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# Economic Commentaries

## What determines developments in US long-term interest rates over time?

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# What determines developments in US long-term interest rates over time?

*This report analyses developments in long-term interest rates in the US. We estimate a model where developments in US long-term interest rates are decided by short-term interest rates, long-term inflation expectations, the ISM index (as a proxy for the output gap), and the current account balance as a percentage of GDP.*

*A larger US current account deficit seems to coincide with lower US long-term interest rates. One explanation might be that the US current account deficit reflects the trade surplus in the rest of the world, and that the savings surplus outside the US lowers long-term interest rates, rendering support to Bernanke's "savings glut"-hypothesis.*

International interest rates influence each other, partly because different countries are exposed to the same real economic shocks and consequently react in tandem when interest rates are set (monetary policy), but also because fixed-income markets in different countries provide investors with alternative investment opportunities. An interest rate increase in one country can, via capital market transactions, lead to interest rate changes in other countries.

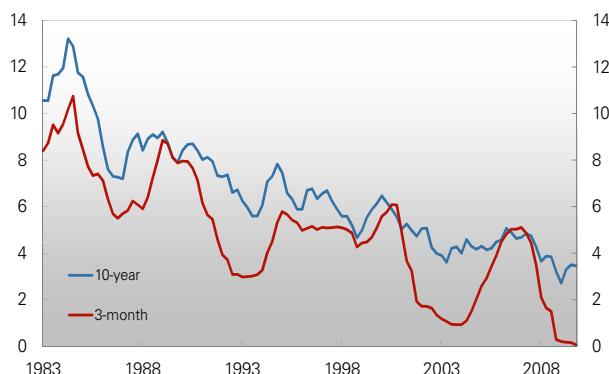
US long-term interest rates in particular have an influence on long-term interest rates in other countries. A simple model where US long-term interest rates are determined by different explanatory factors can therefore be a useful tool in analysing global interest rate developments.

We have estimated a model on data from 1983 Q1 to 2009 Q4. Chart 1–4 shows interest rates on ten-year US Treasury bonds ( $i_{10yr}$ ) and the following four explanatory variables:

Interest rates on three-month US Treasury bills ( $i_{3m}$ ). According to the expectations hypothesis for the term structure of interest rates, long-term interest rates are a weighted average of expected short-term interest rates. Chart 1 indicates that ten-year rates track three-month rates over time. An exception seems to have occurred in the period in the 2000s when the Federal Reserve (Fed) increased the key rate 17 times up to summer 2006. Ten-year Treasury bond rates nevertheless remained at approximately the same level.

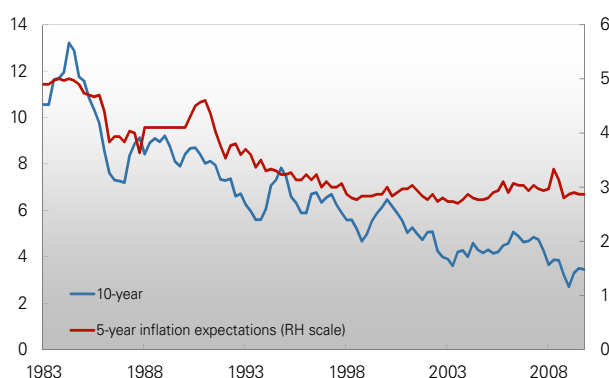
Five-year inflation expectations as measured in a survey by the University of Michigan ( $\pi_{5yr}^e$ ). In the long term,

Chart 1 10-year Treasury bond rate and 3-month Treasury bill rate. Per cent



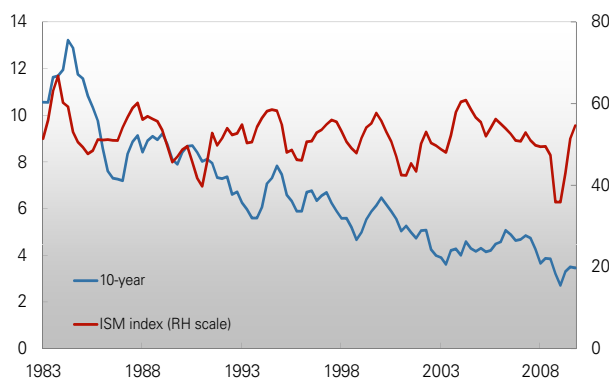
Source: Thomson Reuters

Chart 2 10-year Treasury bond rate and 5-year inflation expectations. Per cent



Source: Thomson Reuters

Chart 3 10-year Treasury bond rate and the ISM index



Source: Thomson Reuters

nominal interest rates will normally reflect inflation expectations (in addition to the long-term real interest rate, according to economic theory determined by the growth potential in the economy). Chart 2 shows that lower ten-year Treasury bond rates coincided with reduced inflation expectations, especially up to the early 1990s when inflation was high and volatile.

