

Integration of Government Bond Markets among New EU Member States

Jiri Chaloupka ¹

¹University of Economics, Prague, Czech Republic

Abstract. In this paper we examine the level and dynamic of integration of the new EU member state government bond markets with the German market. We analyze yields of 10-year government bonds during the period 2001–2011. Using the price-based and news-based indicators, we found out that during times of economic stability the markets converged to Germany, whereas during times of economic slowdown the markets diverged. There also exist substantial differences among the new EU member states - Hungarian and Romanian level of convergence was the lowest, whereas the Czech level of convergence was the highest.

Keywords: Government Bonds, Financial Integration, EU, Central and Eastern Europe, Financial Crisis

1. Introduction

Government bonds play important role in every economy. They serve as a main source of financing for governments, they are often used as benchmark assets when pricing other securities and they are also frequently used as collateral in financial transactions. Volatility in the bond market thus has strong consequences for the real economy.

During the last few years the world has witnessed how important these assets are due to the sovereign debt crisis in Europe. Prior to the fall of Lehman Brothers in September 2008, the Greek bonds bore interest at almost the same level as the German bonds and their rating was close to German as well. However, after the outburst of the crisis the differences between economies of the European Union (hereinafter referred to as the “EU”) came to the surface and the spreads between Greek and German started to increase. The debt crisis hit the whole EU as the financial sector had invested in Greek bonds and today, the EU has to face severe crisis as the financial crisis spreads throughout the EU.

For this reason, the European Central Bank regularly analyses the level of convergence of the government bond markets in the euro area (ECB 2011). These markets are perfectly integrated if the law of one price holds and thus, the interest rates equal for bonds of all countries.

The convergence to the rest of the EU, however, is important also for the new member states of the EU (hereinafter referred to as “NMS”) as they are supposed to adopt the euro. Thus, the aim of this paper is to analyse the level of convergence of the NMS government bond markets to the EU, to describe the evolution of this convergence and to identify the main factors that influenced this process.

2. Literature Review

One of the first studies that investigated integration of NMS government bond markets was that of Reiningger and Walko (2005). These authors investigated yield spreads and correlations between Czech, Polish and Hungarian bonds and German bonds during the period 2000 – 2005. They found out that the most integrated is the Czech market, whereas, the Hungarian market is the less integrated.

Capiello et al. (2006) used the same sample of countries and the same period, but analysed weighted average probabilities of co-movements between these markets. Their result was that while the Czech Republic exhibits a significant probability increase in the, the remaining two countries do not.

Baltzer et al. (2008) studied spreads between 10-year government bond yields of the Czech Republic, Poland, Hungary, Slovakia, Cyprus, Malta and Slovenia and Germany with the result that for the period 2000 – 2006 most new EU countries have converged to Germany. They also utilized the regression analysis to investigate reactions of these markets to shocks in the German benchmark. They concluded that for the

Czech Republic, Hungary and Poland, the slope coefficients fluctuated around one whereas, for the other economies, slope coefficients tended to be close to zero.

Abad et al. (2011) used an asset pricing model for the period 2004 – 2009 and investigated the government bond integration for both old and new EU member states. Throughout the period, the level of integration of new EU countries was slightly lower than that of the majority of old EU countries. However, for the Czech Republic and Poland it was still higher than for Greece, Portugal and Spain.

3. Methodology

In this paper the integration of 10-year government bond markets is investigated for the period 2001–2011. The new EU member states analysed are the Czech Republic (CZ), Slovakia (SK), Poland (PL), Hungary (HU), Slovenia (SI), Latvia (LV), Lithuania (LT), Bulgaria (BG) and Romania (RO). As there are no Estonian sovereign debt securities, this country was not included in the analysis. As a benchmark, the German bond market was selected.

The methodology used in this paper is the same as suggested by Adam et al. (2002), Adjaouté and Danthine (2003) and Baele et al. (2004) and which is used by the ECB for measuring of integration of the euro area. The ECB uses three categories of indicators – price-based, news-based and quantitative-based indicators. In this paper, the price-based and news-based indicators are adopted.

Price-based measures stem from the law of one price, which as mentioned above, should hold in fully integrated financial markets. The simplest way to prove the validity of the law of one price is to directly compute differences between national bond yields and the benchmark bond yields. The higher the difference is, the less integrated the market is, and vice versa.

