

Discussion of 'DSGE Models in a Liquidity  
Trap and Japan's Lost Decade' by Koiti Yano \*

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\*The views expressed here are those of the author, and do not necessarily reflect the position of the Federal Reserve Bank of New York, the Federal Reserve System, or any other institution with which the author is affiliated.

Congratulations to author for an insightful contribution,  
and to organizers for selecting it to open this conference.

What does the paper do

Designs DSGE model encompassing non-negativity constraint on short term nominal interest rate (policy rate)

Estimates parameters of DSGE model using time-varying-parameter approach

Estimates time-varying trends of macroeconomic data: real output, inflation, real interest rate.

Finds target rate of inflation was too low in the 1990s and the 2000s in Japan, with implications for deflationary dynamics.

Finds growth rate of natural output declined in the late 1990s, but was about 0.5% in the mid-2000s.

Finds estimate of output gap relatively similar to alternative estimates based on alternative methodologies

Paper has a lot of value added in terms of its methodological contribution. Application of Monte Carlo particle filter and self-organizing state space model to estimation of DSGE parameters.

In my discussion I won't explore in detail the more technical aspects of the paper.

In the context of this conference, much more interesting to emphasize some of the issues raised in the paper which are of particular interest to a broader policy audience.

Obvious starting point: DSGE model

We have seen this acronym so frequently in the past few years that the typical reaction to another paper with a DSGE model in it is: do we really need it? is there anything left that has not been said and re-said many times already?

Profession is kind of split on usefulness of DSGE models for policy evaluation.

Broadly speaking, two approaches. The pre-Lehman-shock, and the post-Lehman-shock.

Pre-Lehman:

DSGE only game in town. No real alternative.

Benchmark description of macroeconomic interactions based on coherent application of constrained optimization under rational expectations.

Highly stylized representation of economic behaviors.

Medium-to-large-scale simulation models have gained widespread recognition and play an increasingly visible role within policy institutions.

Post-Lehman:

During the past few months, we have seen quite a lot of attacks directed against DSGE class of macro models.

Most of the attacks directed against new Keynesian paradigm, accused to have very little to say about financial stability issues and to be based on a naïve representation of the transmission mechanism.

Ultimately, accused to waste a lot of resources for second-order purposes.

Your reaction to the results of this paper depends on which of the two fields you fall within.

Personally, much in favor of first approach.

My (and others') reaction to all the post-Lehman criticism: sure, but we have been saying exactly the same things *from the inside* for years! Problems and limits of DSGE models are best known to their practitioners themselves.

Humorous bit is that New-Keynesian DSGE models are not quite part of the “standard” tools for policy evaluation and forecasting at most central banks. So they cannot be blamed for not having been useful: quite simply, they were not even in use!

The bottom line is an unashamed plug to give DSGE models a chance.

Worst case scenario, they are unlikely to do much worse than the less formal tools we have relied so far.

Of course, we want a new generation of DSGE models that incorporate the lessons of the last two years.

Most models (such as today's paper) are pragmatically closed through some kind of Taylor rule (eq.29), with short-term rates directly controlled by monetary policymakers that enter directly Euler equations of consumers (eq.18) and Tobin Q equations of entrepreneurs (eq.23).

But we need a better stylized representation of the mechanism of transmission.

We need asset prices, term structures, meaningful spreads, liquidity, risk and default premiums.

We need housing!

Models without collateral and financial accelerators probably should be relegated to the prehistory of the profession.

We want better stories for all the persistent hump-shaped impulse responses than simple habit formation (eq. 1) and quadratic adjustment costs (eq. 4).

We need rational inattention, heterogeneous beliefs.

Some DSGE models (such as the one of the paper) still consider money in utility function. Not necessary. Not warranted. At best, proxy for transaction costs (you need liquidity to make sure you can consume how much you want whenever you want). So, model demand for money by adding transaction costs to consumption (shopping technology).

Even better, in the context of post Lehman: rethink demand of liquidity in global repo market with shocks to haircuts.

For open economies, exchange rate policies are mimicked by taking a Taylor rule and adding a large coefficient on deviation of exchange rate from target.

But sales of foreign reserves are not explicitly modeled, there is no sterilization policy etc.

As models stand right now, not much help in designing credit and quantitative easing programs or in evaluating the introduction of new liquidity facilities.

We need to put more and better quantitative elements into DSGE.

All these details remain behind the scenes. This is a meaningful approach when shocks are unimportant, becomes a useless apparatus when shocks are large and it becomes policy-relevant to investigate precisely these details.

Moving to different set of considerations, much of the interest in the paper stems from the conditions under which the economy enters a liquidity trap and the policy rate is stuck at the zero interest rate floor (ZIR in what follows).

In the paper, it is known when liquidity trap starts and when it ends.

In practice, high degree of uncertainty.

A model such as the one in the paper could help assessing issues about which we worry a lot these days, the dangers of adverse developments affecting price dynamics.

