STOCKS AND BONDS CORRELATION IN BULGARIA SINCE 2001

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Abstract

The correlation between the two main investment asset classes of shares and government securities is an important component in the portfolio management investment analysis. The prices of shares and government bonds are influenced by a number of fundamental factors that define the magnitude and the shift of the correlation coefficient.

Key words: *correlation, stock market, yield on government bonds, fundamental factors, risk premium*

1. INTRODUCTION

The correlation between the stock prices of public companies and prices of government bonds, traded in the capital market in a country, is one of the most important investment indicators that influence the investment decision making process and the construction of a diversified portfolio. The portfolio theory accepts the basic assumption that the returns between different financial instruments and asset classes are not a constant value. In certain periods of time, both the level of correlation between instruments and the general shift change. Trends in correlation between assets and the changes in it have a significant impact in building and rebalancing an investment portfolio.

In Bulgaria so far there have not been in-depth analyses that examine the correlation between the returns of two asset classes over the years - stocks and fixed income instruments such as government bonds. This can be explained mainly with the specifics of the stocks and government bonds markets, which over the years have been characterized by varying degrees of activity, dynamics and liquidity. The main restrictions of the Bulgarian financial markets are:

- Low liquidity of the stock market makes it susceptible to the dynamics of the capital inflows and outflows, and to the emergence of big buyers or sellers of stocks.
- The total market capitalization of the Bulgarian stock exchange is EUR 3.5 bn. The market does not represent the economic situation of the national economy and does not reflect all economic trends in the country.
- The small market capitalization of the stock market does not attract many foreign portfolio investors. The biggest holders of Bulgarian equities are mainly Bulgarian entities.
- The total amount of the issued government bonds surpasses the total market capitalization of the equities.
- The holders of the Bulgarian government bonds are both Bulgarian and international investors.
- The Bulgarian government has a relatively short history in active bond issuance. The first issues had a maturity of maximum five years.

These limitations of the Bulgarian financial market should be taken into consideration in regards to the results of the current research.

As opposed to Bulgaria, around the world there have been many studies seeking both the degree of correlation between the two asset classes and the shift of this correlation, as well as its correlation with other economic indicators such as shift in gross domestic product, inflation, interest rates, etc.

According to a study (E. Rankin, M. Idil, 2014) for most of the 20th century the correlation between stock prices and yields on government bonds in developed countries has changed in different directions, but overall has been negative. Since the late 90s of the 20th century the correlation between the two asset classes has become positive, increasing steadily especially in the last few years after the

growth of the global financial and economic crisis after 2008. The strengthening of the positive correlation especially in recent years can be explained with a number of factors:

- Effects of the financial crisis on the expected recovery of the world economy, as the increased level of economic uncertainty and stability of the financial system affects both stock prices and government bonds. In the beginning of the economic crises the prices of all the financial assets moved in one direction.
- The policies taken by the central banks (USA, Japan, UK, China, European Central Bank) on monetary expansion, known as quantitative easing policy, have the effect of significant liquidity infusion in financial markets, which reflects positively the prices of financial instruments.

Unlike the developed financial markets, in Bulgaria there have been several restrictive conditions that affect the dynamics of trade and prices of financial instruments:

- Underdeveloped stock market, characterized by low liquidity and gradually declining trading volumes;
- Activation of the government bonds market only in the last 4-5 years when the state budget switched into chronic deficit mode. The government bonds market is dominated mainly by commercial banks and institutional investors, which can be characterized more as passive holders of government bonds;
- Limited issuance activity by the Bulgarian government in the early 21st century, when a policy of public debt reduction was undertaken in the terms of a budget surplus;
- Lack of monetary policy by the central bank to influence the level of interest rates;
- Institutional investors in Bulgaria have not adopted a policy of investment choice between the two asset classes - stocks and government bonds. Therefore, in the short term with increasing the uncertainty of economic growth, the escape of the shares does not transform automatically into increased demand for government bonds, and vice versa.

2. FUNDAMENTAL FACTORS DETERMINING THE DYNAMICS OF THE STOCK MARKETS AND THE YIELDS ON THE GOVERNMENT BONDS

Yields on long-term bonds of a country is linked to the risk-free return shift (yield on long-term government bonds of the USA and/or Germany) as well as allowance for risk premium associated with the socio-economic perspective for the country itself, and uncertainty regarding future shifts in the level of real interest rates and/or inflation.