News-based measures are based on the assumption that bond yields should react only to news common to the whole market because local shocks can be easily diversified by investing in assets from other countries and therefore do not constitute a systematic risk. The news-based measures, therefore, measure the proportion of yields' changes that can be explained by common news. Changes in yields of a benchmark asset serve as a proxy for the common news. These changes should therefore explain the changes in yields in national markets.

To measure this relation, the ECB uses the following regression equation suggested by Baele et al (2004):

$$\Delta i_{c,t} = \alpha_{c,t} + \gamma_{c,t} \Delta i_{b,t} + \varepsilon_{c,t}, \quad (1)$$

where $i_{c,t}$ represents a change in yields of asset for the country c at the time t , $i_{b,t}$ is the change in yields of the benchmark asset at the time t , $\alpha_{c,t}$ is a constant and $\varepsilon_{c,t}$ represents a specific shock for the country c at the time t .

In a fully integrated financial market, a) $\alpha_{c,t}$ should equal to 0, b) $\gamma_{c,t}$ should equal to 1 and c) a proportion of variance:

$$VR_{c,t} = \frac{\gamma_{c,t}^2 \text{Var}(\Delta i_{b,t})}{\text{Var}(\Delta i_{c,t})}$$

should also equal to 1. If values of the sensitivity coefficient $\gamma_{c,t}$ are higher than 1 then yields of local assets react stronger to common news than yields of the benchmark asset. If the value of $\gamma_{c,t}$ is negative, then the response of local yields is converse.

However, perfect convergence presupposes identical systematic risks across countries. This presumption is strong for government bond markets as differences in credit and liquidity risks persist in individual markets. Thus, the slope coefficients $\gamma_{c,t}$ may differ from one even under full integration.

In this paper, data from the ECB Statistical Data Warehouse were used. Information on changes in credit ratings was drawn from the database of Fitch Ratings.

4. Analyses and Results

4.1. Price-based Indicators

First, spreads between German 10-years government bond and NMS bonds were investigated. These spreads smoothed by the Hodrick-Prescott filter are presented on figures 1 and 2.

On these figures, the convergence trend is apparent for all countries except for Hungary and Romania throughout the period of 2001–2006. The diminution in spreads was relatively fast so that in the year 2006 the spreads did not exceed 1 % for all countries except for Hungary, Poland and Romania. This implies strong convergence trend during the period of economic growth.

Since mid-2007, German interest rates gradually decreased due to relative stability of its economy compared to other European economies. The trend, therefore, reversed and the spreads started to diverge. However, the pattern of the turn-over was different among the NMS. According to the development of the spreads, the NMS can be divided into two groups. Bulgaria, Latvia and Lithuania witnessed jump in government bond yields and sharp increase was observed also in Hungarian, Polish and Romanian government bond yields as is apparent from the figure 2.

The Baltic States have been amongst the worst hit by the global financial crisis of 2008. Especially the Latvian economy underwent severe downturn in its GDP and in February 2009 the Latvian government asked the International Monetary Fund (hereinafter refer to as “IMF”) and the EU for an emergency bailout loan. This was a result of high capital outflow following the subprime crisis in the USA which led to crisis in Latvian banking sector. These factors in combination with high external debt led the rating agencies to downgraded Latvia's credit rating to non-investment grade.

Also Hungary requested financial help from IMF in 2008. Hungary was one of the most heavily indebted countries in the region and the outflow of foreign capital following the fall of Lehman Brothers in 2008 made the financial sector very weak. Therefore, banks gave fewer loans which led to a decrease in investment and further to economic recession. The country also faced political crisis. These factors caused the outflow of foreign capital and the rating agencies worsened their rating making the interest rates increase.

As for Romania, the country witnessed high foreign capital inflow till September 2008. After the bankruptcy of Lehman Brothers, however, the influx stopped and the GDP deteriorated. Thus, the tax revenues decreased and the government faced troubles in paying current expenses so that in March 2009, the government was forced to apply for loan from IMF. Also Romanian rating was downgraded and its government bond interest rates increased substantially.

Much smoother increase in the government bond spreads after 2007 was witnessed by the Czech Republic, Slovakia, Slovenia, Cyprus and Malta. These countries were not hit by the financial crisis directly but rather they were affected by the subsequent economic slowdown.

