Monetary Policy and Business Cycle

(Jaromír Hurník)

Lecture VIII

Monetary policy strategy II: Inflation targeting, and Taylor rule

"Motto"

"We did not abandon M1. M1 abandoned us."

Gerald Bouey, former Governor of the Bank of Canada, March 1983

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Inflation targeting

- during the 1980s Reserve Bank of New Zealand and Bank of Canada have had the unsatisfactory experience with monetary targeting and have been searching for new strategy for an independent monetary policy

- a little bit later, in the European countries the decision to try a new strategy was triggered by the fact that their exchange rate target *vis-a-vis* the Deutschmark had become obsolete following the unexpected collapse of the ERM in the 1992-3 crisis

- it follows that while monetary targeting had been drawn up after an intensive academic discussion, inflation targeting was developed mainly as an *ad hoc* solution, as in some cases a new policy strategy had to be found almost overnight

- this explains quite pragmatic approach of inflation targeting, for which a theoretical framework was developed many years after its first application (Svensson, 1997)

- despite this, however, the inflation targeting seems to work reasonably well in practice, which one could hardly say about the monetary targeting ...

Genuine elements of inflation targeting

- following Svensson (2000b) inflation targeting can be characterised by:
  - explicit numerical inflation target ...
  - that is pursued in the medium run to avoid real instability (for instance in the output gap)
  - which makes inflation targeting to be 'flexible' rather than 'strict'
  - and due to the unavoidable lags in the effects of instruments on inflation, the decision framework is in practise 'inflation-forecast targeting'
  - in addition, communication is very explicit ...
  - and policy decisions are consistently motivated with reference to published inflation and output (-gap) forecast

- in contrast Bernanke *et al.* (1999) in their comprehensive study:
  - do not explicitly require the publication of inflation and output forecast,
  - and do not clearly specify the intermediate target as the 'inflation forecast'

- on the other hand, they do prefer the 'inflation target' to be set by 'elected officials': *"Because ultimately policy objectives in a democracy must reflect the popular will, they should be set by elected officials."*,
- and they do concern 'instrument independence' as an important feature, which makes the central bank to have the sole responsibility for setting of interest rates

- the differences between Svensson and Bernanke *et al.* definitons are summarized in the following table

Criterion	Svensson (2000b)	Bernanke *et al.* (1999)
Price stability as the main target	Yes	Yes
Announcement of an numerical target	Yes	Yes
Medium-term target	Yes	Unclear
Intensive communication	Yes	Yes
Specific policy rule	Inflation forecast targeting	Unclear
Published forecast	Yes	Not required
Targets set by government	Not required	Yes
Instrument independence	Yes, but not explicitly addressed	Yes

- following Bernanke *et al.* it would be, however, rather difficult to identify the specific features of inflation targeting

- indeed, the ECB's approach matches almost all parts of the definition and so does the one of the Bundesbank, which announced a numerical normative inflation target when setting its monetary targets

- despite it, Bernanke *et al.* do not classify these two central banks as inflation targeters

- it seems therefore that the definition by Bernanke *et al.* implicitly includes that to be an inflation targeter the central bank must not follow traditional intermediate targets like the money stock or the exchange rate

- it is evident that Svensson is more explicit about this very issue and defines inflation targeting explicitly as an 'inflation forecast targeting'

- similarly unclear is the importance of publishing a central bank's internal inflation forecast

  - while Bernanke *et al.* are not very specific about this

  - Svensson regards the publication as essential

  - however, the Bank of Canada and the Bank of Australia are widely regarded as inflation targeters, although they provide only rather non-technical forecasts that are hardly different from statements provided by the ECB

- having all these in mind we shall interpret inflation targeting as an approach to monetary policy in which central bank pursues the ultimate target of price stability *without* taking resource to traditional intermediate target aggregates such as the money supply or exchange rate

Explicit rule of inflation targeting

- the explicit rule of inflation targeting simply requires that the central bank keeps its inflation forecast close to its inflation target

- it follows that the determination of the target value and the forecast value of inflation play a crucial role ...

