Research Paper　　　　　　　　　　　　　　**Economics**

Yields Spread as A Leading Indicator for Economy and Stock Market. The Euro Area Case

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ABSTRACT　　*The present paper analyze the possibility of using the yields spread as an indicator of the developments in the economy and stock market on the case of the euro area. Even though there are some limitations of this analysis undertaken, including the lower length of the statistical data series, the use of a long term interest rate calculated as a weighted arithmetic average of the yields of bonds with maturity of ten years for the euro area countries – it can be concluded that, in the euro area, the yields spread can be used as a leading indicator for the developments of GDP and stock market.*

KEYWORDS: correlation, yields spread, GDP growth, Dow Jones Euro Stoxx 50

INTRODUCTION

The slope of the yields curve is an useful indicator in forecasting the real econonomic activity; at the same time, it can be used as a leading indicator for stock market developments.

The slope of the yields curve represents the difference between the long term interest rate and the short term interest rate; we call this difference the yields spread.

The yields spread has a positive value at the beginning of a phase of economic expansion and negative value at the beginning of a phase of economic contraction. Thus, an inverted yields curve (with negative slope) will be followed in the most cases by economic recession.

For analysis, it can be used the following interest rates: the interest rate on government bonds with a maturity of 10 years (for the long term – available in most countries), the interest rate on interbank deposits with a maturity of 3 months (for short term). It can use the annual change of the real GDP growth as a measure for the economic activity and the annual change of a stock market index as a measure for equity prices developments.

Increasing the short-term interest rate is, broadly, a strengthening of the monetary policy conducted with the aim of reducing inflationary pressures. Conversely, the short term interest rate will fall against the background of lower inflationary pressures. The long term interest rate (for example with a maturity of 10 years) is an expectation of the market regarding the future evolution of the short-term interest rate. The interest rate on long-term government bonds tends to increase in response to strengthening monetary policy; if short-term interest rates recorded growth on a fairly long period and the market expects a reversal of monetary policy cycle then it is possible that long-term interest rate may not rise so much as the short-term interest rate. Strengthening monetary policy by raising short-term interest rates has the impact of reducing the annual growth rate of the real GDP, equity market indices, the annual inflation rate and flatten (or even reversal) of the yield curve. At the same time, expectations of future decrease of short-term interest rate corresponding to the relaxation of monetary policy (in response to slowing economic growth and lower inflation) will generate reduction of the interest rates in the long term.

RESULTS IN THE ECONOMIC LITERATURE ON THE YIELDS SPREAD

In the economic literature, there is a lot of empirical studies that have concluded that the slope of the yield curve is a leading indicator for economic activity.

Estrella and Mishkin (1997), Bernard and Gerlach (1998) concluded on the basis of their analysis that the slope of the yield curve was a good predictor of recessions in the US since 1950, with one exception in 1967.

On the basis of an empirical analysis, Estrella and Hardouvelis (1989, 1990 and 1991) showed the possibility of using the yield curve as a predictor for real growth in consumption, investment, and Gross National Product.

In their work, Bordo and Haubrich (2004) have used a sample of the data with length from 1875 to 1997 on the US case and have concluded that the leading quality of the yields spread for economic activity of this country has varied over time. Baltzer and Kling (2005) reached the same conclusion in their analysis on Germany by using empirical statistical data from the period 1870 – 2003.

THE CORRELATION BETWEEN THE YIELDS SPREAD AND THE ANNUAL VARIATION OF REAL GDP IN THE EURO AREA

To determine the correlation between the yields spread and annual variation of real GDP in the euro area we used the following data series with a quarterly frequency:

- EURIBOR3m = the interest rate EURIBOR for euro interbank deposits with a maturity of three months;
- EURBOND10y = the average interest on government bonds with a maturity of 10 years issued by euro zone states. This interest rate is used as the reference for the criteria of nominal convergence rates of the euro area countries;
- EURSPREAD = EURBOND10y - EURIBOR3m;
- EURGDP = the annual variation of real GDP in the euro area.

Figure 1
The interest rates, their spread and the annual variation of real GDP in the euro area
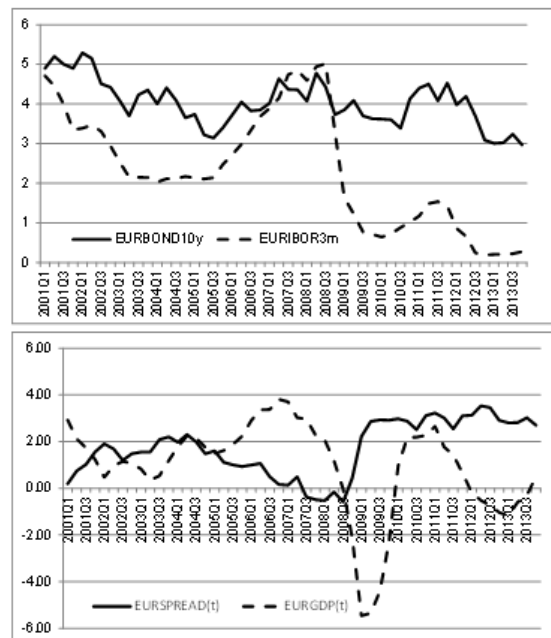
Data source: European Central Bank Statistical Data Warehouse

The data sample used is from the first quarter of 2001 to the fourth quarter of 2013.