Since April 2011, yields of all NMS except for Hungary, Slovenia and Cyprus have been gradually decreasing. This might signal that the process of convergence has been renewed. However, the German interest rates decrease much faster than interest rates of any other NMS country.

The most dramatic increase in spreads in 2011 has experienced the Cypriot economy as its rating was downgraded below investment grade due to its high exposure to Greek banks, a devastating explosion at its main power plant and slow progress with fiscal and structural reforms. Cypriot government, therefore, has to rely on emergency loan from Russia to cover its budget deficit.

At the end of 2011, credit rating was also downgraded to non-investment grade for Hungarian debt due to its political situation. Hungarian government adopted several controversial measures, e.g. nationalization of pension funds, or limitation of the Hungarian National Bank independence, that threaten economics prospect of the country.

Increase in Slovenian spreads is also result of political factors. Slovenian government collapsed as it was unable to enforce public spending cuts and a new pension scheme. Moreover, Slovenian banks have close ties to Italian banks. This increases the risk that the government may need to provide additional support to Slovenia's banking system.

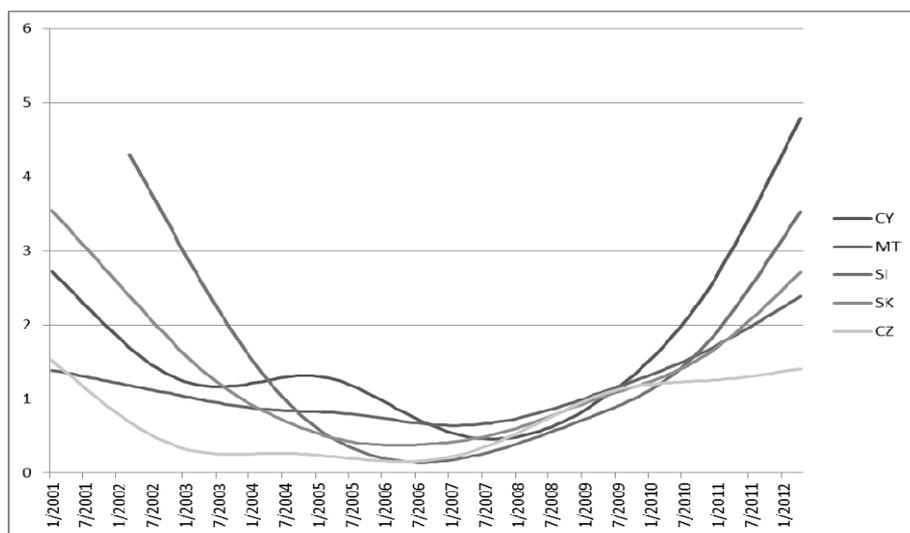


Fig. 1: Spreads between German and NMS 10-years government bonds smoothed by the Hodrick-Prescott filter for monthly data ($\lambda = 144,000$).

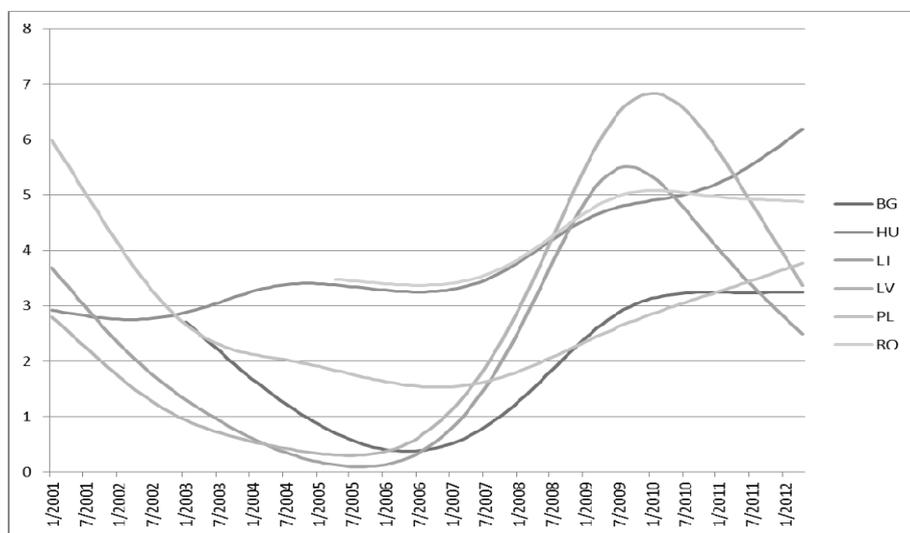


Fig. 2: Spreads between German and NMS 10-years government bonds smoothed by the Hodrick-Prescott filter for monthly data ($\lambda = 144,000$).

