NBIM DISCUSSION NOTE

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Prospective real returns in fixed income

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In this paper, we discuss the potential long-term real return implications of current yield levels in developed economies' government bond markets. Treasury yields in the major economies are at or very close to their historical lows. Forward-looking measures of real yields based on inflation-indexed bonds or on surveys of long-term inflation expectations are depressed.

From a strategic point of view, we must consider the longer-term implications of increased public indebtedness and unconventional monetary measures, such as quantitative easing, on our return expectations. Against this background, we conduct various decompositions of nominal yields into their real, inflation and risk premia components to assess the compensation that we can expect to receive for holding bonds over a five- to ten-year horizon.

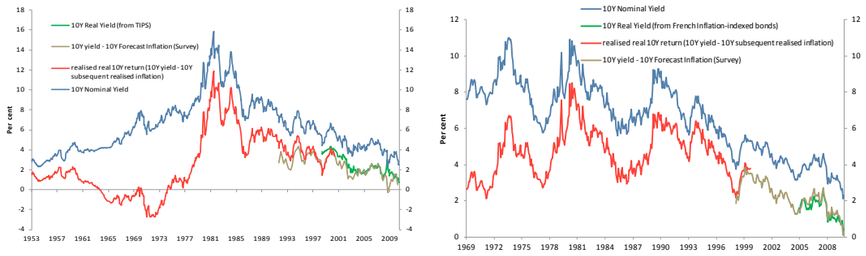
Main findings

- Forward-looking yield measures indicate that real hold-to-maturity returns on developed market government bonds could be very low compared to recent history and low relative to long-term averages.
- Decompositions of current nominal bond yields into a real yield, inflation expectation and risk premia component suggest that risk compensation for holding bonds is thin.
- Government debt dynamics and the high level of under-utilised resources in the developed economies could create an incentive for policymakers to attempt to keep real interest rates as low as possible to relieve the burden on the leveraged public and private sectors. This would reduce prospective returns.
- A significant risk for bondholders in markets where real yields are kept artificially low is that other investors withdraw from those markets and a disorderly currency depreciation ensues during which real yields are driven significantly higher.

Real yield and return in a historical context

The evolution of nominal government bond yields in the largest advanced economies after World War II can broadly be divided into two distinct regimes: a secular rise in long-term interest rates before the early 1980s and a sustained decline since then. As the leading debt market in the world, the development of the US Treasury market can be seen as representative of these trends. In Figure 1, the secular rise and subsequent fall of nominal ten-year US government bond yields is clearly visible.

Figure 1: Nominal and real yields in the US Treasury market (left) and German government bond market (right)



Source: NBIM calculations, Bloomberg, Factset, Federal Reserve, ECB

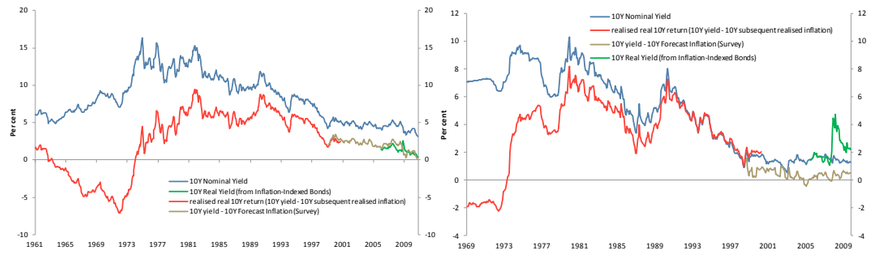
The real yield, i.e. the return from buying and holding these securities to maturity adjusted for the erosion of purchasing power through inflation, is shown both as an ex-post (realised real return) and as a forward-looking measure. To calculate the real realised return, we subtract the average annual inflation over the subsequent ten years from the nominal ten-year yield. The time series of ex-post real return stops in September 2000, since taking it further would require knowledge of future inflation rates. However, we also show two forward-looking measures of real yields that can be compared to realised real returns. The first one is obtained by subtracting a survey measure of ten-year annual inflation (the Philadelphia Fed's Survey of Professional Forecasters) from nominal yields. The other is the real yield from inflation-protected ten-year Treasury securities (TIPSs). Barring default by the US government, the latter allows us to know with certainty what the real realised return will be if we hold the bond until maturity.

We observe that both measures of ex-ante real yields are currently well below 1 percent, with the inflation-indexed yield at 0.7 percent and the survey-based real yield at 0.2 percent. They are also at or very near their lows compared to the relatively short history that is available.

Realised real returns from holding nominal ten-year bonds went through two very distinct regimes over the last 60 years, very similar to nominal yields. Before mid-1978, ex-post ten-year real returns never exceeded 2½ percent and were even negative for most ten-year periods starting between the mid-1960s and the mid-1970s. In this first regime, nominal yields and subsequent real returns diverged as the market had not discounted the rising inflation of the 1970s.