Unlike public debt, share prices of public companies are defined by the systematic and non-systematic factors. However, for the shares the assumption may be accepted that their prices are based on expectations of future cash flows from operations in the form of dividends or discounted net cash flows. The discount rate with shares is associated with risk-free return but also additional risk premium to compensate investors for the risk they take when investing in stocks.

To simplify the analysis, it can be assumed that on a fundamental base, the main factors determining the shift in stock prices and the yield on government bonds are economic growth and the inflation rate. The latter on their turn affect investors' expectations for the value of future dividends and dynamics of interest rates. Stronger economic growth suggests better outcomes for companies and correspondingly higher dividends, as well as strengthening of inflation processes, which implies an increase in interest rates.

Uncertainty regarding the shift of these leading variables affects the prices of shares and government bonds through shift in risk premiums associated with them. For example, the increase in the risk of decrease in gross domestic product, increases the risk premium of shares, which reflects in the decrease in their prices. On the other hand, expectations for decrease in inflation lead to decline in the

risk premium on government bonds, which mean an increase in their prices and a corresponding decrease in profitability.

Changes in fundamental factors do not automatically lead to shift in prices of shares and government bonds. For example, expectations of an increase in inflation could result in decrease in the prices of fixed income instruments, but the impact on stock prices is ambiguous. Some companies would benefit from it, respectively their stock prices would increase, others would lose, but on the third the impact would be negligible. For this reason, in shift in the fundamental factor inflation, the sign of the correlation between the two asset classes is unclear.

In other cases, a shift in the correlation of assets theoretically can be more expected in:

- increase in uncertainty about the economic perspectives would increase the correlation because the risk premium for the shares increases, which has the effect of a drop in stock quotes, and at the same time the premium in fixed income instruments decreases, which has the effect of decreasing their prices and increasing profitability;
- increase in uncertainty about future inflation would decrease the correlation between the two asset classes, causing divergent price movements.

Movement between stock prices and yield on government bonds may be different in the short and long term. In the short term, it can be expected that the deterioration of fundamental factors such as increase in uncertainty over economic growth, investors would avoid shares and will prefer low-risk assets such as government bonds. In the long run, however, the correlations are not so clear and they represent a research interest.

3. RESEARCH IN THE FIELD

International economic literature contains a number of analyses of the correlation between equities and fixed income instruments. Some authors (Shiller, Beltratti, 1992) claim that there has been a negative correlation for an extended period of time between the two asset classes in the United States until 1989, mainly due to changes in key interest rates.

Others (Andersson, Krylova, 2008) believe that the observed correlations are determined by inflation expectations for the respective periods of observation. More recent studies (D'arcy, Poole, 2010) show that for the period 2001-2010, in the USA the positive data on unemployment have a positive impact on the prices of shares and government bonds. Li (2009) examines the correlations and concludes that uncertainty about expected inflation and the level of real interest rates result in observation of a stronger negative correlation. A study of d'Addona and Kind (2006) shows that more frequent change in annual inflation is associated with reducing the strength of correlation between stocks and government bonds.

According to study of Reserve Bank of Australia from 2014, the correlation between stock prices and the yield on government bonds in the USA was negative and comparative with low levels during most of the 20th century. In the 70s and 80s of the 20th century the correlation becomes highly negative, which is explained by the high level of inflation during the period. However, during certain periods observations show that correlation has positive values.

It adopts strong positive values during the Great Depression of the 30s of the 20th century, during the recession of the US economy in the 70s of the 20th century, during the stock market crash in October 1987, during the debt crisis in Asia and Russia in the late 90s, during the recession in the first years of the 21st century, and in the years around and after the last global financial economic crisis. Each of these periods of positive correlation is associated with increased volatility in stock markets and a deterioration of basic macroeconomic indicators.

It can be assumed that it is associated with an increased risk for corporate profits, respectively, expected dividends for shareholders, increasing the risk premium for shares and reducing their value. Prices of government bonds also decrease due to the reduction in the premium over the risk-free rate,

leading to increase in their profitability. This may explain the strong positive correlation during these periods.

In 2010 and 2011 the correlation dropped to zero levels, which coincides with the period of starting of quantitative easing programs by the US Federal Reserve, which result in lower yields on government bonds and raise in stock prices.

4. RESEARCH METHODOLOGY

Basic guidelines on the research methodology of the correlation between the movement of stock prices and the yield on government bonds (GB) are connected with the research of the correlation between the shift in the stock market, as measured by the movement of the main stock index in Bulgaria, SOFIX, and shift in yields on long-term Bulgarian government bonds.

