Market Insight

Analyzing Current Risks in the Japanese Government Bond Market

First in a Series of Three Reports on Stress Testing for Rising Government Bond Yields in Japan

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Abstract:

The Japanese Government Bond (JGB) market rivals the US Treasury market in size. It displays a number of distinctive features that may have contributed to low yields in recent years, despite a deteriorating fiscal environment in Japan. Nevertheless, observers have argued that it is possible for JGB yields to increase significantly in coming years. In this series of stress testing papers, we will help clients understand what scenarios may potentially cause JGB yields to rise, analyze the implications of these scenarios for financial markets, and assess their impact on portfolios.

Why This Matters:

- The JGB Market is one of the largest government bond markets in the world.
- Some observers have argued that yields on JGBs may potentially rise in the coming years. Institutional features of the JGB market point to risks associated with rising yields.
- Turmoil in the JGB market could have significant effects for Japanese, Asia-Pacific and Global bond and equity markets.

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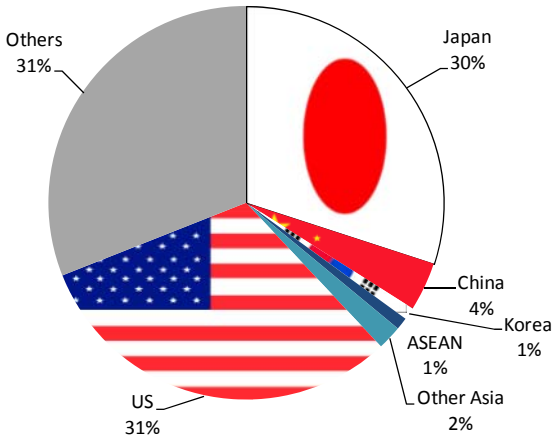
Introduction

The Japanese Government Bond (JGB) market is one of the largest government bond markets in the world, accounting for almost one third of all government debt outstanding. Its size rivals that of the US Treasury Market (see Figure 1). The JGB market displays a number of distinctive features, such as a stable investor base resulting from high private savings, a smaller number of foreign investors, and a current account surplus. These features may have contributed to low yields in recent years, despite a deteriorating fiscal situation in Japan. However, there are a number of reasons to believe that it is possible for JGB yields to increase significantly in coming years. This Market Insight is the first in a series of stress testing papers designed to help our clients understand the likely scenarios that may cause government bond yields in Japan to rise, to analyze the implications of these scenarios for financial markets, and to assess their impact on portfolios.

Figure 1: The Global Government Debt Market.



Source: Bank of Japan Flow of Funds statistics

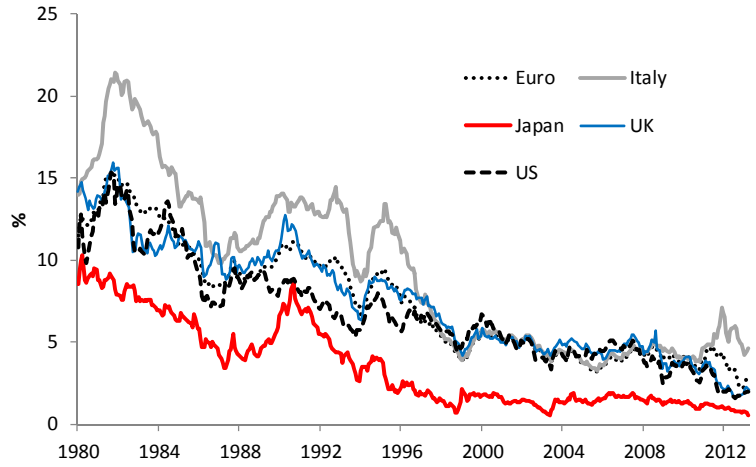
A potential increase in yields may be orderly and driven by positive macroeconomic influences—such as the success of recent economic policies in boosting growth and bringing inflation closer to target levels. However, there are also trends suggesting that structural features of the JGB market that have supported low yields in recent years may erode, bringing with them concerns about the ability of Japan to successfully finance its debt. This could result in a rapid increase in yields, potentially realized in a matter of months.

In this introductory paper, we outline possible scenarios for rising JGB yields, setting the context for each scenario by reviewing Japan's fiscal situation and the institutional features of the JGB market. In parts two and three of this series, we implement the various scenarios using BarraOne and RiskManager.

