GLOBAL FACTORS INFLUENCING GOVERNMENT BOND MARKET COMOVEMENTS

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Abstract

The aim of this theoretical paper is to discuss the researches implemented in government bond and other financial markets, and to identify the most important global factors, influencing government bond market comovements. Even though, there exist various groups of factors, influencing government bond markets, this research is concentrated in the existence of global factors. If the influence of these factors is significant, investors cannot hedge from this influence by diversifying. The research in this paper is implemented by using the analysis, synthesis and systemization of the researches and other scientific literature. This research uses a novel approach by excluding and the most common global factors, influencing government bond market comovements and discussing the measures to assess the influence of these factors on the comovements.

The research resulted in identification of 5 global factors, most commonly disclosed by other researchers as influencing government bond market comovements: global risk aversion, global market portfolio, money market uncertainty, commodity market uncertainty and economic policy uncertainty, with the most important factor being global risk aversion. The existence of these factors reduces the benefits from international diversification: if the markets are strongly influence by the same global factors, the deterioration of these factors will influence the investment portfolio in the same way.

Keywords: government bond markets, global factors, comovements, investment portfolio diversification.

JEL Codes: F36, G11, G15.

Introduction

Large body of academic literature is intended to disclose the interaction between financial markets and the factors, influencing it. Nevertheless, this literature is mostly designated to equity markets, leaving bond markets much less investigated. The motivation to analyze bond markets has particularly strengthened within the resent years, under the conditions of Sovereign debt crisis in Europe. Moreover, government bond markets, being the epicenter of the attention, still tended to receive less researchers’ attention not only in theory, but also because the situation made investors in government bond markets to re-think their investment strategies due to the fact that these markets could no longer be seen as risk-free. This is especially important in the context of unstable economic environment.

Different authors in the field analyzed the concept of financial market comovements with market comovements considered to be the influence of one market on another, or a constant mutual dependence between two markets (adapted by the author, based on Forbes and Rigobon (2001)). Wang et al. (2010) state that the comovements between financial markets is a fixed effect of one market on another, without excluding the direction of the impact.

Even though the government bond market comovements has been confirmed in multiple markets (in Asian countries by Batten et al. (2004); in G7 countries by Manganelli and Wolsiwjk (2009); or in EMU countries by Abad et al. (2009), Brennan et al. (2011)), the factors, influencing these comovements are still questioned. If the factors, influencing government bond market comovements, are specific to every country, can the national governments be responsible for controlling them? And contrarily, if the global factors are the major ones, influencing government bond market comovements, does a collapse of global financial system means the collapse of government bond markets and their infrastructure? These questions require investigation to be answered.

The novelty of the research comes from the fact that, to the best knowledge of the author, the previous researches in the field were not designated to identify the set of global factors, influencing government bond market comovements, as well as their measures. Even though separate authors have implemented their researches with similar purposes, these researchers mostly included one or few global factors and concentrated on country characteristics. Moreover, the research connects the risks, government bond markets are exposed to, with the factors, representing these risks. It should be highlighted that even if the global factors are identified and excluded, neither separate governments, nor international regulatory bodies are unable to control for these factors in order to change the tendencies of government bond market comovements in global environment.

This paper is expected to benefit investors in government bond markets, enabling them to systemize the main global factors, influencing the comovements between the markets in global environment. Synthesis of the factors, excluded by previous authors, should as well be beneficial for governments, planning their emissions, as well as regulatory institutions, determining the valuation criteria and the common policies for the regional/global government bond market regulation.

The object of this paper are the global factors, influencing government bond market comovements.

The aim of this theoretical paper is to discuss the researches implemented in government bond and other financial markets, and to identify the most important global factors, influencing government bond market comovements.

The main methods used in this paper are the analysis, synthesis and systemization of the researches and other scientific literature.

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This paper is destined for the evaluation of the latest researches of government bond market comovements and the factors, influencing them, with the particular concentration on global factors. Firstly, the risks, that government bond markets are facing, are identified. Secondly, different groups of factors, influencing government bond market comovements, are presented. Thirdly, the group of global factors is excluded and a set of separate factors is presented together with their measures. Conclusions are made in the end of the paper.