The ISM index (*ISM*). The index measures US purchasing managers' assessment of activity in the manufacturing and services sectors. A higher ISM index value reflects higher economic activity and is thus expected to result in higher interest rates. The index is constructed so that 50 indicate a normal level, with normal activity in the economy. In the model, the index has broadly the same interpretation as an output gap<sup>1</sup>. Over time, changes in the ISM index largely coincide with changes in ten-year Treasury bond rates (see Chart 3).

Current account balance as a percentage of GDP (*CA*). The effect of a current account deficit on US long-term interest rates is uncertain. If the current account deficit is generated from other countries' current account surpluses and demand for Treasury bonds, higher US current account deficit may lead to lower US interest rates. Alternatively, if the current account deficit is generated from low US savings and the desire to issue Treasury bonds, higher current account deficit may result in higher US interest rates. Which effect that dominates may vary over time. Chart 4 shows that higher current account deficits coincided with lower long-term interest rates from the early 1990s to the mid-2000s.

The model is expressed by<sup>2</sup>

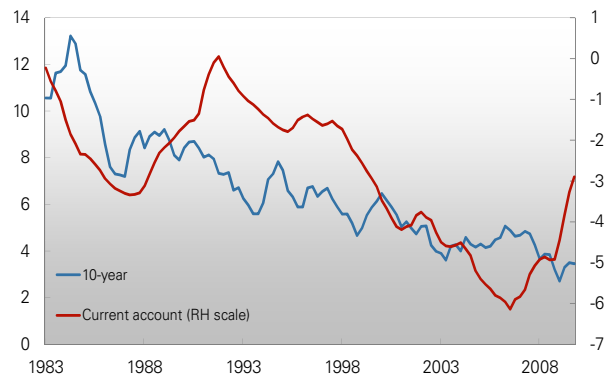
$$i_{10yr} = c + 0,36 i_{3m} + 1,71 \pi_{5yr}^e + 0,11 ISM + 0,18 CA$$

(0,035)            (0,130)            (0,010)            (0,039)

All variables are significant with a positive sign<sup>3</sup>. According to the model, an increase in the short-term interest rate of one percentage point will consequently imply an increase in ten-year Treasury bond rate of 0.36 percentage point. An increase in long-term inflation expectations of one percentage point implies an increase in ten-year bond rates of 1.71 percentage points<sup>4</sup>. A higher ISM index value

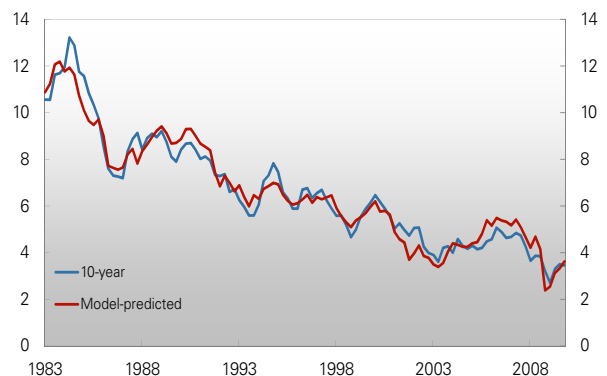
1 However, unlike the ISM index, there are considerable problems in estimating and interpreting the output gap.  
 2 The lagged value of ten-year bond rates is also included as an explanatory variable in the estimation. The model above shows the long-term solution so that the coefficients in front of the different explanatory variables can be interpreted directly. Figures in parenthesis show the coefficient's standard deviation.  
 3 In the first round of the estimation, both current inflation (CPI) and long-term inflation expectations were included in the set of explanatory variables. Current inflation did not prove to have a significant effect on long-term interest rates as long as long-term inflation expectations were also included in the model, rendering support to the view that long-term interest rates primarily reflect long-term inflation prospects and not necessarily current inflation.  
 4 This implies that the so-called Taylor principle is fulfilled, i.e. that the nominal interest rate increases more than the inflation expectations by an increase in the latter. This implies that the real interest rate increases when the inflation expectations increase.