Japan's Fiscal History and Its Government Bond Yields

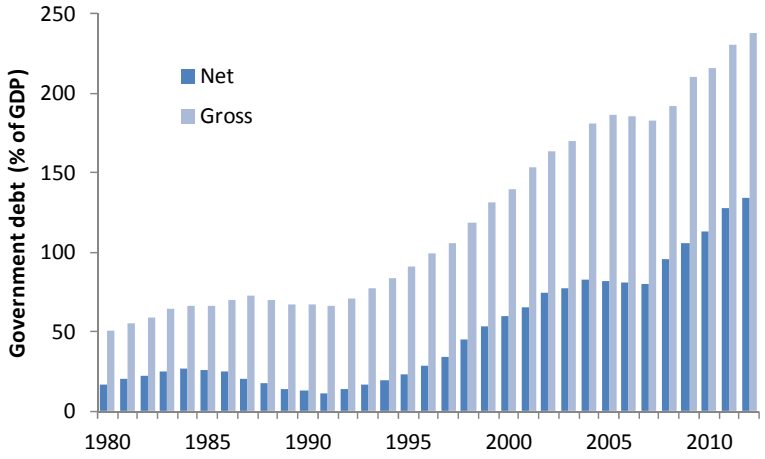
Yields on Japan's long-term government bonds have been decreasing since the early 1980s, falling from around 10 percent in March 1980 to around 0.6 percent in March 2013. While the decrease in government bond yields over this period was mirrored in other countries (see Figure 2), Japan stands out because this decrease in yields was coupled with substantial increases in net and gross government debt.[1] Japan's gross government debt rose from approximately 51 percent of GDP in 1980 to 238 percent of GDP in 2012 (see Figure 3). While a number of countries saw their debt-to-GDP ratios rising over the last decade, the growth of debt as a percentage of GDP in Japan is particularly sizeable in comparison (see Figure 4).

Figure 2: Long Term Government Bond Yields.



Source: IMF

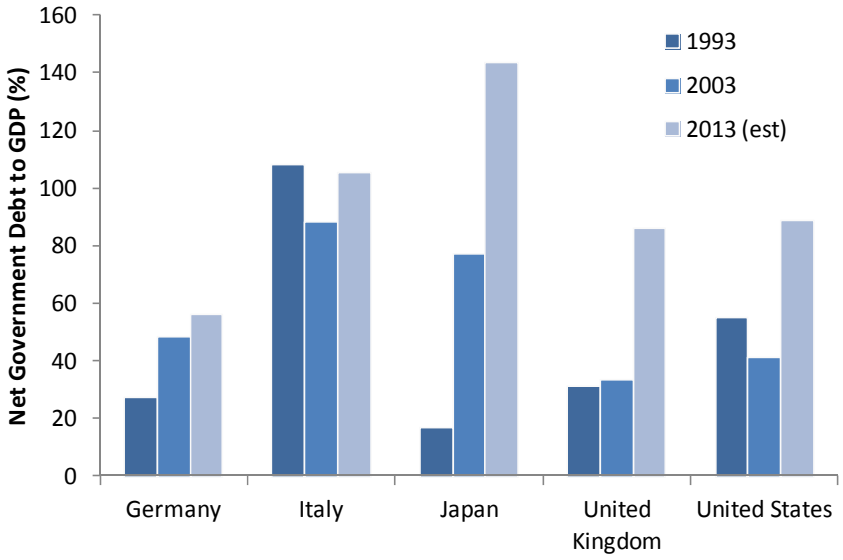
Figure 3: Net and Gross Government Debt in Japan (as a percentage of GDP).



Source: IMF

[1] Gross government debt refers to all treasury obligations. Net government debt subtracts government assets. The distinction between these two measures is important in the case of Japan, as net government debt is approximately 60 percent of gross government debt.

Figure 4: Evolution of Government Debt in Selected Developed Markets.



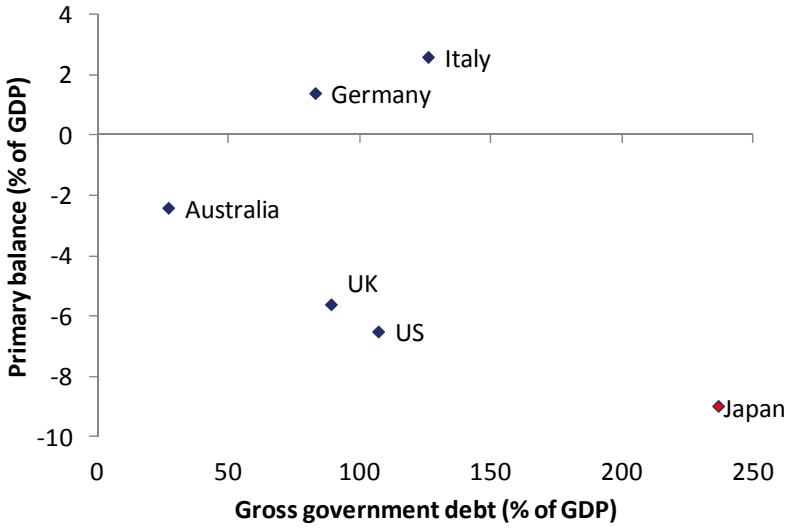
Source: IMF

We can make further comparisons of the fiscal situation in Japan with other developed nations by considering several indicators of debt sustainability and refinancing needs. Figure 5 looks at longer term fiscal sustainability by considering the primary balance[2] and gross government debt (both as a percentage of GDP) in a number of developed countries. Japan stands out on both measures—its primary deficit of 9 percent of GDP and gross government debt of 237 percent of GDP are both substantially higher than those of its peers.