As nominal yields rose above 8 percent in the late 1970s, subsequent buy-and-hold real returns improved markedly, reaching levels above 5 percent for a few years and staying above 2½ percent for most periods through to 2000 when the series stops. This second regime is characterised by a positive correlation of nominal yields and real returns. Where realised real return and the survey-based ex-ante measure of real yield overlap, it is noteworthy that the forward-looking yield measure underestimated actual real returns by 1½ percent at most during the early 1990s, but tracked actual returns remarkably well from the mid-1990s through to 2000. The inflationary outcome was therefore largely in line with expectations priced in the market in this second regime.

Figure 2: Nominal and real yields in the UK gilt market (left) and the Japanese government bond market (right)



Source: NBIM calculations, Bloomberg, Factset, Federal Reserve, Consensus Economics

Figures 1 to 2 are the equivalents to Figure 1 for the German, UK and Japanese government bond markets respectively. Developments in the German and UK fixed-income markets are broadly in line with the US case. Real realised returns were strongly correlated with nominal yields from the late 1970s onwards. Furthermore, expectations of real returns were fairly close to the outcome during the 1990s. In Japan, however, the ex-post real returns on government bonds significantly exceeded the ex-ante measures in the brief period of overlap, indicating that market participants were surprised by the onset and persistence of deflation.

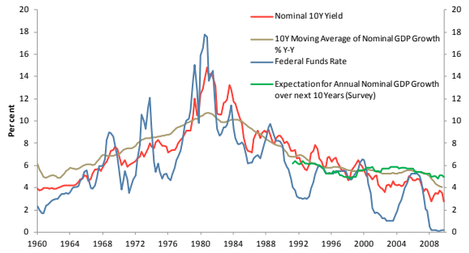
Investing in ten-year TIPSs will yield a certain (ignoring default risk), but historically very low, real return, currently well below 1 percent. Ex-ante measures of the real return from investing in nominal ten-year securities are in the vicinity of the TIPS yield, but obviously subject to uncertainty with regard to the inflation outcome. The low level of nominal and expected real yields seems to leave little room for upward surprises to the rate of inflation or negative shocks to sovereign creditworthiness. In other words, the risk premium for holding long-term bonds appears to be relatively thin – a question we discuss further in the next section.

Decomposing yields into real, inflation and risk premia components

While breaking down nominal yields into a real and break-even inflation component using TIPSs provides valuable insights, the break-even element not only reflects the inflation expectations of market participants, but will also incorporate premia for inflation volatility, liquidity and other risks.

One approach to explaining government bond yields over time is to use macroeconomic variables such as GDP and inflation as explanatory variables in order to decompose bond yields. This framework is related to models of the "term premium", which try to account for the excess return of longer-maturity bonds over Treasury bills that results from yields of the former being higher than would be justified by the expected path of future short-term interest rates.[1]

Figure 3: Nominal US ten-year yields, Federal Funds rate and nominal GDP growth



Source: NBIM calculations, Factset, Federal Reserve

1 The term premium is the subject of a separate section.

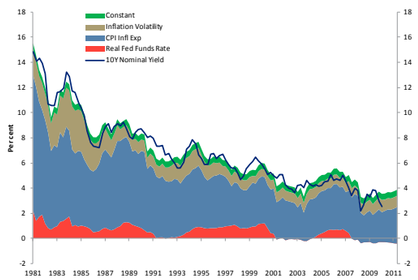
These two approaches are ultimately linked because macroeconomic fundamentals and short-term interest rates move together in the long run, as shown in Figure 3, which plots nominal ten-year Treasury yields against the Federal Funds rate and the ten-year moving average of year-over-year nominal US GDP growth. The co-movement of nominal interest rates and nominal economic growth is evidence of a long-run equilibrium relationship between the macroeconomy and financial market prices.

In this section, we present a model based on macroeconomic fundamentals in order to link the outlook for real returns of government bonds to long-term projections of economic variables. The model was developed by economists at Morgan Stanley[2] and is a regression of the ten-year nominal yield of US Treasuries against three variables:

- The real Fed Funds rate, where past core inflation is used to deflate the nominal policy rate. The measure can be thought of as a proxy of real economic activity as the central bank is expected to follow a so-called Taylor rule and react to GDP deviating from its potential by adjusting the real short-term rate
- Expectations for 12-month ahead CPI inflation as measured by the Philadelphia Fed Survey of Professional Forecasters
- Inflation volatility as measured by the trailing five-year standard deviation of quarterly changes in core prices

The output from the model is shown in Figure 4, where the coloured areas are the contributions from each of the variables (i.e. their regression coefficient multiplied by the variable's value) to the fair-value yield[3], and the blue line represents the actual nominal ten-year Treasury yield. The first observation worth making is that the inflation expectation component contributes most to explaining the variation in the nominal yield. The compression in the fair-value yield can therefore largely be attributed to a trend decline of the survey measure of inflation expectations. The second most important variable is the volatility of inflation, which has also fallen over the period under consideration. Maybe surprisingly, the real Fed Funds rate as a proxy for economic activity has played a lesser role in explaining the variation in fair-value yields, currently deducting about half a percentage point from the equilibrium yield.