Theoretical Background

Multiple analyses in the field are designated to assess the influence of different factors on government bond yields or yield spreads in a particular country (see, for example, Forbes and Chinn, 2003; Rose and Spiegel, 2009; Bunda et al., 2009; Didier et al., 2012; Menși et al., 2014; Paniagua et al., 2015; among others). Factors, influencing government bond markets, gained the researchers’ attention mostly because the awareness of these factors would enable forecasting the government bond market yields and/or avoiding extreme volatilities in the markets. Hawkesby et al. (2005) notice that the analysis of comovements in market prices (and/or returns) captures both market perceptions of direct exposures and exposures themselves to similar external factors. Knowledge of these common factors could help identifying the potential channels for financial stability threats, such as through interlinkages or common vulnerabilities between the markets.

It is commonly assumed that liberalized markets show higher degree of comovements with global factors (Bekaert and Harvey, 2000). Moreover, in an increasingly connected world, real variables can start comoving due to greater trade, coordinated policies, and other common factors. Alternatively, growing specialization could lead to growing divergence of economic cycles. Bracker and Koch (1999) argue that the degree of integration across international financial markets depends upon the degree of economic integration across the countries involved, while Bekaert et al. (2002) find that increase in market integration take substantial amount of time that markets represent different transition speeds.

As it has already been notices, the analysis of the factors, influencing government bond markets, is not a novel approach to academic literature. Even though the factors excluded differ upon the markets investigated, research periods, data frequency and the methods, used for the assessment, common tendencies can still be excluded.

The identification of the factors, influencing government bond markets and their comovements, is commonly implemented by excluding the risks these markets undertake. This approach was taken by Gapen et al. (2005), Manganelli and Wolswijk (2009), Fang (2012), Paniagua et al. (2015) and other authors, excluding credit risk, liquidity risk and global risk as the main risks, affecting government bond yields. Gapen et al. (2005) found strong evidence that credit risk is the main risk, influencing government bond market yields, but these yields are also influenced by liquidity risk and global risk. Contrarily, Manganelli and Wolswijk (2009) relate government bond yield spreads with credit and liquidity risks, determined by the global risk. Geyer et al. (2002), Codogno et al. (2003), Bernoth et al. (2003) state the main factors influencing government bond yields and their spreads being general risk, liquidity, and fiscal factors.

Nevertheless, since this research is concentrated on the factors, influencing government bond markets and the comovements between them, the other common approach within the recent researches is the exclusion of global and country-specific (domestic) factors, influencing government bond markets (Bunda et al., 2009; Hilscher and Nosbusch, 2012; Cronin, 2014; Piljak, 2013).

Under the situation of Sovereign debt crisis in European countries, the researchers in the field concentrated their analyses on the global factors, influencing all the financial markets, so government bond markets as well. The importance of these factors has already been identified by various researchers (Forbes and Chinn, 2003; Weigel and Gemmill, 2006; Bunda et al., 2009; Miyama et al., 2012; Paniagua et al., 2015; among others). Weigel and Gemmill (2006) argue country-specific factors accounting for only a small part of explained variance in financial market returns and comovements, while global conditions explain a big share of it. The importance of the global factors has also been stressed in the study of Codogno et al. (2003), proving them to be very important in determining government bond yield spreads during the Sovereign debt crisis. Gonzalez-Hermosillo (2008) showed that if global financial factors are taken into account, contagion from emerging markets is very small or essentially does not exist, concluding that the creditworthiness of the markets investigated is mainly driven by a set of global factors.

The results, obtained by the other researchers in the field, show that the comovements between financial markets have a tendency to strengthen, with the exact factors, influencing these comovements, being under discussion. Nevertheless, as multiple researchers agree, the factors, influencing government bond market comovements, could be divided in to country-specific and global, even though the significance of either group of factors is arguable. The first group, global factors, are identified and analysed further in this paper.