Figure 6 shows the ease of debt refinancing by considering two dimensions: short term refinancing needs (maturing debt and deficit) and the percentage of debt held by foreign investors. Japan has a shorter maturity profile and hence higher short term refinancing needs relative to its peers, with debt maturing over the next year plus the fiscal deficit amounting to approximately 60 percent of GDP. On the other hand, Japan has a large proportion of its government debt held by domestic investors.

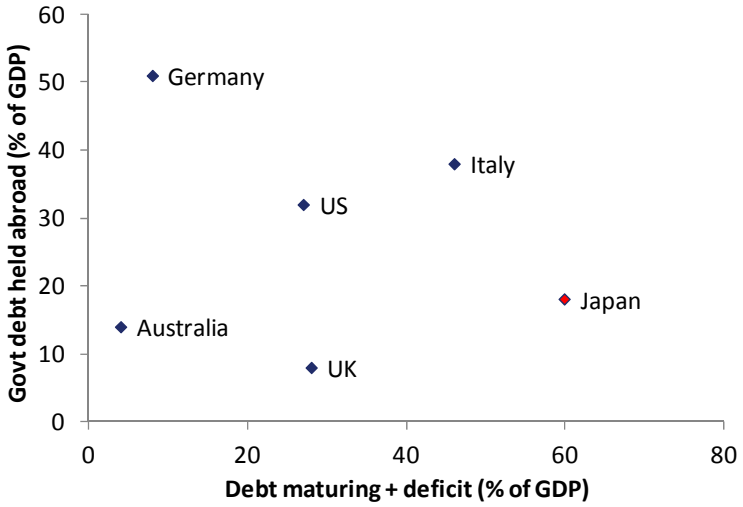
[2] Primary balance is defined as government net borrowing or net lending, excluding interest payments on consolidated government liabilities. It can be said to provide an indicator of current fiscal effort, since interest payments are predetermined by the size of previous deficits. For countries with a large outstanding public debt relative to GDP, achieving a primary surplus is normally viewed as important, typically being necessary (though not sufficient) for a reduction in the debt-to-GDP ratio (see http://www.imf.org/external/pubs/ft/pam/pam49/pam4902.htm).

Figure 5: Fiscal Sustainability in Japan.



Source: IMF

Figure 6: Short-Term Refinancing Needs and Investor Base.



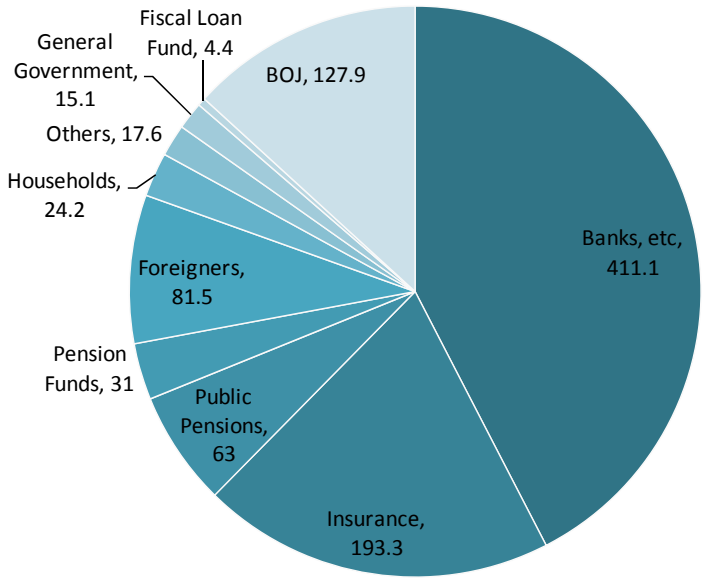
Source: IMF

Some observers have argued that the high reliance on domestic investors and other unique institutional features of the JGB market have played a crucial role in keeping yields low and stable in recent years (see Tokuoka [2010], IMF [2010], Lam and Tokuoka [2011], Iwaisako [2012]).

