Optimal Monetary Policy in a Liquidity Trap:

Recent Theoretical Developments and Some Lessons from the Japanese Experience

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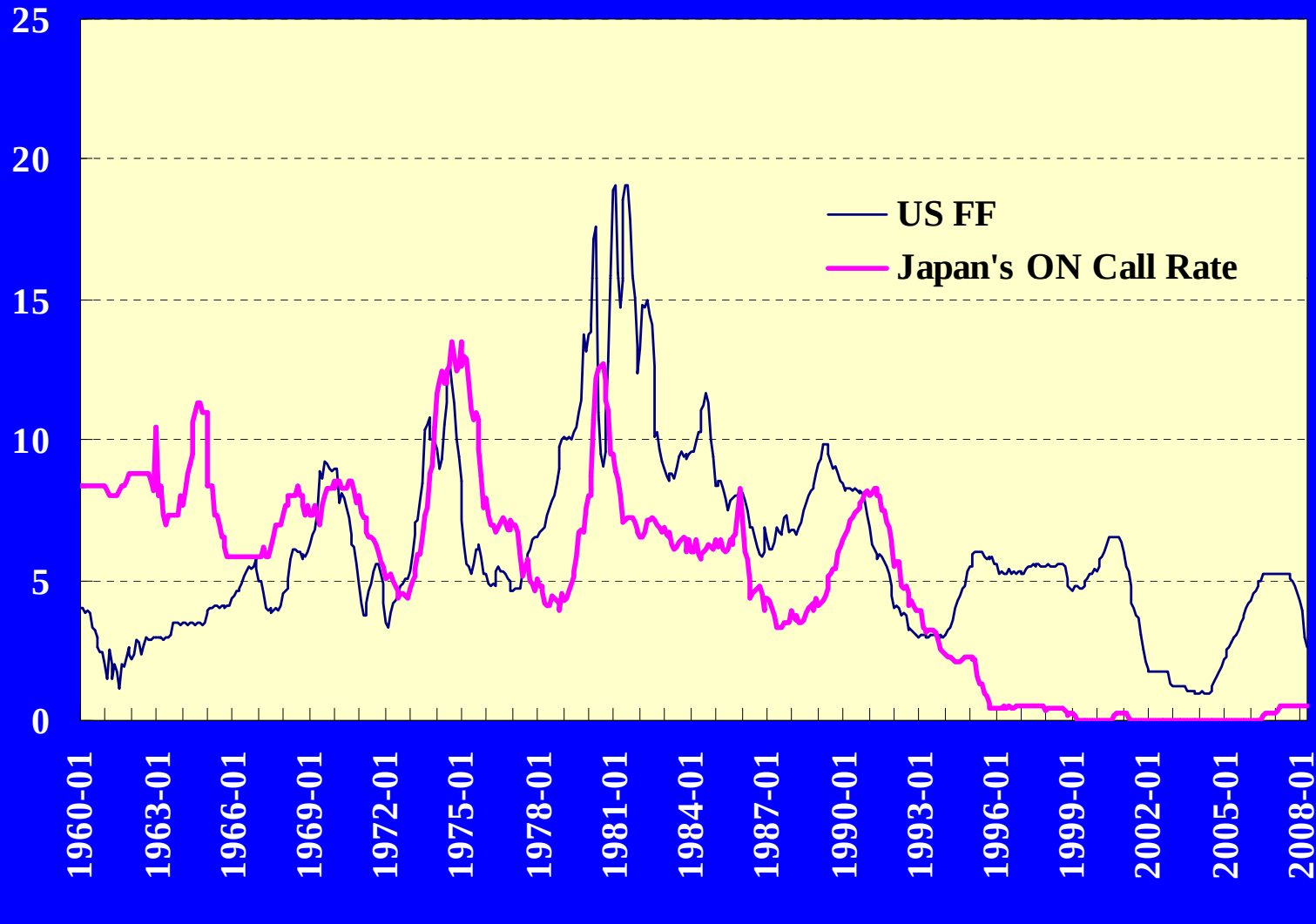
