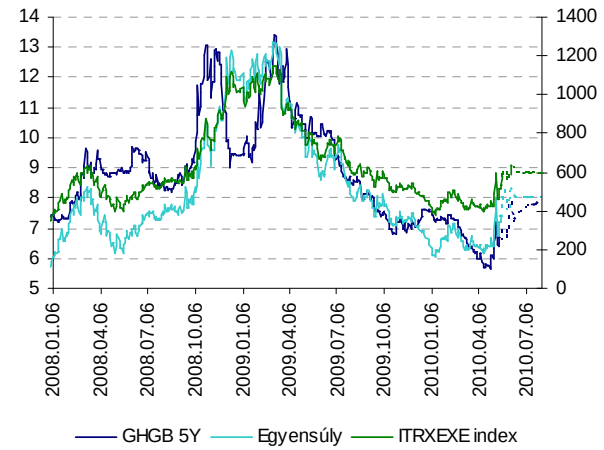
AEGON Asset Management

Monthly analysis – June

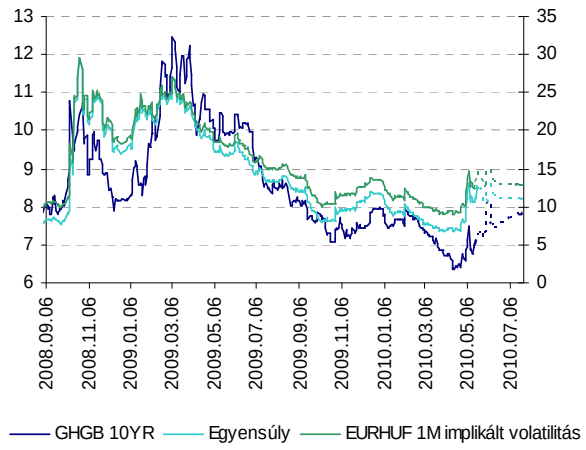
Estimating Hungarian bond yields with an error-correction model

In recent years the yields on 5-year Hungarian government bonds have fairly consistently followed the Itraxx Crossover index, which tracks the premiums on high-risk European corporate bonds. Meanwhile, yields on 10-year annual government securities have been conspicuously in step with the implied volatility calculated from options offered on the EUR/HUF exchange rate. The existence of a close relationship between these factors is also suggested by the high – over 0.9 – correlation coefficient. The empirical findings can be supported by economic theory: under the approach taken by conventional capital-market models, the expected yield is function of the assumed risk. Due to the composition of its basket, the Itraxx Crossover can be regarded as a global barometer of our expectations with regard to the risk premium of instruments with a similar rating to that of Hungarian government securities. The implied volatility, deduced from the EUR/HUF exchange rate, is impacted by both the general perception of risk in the domestic market, and the global appetite for risk.

The Itraxx index and the 5-year bond yield



Implied volatility and the 10-year bond yield



Source: Bloomberg, AEGON Global Asset Management / AAM CEE

How could we describe this relationship using quantitative means? Our aim is to estimate a cointegration equation that implies, based on the interdependency between yields and the explanatory variables observed in the past, an "equilibrium" yield, towards which government securities yields will converge, all other things being equal. The modelling is made more difficult by the integrated nature of the time series. In the case of non-stationary variables such as the indices under discussion, the solution to this is to test for cointegration in order to eliminate false regression and other problems[1] that arise in the course of the forecasting. The cointegration equation typifies the long-run equilibrium relationship between the variables, which, according to our hypotheses, is determined by the global capital-market environment. Subsequently, government bond yields deviate from their long-run equilibrium course by the various country-specific factors and short-term conditions related to supply and demand.

[1] In this case there is no return to the average, and the confidence interval is also wider.

This long-run equilibrium relationship between the 5-year yield and the Itraxx Crossover index is described by the following equation:

$$r_5 = 2{,}44 + 0{,}00934 \cdot Ix$$

while the relationship between the 10-year government securities yield and the implied volatility calculated from the EUR/HUF exchange rate is explained by the equation:

$$r_{10} = 5{,}32 + 0{,}2237 \cdot Iv$$

where r_5 and r_{10} are the yields, Iv and Ix indicate the implied volatility and the value of the Itraxx[2]. Thus, given a state of equilibrium, a 1-percentage-point jump in implied volatility would be accompanied by a 22-basis-point rise in the 10-year yield. A 1-percentage-point change in the Itraxx index precipitates a 0.9-basis-point growth in the 5-year government securities yield. The tendency is clear: an increase in risk brings with it a rise in the expected yield.

The preconditions for applying the error correction model (an identical order of integration and testing for the presence of cointegration, checking the significance of the coefficients and the appropriateness of plus and minus signs) are in place in the case of both estimated models. Since the implied volatility and the Itraxx index can be regarded as exogenous factors, in the course of the correction it is the bond yields that are brought into line. This is also intuitive, as the global appetite for risk has an impact on the Hungarian market, but it is rare for the reverse to be the case. Besides this, it is empirically confirmed by the fact that the coefficients of the error correction equations related to the variables are not significant.

The equilibrium yields determined by the model, today, are 8.2% for 10-year government bonds, and 8% for 5-year government bonds. Based on the analysis, these securities would appear to be overvalued. If the appetite for risk remains unchanged, yields should rise, while if the appetite for risk increases, the securities are likely to underperform. It should be noted, however, that the convergence paths shown in the chart, determined using error correction, are purely of theoretical interest, since any shock that causes a change to the index or to implied volatility will result in a new equilibrium level, and the future development of yields is influenced by other factors apart from the two explanatory variables used in the analysis.

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[2] The estimation of the error correction model for 10-year government security yields and implied volatility was based on the period between 08.01.2004 and 14.05.2010, while in the course of identifying the relationship between the 5-year government security yields and the Itraxx, due to a change in the shape of the yield curve, we used data from the period between 06.01.2009 and 14.05.2010.