Institutional Features of the JGB Market

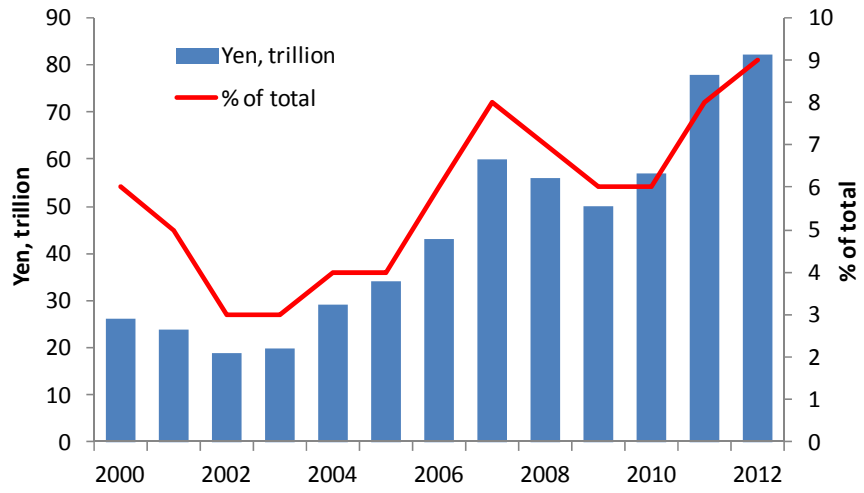
The JGB market is characterized by a concentrated investor base. Most of the debt is held by domestic investors (see Figure 7). Although the proportion of debt held by foreigners is its highest since records began in the late 1970s, they still account for less than 10 percent of JGB holdings (see Figure 8).

Figure 7: Holdings of JGBs by Investor Group (March 2013), Yen Trillion.



Source :Japan Ministry of Finance

Figure 8: Foreign Investor Holdings of JGBs.

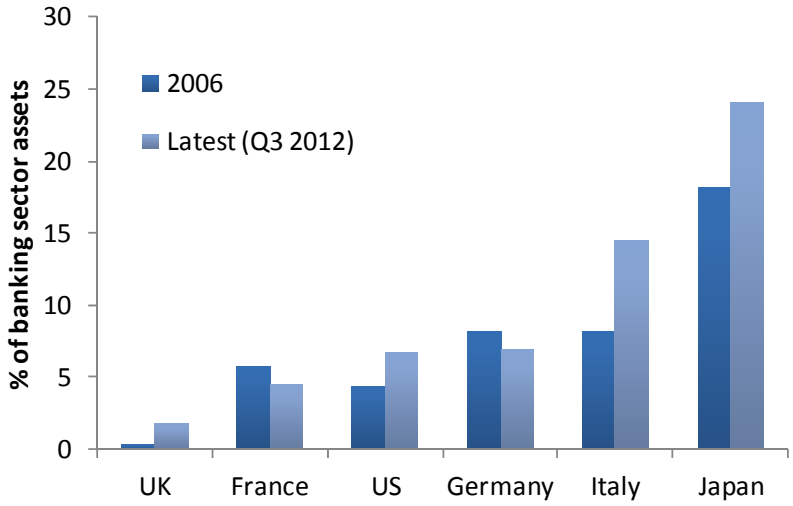


Source: Japan Ministry of Finance

While direct holdings of JGBs by households are low (less than 3 percent), it is estimated that once indirect channels are taken into account, households dominate the total holdings of JGBs (Tokuoka [2010]). These indirect channels include ownership through banks (including Japan Post Bank) and pension funds.

Japanese banks hold more JGBs relative to the holdings of domestic debt by banks in other developed countries as a percentage of banking assets. The holdings of JGBs by domestic banks have also grown significantly in recent years (see Figure 9). As noted by the IMF (2010), this is due to weak corporate demand for loans, limited domestic investment opportunities and strong home bias. Regional banks in particular sought to counteract the contraction in lending by lengthening the duration of their JGB portfolio to augment profit margins.

Figure 9: Bank Holdings of Domestic Government Debt.



Source: IMF

The Paths to Rising Yields

Following our review of the fiscal situation in Japan and the structural features of the JGB market, we can now consider a range of possible scenarios that could potentially lead to JGB yield increases. Different scenarios can lead to different implications for equity market performance, as well as corporate bond spreads in Japan.

Will Abenomics Succeed?

The International Monetary Fund (2013) notes that the new policy framework in Japan, dubbed the "three arrows of Abenomics," provides a unique opportunity to end decades-long deflation and sluggish growth. In this section we outline the implications of this policy framework as a macroeconomic scenario.