Data on yields on government bonds represent the average yield on achieved primary sale auction of government bonds, according to the Ministry of Finance from 2001.

The data from the US capital market give rise to a working hypothesis on Bulgaria that since the beginning of the 21st century the correlation between stock prices and yields on government bonds should be similar to that observed in the USA, namely strengthening during the first years of the century, gradually decreasing until 2007 and adopting a negative and then again adopting positive values after 2008.

5. RESULTS

The results on the researched correlation between the movement of the share prices of public companies in Bulgaria, measured by movement of the SOFIX index and the yield on long-term government bonds are affected by the following restrictive conditions:

- Given the structure of government bonds, the yield of five-year government bonds was used in 2001, for 2002-2003 - seven-year government bonds, then the yield on 10-year government bonds;
- The number of primary auctions conducted over the years is relatively limited between 7 and 10 auctions per year;
- The Bulgarian stock market cannot be characterized as effective and cannot be compared directly to the developed stock markets.
- The performance of the Bulgarian stock market is measured by the movement of the stock index SOFIX.

Figure 1. Yield of the Bulgarian Government Bonds

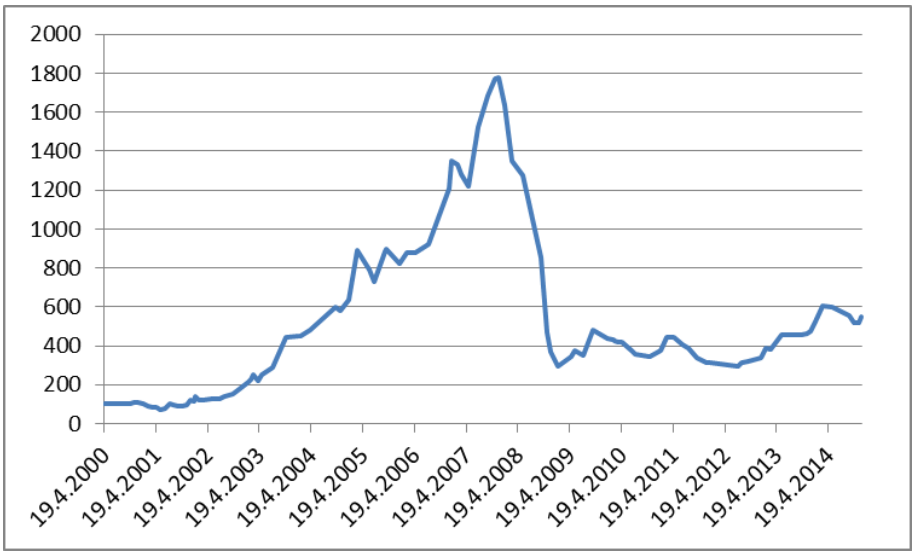


Source: author's calculations

Data over the years have shown a continuous downward trend in yields on long-term government bonds. For example, if at the end of 2002, the yield on seven-year government bonds was about 7.17%, in 2003 it was already around 5%. Yields on 10-year government bonds also dropped in the period between 2004 and the autumn of 2008. In late 2008, after the bankruptcy of US bank Lehman Brothers, the yield on 10-year government bonds began to rise, the trend was reversed only in 2010, when the results of the actions of expansionary monetary policies of central banks around the world began to be noticed.

On the other hand, data on dynamics in the stock market show a clear trend of growth for the period 2001 - 2007, when the top index of 1952 points was reached. There followed years of strong decline, and in 2010-2014, the index fluctuated in a range of 350-600 points without a clear long-term trend.