The series of data mentioned above are shown in Figure 1.

For the correlation coefficient we used the following formula:

$$C = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}},$$

where: C = the coefficient of correlation, x and y are the two variables and $\bar{x}$ and $\bar{y}$ are their averages.

We used the lags of the yields spread for the calculation of the correlation coefficients given that the yields spread has an impact with delay on the real GDP dynamic. The results are presented in Table 1.

Table 1
Correlation coefficients C(j) between the yields spread and the annual change of the real GDP in the euro area

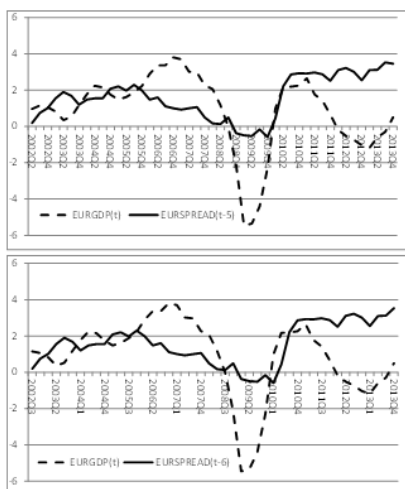| j quarters	C(j)
1	-0.25
2	-0.05
3	0.13
4	0.24
5	0.27
6	0.26
7	0.23
8	0.19
9	0.13
10	0.06
11	0.00
12	-0.05

Quarterly data sample (the first quarter of 2001 to the fourth quarter of 2013)

C(j) = the coefficient of correlation between the yields spread with a lag of j quarters and the annual variation in real GDP real at the moment of time t.

From the economic point of view, we are interested for the purpose of analysis to find positive coefficients of correlation between the two variables and as larger as possible.

Thus, the conclusion of the results presented in Table 1 is that, in the euro area, the change (increase or decrease) of the yields spread at the present moment of time will generate a maximum increase or decrease of the annual rate of change in real GDP after a period of 5 – 6 quarters. (see Figure 2).

Figure 2
Interest rates, yields spread and the annual variation of the real GDP in the euro area


Notations in Figure 2: EURSPREAD(t-5) = the yields spread with a lag of 5 quarters; EURSPREAD(t-6) = the yields spread with a lag of 5 quarters; EURGDP(t) = the annual change in GDP at the present time t.

THE CORRELATION BETWEEN THE YIELDS SPREAD AND THE ANNUAL CHANGE IN THE DOW JONES EURO STOXX 50
In order to study the quality of the yields spread as an anticipatory indicator for euro area stock market developments, we proceeded similar to the previous paragraph calculating the correlation coefficient between the yields spread and the annual change in the Dow Jones Euro Stoxx 50.

Figure 3 Yields spread and the annual change in the Dow Jones Euro Stoxx 50
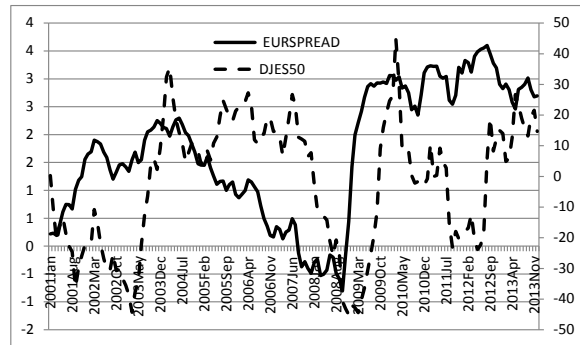
Data source: European Central Bank Statistical Data Warehouse

We used the following data series with monthly frequency:

• EURSPREAD = EURBOND10y - EURIBOR3M;
• DJES50 = the annual change in the Dow Jones Euro Stoxx 50 index.

The data sample used is from January 2001 to December 2013.

Above data series are presented in Figure 3.

The results for the degree of correlation between yields spread and stock prices index in the euro area are presented in Table 2.

