Global Viewpoint

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Global Bonds: No Obvious Safe Haven

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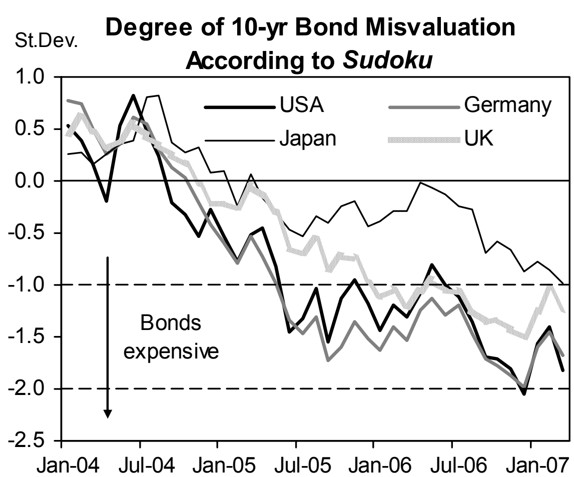
Ten-year government bonds in the main currency blocs have progressively become more expensive since last Summer, according to our models. This conclusion takes into account the low risk premium regime in place since the end of the 1990s. Over the past week, bonds have further benefited from a 'flight-to-quality' bid in the context of a sudden wave of risk-reduction. But unless activity data, especially labour market statistics, break out soon in a much weaker way than our baseline forecasts (and pro-cyclical assets) presently envisage, long-term yields will face increasing valuation headwinds. At the moment, we prefer being long at the front-end of yield curves.

1. A Bigger Bond Conundrum

Intermediate and long-dated government bonds in major developed markets have been widely viewed as overvalued, though the recent wave of financial market turmoil has put them back in investors' favour. This *Viewpoint* tackles two questions on the topic: By how much have bond yields departed from their historical relationship with macroeconomic variables? And, can a shift in the bond premium[1] be distorting valuation metrics based on historical data? In addition to the direct investment implications, the answer to these questions is also relevant for broader valuations across asset classes.

2. How Large a Valuation Gap Now?

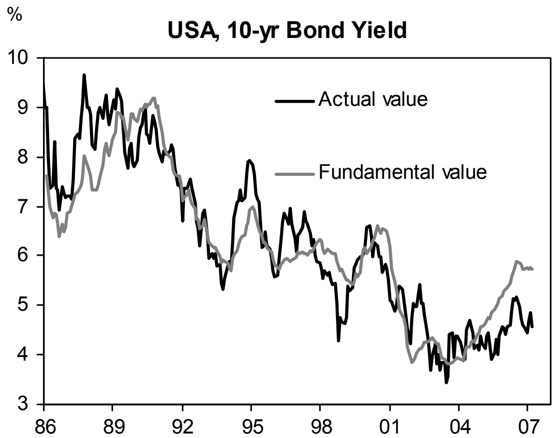
Our *Sudoku* econometric framework[2] is a useful point of departure on these issues. The model builds on our GSWIRE framework and relates the level of government bond yields in the US, Germany, Japan and UK to the respective level of three-month rates, the pace of industrial activity and annual retail price inflation over the period spanning 1986-2006. Importantly, the model also explicitly accounts for cross-market spill-overs in bond pricing – consistent with the notion that, in an integrated international capital market, securities are valued simultaneously. This is one of the main upgrades of our current valuation framework relative to its predecessor.