Figure 2. Dynamics of the Bulgarian Stock Exchange

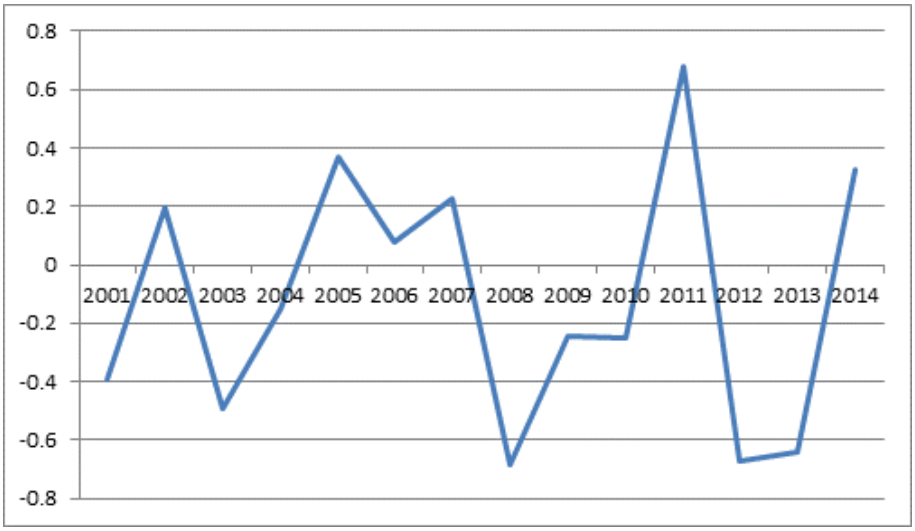


Source: author's calculations

Data from the correlation analysis show that for the period 2001-2014, the years with negative correlation dominated. Positive values are observed mainly in the strong stock market years (2005, 2006 and 2007). The shorter period of positive correlation, unlike the one in the USA, can be explained mainly by the inefficiency of the Bulgarian capital market. Dependencies identified in the US market, that in the years of the financial economic crisis the correlation becomes positive have not been confirmed, in Bulgaria it remains negative.

Some changes in the direction were observed in 2011 and 2014, when the positive values can be explained by the impact of the quantitative easing policies conducted by the central banks around the world.

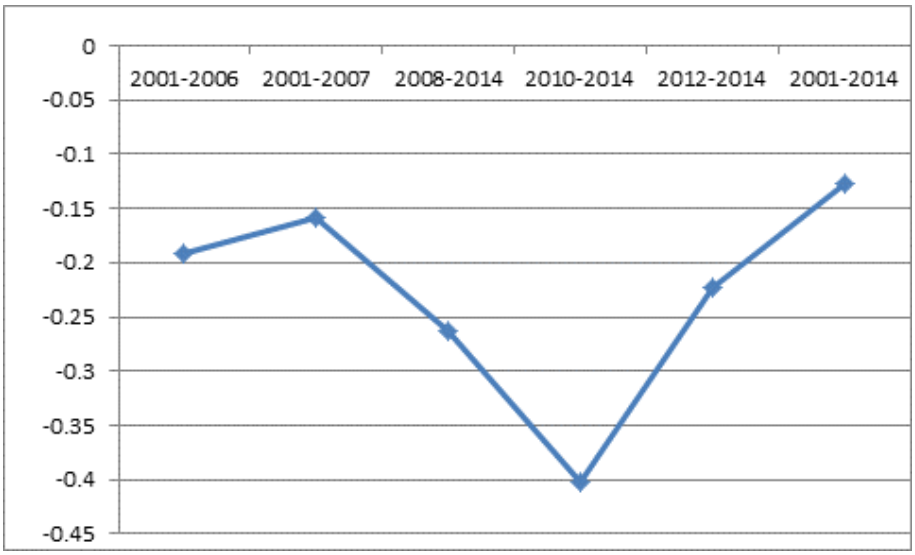
Figure 3. Correlation between shift in shares prices and yields on government bonds in Bulgaria in the period 2001 – 2014



Source: author's calculations

To expand the analysis, also calculated are correlation coefficients for certain sub-periods that are presented in Figure 4. For each of these longer periods a negative correlation coefficient was observed, which value increased most during the period 2008-2014 confirming the effect of factors for increasing uncertainty about the country's economic development. For the whole period 2001-2014, the correlation adopted negative values, which coincided with the developed markets dependencies for an extended period of time.

Figure 4. Correlation between shift in shares prices and yields on government bonds in Bulgaria for certain periods of time.



Source: author's calculations

6. CONCLUSION

The data on the correlation between the two asset classes confirm the basic influence of the fundamental determinants of stock prices and government bonds under restrictive conditions for the inefficiency of the Bulgarian capital market. The correlation between the two assets during the period 2001-2014 was negative, which corresponds with the observations from the international capital markets. The direction of the correlation coefficient is not surprising. It confirms the main assumption that the returns on stocks and government bonds represent two different asset classes with different characteristics. The inclusion of the both assets in a portfolio should increase the total diversification of the whole portfolio.

Policies of the central banks around the world led to a change in the ratio direction. The expansionary monetary policies undertaken by the central banks have led to a gradual surge in the prices of the stocks and bonds.

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