4.2. News-based Indicators

According to responses to changes in German 10-years government bond yields, the NMS can be divided into two groups as well, as is apparent from figures 3 and 4. These figures present the evolution of slope coefficients from regression equation (1). The two groups differ in their level of convergence during the period 2001–2006.

Central European countries (i.e. the Czech Republic, Slovakia, Poland and Hungary) witnessed a process of steep convergence during the period prior to their accession in May 2004 as is presented on the figure 3. At that time, the most sensitive to German market was the Czech Republic whose bonds even over-reacted during 2004. Slovak interest rates, on the other hand, remained almost insensitive prior to November 2005, which corresponds with the date of accession to European Exchange Rate Mechanism II (hereinafter refer to as “ERM II”). Since then, sensitivity of Slovak interest rates to news from Germany increased substantially till 2007.

Since the beginning of 2007, however, all the Central European countries diverged and became less sensitive to news from the German market. After the fall of Lehman Brothers in September 2008, changes in German yields were able to explain less than 50 % of volatility in Central European markets.

The rest of the NMS did not converge to German market prior to 2004, as is apparent from figure 4. The group, however, was not homogenous - Malta, Slovenia and Lithuania became gradually more sensitive to movements in German yields between 2004 and 2008, whereas the rest of the countries remained insensitive throughout the whole period.

The reason for increasing convergence of Maltese, Slovenian and Lithuanian bonds might be the accession of ERM II as the beginning of the convergence process corresponds with date of joining the ERM II, i.e. June 2004 for Lithuania, July 2006 for Slovenia and July 2007 for Malta. Increasing sensitivity on figure 4 along with diminishing spreads on figure 2 denote increasing convergence of these countries after joining the ERM II till September 2008.

After the fall of Lehman Brothers, however, all the markets gradually diverged and except for Malta and Slovenia tended to react conversely to the development in the German market. This opposite reaction was remarkable especially for Bulgaria during 2009. Decreasing sensitivity corresponds with increasing spreads on figure 2 and therefore, the period after September 2008 was marked with the process of divergence from the German market.

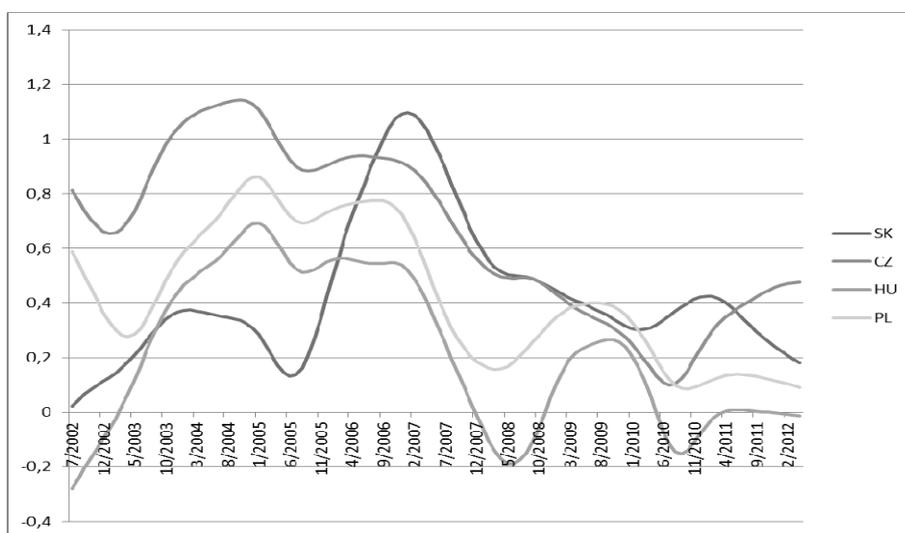


Fig. 3: Evolution of sensitivity coefficients smoothed by the Hodrick-Prescott filter ($\lambda = 444$).

