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# Time-varying integration of the sovereign bond markets in European post-transition economies☆

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ABSTRACT

In this paper, we examine the time-varying integration between eight European post-transition government bond markets and the Eurozone bond market. The objective is twofold: first is to measure the level of integration in these economies, and the second is to better understand some of the fundamental drivers of integration. Our results suggest that integration varies widely across the region. One of the major drivers of integration is economic development, as more advanced countries generally had higher levels of integration. Moreover, joining the European Union either exerted a positive boost or was neutral with regards to sovereign bond integration. Finally, integration changes over time; in particular, integration has decreased with the financial crisis, although the decrease leveled off relatively swiftly soon after.



## 1. Introduction

In this paper, we investigate the integration of East European and Western European economies. During this period, many East European countries experienced a breakdown of socialist economies followed by a transition to economies more closely linked with their western counterparts. The integration process was not always smooth and varied depending on global and country-specific factors. The variation in financial integration in particular is detrimental for the ex-communist countries and new EU member states, as they cannot opt to remain outside the euro area.

To address this issue, we examine the time-varying integration between eight European post-transition government bond markets and the Eurozone bond market. As sovereign bond market integration is one of the main factors in meeting the criteria for euro adoption, the transition economies would be expected to keep their long-term sovereign bond yields in line with the yields of the European core. In this regard, we measure the degree of integration by the excess returns of sovereign bond yields. In doing so, we control for country-specific effects and allow the parameter of integration to vary over time.

We build on the seminal work of Bekaert and Harvey (1995) who examine the time-varying world market integration, and the extended study of Abad et al. (2014). As we examine the effect of different events on the level of integration, our sample covers

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the periods of the most recent EU enlargements, the Lehman Brothers collapse, sovereign debt crisis in Europe, and the period of stabilization that followed. Moreover, our approach permits us to track and explain changes in the level of post-transition sovereign bond market integration country by country, corroborating our findings using country-specific measures of risk and measures that represent the state of the economy with the public finance stance included as an explanatory variable.

Our contribution is twofold. First, we examine changes in the level of European post-transition sovereign bond market integration country by country. Second, as we base our findings on country-specific measures of both risk and measures that represent the relative state of the economy, we can discuss the dynamics of integration with respect to convergence of these countries to the benchmark. More specifically, we can, for example, comment on the effect of the state of public finance on the level of integration and on integration dynamics.

Our findings suggest Eastern European sovereign bond markets are still quite segmented, but their segmentation is diminishing over time. Sovereign bond markets of post-transition countries, which achieved greater economic development and deeper real economic integration with the EU, exhibit the highest integration with the Eurozone. We also show that macroeconomic performance relative to the Eurozone benchmark and fiscal stance matter greatly for bond market integration.

The remainder of the paper is organized as follows. The next section provides a brief literature survey and the motivation of the paper. In Section 3, we discuss how we have measured integration. Section 4 describes the data, the "instruments" for the price of risk, the integration parameter, and the empirical results. Section 5 concludes.

## 2. Literature and motivation

As noted in Bekaert and Harvey (1995), the literature offers three classes of studies for the issues on whether markets may become integrated, segmented, or somewhere in between.

Sharpe (1964), Lintner (1965), and Black (1972) comprise the first class of studies conducted before the onset of financial account liberalization that use Capital Asset Pricing Models (CAPM) to show that markets are segmented.

In the second class of studies, which are offered mostly in the late eighties and nineties, perfect world capital market integration is assumed. Harvey (1991), for example, explores expected returns on a portfolio of different securities of 17 countries using risk exposure as a determinant of differing expected returns. In a more elaborate style, Dumas and Solnik (1995) argue that exchange rates can be a source of risk in expected returns. Dumas (1994) uses external variables such as leading indicators of the business cycle (as found in Stock and Watson, 1993) to explain the behavior of the international stock market. There are a variety of international CAPMs made in that period that assume integration and either accept perfect integration or reject it based on modeling results.[1]

The third strand of literature, which is based on the work of Errunza et al. (1992), presents the mild segmentation model or the case in which there is neither perfect integration nor perfect segmentation. Although their approach is more realistic, one important drawback is that the level of segmentation/integration in those models is fixed through time. Bekaert and Harvey (1995) attempt to resolve this problem by allowing the degree of integration to vary over time. In this way, their model nests cases found in the first two strands of literature, thus generalizing previous modeling approaches. The novelty introduced in their model is that conditionally expected returns are allowed to vary with respect to their covariance with some benchmark and with respect to the variance of country returns. When the market is perfectly integrated, only the covariance enters the modeling specification. On the other hand, when it is perfectly segmented, only the variance counts.

Building on the model developed by Bekaert and Harvey (1995), Barr and Priestley (2004), and Kim et al. (2006a, b) examine the level of integration in world bond European government bond markets. Abad et al. (2010) follow this line of research and apply the CAP-based model on the European bond market, investigating the effect of the euro introduction on the degree of integration in the EU. Abad et al. (2014) expand their work in the sense that they examine the time-varying integration of EU bond markets and compare it with the 2007 financial crisis.

This present paper is associated with the third class of the literature. We focus on the sovereign bond market integration in the European post-transition economies. As such, we wish to extend the scope of our research beyond the world financial crisis and the sovereign debt crisis in Europe. To the best of our knowledge, the European post-transition market integration has not been explored in the literature.[2] We include eight EU new member states and one non-member—Ukraine. Moreover, as we examine the period between 2004 and 2013, we do not omit data that include the European sovereign debt crisis.

Fig. 1 presents sovereign bond yield spreads over Germany for the countries explored. As seen in the chart, major events are reflected in the bond markets. Up to the Lehman Brothers collapse in 2008, we observe relatively low spreads—a sign of convergence and stability. In 2008, 2010, and again in 2012, the spreads widen considerably as the global economy undergoes a financial crisis. We subsequently see stabilized yield spreads in all countries, with the exception of war-involved Ukraine.

[1] Some of these models are presented in Solnik (1983), Cho et al., (1986), Wheatley (1988), Bekaert and Hodrick (1992), Campbell and Hamao (1992), Ferson and Harvey (1993, 1994a, 1994b), and Harvey et al., (1994). See Bekaert et al., (2013) and Carrieri et al., (2013) for more recent evidence.

[2] The above-mentioned paper does include three new EU member states (Poland, the Czech Republic and Hungary), but it leaves out a big number of other European post-transition countries and the specific characteristics of these markets. The only other study that focuses on the three biggest European post-transition countries is Kim et al., (2006a, b). In addition to these three countries, we also explore Bulgaria, Croatia, Latvia, Lithuania, Romania, and Ukraine.