- although the targets can be formulated quite differenlty (remember Lecture V), their definition is still relatively simple

- what is extremely complicated is the determination of the *forecast* ...

- CNB publishes its forecast for inflation together with forecast for real output:
  - first, during the governor's briefing after the Board meeting
  - second, and in a more detail, in a quarterly *Inflation Report*

- an important point is that the forecast is presented as an *unconditional forecast*; i.e, it covers also the future behavior of the central bank, which makes

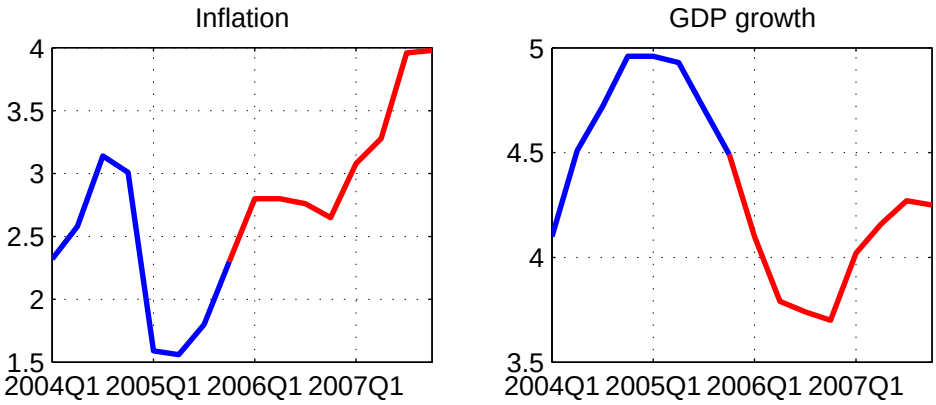
the forecast conditional upon certain short-term interest rate path

- a different approach has been followed by the Bank of England which presented its forecast as a *conditional forecast*; i.e. forecast based on the assumption of constant short-term interest rate (Bank of England has called its forecast as 'inflation projection')

- the discussion of conditional *versus* unconditional forecast goes out of the course scope, students interested in this area should refer to Kotlan and Skorepa (2003) or the seminar

- the CNB forecast:
  - is made for the time horizon of two years and
  - is presented in the form of graphs for inflation and output growth accompanied by more detailed written description
  - the underlying short-term interest rate path is, however, only briefly described
  - as a practical example can be used the CNB January 2006 forecast ...

Inflation and Output growth



- that was accompanied with following statement: *Consistent with the macroeconomic forecast and its assumptions is a gradual rise in interest rates, albeit to a lesser extent than assumed in the previous forecast ...*

- although the forecast is basically based on a 'core macro model', we can hardly say that the forecast is a mechanical outcome of this model

- rather, it drawns upon additional information based on the use of different scale of models and expert view (for detailed description of the forecast process at the CNB visit the seminar)

- comparing this concept with monetary targeting it is evident that the inflation targeting entails completely different approach

- while monetary targeting intends to reduce the complexity of the economic process to a 'fast and frugal heuristic' that can be easily implemented and monitored,
- the 'eclectic approach' of inflation targeting leaves it open how such reduction is achieved

- it follows that while monetary targeting uses the money stock to predict inflation, inflation targeting implies that all the available information is used

- however, to make the policy operable, certain 'reduction' must be done, and, in fact, the choice of the forecasting framework (model plus system) should be viewed as this necessary 'reduction'

Implicit rule of inflation targeting

- implicit rule of inflation targeting makes sense only when the conditional forecast is considered

- if this is the case then the implicit rule becomes relatively simple: if the conditional forecast leads to a value that is higher (lower) than the target, an increase (decrease) in the short-term interest rate is required

$$i_t - i_{t-1} = \gamma(\pi_{t+T|i_{t-1}} - \pi^*) \tag{1}$$

  with $\gamma > 1$

- of course, this simple rule leaves open:
  - by how much the interest rates has to be adjusted if the forecast deviates from the target, and
  - whether any deviation from target is a cause for an interest rate adjustment

Inflation targeting and macroeconomic shocks

- while monetary targeting has defined rather passive role for monetary policy, inflation targeting leads to more activist approach

- the main difference can be shown in the situation of a *demand shock*
  - if the shock is persistent enough to affect the horizon of the inflation forecast (two years for instance), the central bank has to react by adjusting its interest rates
  - while with the monetary targeting no active policy adjustment is necessary (central bank keeps on the constant money growth)
  - thus, inflation targeting with medium-term horizon requires more fine-tuning of economic activity, which is absent in monetary targeting
  - however, it is worth to mention that the longer was time horizont, the less active would be the policy ...

