the social loss

- the higher is ω the closer is the loss L_{real} to the loss L_{rule}; the outcome of higher inflation is too costly for a 'conservative' policy maker

- although instructive, the 'one period' model is too simple for precise discussion of the importance of central bank credibility
  - one period horizon neither allows for the central bank to lose or gain credibility via existence of its track record
  - nor it shows how the credibility can be gained or lost

- the latter can be overcome allowing for multi period game that allows the central bank to improve gradually its reputation and so become credible
  - assume that (1) and (2) represent the period t aggregate supply and loss function only
  - and that the central bank minimizes the loss function over an infinite horizon

$$min = E_t\Big[\sum_{s=t}^{\infty}\delta^{s-t}L_s\Big] \tag{11}$$

    where δ is the policy maker's discount factor; the lower is δ the more the policy maker discounts future

  - further we assume that

    $E_{t-1}\pi_t = 0$ if $\pi_{t-s} = E_{t-s-1}\pi_{t-s}$

$E_{t-1}\pi_t = \pi_t^{real}\ \forall_t$ if $\pi_{t-s} \neq E_{t-s-1}\pi_{t-s}$

- first line states that if the policy maker has not been cheating in the course of previous periods then the public believes the policy maker will not cheat in the next period
- while second line states that if the policy maker has cheated in the past it loses its reputation for the future and the public expects the government to choose the cheat level of inflation thereafter; this is a kind of punishment for cheating
- the question is under what circumstances does the fear of this punishment prevent the policy maker from cheating and hence 'solve' the credibility problem?
- it follows that the policy maker will CHEAT if the one period (short-term) gain exceeds the long-term costs:
  - *the incentive to cheat*

    $$L(\pi_t^{discr} \big| E_{t-1}\pi_t = 0) - L(\pi_t = 0 \big| E_{t-1}\pi_t = 0)$$

    is higher than
  - *the incentive not to cheat*

    $$L(\pi_t^{real} \big| E_{t-1}\pi_t = \pi_t^{real}) - L(\pi_t = 0 \big| E_{t-1}\pi_t = 0)$$

    $\forall_{t+1+s}$

- to get the first one we simply subtract (3) from (8) and the short-term benefit is

$$= -\frac{(1-k)^2}{\omega+\gamma^2} y^{*2}\gamma^2 \qquad (12)$$

- while the way to the subsequent cost is more complicated
  - according to our assumptions if the government cheats the market expects the time consistent inflation rate thereafter
  - thus for periods $t+1 \rightarrow \infty$ the market expects and the policy maker delivers the rate of inflation given by (9) and the value of the loss function given by (10)
  - subtracting (3) from (10) we get

    one period increase in cost$= \frac{\gamma^2}{\omega}(1-k)^2 y^{*2} = \Omega$
  - since this apply $\forall_{t+1+s}$ we have

$$\Big[\sum_{s=t+1}^{\infty} \delta^{s-t} L_s\Big] = \Big[\sum_{s=t+1}^{\infty} \delta^{s-t}\Omega\Big] =$$

$$\delta\Omega + \delta^2\Omega + \delta^3\Omega + ... = \Omega\frac{\delta}{1-\delta} \qquad (13)$$

  - the latter represents the total increase in cost as a result of cheating in period t

- thus, the central bank (policy maker) cheats if the (13) is less than (12), i.e. if

$$\delta < \frac{\omega}{\gamma^2 + 2\omega}$$

- it follows that the central bank will choose *discretion* (cheating) if
  - the policy maker discounts the future too highly (low δ)
  - the policy maker is not inflation averse enough (low ω)
  - and if the inflation output gap trade-off is small (low γ)

Economic policy implications I

- the main policy recommendation of 'time inconsistency' debate is a rule that obliges a central bank to pursue price stability even in the short-run

- thus the model provides above all good description of the problems that arise if monetary policy follows an *activist employment policy*

- it is obvious that the whole inflation bias depends on $k \neq 1$ or on an output target of monetary policy

- which may seem to be relevant only for central banks that are efficiently insulated from the general political process

- in fact, in 1970s and early 1980s, when the model was developed, many central banks were under a very tight control by the government and the model can be regarded as a very important justification for central bank independence

  - if this arrangement guarantees $k = 1$, it will not be longer necessary to prescribe a rule that forces a central bank to follow price stability even in the short-run

  - if not, central bankers should be appointed for relatively long time as this should raise the level

of its discount factor δ and so, its preference for *rule* oriented policy

- another strenght of the 'time inconsistency' discussion is the concept of central bank *credibility*

- a central bank is genereally described as *'credible'* if its declared policy of *pursuing price stability* is taken by private individuals to be the basis of their inflation expectation formation (Cukierman, 1986)

- once a central bank has lost its credibility the economy moves in the unfortunate position (L_{real}), in which, despite high inflation, monetary policy produces no positive employment effects

- the only way in which a central bank can regain its lost credibility, is by accepting a policy of *disinflation* over several years
  - that is to say, despite positive inflation expectation ($E_{t-1}\pi_t > 0$), it must pursue a policy of price stability ($\pi_t = 0$)
  - this means that the central bank must temporarily accept a decline in output and employment ($L_{disinflation} > L_{real}$) as the price for gradually convincing private individuals once again that its announcement of a policy of price stability is meant to be taken seriously

- the more rapidly the central bank can regain a satisfactory level of credibility, the sooner will it be able to achieve welfare values of the order of L_{rule} instead of L_{real}