Discussion of "Did the Crisis Affect Inflation Expectations?"*

Shigenori Shiratsuka
Bank of Japan

1. Introduction

As is currently well recognized, anchoring long-term inflation expectations is a key to successful monetary policy. Chen Zhou and his co-authors, Gabriele Galati and Steven Poelhekke (Galati, Poelhekke, and Zhou 2011, hereafter GPZ) address an important current policy question: did the crisis affect long-term inflation expectations?

To address the above question, GPZ carry out an econometric analysis using high-frequency market-based indicators for long-term inflation expectations in the United States, the euro area, and the United Kingdom. They find that long-term inflation expectations have become more responsive to macroeconomic news, suggesting the possibility of less firmly anchored inflation expectations after the crisis.

GPZ's efforts to employ high-frequency market data to assess whether long-term inflation expectations are firmly anchored after the financial crisis are important trials, which can be viewed as a real-time assessment of policy performance. Unfortunately, however, GPZ's empirical results are still inconclusive because of noisy market data under destabilized financial markets during the financial crisis. It is thus deemed necessary to reformulate their empirical strategy to obtain robust conclusions even in times of crisis. I will elaborate on those points in my comments below.

* The views expressed here are mine and do not necessarily reflect the official position of the Bank of Japan. I thank Hiroyuki Ooi and Kentaro Koyama for their assistance.

2. Empirical Framework

My first comment concerns the empirical framework used in GPZ. Following Gürkaynak, Sack, and Swanson (2005), GPZ employs the specification below that regresses measures of long-term inflation expectations on a constant term, a set of explanatory variables, and a set of control variables:

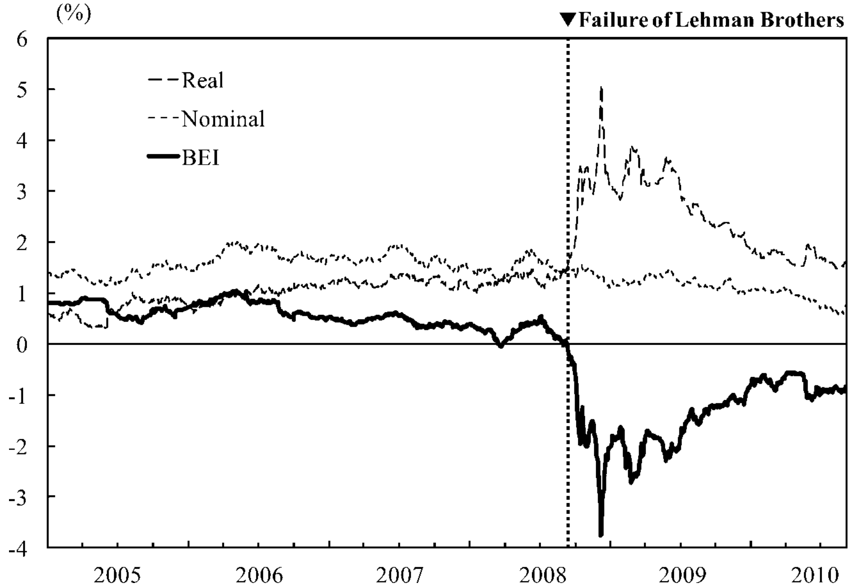
$$\Delta f_t = \alpha + \beta \mathbf{X}_t + \gamma \mathbf{Z}_t + \varepsilon_t, \tag{1}$$

where the dependent variable Δf_t is the daily change in one-year inflation compensation ten years ahead. The explanatory variables $\mathbf{X}_t$ are a vector of news variables on various measures of the state of the economy, defined as differences between actual release and ex ante survey data. $\mathbf{Z}_t$ is a vector of control variables intended to capture the changes in market conditions, especially shorter-term fluctuations of market liquidity and technical factors unrelated to inflation expectations.

Two points should be noted in the above specification. First, it is crucially important to control for relative changes in market conditions in nominal and inflation-indexed government bond markets to obtain robust empirical results. I am concerned about how effectively this paper does that. As shown in GPZ, estimates of the control variables become less statistically significant, and some of them have the wrong sign after the crisis. The empirical results in GPZ suggest that it is difficult to control for relative changes in market conditions in nominal and inflation-indexed government bond markets simply by using VIXs or implied volatility of stock price indexes, especially under stressed conditions in financial markets.