- in the situation of a *supply shock* (one that affects the forecast), on the other hand, inflation targeting seems to prescribe a non-accommodating policy stance

- for the inflation forecast remaining always identical with the target, a supply shock (negative) would require a much stronger interest rate increase than under monetary targeting

- in practice, however, inflation targeting is much more flexible:
  - already the use of target's tresholds of, for example, $\pm 1\%$ offers some additional flexibility
  - moreover some central banks do adjust headline inflation for changes in energy and food prices and do define the target for core inflation

Inflation targeting: Simple rule?

- so far, inflation targeting could be viewed as rather an 'eclectic approach' than a 'simple rule'

- this arises as a consequence of the fact that the inflation targeting does not precisely prescribes a specific set of variables and a specific model with help of which an inflation forecast can be produced

- the latter is, however, to some extent solved via an active communication with the public

- indeed, the central banks do communicate not just the forecast itself but also the way the forecast has been produced, and in addition they try to describe how the decision has been made

- CNB, for instance, publishes the minutes of the Board meetings regularly, and has published the description of the forecasting process and forecasting tools

Inflation expectations and monetary policy

- inflation expectations do play an important role for the policy conduct as they represent a significant part of transmission mechanism

- inflation expectations do anchor observed inflation to the target ...

- so, as long as the inflation expectations are identical with the target, the risk of missing the target is relatively low (if there is no unexpected shock as a change in the exchange rate or similar)

- however, it does not mean that the short-term interest rate should be held constant facing inflation expectations to equal the target

- indeed, the inflation expectations are formed assuming particular monetary policy, i.e. a particular path of interest rates

- it follows, that when the central banks do search for (for example) financial market inflation expectations, they also search for the expected interest rates path

- a natural question arising immediately is whether following the market interest rate expectations it

would be enough for the central bank to stabilize the economy

- a short answer is: *no*
- Bernanke and Woodford (1997) showed that when the central bank fully follows the market expectations about its policy it will indeed stabilize the economy, but at huge costs of inflation and output volatility (technically speaking, rational expectations equilibrium of such a situation is not unique)
- Blinder (1998) wrote about that issue: *"This can create a dangerous 'dog chasing its tail' phenomenon, wherein the markets react, or rather overreact, to perceptions about what the central bank might do, and the central bank looks to the markets for guidance about what it should do"*
- Bernanke and Woodford (1997) call the situation as a "sunspot equilibriums" in which the central bank responds to random variables only because it is expected to do so,
- and they conclude that the central bank should rather develop its own structural model for policy analysis and rely on its own evaluation of the economy current state
- as a consequence it follows that the central bank surprises the markets from time to time, simply

because its evaluation of the economy functioning is different

Taylor rule: a rule for an operating target

- so far, we have discussed two implicit rules for setting the short-term interest rate for the control of inflation: the money growth and the central bank's inflation forecast

- we now come to the rule prescribing a concrete value of short-term interest rate, i.e. the central bank operating target, with no reference to any intermediate target

- such a rule was developed by John Taylor (Taylor 1993) and states:*keep the real short-term interest rate constant as a neutral policy stance, and make a surcharge (discount) when the output gap is positive (negative) and/or inflation is above (below) target rate*

- the Taylor rule was a result of an empirical study of the monetary policy of the Federal Reserve System during the years 1984-92, and in the general form it can be formulated as follows

$$i_t - \pi_t = R + \alpha(\pi - \pi^*) + \beta(\frac{Y_t - Y^*}{Y^*}) \qquad (2)$$

  the nominal short-term interest rate has to be set equal to an average short-term real rate (R), plus

inflation, plus a term that reflects the deviation of inflation from an inflation target and the output gap; α and β are weights