The first step in systematically evaluating a macro scenario is the definition of a baseline. The purpose of a baseline scenario is to set bands against which stress scenarios can be measured. Table 1 outlines an example of such a baseline scenario, which shows the projected growth rate for Japan's real GDP and

inflation in four quarters. The scenario was calculated using a Bayesian Vector Autoregression (BVAR; for details see Winkelmann, Suryanarayanan, Hentschel and Varga [2013a]). The table also shows confidence bands around the baseline, set at the 70 and 30 percent levels. Most of the time, realized GDP and inflation will be within the confidence bands. These bands are therefore important in developing stress scenarios.

The 70 percentile scenario suggests that a rise in economic growth is plausible, as is an increase in inflation, though an optimistic scenario for the latter is still far short of the official two percent target. The analysis in Winkelmann, Suryanarayanan, Hentschel and Varga (2013b and 2013c) suggests that a rise in GDP growth and inflation could contribute to a rise in nominal yields. Qualitatively, this scenario could also be positive for equity returns.

Table 1: Scenarios for Growth and Inflation in Japan.

		Confidence Bands	
	Baseline	30th Percentile	70th Percentile
Real GDP Growth (Year-Ahead,%)	1.14	-0.51	3.26
Inflation (Year-Ahead, %)	0.26	-0.32	0.86

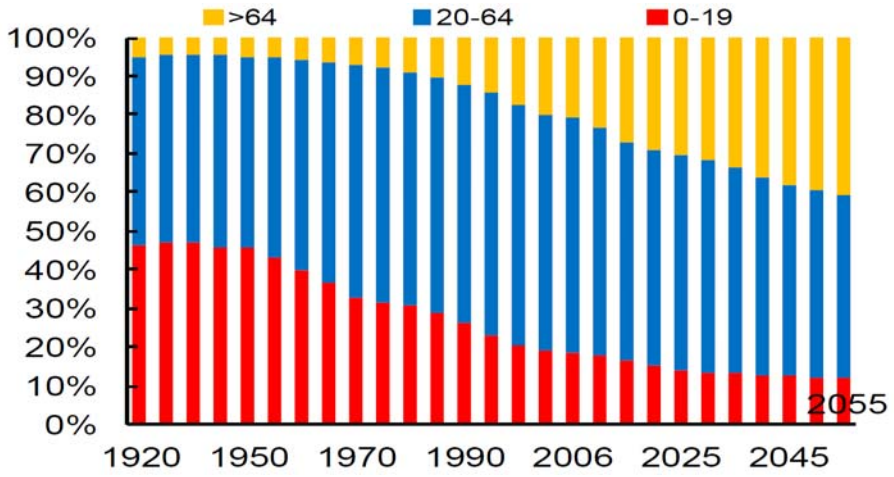
Source: MSCI

A less rosy scenario is that the quantitative easing succeeds in raising inflation, but not long-term growth. Qualitatively, an inflation shock on its own is likely to imply rising nominal bond yields and to have a negative long run impact on equity cash flows.

Declining Domestic Demand for JGBs

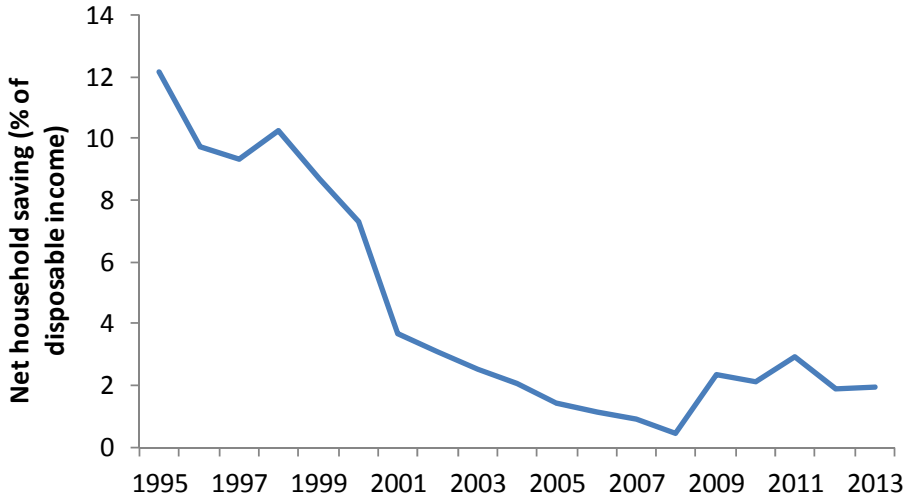
As we noted above, a large portion of JGBs is essentially financed by the household sector, once indirect holdings through banks and intermediaries are taken into account. Going forward, the role of the household sector in the JGB market is likely to decline. Figure 10 shows that Japan's population is steadily ageing. A standard life-cycle model predicts that this change in the population would be associated with a reduction in saving. The prediction is consistent with the data, which shows that Japan's household savings have been declining in recent years (Figure 11). This implies that over the medium term, the capacity of households to absorb government debt will diminish. Tokuoka (2010) and Lam and Tokuoka (2011) argue that the stock of gross public debt could exceed household financial assets in several years, which implies that domestic financing of JGBs will become increasingly difficult.

