GAPS, OPTIMAL POLICY & INTEREST RATE PATHS

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New Zealand Treasury Workshop, 20 August 2007
Discussion draws on a dog-and-pony show Lars Svensson and I performed at Sveriges Riksbank, summer 2006

Examples draw on Riksbank materials—may seem a bit Scanda-centric

Principles illustrated apply broadly

Possibly even to other inflation-targeting central banks

I have revised & expanded the slides to reflect my current thinking & recent topics of interest
Sketch of the Talk

- Inflation targeting & angst about output
- Output gaps: concepts, measurement, welfare, communication
- Optimal policy: some skepticism
- Announcing interest rate paths: some issues
GENERAL BACKGROUND

Why target inflation?
- nearly everyone believes low & stable inflation helps to maximize long-run growth
- emphasis more on low than on stable

Complete compatibility between inflation & growth objectives in the long run

Why is central bank talk about output angst-ridden?
- problem especially acute among inflation targeters
- it’s traditional for central bankers to feel angst
**Angst**

- One source of the angst
  - “removing the punch bowl syndrome” (REPUBS)
  - *presumes* that if output grows “too fast,” inflation rises
  - to stabilize inflation, must reduce output
  - central bankers feel bad about this, hence the angst

- Can arise from the view that business cycle fluctuations are caused by demand

- Output → inflation channel *not* the modern rationale
  - output volatility reduces welfare
  - but REPUBS thinking still haunts actions & communications

- Another source: Stan Fischer quotation
Examples from “Monetary Policy in Sweden” reveal great angst

- purpose to explain that the bank has scope to consider real economy, but real economy mentioned obliquely and not until 4th bullet: “The two-year time horizon provides scope for taking fluctuations in the real economy into consideration.”
- without the 2-year horizon would the Riksbank not care about output?
- proviso “without prejudice to the price stability target” not given a clear interpretation
- “monetary policy cannot affect growth and employment in a lasting way”

Angst is less apparent at RBNZ (is this good?)
Angst is a Sign of Success

- Many CBs are now credible inflation targeters.
- They are moving away from “simple” toward “complex” policies.
- Swedish rhetoric reflects this: CPI is reference inflation measure, but also look at UND1X and others.
- This is all good: credible CBs have genuine flexibility.
  - can now shed albatrosses that came with the early years.
  - can drop awkward “rules of thumb” (as in Sweden).
  - can drop or avoid other things that simplify too much.
1. Theory-based measures

- $y^F$: the level in absence of various distortions ("flex-price")
  - nominal rigidities; adjustment costs; most deviations from efficiency
- $y^F$ completely model dependent
  - varies w/ structure, shocks, frictions
- because fluctuations in $y^F$ are optimal, CB should not try to smooth them
- more broadly, many fluctuations should not be reacted to \(\because\) we have no idea whether or not they are efficient responses to exogenous disturbances
2. Data-based measures
   - $y^\dagger$: some filtered smooth trend to which the CB should try to return the economy
   - no theoretical basis for any filter used
   - no theoretical presumption that deviations from trend are bad
   - is this $y^\dagger$ some sort of permanent component of theory-based $y^F$?

   A clear & present danger
   Believing that $2 = 1$
Empirical Issues About Potential, $y^P$

- In practice, need real-time measures of $y^P$
- These should be accompanied by real-time measures of precision
- Precision must be small for all measures of $y^P$
- Even filtering techniques are imprecise in real time
- Theory-based more problematic in real time
  - a very long-run concept: $y^F$ never observed
  - $y^F$ simply a model of $y^P$
  - can we learn $y^P$ (via $y^F$) from data, even after imposing strong theoretical restrictions?
  - many factors that affect $y^P$ are unmodeled, so do not affect $y^F$ (oil prices, commodity prices, tax distortions, gov’t program that distort incentives)
A Welfare Issue About $y^P$

- No formal welfare arguments justify the $\pi^*$’s CBs have chosen.
- Theory typically says optimal $\pi^*$ is deflation.
- We believe can’t do practical welfare analysis on $\pi^*$.
- For practical purposes, some reasonable $\pi^*$ chosen based on:
  - belief that deflation is bad
  - “low” and stable $\pi$ is good
  - 2% or 3% probably equally good.
Why doesn’t this reasoning apply to $y^P$?

- for welfare, do we really think there is a big difference among stabilizing $y$ around
  - a constant growth trend
  - Hodrick-Prescott trend
  - band-pass filtered trend
  - theory-based trend

- after accounting for uncertainty, are the welfare implications of alternative $y^P$ measures quantitatively distinguishable?
- if they are, how do you choose among the measures?

Microfoundations of models fit to data are fishy

- hard to have faith we have extracted the relevant $y^P$
REPORT THE OUTPUT GAP?