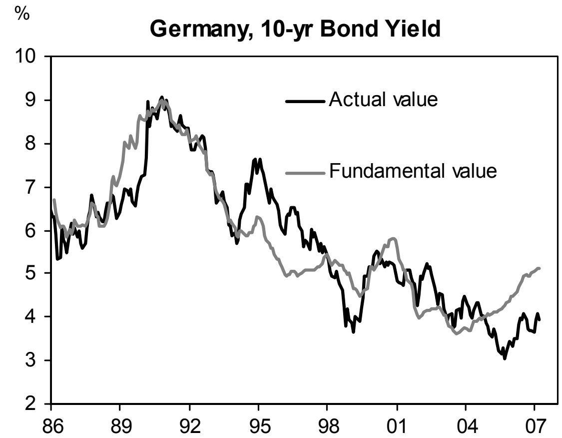


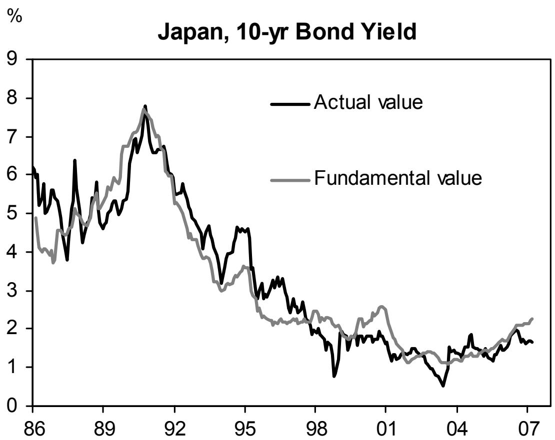
The charts at the top of page 2 show the fitted value of bond yields against their actual levels in each of the four countries considered. Given that the variation of regression errors in basis points differs from country to country, the chart to the right plots the valuation

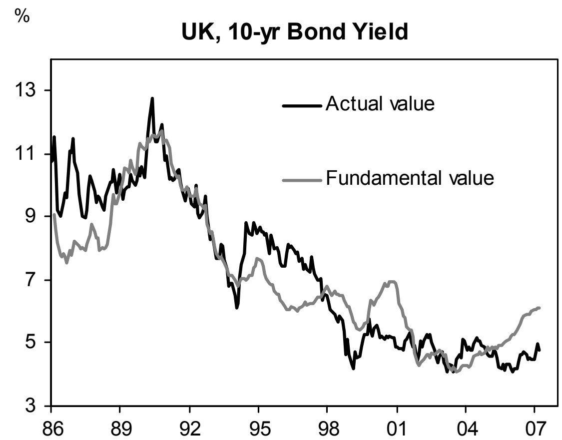
1. We use here the term 'bond premium' in the broadest of senses: real, inflation, liquidity, etc.

2. For details on the *Sudoku* model, see *Foreign Exchange Annual* 2006, Chapter 12.









gap on a common standard deviation scale. Up to last Summer, the departure of global bond yields from 'fair value' was still a one standard deviation event. But since then, the valuation gap has grown.

Currently, government bond yields are between 50bp (in Japan) and 100bp (in the US, Germany and the UK) below where *Sudoku* would place them on the basis of the typical relationship with macro variables that has held over the past 20 years. After the 'flight-to-quality' bid over the past week, global bonds are close to being as 'expensive' as they were at the start of last December, and in 1997-98.

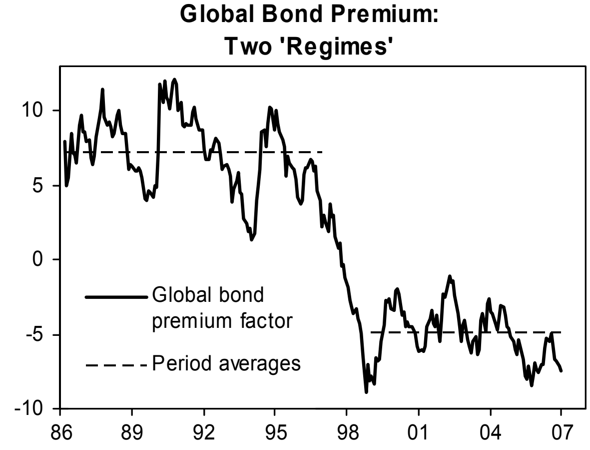
3. Low Bond Premium Around for a Decade!

We are frequently asked whether a model based on average historical relationships such as *Sudoku* still provides a correct valuation message in light of a greater appetite for risk in this cycle. After all, the alternating valuation gaps illustrated in the charts on this page do suggest that the bond premium may vary over time.

The following exercise provides an answer. We assume there is an unknown variable – which we associate with the bond premium – driving 10-yr yields across the major markets through time, over and above the domestic macro variables entering the *Sudoku* framework.

To avoid introducing any *a priori* structure, we assume that such a variable depends only on its past realization and a random shock. Additionally, we establish that the variable should be 'global' in nature – i.e., common across all countries. Each bond market relates to such a common variable with its own sensitivity, resulting in a country-specific bond premium (see the *Technical Appendix* on page 5 for a more formal illustration of our methodology).

The graph below plots the common factor we identify with the global bond premium from the mid-1980s to today. As can be seen, the variable has two distinct averages over the period: One holding broadly up to



1996, and a second in place from roughly 1999 onwards. The interim phase, 1997-98, is characterized by a precipitous decline in the values taken by the variable.