Research Results

Different authors found that financial markets and their returns/yields are strongly influenced by global risk factor (Arghyrou and Kontonikas, 2011; Favero et al., 2010; Manganelli and Wolswijk, 2009). The factor, commonly identified single, actually can include a group of factors, jointly representing global financial situation. According to ECB (2007), estimating the degree of global risk aversion at any point of time is important from a financial stability perspective because past episodes of sudden rises in risk premiums, sharp declines in market liquidity and asset prices are often associated with investors’ loss of risk appetite.
Even though various authors used the concepts of global risk sentiment (Miyama et al., 2012), global risk appetite (Gai and Vause, 2004; Illing and Aaron, 2005), global risk variable (Fang, 2012) or global market uncertainty/volatility (Perego and Wermeulen, 2013), the author of the paper agrees with the researchers, identifying the component as global risk aversion1 (Manganelli and Wolswijk, 2009; Codogno et al., 2003; Paniagua et al., 2015; among others). Coudert and Gex (2008) define it as the price of risk – a global decisive factor in the formation of asset prices, making it possible to reflect investor sentiment with regard to risk in the constantly changing environment. Figure 1 represents how the global risk aversion depends not only on the degree, to which investors dislike uncertainty but also on the overall level of uncertainty in financial markets.

![Figure 1. Uncertainty and Global Risk Aversion](source: adapted by the author, based on ECB (2007))

The objective uncertainty, coming from the environment, is divided into perceived uncertainty and actual risk. Agents in the market (investors) perceive the objective uncertainty and form their attitudes towards risk aversion. These attitudes are communicated to market environment and the overall set of the attitudes from different investors, together with the actual risk, coincide and form the observed risk aversion in financial markets. According to this risk aversion, the risk premium on financial assets is determined. The overall process and the determinants make the risk premium on financial assets a combination of objective and subjective measures, rather than a purely objective concept. In other words, the risk premium for different asset prices is influenced by the degree of global risk aversion, as a combination of investors’ attitudes and the uncertainty in global environment. The degree of investors’ risk aversion is commonly assumed to be fairly stable, while global risk aversion is considered to be increasing under market uncertainty.

The results, obtained by Barrios et al. (2009), showed the existence of strong positive relationship between global risk aversion and government bond risk premium. Fang (2012), Paniagua et al. (2015) revealed that global risk aversion play an essential role in explanation of government bond yield spreads. Gonzalez-Hermosillo (2008) proved that shocks in a particular market may impact international investors’ risk aversion through the rebalancing of their portfolios – investors would firstly abandon the most liquid markets where exiting is less costly.

Global risk aversion is commonly measured as the volatility, common to all the economies. Illing and Aaron (2005) argue that risk aversion incorporates both investors’ attitudes towards the risk and their perceptions of risk, while Paniagua et al. (2015) state that changes in investors’ risk aversion cannot be observed directly. Manganelli and Wolswijk (2009) calculate the spread between the US corporate and government bond yields as a proxy for global risk aversion while Geyer et al. (2002), Calvo (2003) use the US high-yield corporate bond yield for the same purpose. Other common way to measure global risk aversion is to use the indices that, as Illing and Aaron (2005) notice, assess risk aversion either by looking at specific market aspect or by combining information from various markets into a composite measure. Baur and Lucey (2009) highlight that increase in aggregate separate investors’ risk aversion increases volatility and global risk aversion. If increased volatility in global financial markets is directly related to global risk aversion, global risk aversion may be measured by the volatility index.

One of the most commonly used volatility indices is the Chicago Board Options Exchange Volatility Index (VIX) (Kalotychou et al., 2014), representing the implied volatility of S&P 500 index options (Caceres et al., 2010).

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1 Risk aversion is one of the main assumptions of Utility Theory. It is the unwillingness of investors to implement a riskier transaction with questionable payoff and the choice of a less risky transaction even if the latter will bring the smaller payoff. Risk averse investor intuitively prioritizes less risky and less profitable transaction. This decision is connected with the decreasing marginal utility and explains the avoidance of high risk (see Robin, 1999).
According to Mensi et al. (2014), VIX is driving equity returns in a bear market but this relationship is insignificant bulls market. Coudert and Gex (2008) identify VIX as a direct meter of fear. One of the VIX’s drawbacks is the fact that VIX is on average based on few observations (volatility smile), rather than all possible volatility-price combinations (Gonzalez-Hermosillo, 2008). However, the simplicity does not significantly reduce its power when compared to other indices.