Table 2 The correlation coefficients C(i) between the yields spread and the annual change in the Dow Jones Euro Stoxx 50

i months	C(i)
1	0.17
2	0.22
3	0.26
4	0.30
5	0.34
6	0.36
7	0.37
8	0.38
9	0.39
10	0.37
11	0.37
12	0.36
13	0.34
14	0.33
15	0.31
16	0.30

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17	0.29
18	0.29
19	0.29
20	0.29
21	0.29
22	0.28
23	0.27
24	0.25

Monthly data sample (January 2001 – December 2013)

$C(i)$ = the correlation coefficient between the yields spread with a lag of i months and the annual change in the Dow Jones Euro Stoxx 50 at time t.

In Table 2, the highest values of the correlation coefficient between the yields spread and the stock market index is for $i = 8$ and $i = 9$. Under these conditions, it can be said that the euro area yields spread has a maximum leading impact on stock prices developments after a period of 8 – 9 months. (see Figure 4)

Figure 4 Yields spread and the annual change in the Dow Jones Euro Stoxx 50
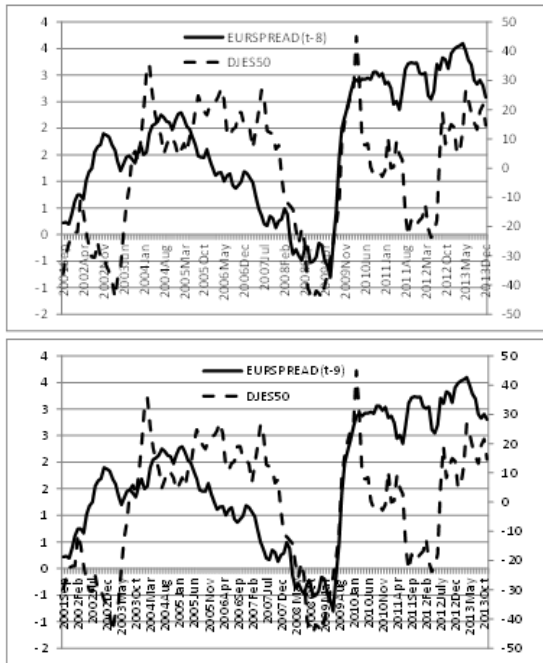
Notations in Figure 4:

EURSPREAD (t-8) = yields spread with a lag of 8 months; EURSPREAD (t-9) = yields spread with a lag of nine months; EURGDP (t) = annual change in the Dow Jones Euro Stoxx 50 at the present time t.

So sharp changes in the yields spread (increase or decrease) is transmitted much faster to the evolution of stock prices than to the economic activity.

CONCLUSIONS AND LIMITATIONS OF THE ANALYSIS
The main conclusions of this paper are:
- the euro area yields spread has a maximum leading impact on real GDP in the euro area after a period of 5 – 6 quarters;
- the euro area yields spread has a maximum leading impact on equity prices developments after a period of 8 – 9 months.

Conclusions drawn from this work should be considered taking into account the limitations of the analysis undertaken in studying the quality of the yields spread for leading the economic activity and stock prices developments in the euro area:

- the available data series used has a length much shorter than in other monetary unions (such as US). Under these conditions, the time period resulted from the correlation coefficients analysis should be seen with caution;
- the euro area does not issue sovereign bond yet. Although many countries are now seeking start issuing joint euro zone government bonds, there are strong opponents including Germany which believes that fiscal responsibility could fall more if this bonds are issued. Under these conditions, statistical data on long-term bond yields in the euro area are not resulting from market supply and demand but is calculated as a weighted arithmetic average yield of ten-year yields of the sovereign bonds issued by each countries from euro area.

REFERENCES [1]Baltzer, Markus and Kling, K. (2005), „Predictability of future economic growth and the credibility of different monetary regimes in Germany, 1870-2003", Working Paper, University of Tubingen. | [2]Bernard, Henry and Gerlach, Stefan (1998), „Does the term structure predict recessions? The international evidence", International Journal of Finance and Economics 3, pp 195-215. | [3]Bordo, Michael D. and Haubrich, Joseph G. (2004), „The yield curve, recessions and the credibility of the monetary regime: Long run evidence 1875 – 1997", NBER Working Paper 10431. | [4]Estrella, Arturo and Hardouvelis, Gikas (1989), „The term structure as a predictor of real economic activity", Federal Reserve bank of New York Research Paper. | [5]Estrella, Arturo and Hardouvelis, Gikas (1990), „Possible role of the yield curve in monetary analysis" – published in Intermediate Targets and Indicators for Monetary Policy: A critical Survey, Federal Reserve Bank of New York. | [6]Estrella, Arturo and Hardouvelis, Gikas (1991), „The term structure as a predictor of real economic activity", Journal of Finance 46, pp 555-576. | [7]Estrella, Arturo and Mishkin, Frederic S. (1997), „The predictive power of the term structure of interest rates in Europe and the United States: Implications for the European Central Bank", European Economic Review 41, pp 1375-1401. |