The charts at the bottom of this page show the basis point contributions of the global bond premium factor to each of the four countries' level of 10-yr rates – or the size of the bond premium in the respective markets.[3]

Determining what macro or financial developments in the mid-1990s may have led to a substantial decline in the global bond premium is a tall order. Possible causes include: The fall in long-dated inflation expectations (and their volatility), likely to have been supported by China's and the former Communist bloc countries' entry into the global supply chain; greater central bank 'transparency' (i.e., predictability); changes in savings patterns following the Asian and Russian crises; and the cumulative injection of liquidity by the major central banks since the end of the last decade.

Testing the empirical relevance of these alternative explanations is beyond the scope of this note. And probably none of these explanations can fully explain why the premium has fallen dramatically over such a short interval of time.

There are nonetheless two key takeaways from our empirical analysis:

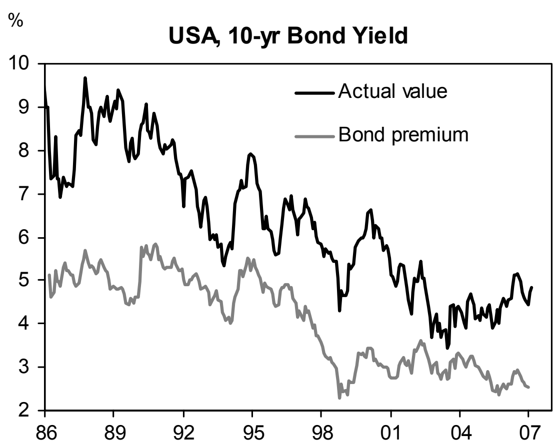
- **The phase of low bond premium we currently operate in is now almost a decade long.** In addition to the valuation gaps that open up from time to time, a substantial shift in the way bond yields are priced took place in 1997-98. Our *Sudoku* valuation framework is flexible enough to accommodate the shift between the two bond premium regimes identified here. When we try accounting explicitly for the different bond premium phases with 'dummy' variables, we find these 'plugs' to be of little statistical significance.

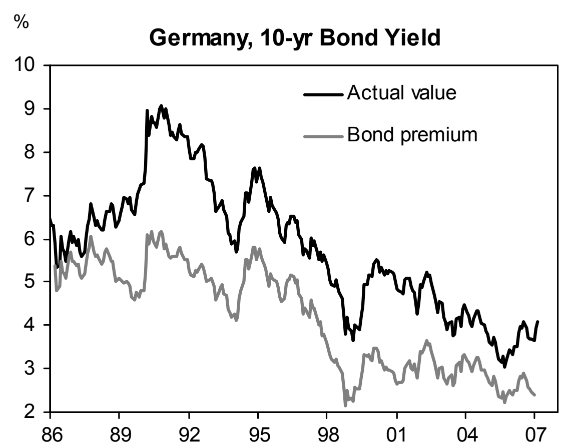
- **Even for the current low bond premium environment, 10-yr yields in the major bond markets remain stretched according to *Sudoku*.** Supporting this conclusion, the global bond premium measure recovered through the exercise presented here is at the low end of its recent range in all markets, providing investors with little 'cushion'.

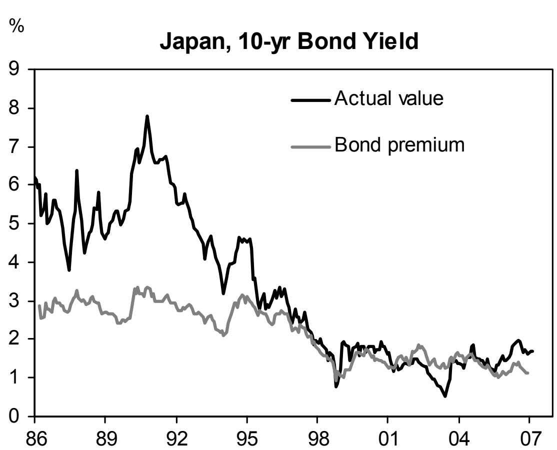
4. Europe More Responsive to Global Swings