Since global financial market conditions, influencing government bond markets, are not only reflected by the market volatility, global market situation can be also represented by other factors, with the choice of the factors being constrained by the need to have a small set of sound variables. The set of factors, excluded as influencing government bond market comovements in different researches, and systemized by the author of this paper, can be seen in Figure 2.

The second global factor, excluded by different authors as influencing government bond markets and their comovements, is money market liquidity. Gonzalez-Hermosillo (2008) states that under ceteris paribus increased money market liquidity should promote international investors to invest in riskier assets. Contrarily, higher interest rates would increase the costs of borrowing and the probability of default for creditors. Kashiwase and Kodres (2005) use a 3-month-ahead federal fund futures’ rate to measure money market liquidity and monetary conditions. This measure affects monetary conditions in two channels. Firstly, a decline in the federal funds rate indicates lower borrowing costs and increasing liquidity in the economy. Secondly, it reduces the returns of government bonds. Forbes and Chinn (2003) use short-term interest rates as a proxy for money market liquidity, while Gonzalez-Hermosillo (2008) uses the difference between 20-year and 10-year US government bond yields, rationalizing that since these government bonds are risk-free, the spread should only reflect the liquidity premium. The author states that the expected US government bond yields for different maturities in reality should roughly be equal, so the movements in the spreads should be strongly influenced by the movements in global liquidity premiums.

![Figure 2. Global Factors, Influencing Government Bond Market Comovements, and their Measures](image)

(Source: compiled by the author, based on the systemization of previous researches)

When analysing the global financial conditions, in addition to global risk aversion, the proxy for global market portfolio has also been excluded by multiple authors (Solnik, 2000; Korajczyk, 1996; Karolyi and Stulz, 2002; among others). The most common way to represent the global market portfolio is to use the changes in Standard and Poors 500 equity index value, commonly used as a proxy of world equity market portfolio for the mature markets (Bunda et al., 2009; Mensi et al., 2014). Since equities can be identified as the alternative investments to bonds, the structure and index changes should reflect the competitive market environment. Karolyi and Stulz (2002) argue that country’s risk premium depends on its covariance with the global market portfolio. Moreover, as noticed by Bunda et al. (2009), the sensitivity of government bond market returns to changes in equity market returns might reflect the global portfolio reallocations between the bonds and the equities. Since investors’ attitude towards equity markets partly depends on expected output growth in the home country, they potentially prefer domestic equities when the earnings’ growth is high and may switch to theoretically riskless or at least less-risky assets when the risk aversion increases.

In parallel with global factors, representing equity and money markets, commodity market uncertainty can as well be identified as a global factor, influencing government bond market returns and the comovements between them, even though the inclusion of it is less common. Other researchers tend to use two measures – oil prices and gold prices – as the representations of commodity market uncertainty. In the factor model, developed by Forbes and Chinn (2003), financial market returns in different countries were a function of oil and gold prices. Mensi et al. (2014) also proved that oil prices display symmetric tail independence with all the BRICS\(^2\) markets, even though the dependence between oil

\(^2\) BRICS is a grouping acronym, referring to the list of countries: Brazil, Russia, India, China and South Africa. These countries are considered being at a similar stage of newly advanced economic development.
and BRICS markets significantly increased with the onset of financial crisis. The gold price returns commove with those of the BRICS markets with the degree of comovements decreasing after crises.

Forbes and Chinn (2003), as well as Mensi et al (2014), used the WTI crude oil price expressed in U.S. dollars per barrel, a global benchmark for determining the prices of other light crudes in the United States. In addition, Mensi et al (2014) included gold price expressed in US dollars per ounce to reflect the changes in commodity prices and its influence of equity markets in other countries. Ziaei (2012) found that gold price changes influence bond and equity markets, while Simakova (2015) argues that even if oil was initially traded for its fundamental purposes, with time it gained a permanent place in investment portfolio with oil and its derivatives being specific with high liquidity, volatility and relatively high profit opportunities for investors. Moreover, oil market is strongly influenced by political factors and internal situations in major producing/consuming countries, as well as international conflicts and tensions.