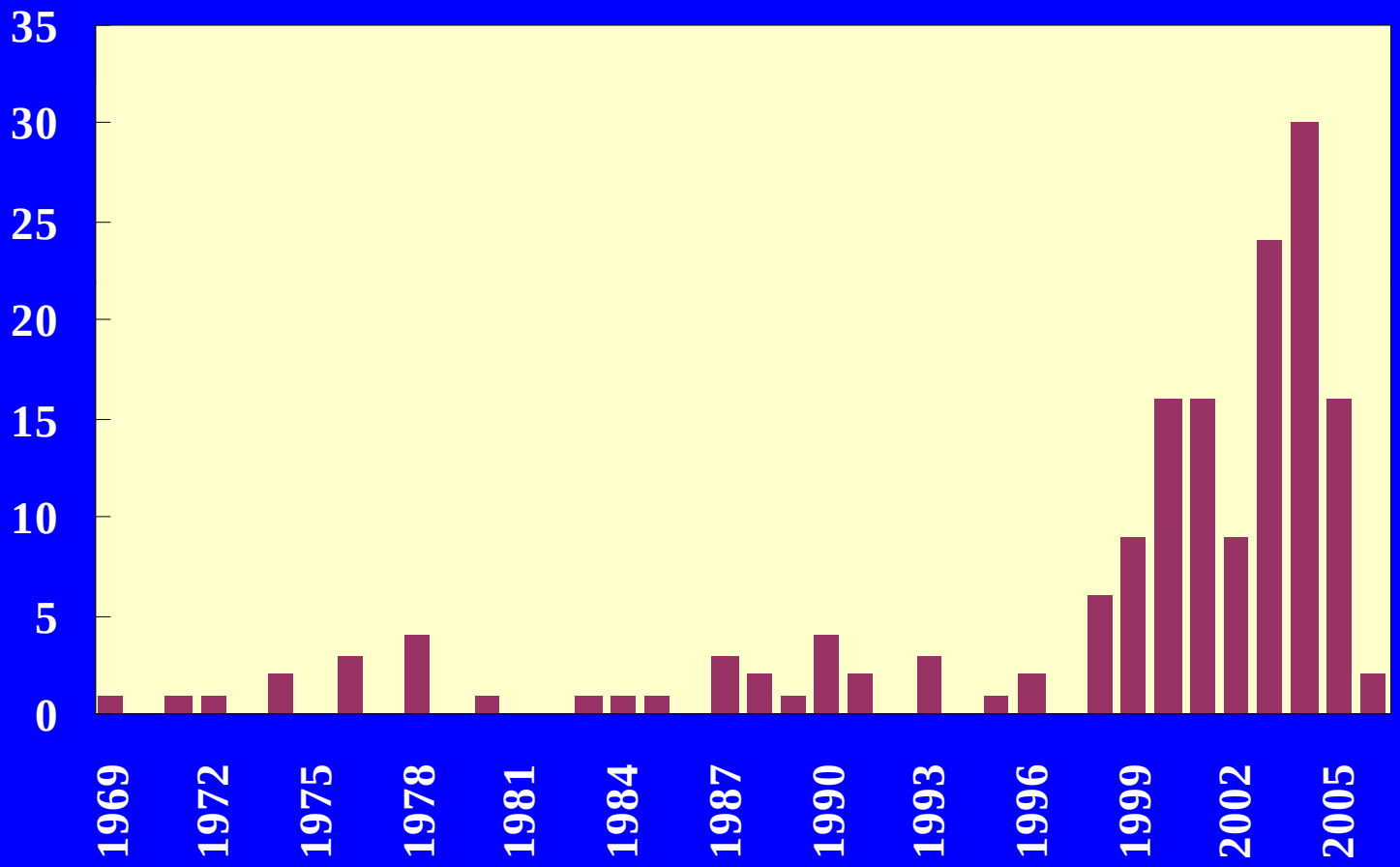
Background:
Thirty Five Years of Model Building for Monetary Policy Evaluation
• Breakthroughs: 1970s
• Dark Age: 1980s
• Renaissance: 1990s and beyond