Figure 4: Nominal US ten-year yields and contributions to fair-value yield



Source: NBIM calculations, Morgan Stanley

Market interest rates have been below fair values for most of the time since 2004. The predicted model yield based on forecast GDP and inflation shows a slightly rising trend into 2011 while staying below the 4 percent mark. All things considered, fair-value models commonly employed by practitioners appear to imply that a substantial part of the yield compression during the last three decades can be ascribed to the fall in inflation expectations and past *volatility* of inflation, the latter of which we could interpret as a decline in the inflation risk premium.[4] The "real" component as proxied by the real policy rate currently subtracts from the yield, which is consistent with the negative real yields observed from some maturities of the TIPS market.

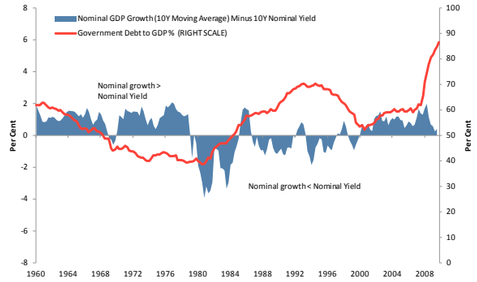
These observations generally point to risk premia embedded in nominal long-term bond yields being relatively thin. This reflects an expectation that policy rates will remain low and that inflation and growth are muted for now. Recent declines in inflation volatility cannot be guaranteed to persist, however, as sovereign indebtedness and unconventional central bank policies make the outlook for inflation more uncertain than before.

Real yields and debt dynamics

In the aftermath of the financial crisis, a widespread belief has emerged that the indebtedness of the state and the household sectors in many developed economies will seriously constrain the ability of these countries to grow vigorously. This belief is supported by the analysis of Reinhart and Rogoff (2010) based on a large historical cross-country dataset. Most developed-country central banks seem to have subscribed to the view that low nominal and real interest rates across the entire maturity spectrum are needed to underpin the nascent, tepid recovery. What is more, government deficits and debt-to-GDP have ballooned in many advanced nations following the large-scale state interventions during the financial crisis of 2007-2009. Keeping real interest rates low is therefore not only necessary to support the economic expansion, but has nearly become an imperative for keeping debt-to-GDP on a sustainable path given the historically high debt-to-GDP ratios in many industrialised nations.

The crucial role of the real interest rate paid on outstanding debt, and in particular whether that rate is above or below the real rate of economic growth, follows from the arithmetic of the long-term government budget constraint. Under some simplifying assumptions, this arithmetic can be summarised in the following statement: When the primary (i.e. non-interest) government budget is in balance, the debt-to-GDP ratio can be stabilised and fiscal policy is therefore sustainable *if the real growth rate of the economy is equal to or greater than the real interest rate on outstanding debt* (or equivalently nominal growth is at least as high as the nominal interest rate).

Figure 5: US debt-to-GDP and nominal GDP growth minus nominal ten-year yield



Source: NBIM calculations, Factset

2 See Fels and Pradhan (2006). Other investment banks that we have surveyed, for example Kapadia (2010), maintain comparable models that currently yield similar conclusions.

3 We have obtained forecasts of the fair-value yield through to the end of 2011 by plugging the Fed's forecasts of growth and inflation into the model, as well as assuming that inflation volatility and the policy rate will stay at their current levels.

4 The gradual reduction of inflation risk compensation could well be justified by the increased credibility of central banks and the inflation outcomes actually delivered over the last thirty years, while the threat of deflation may compress this risk premium even further. On the other hand, embedded inflation risk compensation should account for the massively increased *incentive* for countries to create surprise inflation so as to reduce the real value of outstanding government and private debt.

Using the US example once again, we can see these dynamics at play in Figure 5, which depicts the aforementioned difference between nominal growth and nominal interest rate alongside the public debt-to-GDP ratio. In the 1960s and the 1970s, nominal economic growth largely exceeded the ten-year bond yield, which coincided with a gradual reduction in the debt-to-GDP ratio, as fiscal arithmetic would suggest. From about 1980 until 2000, the relationship between growth and yields reversed, with growth now mostly being below interest rates. As expected, the debt-to-GDP ratio rose through most of this period until the mid-1990s when the large primary surpluses of the Clinton administration brought about a temporary reduction in the debt ratio. In the 2000s, yields fell below the rate of nominal economic growth once again, but this favourable shift in the yield-growth relationship was more than offset by a massive widening in the primary public deficit (not shown in the figure).