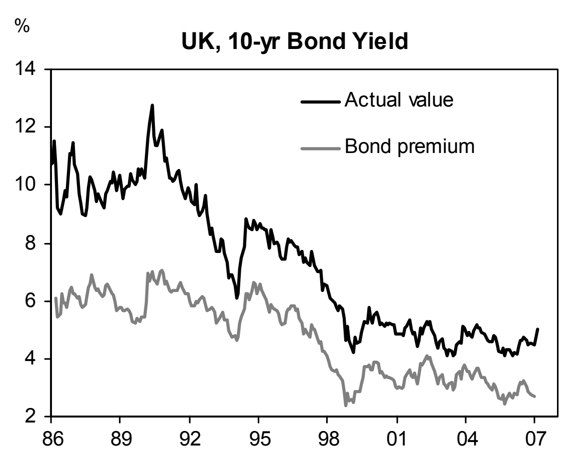
Our estimates of the sensitivities to the global bond premium rank the four bond markets as follows (in descending order): UK, Germany, US and Japan.

An interesting extension to our analysis is to assess whether the portion of bond yield variance we cannot explain through macro variables results more from









3. Following the notation presented in the *Technical Appendix*, the contributions are calculated as: $\beta_0^X + \beta_1^X \times f_t$.

What Drives the Unexplained Portion of Bond Yields?

bp	Contribution of local shocks	Contribution of global shocks
USA	19	17
Germany	7	19
Japan	21	11
UK	18	22

domestic forces that were unaccounted for or rather from shocks to the global bond premium.[4,5]

The table above juxtaposes the contribution of local and global shocks to bond yields in each country. Two main results stand out:

- Local and global 'surprises' are of the same order of magnitude. This tells us that, broadly speaking, events that hit all bonds markets uniformly are roughly as important as those that directly affect only some markets but not others, once macro factors have been controlled for.
- Local factors (outside our three domestic macro drivers) appear to play a bigger role in relation to global developments in the US and especially in Japan. On the other hand, the European bond markets tend to have a comparatively larger response to international forces.

On a practical note, the higher 'beta' to global developments of UK Gilts makes them relatively more attractive to hold at times of international financial jitters, such as those we are currently facing.

5. Global Bonds: No Obvious Safe Haven

The empirical work presented here suggests the decline in bond premium across the major markets is not a recent phenomenon, but one that has its roots in the late 1990s.

Our *Sudoku* valuation framework can accommodate for the shift to a lower premium regime. Yet, the model signals that, particularly since last Summer, global 10-yr yields have increasingly departed from their macro underpinnings. Even JGBs, which the model had correctly told us were 'cheap' on an outright basis and in relation to their counterparts in Europe and the US through most of last year, no longer offer much value both in absolute and relative terms.

Where does all this leave us? From current levels, 10-yr rates can move back towards 'fair value', as the transitory forces that have pushed them away from their typical relationship with the fundamentals gradually dissipate. An alternative is that long bonds may be anticipating a more pronounced slowdown than our baseline forecasts (and pro-cyclical assets, for that matter) foresee. But unless activity data break out soon in this direction, bonds will face increasing valuation headwinds. For investors in search of a safe haven for their money, global bonds do not seem to us an obvious destination this time around.

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Current trading recommendations

Strategic trades (Top 10):
2. Long Dec-07 Eurodollars vs. short Dec-07 Euribor. Opened on 6 Dec 2006 at 81bp.
3. Long AUD and NZD 2-yr swaps vs. short EUR and SEK 2-yr rates equally weighted. Opened on 6 Dec 2006 at 305bp.
5. Long Japan 10-yr breakeven inflation, short Euroland 5-yr breakeven inflation. Opened on 6 Dec 2006 at 163bp.
Tactical trades:
1. Sell 10-yr protection on Portuguese 10-yr CDS. Opened on 27 Oct 2006 at 11bp.
2. Long 5-yr GBP swaps vs. short 5-yr EUR. Opened on 9 Feb 2007 at 140bp.
3. Long Sep-07 Euribor (ERU7). Opened on 28 Feb 2007 at 95.95.

4. Formally, the exercise consists of comparing the standard deviations of the signal equations' innovations ($\sigma(\varepsilon_t^X)$) to the contribution of the state equation's innovations expressed in the same standard deviation terms ($\beta_1^X \times \sigma(\zeta_t) = \beta_1^X$).
5. Note however that, even after controlling for the co-movements between macro variables, the global bond premium does not account for all the remaining correlation between different countries' 10-yr interest rates. In other words, local shocks are not completely idiosyncratic. (Indeed, innovations in the different country signal equations are positively correlated with one another, with correlation coefficients ranging from 0.35 to 0.67.)

