

Japanese report: 11 Jul 2013

# Repercussions of BOJ's Quantitative and Qualitative Easing

## *Relationship between inflation expectations and interest rates*

Higher inflation expectations in Japan, accompanying possible tapering of US QE3, would raise nominal interest rates in Japan

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#### Summary

- The relationship between inflation expectations and interest rates has come under the spotlight. Some argue that the Bank of Japan (BOJ) has set a pair of inconsistent goals, namely a lower nominal interest rate and a higher expected inflation rate, goals which cannot be pursued simultaneously. Others believe BOJ's policy of aiming for a higher expected inflation rate will lower real interest rates, thus spurring the economy.
- Reviewing the trends of nominal/real interest rates and the expected inflation rate from the beginning of 2013 in Japan, a higher expected inflation rate resulted in a lower real interest rate on one occasion but a higher nominal interest rate on another. Currently, no stable relationships are observed among nominal interest rate, real interest rate, and expected inflation rate.
- Looking at real interest rate trends from a global perspective gives a different picture. Empirically and theoretically, real interest rates tend to converge to equilibrium over the long term among advanced nations. Japan's real interest rate has currently converged to those in the US and UK.
- When there is plenty of room for real interest rates to decline, a higher expected inflation rate will cause them to fall. In contrast, when Japan's real interest rate moves in line with those in major economies, a higher expected inflation rate will push up the nominal interest rate.
- A tapering of QE3 in the US could exert upward pressure on real interest rates in advanced nations. In conclusion, if the expected inflation rate moves upward in Japan, the nominal interest rate is likely to begin to rise in Japan.

### Relationship between inflation expectations and interest rates has come under the spotlight

There have been arguments in the market regarding inflation expectations and interest rates since the BOJ introduced quantitative/qualitative monetary easing measures on 4 April 2013. Some market participants argue that the BOJ has set a pair of inconsistent goals, namely a lower nominal interest rate and a higher expected inflation rate, goals which cannot be pursued simultaneously. Others believe BOJ's policy of aiming for a higher expected inflation rate will lower real interest rates, thus spurring the economy. Where did these different views regarding a higher expected inflation rate come from? And, if the expected inflation rate rises, how will nominal and real interest rates respond?

In this regard, we believe a higher expected inflation rate at first functioned to lower real interest rates in Japan. However, going forward we expect it will function to raise nominal interest rates, reflecting changes in real interest rate conditions viewed from a global perspective.

#### Equation defining inflation expectations and interest rates

In either case, market participants will very likely bear in mind the Fisher equation, which defines that a nominal interest rate is the sum of a real interest rate and an expected inflation rate<sup>1</sup>.

A higher expected inflation rate would function to lower the real interest rate if changes in the expected inflation rate first alter the nominal interest rate, and then the resulting real interest rate is calculated by subtracting the expected inflation rate from the nominal interest rate. Meanwhile, a higher expected inflation rate would function to raise the nominal interest rate but not to lower the real interest rate if the real interest rate is determined by exogenous factors, and then the nominal interest rate is calculated by adding the real interest rate to the expected inflation rate.

Fisher Equation	Chart 1
$i = r + \pi^{e}$	
<i>i</i> nominal interest rate, <i>r</i> real interest rate, and $\pi^e$ expected inflation rate	
Source: Compiled by DIR.	

To distinguish the relationship among inflation expectations, nominal interest rates, and real interest rates, we examined trends of these three factors. In this report, we substituted the first with a breakeven inflation rate (BEI)<sup>2</sup>, the second with a yield on fixed-income JGBs, and the last with a yield on inflation-indexed JGBs.

As shown in Chart 2, when the BOJ announced a price stability target on 22 January 2013, the expected inflation rate began to rise but the real interest rate began to decline. Meanwhile, the nominal interest rate remained flat. Next, when the BOJ announced quantitative/qualitative monetary easing policy on 4 April, expected inflation and the real interest rate followed suit, maintaining an uptrend and downtrend, respectively. However, the nominal interest rate began to rise this time. Then, in the second half of May, expected inflation and the real interest rate made sudden turns, nose diving and soaring, respectively. However, the nominal interest rate remained flat.

No stable relationship has been observed among these three factors. On one occasion, a higher expected inflation rate resulted in a higher nominal interest rate. On another, it did not lead to a higher

<sup>1.</sup> Effects of risk premiums are sometimes taken into account, but not in this report.