- Some (unsolicited) advice
- Avoid talking about resource utilization as a generic topic
  - refer to resource utilization only when there is specific, direct evidence that it is relevant
- Always publish output forecast
  - publish gap forecast only when it’s part of the narrative you want to tell
- Adopt output growth as reference measure for real activity
  - admit you monitor many other measures to understand real side of the economy
The "Gap" is Poorly Understood Code

- The gap as an explanation of economic conditions
  - transparent communications involve "stories"
  - stories amount to identifying shocks driving the conditions
  - given the identified shocks, the gap is completely redundant

- The gap is central bank code
  - decoding requires knowing both the shocks and the structure
  - by using code, internal communication can be more efficient—if everyone possesses a secret decoder ring
  - but encoding generally does not enhance transparency
Gap thinking seems to presume symmetric loss functions

- $y > y^P$ as bad as $y < y^P$
- trying explaining that to your grandmother

This backs CBs into a corner

- must explain why raising unemployment is good policy—REPUBS redux

Asymmetric loss perfectly reasonable

- hard to tell a story that output is “too high” because people are working “too hard”
- easy to argue that resources are underutilized and need to stimulate aggregate demand
If too religious about gaps, inevitably there will be a time when $y > y^P$ for the reasons the CB believes are unmodeled

- may decide it’s good policy *not* to offset
- now in a different corner: must explains why some gaps are bad and some are good
More constructive & accurate to talk about offsetting the inflationary consequences of specific shocks
- connects nicely to storytelling plus it’s true
- contributes to transparency

Fed uses the rhetoric of “sustainable growth”
- has been well-understood and effective
- puts a positive spin on policy:
  - returning economy to “sustainable growth” is **good**
  - “unsustainable growth” is **bad**
- avoids the gap code
- without abandoning useful aspects of gap thinking
Talk plainly about the CB’s multi-dimensional mandate
- emphasize long-run compatibility
- discuss potential short-run tradeoffs
- tradeoffs arise from aiming for “sustainability”
Many Central Bankers Already Do This

- Irma Rosenberg’s (Riksbank Deputy Governor) 8 June 2006 speech contains terrific language
- Examples:
  - “To further push up demand when the economy was already showing strong growth *could have entailed risks for the stability of the real economy* . . . .”
  - “...now may be the time to take a further step towards less expansionary monetary policy....”
  - “Changes in asset prices *can reflect or lead to increased uncertainty* regarding future developments....”
- This is useful rhetoric that is not angst-ridden
- Accurately reflects state of economic knowledge
Optimal Policy for Internal Analysis?

- Avoid the language of “optimal policy”—internally and externally
  - internal language flows over to external communications
  - if “optimality” arguments drive policy choice, in the interest of transparency, they ought to be communicated
  - if they don’t, then they shouldn’t be used at all
- “Optimal policy” might be a useful starting point
  - is it a *modest intervention*?
    - if not, have problems
  - better language: *model-based linear-quadratic policy*
  - doesn’t carry the baggage of “optimal”
Skepticism About Optimal Policy

- “Optimal” for whom?
- With many gaps, optimal policy trades off closing all of them
  - output gap; goods-inflation gap; wage-inflation gap; IUP gap; PPP gap; term structure gap
- How do you justify objective function with just $\pi_t - \pi^*$ & $x_t$?
- Is optimal policy robust & representative?
- Modern literature emphasizes second moments with essentially no discussion of optimal first moments
  - no optimality argument for $\pi^*$
  - can you make one about $\pi_t - \pi^*$?
3 CBs now present main scenarios conditional on Bank’s preferred $i$-path
- if dynamics of forecasts are correct and no new shocks hit, this is the most likely path for $i$
- it is understood that this is not a commitment to an $i$-path (Archer paper)
- Faust & I have advocated this
  - we regard it as an unconditional forecast
  - uses all the CB’s information, including information about CB objectives and constraints
- RBNZ, Riksbank, Norges Bank report
  - main scenario
  - counterfactual scenarios (“what ifs?”)
Riksbank also reports (Norges Bank used to; may again in future)
- alternative \( i \)-paths
- what if the main scenario were different?
- used as a basis for arguing the main scenario is good policy

Alternative \( i \)-path scenarios present conceptual challenges
- main scenario presumes CB behaves optimally
- has always behaved optimally
- agents expect it to continue to behave optimally
- main scenario \( i \)-path credible & fully anticipated
- main scenario \( \iff \) Faust-Leeper unconditional
Thinking About Monetary Policy

- Step back to gain some perspective
- Policy maker can set an \( i \)-path arbitrarily
  - choices seem to be unconstrained
  - tempting to model \( \{i_t\} \) as exogenous
- That would be a mistake
  - policy is & has always been purposeful
  - even when it’s bad, it’s purposeful
  - purposeful \( \neq \) arbitrary
- Key issue: how to model private agents’ expectations of policy
  - has implications for the design & the interpretation of policy scenarios
Thinking About Monetary Policy