Chart 4 10-year Treasury bond rate and the current account balance as a share of GDP. Per cent



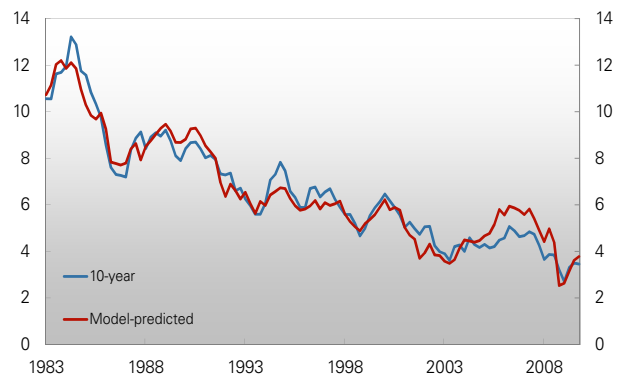
Sources: Bloomberg and Thomson Reuters

Chart 5 10-year Treasury bond rate: Actual and model-predicted with CA. Per cent



Sources: Bloomberg, Thomson Reuters and Norges Bank

Chart 6 10-year Treasury bond rate: Actual and model-predicted without CA. Per cent



Sources: Bloomberg, Thomson Reuters and Norges Bank

and improved US current account balance also coincide with higher long-term bond rates.

Chart 5 shows actual and model-predicted ten-year Treasury bond rates.

Since the mid-2000s, long-term interest rates have been at a low level. One explanation that was emphasised was that the savings surpluses in Asian countries in particular and oil-exporting countries, resulted in increased demand for US government bonds (also called the “savings-glut”-hypothesis)<sup>5</sup>. According to this hypothesis, this pushed down US government bond rates<sup>6</sup>. The US current account deficit has a positive effect on US long-term interest rates in the model. This coincides with the “savings-glut”-hypothesis.

Chart 5 and 6 provides an impression on how important the development in the current account balance might have been. Chart 6 shows the actual and model-predicted ten-year Treasury bond rate when the current account balance is excluded from the model. The model-predicted rate follows approximately the same path as in chart 5, with one exception. When the current account balance is excluded from the model, the rate predicted by the model is just over one percentage point higher in the mid-2000s. One possible explanation is that the “savings-glut”-effect explains approximately one percentage point of the level of the long-term interest rate<sup>7</sup>.

Measures taken by the US government during the financial crisis have led to a considerable increase in government debt in recent years. Higher government debt and deteriorating government finances can, in turn, lead to investors demanding increased compensation in the form of higher interest rates for investing in Treasury bonds. However, we find no stable and significant relationship between US government debt and the development in the US long-term interest rates<sup>8</sup>.

It is especially since 2009 that the US government debt increases considerably without having a significant impact on the US long-term bond rates. This reflects that the demand for US Treasury securities remained high, and a number of market participants were active buyers of US

Treasury bonds. Federal Reserve appeared among other factors as a considerable buyer of US government bonds, mortgage-backed securities and agency debt securities. Also, foreign central banks were active purchasers of US government bonds. Simultaneously, many banks wished to reduce risk and increase liquidity in their balance sheets, both in their own interest and to adapt to future regulations. One method of doing so is to change the composition of the asset-side of the balance sheet by reducing lending and increasing the share of government securities. In additions, households and enterprises increased their financial savings, partly by buying Treasury bonds.

Due to the fact that the demand for US Treasury securities has remained high, high issuance of US Treasury securities have not had a particular effect on the US long-term interest rates. Hence, US government debt obtains no significant effect in the model. If, however, the special conditions that have contributed to maintain a high demand for US Treasury securities are to be reduced in the time to come, the size of the government debt might be of higher importance for the US long-term interest rates than what follows from our model.

5 Ref. Ben Bernanke at the Virginia Association of Economics, Richmond, Virginia on 10 March 2005.

6 See box “Why are long-term interest rates so low?” in Norges Bank’s Inflation Report 1/2005.

7 In principle, the effect of the savings glut on US long-term interest rates could be estimated here. One should nevertheless be careful of reading too much into the results as other models may provide somewhat different results.

8 There is no consensus, in theory or empirically, on the interaction between debt and long-term interest rates. Variations in data, different definitions of debt and dissimilar econometric models make it difficult to compare the various studies. See for example Engen E., & Hubbard R.G., (2004). *Federal Government Debts and Interest Rates*. Working Paper 10681. NBER.