<sup>2.</sup> It should be noted that the current BEI does not necessarily properly reflect the market's inflation expectations, because (1) it is very likely to have factored in effects of an expected consumption tax hike in April 2014 and (2) the circulation of inflation-indexed JGBs is very limited.

nominal interest rate, but, instead, resulted in a lower real interest rate. By only referring to the JGB market, it is hard to determine whether a higher expected inflation rate will boost the nominal interest rate or depress the real interest rate.



Source: Bloomberg; compiled by DIR.

Note: Nominal interest rate=yield on 10-yr fixed-income JGBs (issue number: 293; issued 20 Jun 2008); real interest rate=yield on10-yr inflation-indexed JGBs (issue number: 16; issued 5 Jun 2008).

#### Real interest rates to converge to equilibrium over time from global perspective

Comparison of Japan's interest rates with those of other major nations shows a different picture. Charts 3 and 4 show trends of nominal and real interest rates, respectively, in Japan, the US, UK, and Germany.

In Chart 3, Japan's nominal interest rate has been persistently low compared to those in other nations. In Chart 4, however, Japan's real interest rate has been almost at a similar level as, and moved in tandem with, those in other nations, even when level and trend of the nominal interest rate deviated from those in other nations. This means that if nominal interest rates are at different levels by nation, real interest rates tend to converge to a certain range among nations.

Theoretically, if a currency rate explained by uncovered interest rate parity matches that explained by purchasing power parity<sup>3</sup>, real interest rates would converge to equilibrium among nations. These two currency rates explained on a different parity basis do not necessarily match in the short term but should converge to equilibrium over time. If this is the case, real interest rates should converge to equilibrium over time.

<sup>3.</sup> Uncovered interest rate parity denotes a currency rate based on the domestic-foreign spread in nominal interest rates, while purchasing power parity is that based on the domestic-foreign gap in inflation rates.



#### Japan's real interest rate, examined from global convergence

Recent real interest rate trends in Japan are easily understood in the context of real interest rates converging to equilibrium among nations. In other words, Japan's real interest rate has recently altered course from a solely persistent high level to a global convergence process. To closely monitor recent trends, we examined real interest rates in Japan, the US, and UK over three years.



Source: Bloomberg; compiled by DIR.

\*Yields on 5-yr inflation-indexed sovereign bonds.

#### Higher expected inflation rate lowered real interest rate through end-March 2013

In the wake of the Lehman crisis, advanced nations intensified accommodative monetary policy, lowering policy interest rates to a virtually zero level, which in turn pushed down long-term nominal interest rates to significantly low levels. Under such circumstances, real interest rates entered negative territory in advanced nations, where expected inflation rates were stable at around 2%. However, this was not the case for Japan, where the expected inflation rate remained persistently low, at times falling into negative territory. Thus, real interest rates did not decline in Japan.

However, the expected inflation rate began to rise in 2012 in Japan, accompanying a change in the BOJ's monetary policy stance. As a result, Japan's real interest rate began to decline, nearing US and UK levels. At the beginning of 2013, a shift to a weaker yen progressed and expectations for Abenomics intensified. As a result, the growing pace of inflation expectations accelerated, lowering the real interest rate further. In so doing, Japan's real interest rate declined to a level similar to US and UK levels by end-March 2013.

### After converging with US and UK levels, declining pace of Japan's real interest rate slowed from April to mid-May

The expected inflation rate rose further when the BOJ introduced quantitative/qualitative easing measures on 4 April. As Japan's real interest rate had already declined close to US and UK levels by this time, however, room for Japan's rate to decline was limited compared to the period through March. Thus, the pace of decline decelerated.

### Japan's real interest rate began to rise in the second half of May, driven by ascent of US real interest rate

Following testimony before the US Congress by Fed Chairman Ben Bernanke on 22 May, concerns intensified among market participants that the Fed would taper QE3 (the third round of quantitative easing) at an earlier occasion, and real interest rates began to increase in the US and UK in the second half of May. The rising pace accelerated when Chairman Ben Bernanke referred to the possibility of tapering at the press conference following the FOMC on 19 June. The US real interest rate has currently risen to a level seen around June 2011.

Japan's real interest rate began to turn up following the rise in the US real interest rate. This time, it reflects foreign factors rather than domestic factors, as it had already converged with US and UK levels.

### Response of nominal interest rate to change in inflation expectations in Japan viewed from global convergence of real interest rates

It will help to determine whether a higher expected inflation rate will push up the nominal interest rate or pull down the real interest rate in Japan, if viewed from how the trend of the real interest rate has changed in Japan. Thus, we will re-examine the relationship between expected inflation rates and interest rates from a different perspective.