Policy Rates in Japan and the United States



The number of academic papers related to the “Liquidity Trap”



Econlit search for “Liquidity Trap” and “Liquidity Traps” in title, abstract and subject field

An old but key idea:
The natural rate of interest could fall below zero

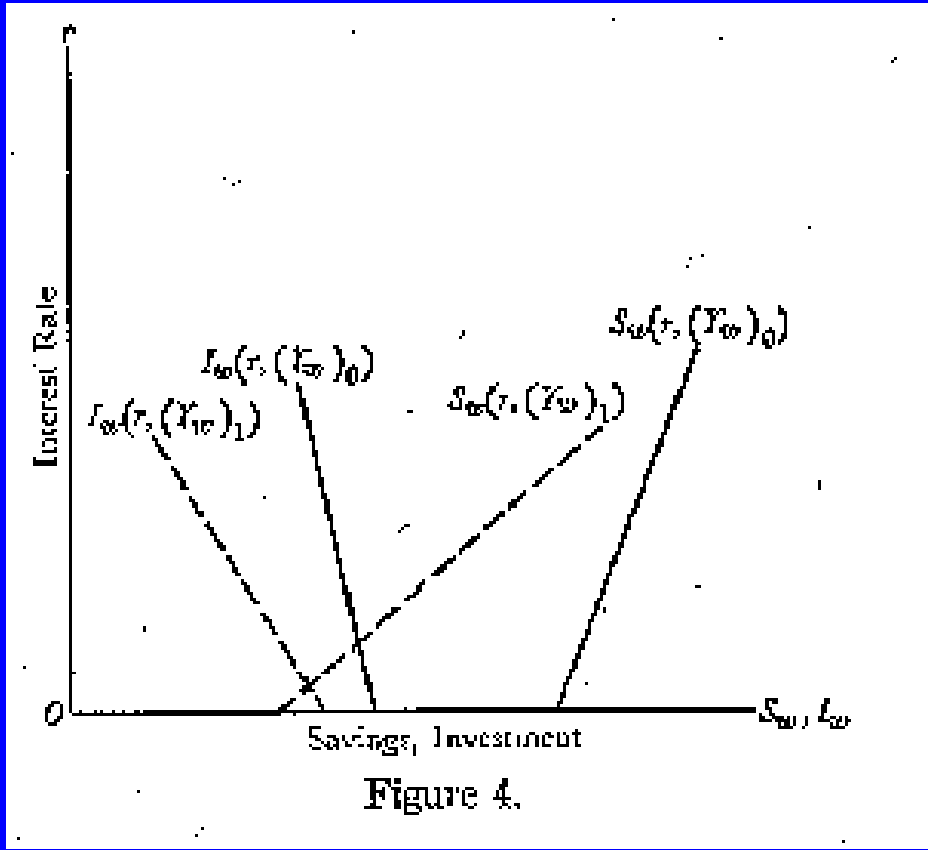


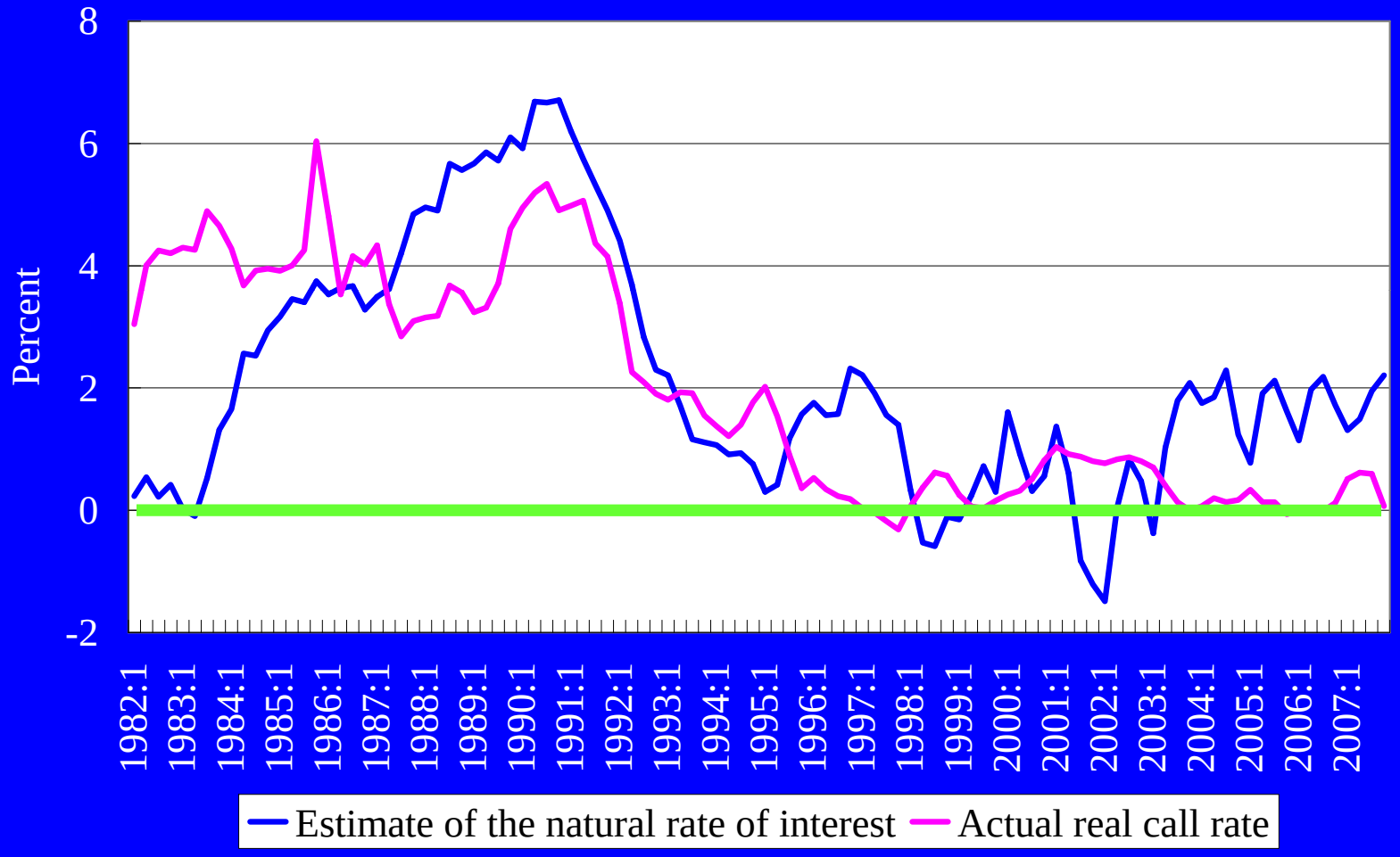
Figure 4.