Perhaps even more importantly, one could use model to draw lessons about risks of premature withdrawal of monetary stimulus, predominant relative to the risks to price stability.

To clarify this point in the context of current events.

Fiscal and monetary policy responses so far, here and abroad, have been on average appropriate.

In the monetary space in particular we have seen a series of actions that are quite unprecedented, both in vertical terms, that is in terms of the ability to slash interest rates promptly and aggressively, and in horizontal terms, that is in terms of willingness to maintain rates at low levels for considerable periods of time.

Frankly, it has not been easy. If you go back, say, twelve months ago, the dynamics of headline inflation at the time was still affected primarily by the pass-through of the very large upswings in commodity prices.

With the result of creating a confusing dispersion of views in the assessment of the global inflation path. Some central banks worldwide had a tightening bias still a few weeks before the Lehman shock.

Of course, what happened instead was a large drop in non-core inflation. About core prices, the risks of a deflationary spiral have been mitigated by the large-scale policy response, expected to remain in place for a considerable period of time.

Today, some central banks are currently using the word “commitment” to low interest rates in their statement language, in terms not too dissimilar from what we would find in a choice-theoretic analysis of optimal monetary policy.

But temptation to overreact to “green shoots” and early signs of recovery and inflation, real or presumptive, can be very strong.

Sometime soon we may start seeing signs of upswings in agricultural and commodity prices – especially if emerging Asia is expected to recover earlier than the rest of the world – with pass-through to food and energy prices to global economy.

What models like the one in the paper emphasizes are importance (and challenges) for global policymakers to engineer a hump-shaped path for inflation,

- relying on higher inflation expectations to reduce real rates in the medium term,
- followed by a smooth downward adjustment toward long-term comfort zone.

Obviously not an easy task.

For an open economy this could be designed and communicated in the context of an appropriate scheme of exchange rate managed float.

More generally, hump-shaped path for inflation could be engineered in the context of price-level path targeting.

Not a framework many central banks seem willing to explore at this time, mostly because of the (reasonable) fear that communication difficulties may be insurmountable.

But perhaps, what today seems unfeasible may turn out to be the best answer tomorrow.

Let me elaborate.

Large body of literature raises important questions on the causes of persistent deflation (falling prices and highly persistent economic slump) and possible policy strategies to deal with it

Relevant for Japan and other economies as well. General, not country-specific issues.

Is deflation the result of structural factors that have reduced the potential growth rate of the economy?

Is it the outcome of insufficient aggregate demand coupled with the difficulties of providing monetary policy stimulus when interest rates hit the zero interest rate floor (ZIF)?

Proponents of the first view argue that low trend growth is a result of problems in the banking and corporate sectors, low population growth, low productivity growth, labor market regulations etc.

Advocates of the second view argue that a key component to restoring confidence involves committing to macroeconomic policies that prevent further declines in the price level.

This is deemed to require the adoption of a framework that would not only eliminate deflation in the short run, but would guard against liquidity traps from occurring in the future.

Use a DSGE model similar to the one in the paper, calibrated to the Japanese economy as an example of an economy with a history of deflation.

In the home country, monetary policy encompasses Price Level Path Targeting (PLPT).

In the rest of the world the interest rate rule does not encompass PLPT.

The year-on-year inflation target is set at 0.5 percent for Japan, broadly in line with the average inflation rate during 1995-1999, and 2.5 percent for the rest of the world.

Consider a baseline and an alternative scenario to show the implications of the ZIF in the presence of shocks that require easing monetary conditions.

The baseline scenario is assumed to be the result of both low levels of domestic demand and a medium-term trend productivity growth below the long-term steady-state growth rate.

More precisely, assume that productivity grows 1 percentage point below steady-state growth rate of 2 percent for two decades.

Figure 1: solid lines illustrate baseline scenario over a time horizon of ten years (40 quarters). The ZIF is binding for the first seven quarters.

In the short run, there is deflation but over the medium term the economy recovers and inflation expectations increase.

Expectations of higher inflation and lower real interest rates combined with a weaker yen raise aggregate demand and boost actual inflation.