Chart 6 shows change in nominal interest rate on a weekly basis, explained by real interest rate and expected inflation rate. From January to March, a higher expected inflation rate lowered the real interest rate. Behind this was Japan's real interest rate having been persistently high compared to those in the US and UK, and thus it had ample room to decline.

A higher expected inflation rate pushed up the nominal interest rate in April. By then, Japan's real interest rate had declined close to US and UK levels, which left less room to decline. Thus, a decline in

the real interest rate was insufficient to offset a rise in the expected inflation rate, and the remaining portion of rise in expected inflation rate likely pushed up the nominal interest rate.

In the second half of May, a lower expected inflation rate did not pull down the nominal interest rate. This is because Japan's real interest rate increased, accompanying a rise in the US real interest rate.



Source: Bloomberg; compiled by DIR.

Note: Nominal interest rate=yield on 10-yr fixed-income JGBs (issue number: 293; issued 20 Jun 2008); real interest rate=yield on 10-yr inflation-indexed JGBs (issue number: 16; issued 5 Jun 2008).

In the US and UK as well, depending on underlying real interest rate conditions, expected inflation and nominal interest rates have moved in opposite directions. This is confirmed in charts 7 and 8. Usually, a decline in expected inflation rate leads to a lower nominal interest rate. However, this time, US and UK nominal interest rates have risen sharply when expected inflation rates declined. Behind this was real interest rates rising by a margin larger than that of decline in expected inflation rates, leading to higher nominal interest rates.



### Direction of monetary policy holds the key to determine trends of inflation expectations and interest rates going forward

As examined so far, real interest rate trends hold the key to determine how nominal interest rates will respond to changes in expected inflation rates. At the same time, foreign economies have an impact on Japan's real interest rate through the global convergence of real interest rates to equilibrium. In addition, to determine the trend of Japan's real interest rate going forward, worth monitoring is the direction of US monetary policy.

#### Traditional monetary policy causes nominal/real interest rates to move in same direction

Chart 9 shows US nominal and real interest rates according to monetary policy phase. When the policy rate began to increase in 2004, real and nominal interest rates rose simultaneously. When the policy rate began to decline in 2007, they declined simultaneously. This suggests that a change in traditional monetary policy usually causes real and nominal interest rates to move in the same direction.

#### Nontraditional monetary easing lowers real interest rate more than nominal one

Following start of QE1 in the US, the real interest rate began to decline at a faster pace than the nominal interest rate. This is because nontraditional monetary easing raised the expected inflation rate, and, as a result, the real interest rate declined at a faster pace than the nominal one.

### Tapering toward exit from nontraditional monetary easing, real interest rate to rise more than nominal one

During a monetary tightening phase, nominal and real interest rates usually rise simultaneously. Nevertheless, the degree of decline in the real interest rate has been significant so far, and thus, when exit from nontraditional monetary easing is pursued, the degree of increase in the real interest rate should be larger than that in the nominal one. Indeed, in conforming to our above estimation, nominal

and real interest rates have recently begun to rise simultaneously, reflecting concerns over an earlier tapering of QE3.



Source: Federal Reserve Board, Standard and Poor's, Haver Analytics; compiled by DIR. Note: Nominal interest rate=yield on 5-yr fixed-income Treasuries; real interest rate=yield on 5-yr Treasury inflation-protected securities.

#### Tapering of QE3 likely to exert upward pressure on real interest rates worldwide

In contrast to the US situation, where tapering of QE3 is becoming a real possibility, a narrowing of accommodative measures on an earlier occasion is quite unlikely in Europe, taking into account a series of announcements by the Bank of England and the European Central Bank. In Japan, accommodative policy, aiming to raise the inflation rate to 2% in two years, is in place. Thus, monetary policies are not likely to move in the same direction worldwide. Therefore, ongoing surges in real interest rates worldwide are unlikely to continue. However, the greater the possibility of tapering of QE3, the higher the US real interest rate will rise. This would spur a rising pace of real interest rates in major economies.

### Conclusion: Stronger inflation expectations going forward likely to raise nominal interest rate in Japan

Summarizing the above, when exogenous factors intensify the possibility of an increase in the real interest rate, a higher expected inflation rate tends to lead to a higher nominal interest rate in general. As a natural consequence, if the expected inflation rate begins moving toward an uptrend in Japan, we can expect that the nominal interest rate is also likely to rise going forward.