Klein, L. R., *The Keynesian Revolution*, 1947

"The full employment equilibrium real interest rate — the Wicksellian natural rate that equates full employment investment and saving is below zero."

Tobin, J., *Asset Accumulation and Economic Activity*, 1980

The Natural Rate of Interest in Japan, 1982-2007



Source: Iwamura, M, T. Kudo, and T. Watanabe (2006)

Optimal monetary policy with the zero bound constraint

$$x_t = E_t x_{t+1} - \sigma(\hat{i}_t - E_t \pi_{t+1} - \hat{r}_t^n)$$

$$\pi_t = \kappa x_t + \beta E_t \pi_{t+1}$$

$$\phi_{1t} - [1 + \beta^{-1}(1 + \kappa\sigma)]\phi_{1t-1} + \beta^{-1}\phi_{1t-2} = -\kappa\pi_t - \lambda(x_t - x_{t-1})$$

Watanabe, T. (2001)

Jung, T, Y. Teranishi, and T. Watanabe (2005)

The zero bound in an economy with credit frictions

Curdia, V. and M. Woodford, "Credit frictions and optimal monetary policy" April 2008

Consumers randomly switch between being patient and impatient, thereby switching between savers and borrowers. The borrowing and lending rates are not identical

$$\hat{Y}_t = -\bar{\sigma}(\hat{i}_t^{avg} - E_t\pi_{t+1}) + E_t\hat{Y}_{t+1} - E_t[\Delta g_{t+1} + \Delta\hat{\Xi}_{t+1} - \bar{\sigma}s_\Omega\Delta\hat{\Omega}_{t+1}]$$

$$\hat{i}_t^{avg} = \hat{i}_t^{d} + \pi_b\hat{\omega}_t$$

$\hat{i}_t^{avg}$: weighted average of deposit and lending rates

$\hat{i}_t^{d}$: deposit (and policy) rates

$\hat{\omega}_t$: credit spreads

The zero bound constraint is more likely to be binding in an economy with a larger credit spread

Optimal monetary and fiscal policy rule in a liquidity trap

History dependent inflation targeting

[1] Central bank chooses overnight interest rate to achieve the target criterion

$$\tilde{\pi}_t \equiv \hat{\pi}_t + \kappa^{-1}\lambda(\hat{x}_t - \hat{x}_{t-1}) = \pi_t^{TAR}$$

as long as this is possible. If this is not possible, simply set overnight interest rate at zero

[2] The target inflation rate for the next period is determined by

$$\pi_{t+1}^{TAR} = [1 + \beta^{-1} + \kappa(\beta\sigma)^{-1}]\Delta_t^{\pi} - \beta^{-1}\Delta_{t-1}^{\pi}$$

where $\Delta_t^{\pi} \equiv \pi_t^{TAR} - \tilde{\pi}_t$

Ricardian fiscal policy

$$\hat{s}_t + \hat{P}_t = (1-\beta)^{-1}\hat{i}_{t-1} + (1-\beta\theta)[\hat{B}_{t-1} + (\beta\theta)^{-1}\hat{Q}_{t-1}]$$