In order to stabilise or even reduce debt–to-GDP from these elevated levels, policymakers are likely to try to keep bond yields below the rate of growth. This applies not only to the US, but also to other highly indebted developed nations.

Possible implications for bond investors

In a situation where the sovereign debt dynamics of several G7 countries are on an unsustainable path, the policy option of imposing losses on bondholders is a risk that cannot be easily dismissed. This may be a more likely outcome than the remote possibility of an outright default.
One way of imposing such real losses is to keep nominal yields lower than what their market-determined value would be. Quantitative easing, as practised by the US Federal Reserve, the Bank of Japan and the Bank of England, could have that effect as it is conducted through purchases of government securities.

Such bond acquisitions by monetary authorities may have had a significant impact on yields. The Bank of England (Joyce et al., 2010) estimates that the round of quantitative easing that was decided on in March 2009 and involved purchasing about 200 billion pounds worth of UK gilts (about 14 percent of nominal GDP) lowered gilt yields by about 100 basis points. In addition to taking on the entire supply of government bonds in the 2009/2010 fiscal year, the Bank of England made new issuance cheaper for the UK Treasury by shifting the gilt curve downward in nominal terms.

The asset purchase programmes in the US, Japan and the euro zone have not been as large as in the UK (relative to GDP), but the policies of quantitative easing are continuing. It is worth noting that such programmes can last a very long time. During World War II and afterwards until 1951, the US Treasury and the Federal Reserve had an agreement to keep the yield on the longest-term marketable securities at 2½ percent.

Another way of lowering real interest rates is to create surprise inflation. The large gap between actual and potential output in developed economies and evidence of a dysfunctional monetary transmission mechanism (i.e. the large amount of excess reserves that commercial banks hold with central banks) are impediments to a significantly higher rate of inflation in the short term. Notwithstanding these headwinds to faster inflation, quantitative easing is clearly aimed at lifting inflation rates to more "normal" levels. Current yield levels appear to provide insufficient protection against an overshooting of inflation, caused either by policymakers failing to correctly anticipate the inflationary effects of unconventional policies as the monetary transmission mechanism regains traction, or by intention.

An intentionally higher rate of price increases could be justified by the theory of "price-level targeting", as recently advocated by reputable economist Michael Woodford (2010) as well as Fed presidents Charles Evans and William Dudley. Price-level targeting recommends that central banks should aim for a temporarily faster rate of inflation than long-term targets to "make up" for any past downward deviations from the inflation goal.

Other plausible ways of keeping real interest rates low involve regulatory measures that coerce the private sector into buying more government debt than it voluntarily would. Pension funds and insurance companies are often subject to solvency requirements that can compel them to buy long-dated fixed-income securities when their assets have a lower duration than their liabilities. In that case, a fall in discount rates raises, all other things being equal, the actuarial value of liabilities more than that of assets, widening the funding gap and weakening the solvency position. Such regulations are already in place in many developed economies, but policymakers could increase the pressure on private sector agents to purchase government debt by tightening solvency requirements. Under existing regulations, lowering discount rates across all maturities through quantitative easing could be seen as a further step to compel institutional investors to acquire bonds at uneconomic prices.

A caveat is in order at this point. Even if most G7 central banks and governments did have the intention of keeping a lid on real interest rates, and have various means of working towards that aim, they may not succeed. Some governments depend on capital inflows to fund shortfalls in public budgets. Foreign investors, such as sovereign holders of developed market government debt, are less subject to regulations that compel them to keep holding these securities. If foreign investors lose confidence in a market, they may divest their holdings too hastily, driving down bond prices and the debtor's currency. The greatest risk for bondholders in markets where real yields are kept artificially low is that other investors withdraw from these markets, leading to a disorderly currency depreciation during which real yields are driven significantly higher.

According to US Treasury statistics, China held more than 850 billion US dollars of Treasury notes as of August 2010 and foreign investors are thought to own about half of the marketable US government debt outstanding. Statements coming from the central bank of China on the impact of quantitative easing clearly convey these concerns (People's Bank of China, 2009):

"...an unconventional monetary policy featuring quantitative easing is potentially risky and could have far-reaching implications for international financial markets and the global economy. First, it might increase the risks of future global inflation. [...] Second, it increases the possibility of major exchange rate fluctuations. [...]The third influence is on the bond markets of the major economies."

While it is clearly not in the foreign creditors' interest to spark an accelerated depreciation of the debtor currency and a disorderly rise in real interest rates, the risks of such a scenario appear to be increasing with the unconventional policies pursued by developed-country policymakers.

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