Technical Appendix

The countries considered in this analysis are the US, Germany, Japan, and the UK; our monthly dataset spans 1986:M3 to 2006:M12.

For each country *X*, the level of 10-yr bond yields, LR_t^X, is defined as a function of domestic macro variables - annual industrial production growth, IP_t^X, the rate of retail price inflation, INF_t^X, the spot level of 3-mth rates, SR_t^X - and a global factor, f_t. This results in the following 'signal' equation:

$$LR_t^X = \beta_0^X + \beta_1^X \times f_t + \beta_2^X \times IP_t^X + \beta_3^X \times INF_t^X + \beta_4^X \times SR_t^X + e_t^X ,$$

where β_i^X are the parameters, and e_t^X is a disturbance term. The e_t^X is allowed to be first-order auto-correlated, as described by the equation:

$$e_t^X = \rho^X e_{t-1}^X + \varepsilon_t^X ,$$

where ρ^X is an autoregressive parameter, and ε_t^X is a shock. Equations as above describe each of the bond yields in the four countries considered here.

In this specification, the global factor f_t is an unobserved (or 'latent') variable that effectively allows the intercept term in the bond yield equation to vary over time. In order to identify this global factor, we need to impose its law of motion. We use a simple AR(1) structure, which results in the following 'state' equation:

$$f_t = \gamma_0 + \gamma_1 \times f_{t-1} + \zeta_t ,$$

where γ_i are parameters, and ζ_t is a disturbance term.

The set of four 'signal' equations for country bond yields and the 'state' equation jointly form what is called a 'state-space system'. We assume normal distributions for the disturbance terms ε_t^X and ζ_t, and estimate this system using a method of maximum likelihood.

A few additional technical notes: (i) the β_1^X coefficients on the global factor are constrained to be positive, which is not restrictive, because the latent factor itself can take any sign (but at the same time, making all these coefficients have the same sign, no matter what it is, means that the global factor moves all bond markets in the same direction); (ii) we also restrict the autoregressive coefficient γ_1 to lie strictly between 0 and 1 (in order to get a stationary series with positive autocorrelation); (iii) since it is not possible to identify separately all constant coefficients β_0^X and γ_0 in this framework, we set γ_0 to 0, without loss of generality; (iv) next, we normalize the variance of ζ_t to be equal to 1, also without loss of generality; (v) finally, note that we leave the covariances of the disturbance terms ε_t^X and ζ_t completely unrestricted (thus allowing the signal equations' innovations to be correlated with each other and with the state equation's innovation).

The main estimation results are summarized in the table below.

Note that the lag coefficient in the state equation is close to one (Augmented Dickey-Fuller test can not reject a unit root hypothesis at conventional significance levels), suggesting that the global factor follows a highly persistent process. This means that the best prediction one can make of the level of the global factor in the short-to-medium run is its current realization. In connection to the issue of the non-stationarity of the latent factor, it is important to note that a number of observed variables in our model are found to be non-stationary too, so we are effectively estimating a system of co-integrating equations here (which is proven by the fact that residuals in the signal equations are all stationary).

As in *Sudoku* model, in this specification we have also tried to allow for potential price 'spill-overs' across different markets, by accounting for the level of foreign bond yields in each country's equation. However, it appears that inclusion of the global factor renders such 'spill-over' terms irrelevant.

Signal equations, dependent variable LR_t^X				
	USA	**Germany**	**Japan**	**UK**
β_0^X	3.785***	3.845***	1.965***	4.342***
β_1^X	0.168***	0.192***	0.114***	0.222***
β_2^X	0.040**	0.012***	0.007	0.028***
β_3^X	0.078*	0.045	-0.064*	0.006
β_4^X	0.351***	0.257***	0.522***	0.335***
ρ^X	0.896***	0.976***	0.867***	0.800***
$\sigma^2(\varepsilon_t^X)$	0.035***	0.005***	0.043***	0.031***
State equation, dependent variable f_t				
γ_0	0†			
γ_1	0.987***			
$\sigma^2(\zeta_t)$	1†			
Observations	250			

* significant at the 10% level;

** significant at the 5% level;

*** significant at the 1% level;

† fixed value.