According to Simakova (2015), even though a significant component of gold demand results from the characteristics of the rareness, it is used as an essential investment portfolio component in practice. Moreover, in many terms gold price is influenced by governments and central banks: monetary policy performed by governments, changes in interest rates, inflationary policy effects. Consequently, changes in gold price should influence government bond market comovements. In their research of the global linkages between government bond markets, Forbes and Chinn (2003) assumed country return factors being a function of global, sectoral and country-specific factors, indicating the prices or gold and oil as the global factors. The authors used the gold prices to capture the changes in global risk aversion. Simakova (2015) found oil prices being positively related with the government bond interest rates while there exists the opposite relationship between the gold prices and the interest rates.

The final global factor, the author of the paper excludes as influencing government bond markets, is economic policy uncertainty (EPU). This factor coincides from government policy uncertainty and monetary policy uncertainty. Leippold and Matthys (2015) found that the increase in government policy uncertainty results in a decline in government bond yields and an increase in bond yield volatility, while monetary policy uncertainty has no simultaneous effect on the yields and volatilities, but enables predicting bond risk premium. According to Mensi et al. (2014), economic policy uncertainty had no impact on the BRICS equity markets both before and after the beginning of financial crisis. As Leippold and Matthys (2015) argue, government policy uncertainty plays an important role in determining the level of interest rates, but it also has a crucial impact on the level and shape of the term structure of bond yield volatilities. Baker et al. (2012) found evidence that increases in EPU foreshadow the declines in output, employment and investment. Even if it cannot be firmly claimed that economic policy causes the negative developments mentioned, with many factors moving together in the economy, high levels of policy uncertainty are associated with weaker growth prospects.

Conclusions

Majority of previous researches in the field were designated to assess the factors, influencing equity markets and their volatilities, with lack of the attention for government bond markets. Even though it was traditionally assumed that government bond markets represent none or only a minimum risk, different researchers revealed the strengthened comovements between government bond markets, not being able to unanimously identify the factors, influencing these comovements. Researchers commonly identified credit, liquidity and global risks as the main risks, influencing government bond markets and determining government bond risk premium. Some of the authors associated these risks with the groups of factors by excluding global and country-specific factors, influencing government bond market comovements.

The theoretical research allowed connecting the risks, government bond markets are exposed to, with the groups of factors, representing these risks. Other researchers found that when assessing long-term dependence, government bond markets were more strongly influenced by country-specific factors, while in shorter-term fluctuations global factors were the determining ones. Under increased volatility these tendencies inspired the concentration on global factors and the aim to identify the specific factors, influencing government bond market comovements.

The research results enabled excluding five global factors, influencing government bond market comovements: global risk aversion, global market portfolio, money market uncertainty, commodity market uncertainty and economic policy uncertainty, with the most important factor being global risk aversion. The analysis has also revealed that the risk premium, assigned for global risk aversion, is rather subjective, since it depends on the aggregated uncertainty, observed by different agents. Most of the excluded factors represent competitive financial market, approving the assumption that different financial markets strongly influence each other. The existence of the global factors excluded reduces the benefits from international diversification: if the markets are strongly influenced by the same global factors, the deterioration of these factors will influence the investment portfolio in the same way and will reduce the benefits of international portfolio diversification.

The results of this paper is expected to benefit investors in government bond markets, enabling them to identify the main global factors, influencing the comovements between the markets in global environment. Synthesis of the factors, excluded by previous authors, should as well be beneficial for governments, planning their emissions, as well as regulatory institutions, determining the valuation criteria and the common policies for the regional/global government bond market regulation. Further analysis should be implemented in order to quantitatively assess the influence of global factors on government bond market comovements and to test, whether global risk aversion is the most significant of all the global factors, excluded as influencing government bond market comovements. In addition,
further analysis could also be focused on the identification of country-specific factors, influencing government bond market comovements.

References


Šio teorinio straipsnio tikslas yra išanalizavus tyrimus, atlikus vyriausybinių obligacijų ir kitose finansų rinkose, identifikuoti globalaus pasaulio veiksniai, darančius įtaką šiuo klausimu. Tyrimas atliktas naudojant dydžių analizę, taip pat koncentruotasis į dokumentų analizę, atlikus mokslinio darbo vertinimą naudodami iš anksto atliekantį mokslo darbą. "Svarbiausia bus tų globalaus pasaulio veiksnių poveikio įvertinimas."