Figure 10: Ageing of the Japanese Population.



Source: IMF

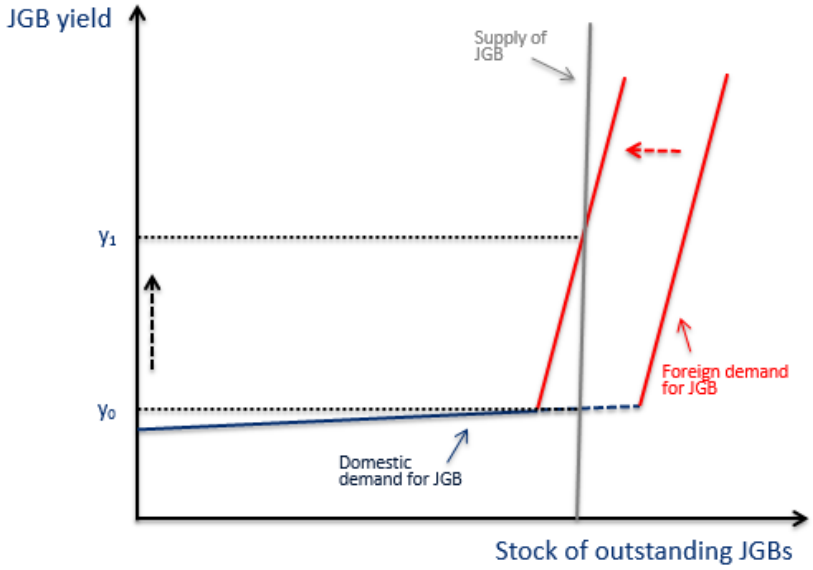
Figure 11: Decline in Household Savings.



Source: OECD

Iwaisaka (2012) notes that even a small decline in domestic demand could cause JGB yields to increase sharply. This is because the JGB yield will be determined by the required rate of return of marginal investors. This possibility is illustrated in Figure 12. Here, we assume that the demand of domestic investors for JGBs is relatively inelastic, since domestic government bonds are considered a risk-free asset that requires only a minimum rate of return. However, foreign investors' demand is more sensitive to JGB yields, as they would treat the JGBs as a risky asset class in a multi-asset class portfolio and would demand a risk premium for exchange rate volatility. In this setting, even a marginal shift from domestic to foreign financing of JGBs could have a significant upward impact on JGB yields.

Figure 12: The Effect of a Decline of Domestic Demand in the JGB Market.



Source: MSCI

Fiscal Outlook

Macroeconomic theory suggests that either fiscal deficits or the stock of debt should have a positive relation with government bond yields. In studies which test fiscal deficits across countries, the estimated impact of an increase in the fiscal deficit by 1 percent of GDP on long term government bond yields ranges from 10 to 150 basis points. A 1 percent rise in debt to GDP is associated with rises in yields of around 10 basis points.[3] To date, it seems that Japan's worsening debt and deficit outlook has not been reflected in the evolution of JGB yields. However, IMF (2013) warns that a lack of concrete fiscal measures to bring down government debt or a delay in the consumption tax increases (currently planned for April 2014 and October 2015) could elevate the risks of a rise in government bond yields.

In another IMF study, it is estimated that if JGB yields rise by 100 bps over the next five years, the long-term net public debt to GDP ratio would remain high at 150 percent of JGP even after a 10 percentage point of GDP adjustment in the structural fiscal balance. Prolonged fiscal stress and lackluster growth, coupled with a projected decline in the ability of households to finance JGBs could erode confidence in the JGB market. A full blown sovereign debt crisis in Japan would likely be negative for both bond and equity markets as evidenced by the developments in the highly indebted Eurozone countries in recent years.

Risks Associated with Bank Holdings of JGBs

We noted earlier that bank holdings of JGBs have increased in recent years and Japanese banks now hold approximately 25 percent of their assets in domestic government bonds. This proportion is large for an advanced economy. In fact, in recent years, banks have emerged as dominant buyers of JGBs. The

[3] See Ardagna, Caselli and Lane (2004) and Kinoshita (2006) as examples in this literature.

heavy dependency on bank purchases brings with it a risk of a disorderly reversal in the JGB market, if a potential rebound in credit demand prompts banks to reduce their JGB holdings.