Second, assuming that fluctuations in market liquidity and other technical factors are adjusted adequately by the control variables, the explanatory variables are expected to be insignificant if inflation expectations are firmly anchored. However, it seems quite difficult to control for fluctuations in market liquidity and other technical factors under highly stressed market conditions. It thus does not seem robust enough to empirically examine only the irresponsiveness of market-based indicators for long-term inflation expectations to macroeconomic news. In that sense, it should be noted that that line of hypothesis testing provides only a necessary condition and not a sufficient condition to assess whether long-term inflation expectations are anchored. It is thus deemed appropriate to consider that

Figure 1. Break-Even Inflation Rates in Japen



Source: Bloomberg.

the empirical framework of GPZ is applicable only to normal times and not to crisis times.

To examine the effects of highly stressed market conditions after the failure of Lehman Brothers in September 2008, figure 1 plots yields on nominal and inflation-indexed government bonds as well as break-even inflation rates in Japan. After the failure of Lehman Brothers, yields on nominal and inflation-indexed government bonds decoupled and became exceptionally volatile.[1,2] The yields on

[1]Campbell, Shiller, and Viceira (2009) point out that a similar phenomenon of decoupling of the yields on nominal and inflation-indexed government bonds is also observed in the United States after the failure of Lehman Brothers in September 2008.

[2]Inflation-indexed government bonds issued in Japan and the United Kingdom are adjusted for the principal in a symmetric manner to inflation and deflation, thereby guaranteeing the real value of the principal. By contrast, inflation-indexed government bonds issued in the United States are adjusted in an asymmetric manner so as to guarantee the face value of the principal. That gives U.S. inflation-indexed government bonds an option-like feature when deflation is anticipated.

inflation-indexed government bonds rose sharply to a higher level than nominal government bonds, making the break-even inflation rate negative.

The above observation suggests two possibilities: one is heightened deflationary expectations, and the other is a sudden and significant decline in market liquidity in the inflation-indexed bond market relative to the nominal bond market. Sudden and sharp increases in the yields of inflation-indexed government bonds, while gradually declining the yields of nominal government bonds, indicate that the second possibility is more likely to be provoked by segmented markets with unexploited arbitrage opportunities between nominal and inflation-indexed government bonds markets due to tightened liquidity constraints at highly leveraged financial institutions.[3]

3. The Use of the Nelson-Siegel Model

My second comment relates to the use of Nelson and Siegel's (1987) model. The Nelson-Siegel model specifies the instantaneous forward rate (IFR) for a settlement at period m, denoted by $r(m)$, as

$$r(m) = \beta_0 + \beta_1 \cdot \exp\left(-\frac{m}{\tau}\right) + \beta_2 \cdot \left(\frac{m}{\tau}\right) \cdot \exp\left(-\frac{m}{\tau}\right), \qquad (2)$$

where β_0, β_1, β_2, β_3, and τ are parameters to be estimated from the data, and β_0 and τ are expected to be positive.

The above model has simple, parsimonious functional forms but is flexible enough to capture the general properties of the yield curve for monetary policy purposes. In that regard, important features of equation (2) are that the limits of forward and spot rates when maturity approaches zero and infinity, respectively, are equal to $\beta_0 + \beta_1$ and β_0. In the estimation procedure, those features are very convenient for avoiding the very short end of the IFR curve becoming negative, by restricting that the overnight rate is equal to $\beta_0 + \beta_1$.[4]

[3] Saito and Shiratsuka (2001) examine Japan's financial crisis in the late 1990s from the viewpoint of the failure of arbitrage between financial markets.

[4] Okina and Shiratsuka (2004) show that the yield curve can be estimated with tight confidence intervals even under the zero lower bound of short-term nominal interest rates, by using the extended version of the Nelson-Siegel model, proposed by Söderlind and Svensson (1997). The extended Nelson-Siegel model allows up to two humps or U shapes in the IFR curve, while the original one has only one hump or U shape.

In addition, it is important to note that confidence intervals for the estimated coefficients can be computed from their standard errors.

With the estimates of the Nelson-Siegel model, GPZ compute one-year forward rates ending ten years ahead as a market-based indicator for long-term inflation expectations, $f_{t,10}$, using equation (3) below:

$$f_{t,10} = (1 + y_{10})^{10}/(1 + y_9)^9 - 1, \tag{3}$$

where y_9 and y_{10} are spot rates with maturity of nine and ten years, respectively.