Source: Iwamura, M, T. Kudo, and T. Watanabe (2006)

Optimal Policy: The Case of Endogenous Capital Formation

$$\text{FOCs} \Rightarrow (1-1.7983L)(1-0.6316L)\phi_{1t} = -19.6637 * \underbrace{\frac{1-0.9286L^{-1}}{1-0.9304L^{-1}} E_t \tilde{\pi}_t}_{F_t(\tilde{\pi})}$$

History-dependent inflation-forecast targeting:

[1] Central bank chooses overnight interest rate to achieve the target criterion

$$F_t(\tilde{\pi}) = \pi_t^{TAR}$$

as long as this is possible. If this is not possible, simply set overnight interest rate at zero

[2] The target inflation rate for the next period is determined by

$$\pi_{t+1}^{TAR} = 2.4299 * \Delta_t^{\pi} - 1.1358 * \Delta_{t-1}^{\pi} \qquad \text{where} \quad \Delta_t^{\pi} \equiv \pi_t^{TAR} - F_t(\tilde{\pi})$$

Source: Takamura, T., T. Watanabe, and T. Kudo (2007)

Bank of Japan's commitments to monetary easing

1. The BOJ will continue the Zero Interest Rate Policy "until deflationary concerns are dispelled" (Statement by Governor Hayami, April 13, 1999)

2. The BOJ will continue the Quantitative Easing Policy "until the core CPI records a year-on-year increase of zero percent or more on a stable basis" (MPM decision, March 19, 2001)

3. "First, It requires not only that the most recently published core CPI should register a zero percent or above, but also that such tendency should be confirmed over a few months."

"Second, the Bank needs to be convinced that the prospective core CPI will not be expected to register below a zero percent. To be more specific, many Policy Board members need to make the forecasts that the core CPI will register above a zero percent during the forecasting period."

"The above conditions are the necessary condition. There may be cases, however, that the Bank will judge it appropriate to continue with quantitative easing even if these two conditions are fulfilled." (MPM decision, October 10, 2003)

Was actual policy close to the optimal one? If not, why?

1. **Monetary aggregates vs. interest rates**
   - The BOJ switched its policy instrument from interest rates to monetary aggregates ("Quantitative easing"). But there was no theoretical rationale for this, given that the marginal utility of money already reached zero (Eggertsson and Woodford (2003)) . Instead, the BOJ should have raised its inflation target so as to alter the market expectation about the future course of monetary policy.
2. **Time inconsistency**
   - The BOJ had strong incentive to reneging on its commitment when the economy started to recover. Probably the BOJ should have continued the zero interest rate policy a bit longer.
3. **Fiscal policy**
4. **Forward vs. backward-looking**
   - Japanese version of IPN (Inflation Persistence Network) using micro price data

1. Yabu, T. and T. Watanabe, "The Great Intervention and Massive Money Injection: The Japanese Experience 2003-2004," Research Center for Price Dynamics Working Paper Series No.12, June 2007.

2. Iwamura, M., T. Kudo, T. Watanabe, "Monetary and Fiscal Policy in a Liquidity Trap: The Japanese Experience 1999-2004," In *Monetary Policy with Very Low Inflation in the Pacific Rim*, NBER-EASE Volume 15, edited by T. Ito and A. Rose, 2006, 233-273.

3. Jung T., Y. Teranishi, and T. Watanabe, "Optimal Monetary Policy at the Zero-Interest-Rate Bound," *Journal of Money, Credit, and Banking* 37 (5), October 2005, 813-835.

4. Iwamura, M., S. Shiratsuka, and T. Watanabe, "Massive Money Injection in an Economy with Broad Liquidity Services: The Japanese Experience 2001-2006," Research Center for Price Dynamics Working Paper Series No.1, November 2006.

5. Takamura, T., T. Watanabe, and T. Kudo, "Optimal Monetary Policy at the Zero Interest Rate Bound: The Case of Endogenous Capital Formation," Research Center for Price Dynamics Working Paper Series No.3, November 2006.

6. Watanabe, T., "The Liquidity Trap and Monetary Policy," *The Economic Review*, vol. 51, no. 4, October 2000, 358-379.

7. Takamura, T. and T. Watanabe, "The Liquidity Trap and Optimal Monetary Policy: A Survey," *The Economic Review*, vol. 57, no. 4, October 2006 , 358-371.