On the other side of the coin, IMF (2012) estimated that a 100 basis point increase in interest rates across the yield curve would lead to mark-to-market losses of 20 percent of Tier 1 capital for the regional banks and 10 percent for the major banks. Several regional banks have low core profitability, thin capital positions and large duration gaps, making them vulnerable to slow growth and market yield shocks. The vulnerability is especially pronounced in the case of small regional banks (which make up 6 percent of the banking sector). This suggests that an increase in JGB yields may be accompanied by a rise in bank bond spreads and may have a negative effect on the equities of financial companies.

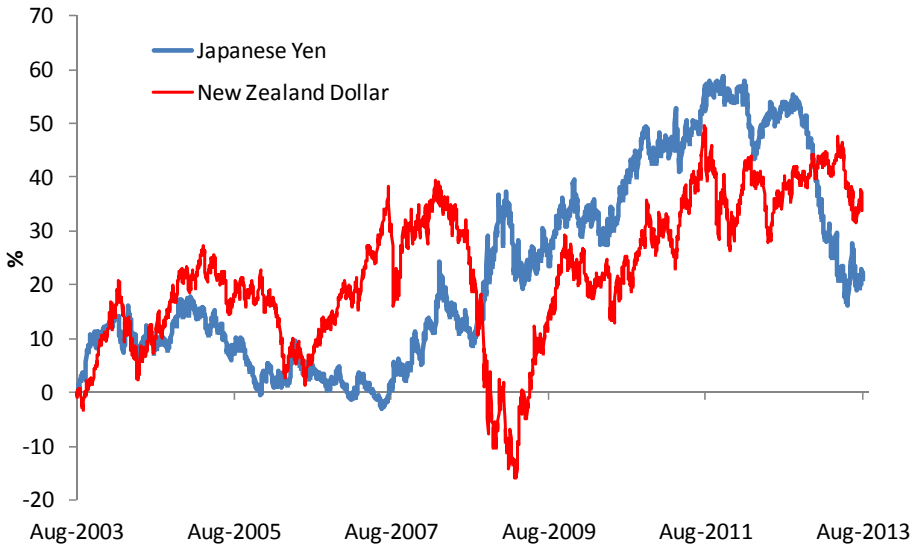
Potential Mitigating Factors

Unwinding of the Yen Carry Trade

In the run up to the Global Financial Crisis of 2008, the Japanese Yen, as a low yielding currency, was the subject of a carry trade. This trade involves borrowing in the yen and buying assets in a currency with higher interest rates. Anecdotal evidence suggests that the New Zealand Dollar, the Australian Dollar and the Norwegian Krone were the usual currencies on the other side of the carry trade.

The aftermath of the 2008 crisis was characterized by the steady unwinding of the carry trade, coupled with the appreciation of the yen (see Figure 13). While it is extremely difficult to estimate the size of the carry trade accurately, its unwinding and the associated return of capital to Japan acts as a potential mitigating factor against a decline in domestic demand for JGBs, as the returning capital gets invested domestically. However, an examination of the returns of the Japanese Yen and higher yielding currencies (such as the New Zealand dollar) in recent months suggests that the carry trade may be gaining favor with investors again.

Figure 13: Cumulative Returns of JPY and NZD against the US Dollar.



Source: RiskManager

Demand from Sovereign Wealth Funds

As foreign demand for JGBs grows, it is useful to consider the source of the demand. On September 20, 2012 the *Wall Street Journal* noted that there is a belief among market watchers that a significant portion of foreign demand for JGBs is due to central banks and sovereign wealth funds.[4] The article noted that central banks have boosted their yen reserves by 22 percent over the last four years. Sovereign wealth funds, particularly in Asia, have also been big purchases of yen debt, particularly short-term government debt.

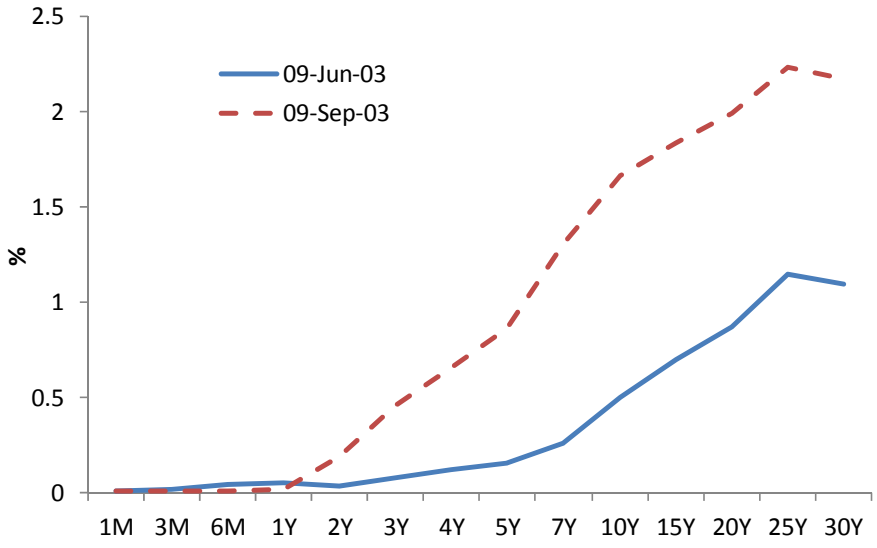
While the evidence for a sovereign wealth effect on foreign purchases of yen debt is largely anecdotal, this type of foreign demand could have a mitigating impact on potential yield rises. The demand curve for reserve purchases of yen is likely to be similar to that of the domestic investors (see Figure 12). Hence, if the decline in domestic demand is offset by purchases from sovereign wealth funds and central banks, then the increase in JGB yields may be less dramatic than the stylized picture of Figure 12.