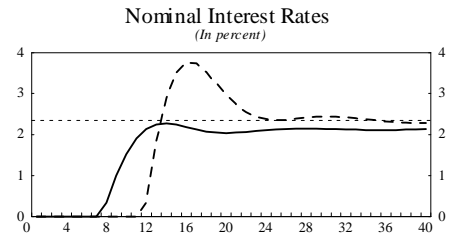
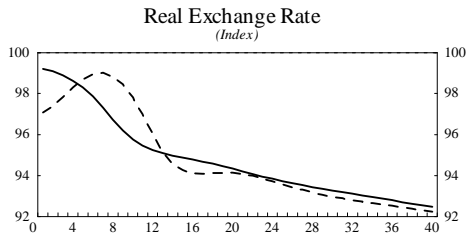
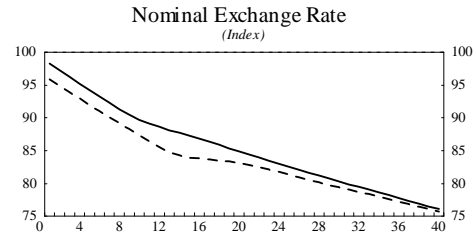
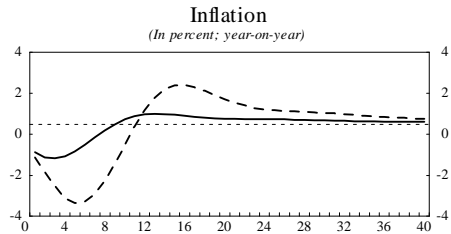
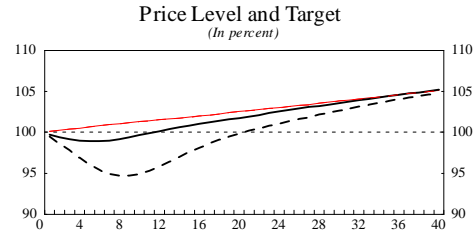
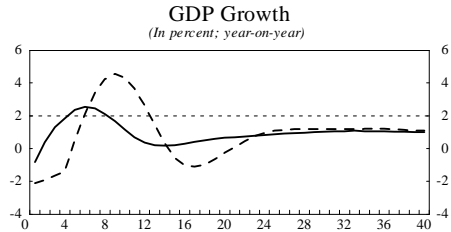
Trade and current account are in surplus in the short run, in deficit over the medium term (after about 5 years), and in balance in the steady state.

The short-run surplus results from lower demand and slower productivity growth (keeping unchanged global demand for exports). The medium-term deficit reflects the positive income effects that short-run surpluses have engendered, boosting domestic demand

Figure 1: Base Case and Scenario with Negative Demand Shock with ZIF

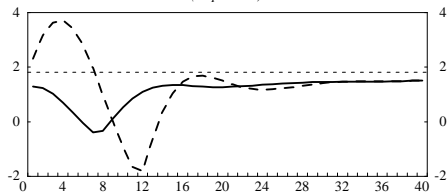
### Japan

(Solid Line=Baseline, Dashed Line=Shock)



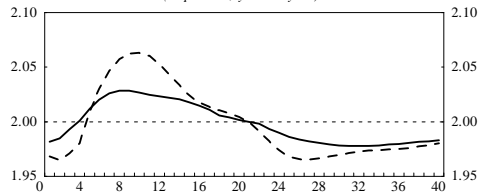
### Real Interest Rates

(In percent)



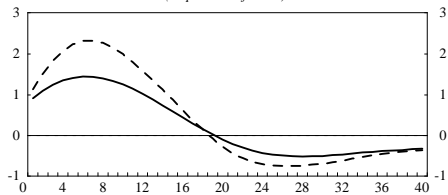
### Rest of the World GDP Growth

(In percent; year-on-year)



### Trade Balance

(In percent of GDP)



### Current Account Balance

(In percent of GDP)

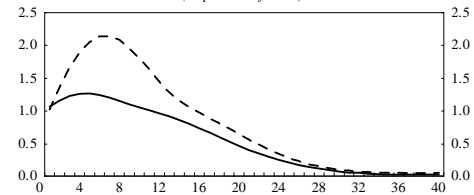


Figure 1: dashed lines are based on an alternative scenario in which domestic demand turns out to be weaker than in the baseline case.

In this new scenario, the ZIF binds for an additional four quarters.

This results in a more severe deflationary spiral with significantly slower growth in the short run.

Real interest rates rise significantly in the short run, but then start to fall dramatically in anticipation of future increases in the price level even before the ZIF is no longer binding.

Is it difficult to implement a PLPT policy when the ZIF is binding?

Lower real interest rates which are required to stimulate aggregate demand in the short run work entirely through an expectational channel, and by definition cannot be backed up in terms of a reduction in nominal short-term interest rates.

If central bank lacks credibility, this channel is not operational

But this argument seems to assume that the central bank will not take other measures to ensure the credibility of the policy strategy (e.g., exchange rate policy in the context of an open economy, or intervention with larger menu of assets).

Once again, need to expand DSGE model to incorporate quantitative elements.

Does this analysis simply show the benefits of choosing a high enough inflation target?

Paper suggests that from early 1990s to present, the implicit target rate of inflation in Japan was negative. During this period "the BOJ needed positive inflation rates to stimulate the economy" (p.14).

Author could perhaps go beyond that, by showing the equilibrating properties of monetary policy rules that embody PLPT.

A monetary policy rule that embodies PLPT results in a larger and more persistent decline in interest rates in response to deflationary shocks than a pure inflation-targeting rule with positive inflation target.

In practice, this rule works in the direction of reducing the probability of actually hitting the ZIF.

## Conclusion

Interesting paper with great potential for policy evaluation

State-of-the-art methodology

Among issues to be explored, priority goes to:

- deeper characterization of transmission mechanism
- financial accelerator and collateral constraints
- alternative policy rules