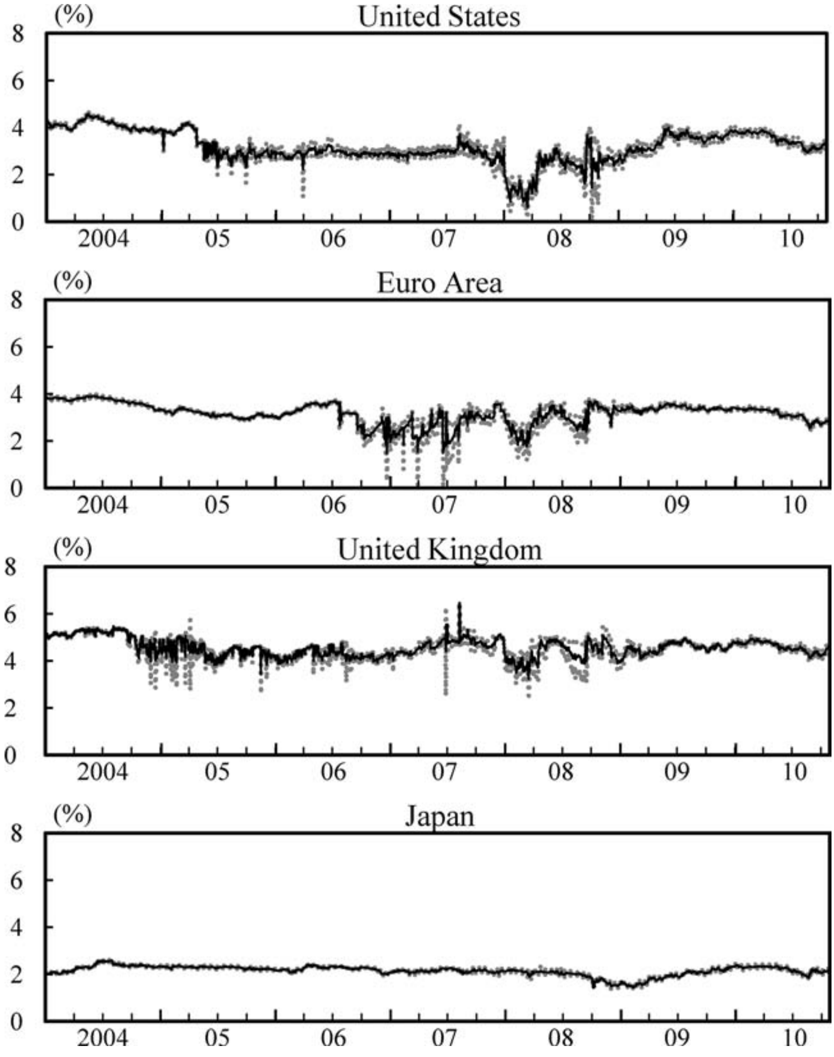
However, the above definition of the explanatory variables does not make full use of the convenient properties of the Nelson-Siegel model. I suggest using an alternative indicator of β_0, or long-term forward rate, based on the estimates of the Nelson-Siegel model. That indicator corresponds to inflation expectations at an infinite horizon, and thus seems to be more appropriate from the viewpoint of tracing long-term inflation expectations. At the same time, it becomes more informative by computing confidence intervals for the estimates of β_0, with its estimated standard errors.

In addition, market data for inflation swaps and inflation-indexed government bonds are available for a wide range of maturities, thus enabling us to compute the term structure of inflation expectations. With such data, it seems interesting to analyze dynamics of term structure of inflation expectations and their responses to macroeconomic news at different maturities.

In order to seek a direction of future extensions of the paper, figure 2 plots the estimates of β_0, or long-term forward rates for the United States, the euro area, the United Kingdom, and Japan.[5] The figure shows that long-term forward rates in Japan move in a fairly stable manner at a relatively low level. In particular, long-term forward rates in Japan do not show volatile fluctuations even during the financial crisis, in contrast to the other three economies. That point is confirmed by the tight confidence intervals in Japan, compared with the other three economies.

[5] In estimating β_0, I use the extended Nelson-Siegel model as well as market interest rate data for overnight policy rates, LIBORs for one to twelve months, and swap rates for one year and longer.

Figure 2. Long-Term Forward Rates



Source: Author's calculation.
Note: Solid lines are estimated coefficients, and shaded and dotted lines indicate their upper and lower bounds, respectively, of the confidence interval (estimated coefficients ± two standard errors).

4. Conclusions

In closing, I emphasize the importance of conducting further research work for examining long-term inflation expectations using high-frequency market data. GPZ show that the high-frequency market data analysis is an effective analytical tool to assess monetary policy performance, even though their empirical results are still inconclusive because of noisy market data under destabilized financial markets during the financial crisis.

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