- Taylor came to the result that following equation gives a very good description of the Federal Reserve Board's policy

$$i_t - \pi_t = 2 + 0.5(\pi - 2) + 0.5(\frac{Y_t - Y^*}{Y^*}) \qquad (3)$$

- of course, the most important question is whether a rule derived from empirical observation can serve as a general guideline for monetary policy

- Taylor on the basis of a comprehensive analysis (comparing different models) argues that this is really the case:
  Model simulations show that simple policy rules work remarkably well in a variety of simulations; they seem to be suprisingly good approximations to fully optimal policy (Taylor 1999)

- a similar result is presented in Rudenbusch (2000), who shows that the Taylor rule performs better than a nominal income rule

Taylor rule: some theory behind

- good performance of Taylor rule in a multitude of models indicates that it must be based on some very solid theoretical cornerstones

- an important pilar of the whole approach seems to be *the neutral real short-term interest rate*

- however, as Blinder (1998) reminds us this is a difficult concept:
  It is therefore most usefully thought of as a concept rather than as a number, as a way of thinking about monetary policy rather than as the basis for mechanical rule.

- the logic of a neutral interest rate can be derived from the interest rate channel:
  - in the flow approach, a neutral interest rate can be defined as a rate that leads to an aggregate demand that equates the full-employment aggregate supply
  - with respect to the stock approach, a neutral real short-term rate can be defined as an interest rate that is identical to an average long-term interest rate, which can be assumed to be independent of monetary policy, minus a risk liquidity premium

- Taylor's estimation of the neutral real short-term rate was 2%, which corresponds with an average real short-term interest rate of 2.3% observed in the period 1990-98
- however, over longer period 1960-1998 the average real short-term rate is a little bit higher, 2.8% for both US and Germany
- CNB's estimation of the neutral short-term real interest rate is slightly above 1%, but there is undergoing discussion that it could be even lower (do you have any idea why it is assumed to be lower than in Germany or US?)

- the other two components of the Taylor rule are related to the AS/AD model; the direction of interest changes can be simply derived from the shocks' analysis in this kind of model
  - in the situation of a negative *demand shock*
    - the level of output declines causing the output gap to be negative
    - the rate of inflation is lower than the target
    - then the Taylor rule indicates a real interest rate reduction
  - in the situation of a negative *supply shock*
    - the level of output again declines

    - while the inflation rate increases
    - assuming identical shifts in output and inflation the combined effect of both determinants would be zero, i.e. the short-term real rate would remain constant
- however, it is worth to mention that the nominal short-term interest rate does not remain constant as the higher inflation rate causes the nominal interest rate to rise by the increase in the inflation rate

Taylor rule: defining the target values

- the practical application of the Taylor rule raises some difficult empirical questions
  - correct definition of the neutral real short-term interest rate, which becomes even more complicated for an open economy
  - choice of inflation rate (index and number)
  - difficult measurement of the output gap; for example Orphanides (2000) shows, that real-time data on the output gap in the US were seriously flawed in the 1970s, which led to the overestimation of the economy's growth potential. Orphanides regards this as a major cause ot the relatively high inflation during that period

A forecast based Taylor rule

- during the 1990s a forecast based Taylor rules have been developed

- those rules incorporated a 'forward-looking' parameter in a way that not the observed but expected inflation is compared with the target value

- the forward-looking Taylor rule than looks as follows:

$$i_t - \pi_t = R + \alpha(\pi^e_{t+T} - \pi^*) + \beta(\frac{Y_t - Y^*}{Y^*}) \qquad (4)$$

- remember that replacing the observed inflation by the expected makes a *critical* difference between the Taylor rule and the forward-looking Taylor rule
  - while the Taylor rule can be used as a 'fast and frugal heuristic'
  - the forward-looking Taylor rule must be completed by a model of the economy to produce the expected inflation and adequate policy reaction

- nevertheless, this is exactly what is the current situation at inflation targeting central banks about, and the forward-looking Taylor rules are part of state of art forecasting models nowadays