Historical Precedents

The previous sections outlined a number of reasons why JGB yields might increase, what the rise in government bond yields might imply for banks, and the implications of these hypothetical scenarios for bond and equity markets. We can also look to history to identify past periods of rapid yield increases.

Between June 9, 2003 and September 9, 2003, 10-year JGB yields more than tripled, surging from 50bps to 162bps (see Figure 14). This episode was termed the "VaR shock," because a rise in volatility increase risk measures in banks' internal Value-at-Risk (VaR) models and led to one-sided selling by banks, as they attempted to shed risk.

Figure 14: JGB Yields during the VaR Shock of 2003.

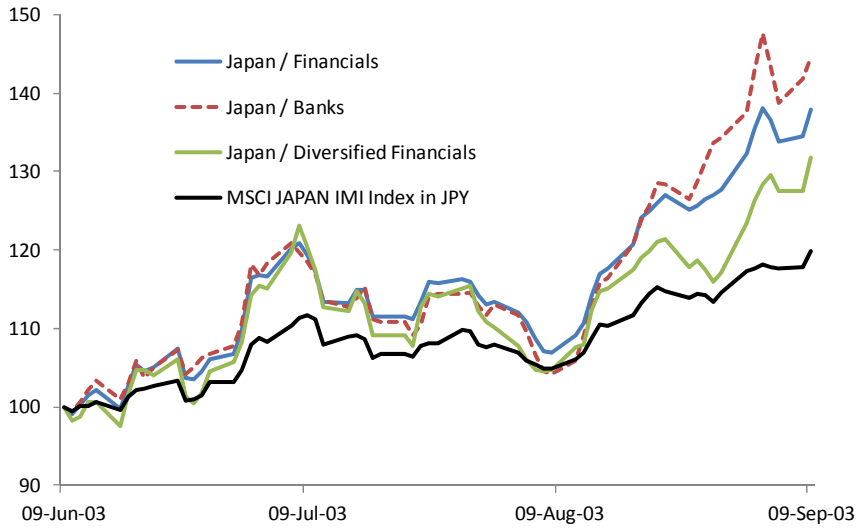


Source: RiskManager

[4] Foreigners Boost Holdings of Japan Debt, The Wall Street Journal, September 20, 2012.

Interestingly, this period in history was also associated with an equity market rally. The MSCI Japan IMI Index rallied by approximately 20 percent in JPY terms, with Diversified Financials rallying by 32 percent, banks rallying by 45 percent and Financial rallying by 38 percent (see Figure 15). The yen appreciated by approximately 1.5 percent during this period.

Figure 15: Performance of the Japanese Equity Market during the VaR Shock of 2003.



Source: MSCI

Conclusion

Predictive stress testing requires defining severe, but plausible, hypothetical scenarios rooted in current market trends. Due to the size of the Japanese Government Bond market, potential stress scenarios focused on JGB yields can have wide-ranging implications for financial markets in Japan, the Asia-Pacific region, and worldwide.

This is a first in a series of three papers that aim to help our clients to understand the scenarios that may cause government bond yields in Japan to rise, to analyze the implications of these hypothetical scenarios for financial markets, and to assess their impact on specific portfolios.

In this paper, we highlighted a number of possible reasons why JGB yields could potentially rise during the next few years. These range from benign economic scenarios, where Abenomics succeeds, to less favorable scenarios where yields rise due to a decline in domestic savings and continuing concerns over the fiscal situation in Japan. We also pointed to a number of mitigating factors that may serve to slow the rise in JGB yields, such as the unwinding of the yen carry trade and demand from sovereign wealth funds.

The next two papers in this series will present the practical implementation of these scenarios using the Barra Integrated Model and RiskManager methodology.

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[1] *As of September 30, 2012, as published by eVestment, Lipper and Bloomberg on January 31, 2013*

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