

Comments on Porntawee (2006)

"Imperfect Common Knowledge, Price Stickiness, and
Inflation Inertia"

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Real Effects of Monetary Policy Shocks

This paper builds on Woodford (2001) that attempts to credit Phelps' insights in explaining the output-inflation tradeoffs, and inflation inertia, and abandoning Lucas's rational expectation and imperfect information setting altogether.

- Including price stickiness, or Calvo-type Price setting.
Consider Alternative Cognitive (or Reasoning) Abilities of economic agents . . .
 - The Rational Behavior Model, and
 - The Limited Depth of Reasoning Model.

- Friedman-Phelps-Lucas convinced us that "money matter" in explaining business cycles.
- However, evidences do not fit well with the prediction of their theories.
- Impulse Response Function shows that the monetary policy shock has prolonged effects on output and inflation.
- Much longer than what implied by the "imperfect information" model (Lucas(1972))

Alternative Routes

- Route One: Real Business Cycles.
 - Consider "real" shocks as a driving force instead.
- Route Two: Price Stickiness, or New Keynesian Model
 - Price is not fully flexible, therefore anticipated policies can have a prolonged real effect
- Route Three: Woodford proposes "Higher-Dimension Expectations", and credit this to Phelps (1983)

Firm's Pricing Policy

The model has a continuum of firms in monopolistic competition. Each firm i will in equilibrium set its (log) price $p_t(i)$ according to

$$p_t(i) = \xi y_{t|t}(i) + p_{t|t}(i) . \quad (1)$$

- $p_t(i)$ is the firm i 's estimate in period t of the price level, and
- $y_{t|t}(i)$ is the firm i 's estimate of the output gap.

Averaging over firms to obtain the aggregate price equation.

$$p_t = \xi y_{t|t} + p_{t|t} . \quad (2)$$

Woodford (2001) closes the model by imposing that the central bank uses nominal income targeting policy. Let q_t be the nominal GDP at date t . (2) can be rearranged as follows.

$$p_t = \xi q_{t|t} + (1 - \xi)p_{t|t} . \quad (3)$$

Insert Figure 1 About Here

Higher-Order Dimensions Expectations (I)

Woodford abandoned Rational Expectation Equilibrium, and goes for the higher-order expectations instead.

- Define $p_t^{(k)} = p_{t|t}^{(k-1)}$, for each $k \geq 1$.
- $p_t^{(0)} = p_t$

Let's look at how higher-order expectation replaces rational expectations.

Higher-Order Dimensions Expectations (II)

From the definition above,

$$p_{t|t} = p_t^{(1)} .$$

Use (3) to obtain the expression of $p_t^{(1)}$, i.e.,

$$p_t^{(1)} = \xi q_{t|t}^{(1)} + (1 - \xi) p_{t|t}^{(1)} .$$

Substitute the RHS of the equation above in place of $p_{t|t}$ in (3).

(3) becomes

$$p_t = \xi q_{t|t} + \xi(1 - \xi)q_{t|t}^{(1)} + (1 - \xi)^2 p_{t|t}^{(1)} .$$

Iterate on $p_{t|t}^{(1)}$, by using the updating rule that defines

$$p_{t|t}^{(1)} = p_t^{(2)} .$$

An infinite repetition of this recursive substitution yields,

$$p_t = \sum_{k=1}^{\infty} \xi(1 - \xi)^{k-1} q_t^{(k)} . \quad (4)$$

The (log) price level is a weighted average of expectations and higher-order expectations of the current level of (log) nominal GDP.

On Higher-Order Expectations(I)

- Notice that if the average of expectation in different orders are the same, $q_t^{(k)} = \bar{q}$, for all k , then (4) will reduce to

$$p_t = \xi \bar{q} \cdot \frac{1}{1 - (1 - \xi)} = \bar{q}.$$

- This is the price in a rational expectation equilibrium p^{RE} .
- Question: Are there any reason why $p_{t|t}^{(2)}$ not the same as $p_{t|t}^{(1)}$?

On Higher-Order Expectations(I)

As in Svensson (2001), answer the following questions

- What do you think inflation will be next year?
- What do you think other people think inflation will be?
- What do you think other people think other people think inflation will be?
- Will your answer in the last question be different from the first?

If the higher-order expectations, say after K -round of iterations, lead us to a more accurate forecast of the actual price level, p_t , is it rational to use weighted average of all $K - 1$ previous round of reasoning to calculate p_t ? Why not using just the K th -order of expectation?

I have doubt over the use of nominal income targetting. How many central bank in the world subscribe to such policy stance? Svensson (2001) also made crucial comments about this assumption.

It is about the realism of higher-order expectations. Agents in this model have some clue about the economic conditions, but still able to calculate sophisticated objects like the average of the average of . . . of expectations of others. Again this point is also raised by Svensson(2001). Great minds think alike!

1. Including Price Stickiness May Not Be A Novel Idea

- The Virtue of Woodford (2001) is creating inflation inertia and output persistence without resorting to price stickiness.
- One can expect that Porntawee(2006) model will easily generate this impulse response function with price-stickiness feature.
- The LDR model use only the 3rd order expectation to create prolonged effect of monetary shock.
- However, the realism of HOE is in jeopardy.

1. (Continued)

- How can one learn about other sellers' expectation if those group of sellers does not reset their prices in that period?
- Economic agents seem to know too much on one dimension.
- Besides, equation (2) in Porntawee(2006) doesn't contain "forward looking" nature of Calvo-type price setting.
- Woodford(2001) doesn't assume price stickiness. Therefore, the pricing policy of sellers in his model is purely a static one.

2. The RB Model

- Porntawee should give more details about this new concept. What is its operational definition?
- If the sellers cannot recognize that their decision can have effect on aggregate outcome,
- what will be an equilibrium outcome?
- Writing down explicitly the "definition" of this "monopolistic competitive equilibrium" will sort out this kind of confusion

- I find this paper, as well as Woodford(2001) **stimulating** .
- Not only it's an academic thought experiment of top class, but it contains **profound policy implications** for central bankers.

- Outlook
 - Reconsidering HOE.
 - Alternative Models of Reasoning

For Further Reading I



Micheal Woodford.

"Imperfect Common Knowledge and the Effects of Monetary Policy".

The Conference on Knowledge, Information and Expectations in Modern Macroeconomics: In Honor of Edmund S. Phelps , 2001.



Lars Svensson.

Comment on Michael Woodford, *Imperfect Common Knowledge and the Effects of Moneatry Policy.*
Unpublished Manuscript, October 2001.