- Posit past policy was purposeful
- Need to model it
- Two choices
  1. *Ad hoc*, but systematic response to (endogenous) economic conditions
  2. Optimal, given some objective function
- *Ad hoc* need not imply sub-optimal
  - historical policy probably *should* be treated as optimal
  - but no attempt to model the objectives & constraints underlying the optimization problem the CB solves
- Optimal policy requires imposing much more structure on the analysis
The Policy Issue

- Want to use alternative \( i \)-path scenarios as a guide to policy choice
  - governed by principles of optimal policy
  - informed by historical policy behavior
  - want room to deviate from past behavior
  - like to think can improve on past performance
  - without becoming arbitrary (“too discretionary”)

- Lucas: Can’t do this—deterministic rules
- Sims: Can do this—optimal policy can have randomness
- Sadly, Sims doesn’t tell us \textit{how} to do it
Rational Expectations Analysis

- Policy behavior described by
  \[ i_t = f(\Omega_t) \]

- \( \Omega_t \) is the CB’s (large) information set; \( f \) is a generally non-linear function
- We take \( f \) to be the optimal rule given \( \Omega_t \)
- An exact function of public & private information
- Lucas’s policy prescription: find \( f \)
  - a one-time choice of \( f \)
  - any deviation is sub-optimal
  - no room or desire to deviate
- Job of economic analysts:
  - collect \( \Omega_t \) & tell policy makers how to implement \( f \)
For practical purposes this general specification is intractable

We—econometricians, analysts—don’t observe $\Omega_t$

- posit $\Phi_t \subset \Omega_t$

\[ f(\Omega_t) = g(\Phi_t, \varepsilon_t) \]

- $\Phi_t$ is observable
- $\varepsilon$ is the deviation

How should we think about & model $\varepsilon$?
A simple way (Taylor rule example)

\[ \dot{\pi}_t = \alpha + \alpha_\pi \pi_t + \alpha_x x_t + \varepsilon_t \]

- \( \Phi_t = \{\pi_{t-j}, x_{t-j}, \dot{i}_{t-j}, j \geq 0\} \)
- deviations are additive (exogenous?) shocks
- Deviations affect conditional expectations but **not** expectations *functions*
- \( \text{span}\{\varepsilon_t, \varepsilon_{t-1}, \ldots\} \subset \Omega_t^{PA}; \varepsilon_{t+j} \not\in \Omega_t^{PA}, j > 0 \) (PA: private agents)
- Construct alternative \( i \)-paths by intervening on \( \{\varepsilon_t\} \)
Feed in a sequence of $\varepsilon$’s to hit an arbitrary $\{i_t\}$ path

- $\varepsilon_t \equiv 0$: implements history
- $\varepsilon_t \neq 0$: deviates from history
- the deviations are, by construction, surprises
- need to check if interventions are “modest”

Doesn’t produce *announced* and *credible* $i$-paths

Not clear the exercise addresses needs of CBs that publish $i$-paths

Alternative: treat as one-time surprise in *path* of $i$

- only initial announcement a surprise
- path that follows fully anticipated
A less simple way (Taylor rule example)

\[ i_t = \alpha(s_t) + \alpha_\pi(s_t)\pi_t + \alpha_x(s_t)x_t + \sigma(s_t)\varepsilon_t \]

- \( s_t \): state with known probability distribution
- \( \Phi_t = \{\pi_{t-j}, x_{t-j}, i_{t-j}, s_{t-j}, j \geq 0\} \)
- Think of \( s_t \) as reflecting CB preferences
- Deviations affect expectations *functions*
- Two cases:
  1. one-time change in \( s_t \)
     - coincides with Lucas exercise
     - permanent regime change
  2. recurring change in \( s_t \)
     - coincides with Davig-Leeper exercise
     - on-going regime change
Regime Change in Policy Work

- Change parameters of policy rule to hit an arbitrary $\{i_t\}$ path
- Could be an optimal rule or an *ad hoc* rule
- If re-solve rational expectations model for each choice of parameters, respect Lucas critique
- Can address: what are the consequences of $i$-path that returns $\pi$ to $\pi^*$ more rapidly than normal?
  - closer to the actual questions policy makers ask
- But need to do this every policy round
- How can you have *permanent* regime change 4 to 6 times a year?
REGIME CHANGE IN POLICY WORK

- For on-going policy analysis, may need on-going regime change
- Agents form expectations over possible regimes
- Issues remain:
  - is regime change exogenous? (probably, if reflecting policy makers’ preferences)
  - how do you ascribe prob distn to regimes?
  - are those probs time-invariant? (probably not, if set of policy makers is fixed)
  - is there value-added to repeating the exercise each policy round? (probably not, if set of policy makers is fixed)
As inflation targeters have become more successful, the issues they confront have become more subtle

- it’s harder to talk about tradeoffs than to be lexicographic in inflation

There remain many conceptual issues about how to model policy choices

The desire to be transparent also introduces new modeling issues, not fully explored by the literature

A lot of important work remains to be done