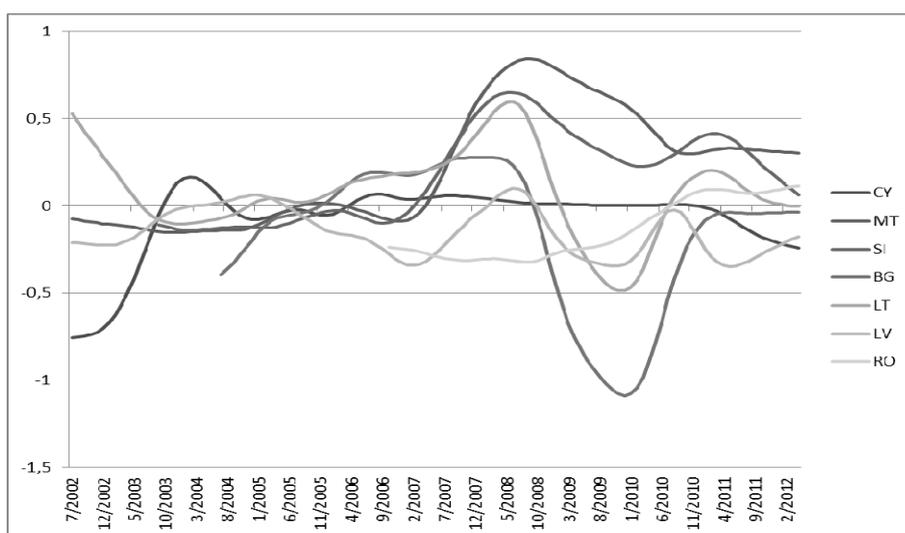


Fig. 4: Evolution of sensitivity coefficients smoothed by the Hodrick-Prescott filter ($\lambda = 444$).

5. Conclusion

Comparing the results of price-based and news-based indicators, we can conclude that the convergence process differs for times of economic stability (i.e. 2001 – 2006) and for times of economic slowdown (i.e. 2007 – 2011). During the period of economic growth the NMS were converging to Germany, whereas, during the period of crisis the NMS were diverging.

However, there exist substantial differences among the NMS. Hungarian and Romanian level of convergence remained very low for both periods. On the other hand, the level of convergence of the Czech Republic was high throughout both periods.

In the period of convergence (i.e. till 2007), the spreads were decreasing for all countries but the sensitivity to news from German market was different among NMS. The Czech Republic and Poland became increasingly sensitive prior their accession to EU in May 2004 and remained relatively sensitive till September 2008. Slovakia, Slovenia, Malta and Lithuania became sensitive after their joining of the ERM II but diverged since the fall of Lehman Brothers. Cyprus, Bulgaria and Latvia were insensitive to news from German market.

After the fall of Lehman Brothers in September 2008, all the NMS diverged from the German market. The divergence was strongest for countries that were hit by the crisis the most.

6. Acknowledgement

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7. References

- [1] Abad, P., Chuliá, H., Gómez-Puig, M. Time-varying integration in European government bond markets. FUNCAS: Documento de trabajo 611, 2011.
- [2] Adam, K., Jappelli T., Menichini A. M., Padula M., and M. Pagano. Analyse, Compare, and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union. Report to the European Commission. Salerno: CSEF, 2002.
- [3] Adjaouté, K. and J.-P Danthine. European Financial Integration and Equity Returns: A Theory-Based Assessment, in Gaspar, V. et al. *The transformation of the European financial system*, Frankfurt am Main: ECB, 2003.
- [4] Baele, L., Ferrando, A., Hördahl, P., Krylova, E., Monnet, C.: Measuring Financial Integration in the Euro Area. *Oxford Review of Economic Policy* 20(4), 2004: pp. 509-530.
- [5] Baltzer, M., Cappiello, L., De Santis, R. A., Manganelli, S. Measuring Financial Integration In New EU Member States. *ECB Occasional Paper # 81*. Frankfurt am Main: ECB, 2008.
- [6] Cappiello, L., Gérard, B., Kadareja, A., Manganelli, S. Financial Integration of New EU Member States. *ECB Working Paper # 683*. Frankfurt am Main: ECB, 2006.
- [7] ECB: *Financial Integration in Europe*. Frankfurt am Main: ECB, 2011.
- [8] Reininger, T., and Z. Walko. The Integration of Czech, Hungarian and Polish Bond Markets with the Euro Area Bond Market. Paper presented at the “*Conference on European Economic Integration*,” Vienna, 2005.
- [9] <http://sdw.ecb.europa.eu/>
- [10] <http://www.fitchratings.com/>