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Nonlinearities and divergences in the process of European financial integration

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A B S T R A C T

This paper aims to analyze the process of financial integration in the EU-27 area, from 2000 to 2013, using nonparametric methods. Besides a set of other nonparametric measures (e.g. Hartigen and Hartigen test, Kernel density estimation), the stochastic kernel indicates the presence of two or even more convergence clubs into the bond yield density distribution, in the short term, middle term and long term as well. The financial crisis has intensified the divergences emerging within the EU-27, leading to the multimodality of bond yield density distribution, and also to the decline of the financial integration process in the long term. In comparison with traditional parametric approaches used in the convergence literature, the nonparametric measures are found to provide new and more reliable insights to the literature of financial integration.

1. Introduction

The deepening of the degree of financial integration is one of the European Central Bank's key objectives because it ensures the financial stability, the efficiency of the financial system and the effectiveness of monetary policy in the euro area. The process of financial integration in the EU has started many years ago, but has intensified only after adoption of the common currency in 1999. The recent financial crisis has caused the deterioration of financial integration in the euro zone, as well as at the EU level.

According to the European Central Bank (ECB) reports (2007–2013), the euro area bond market was one of the most integrated financial markets before the financial crisis. From 2003 to 2007, independent of risk and fiscal position differences, all euro area government bond yields were similarly priced. This has caused high risk tolerance and low risk premia. Overall, the period before the euro introduction is considered as a convergence period on the governmental bond market. Since the onset of the financial crisis, the euro area sovereign spreads have substantially increased, the market segmentation has become a common tendency on the government bond markets, and the risk has considerably increased, leading occasionally to risk overpricing.

The ECB identifies three sub-periods following the financial crisis. In the first phase, when the impact of the crisis was rather heterogeneous within the euro area, the sovereign bond yields steadily diverged. The second phase, during 2009, is associated with the decrease of the sovereign bond spreads for most euro area countries, while the third phase, developed during 2010, when the yield spreads between euro area countries and the German benchmark started to rise again.

While only few countries were affected by the sovereign debt crisis in 2010, two years later most countries came under pressure, enhancing the degree of divergence and segmentation on the euro sovereign bond markets. From 2011 to 2012, in the Euro area the fiscal conditions have worsened and the banking sector has weakened, in the context of financial crisis intensification. The concerns about the break-up of the euro area amplified the redenomination risk, determining investors to claim redenomination premium for holding risky financial assets. The risk was much higher in countries under financial stress and lower in countries with a more stable financial environment, so that the divergence in the governmental bond yields has increased even more in the euro area. In the second half of 2012, the fragile financial conditions in the euro area improved due to the banking union perspectives and also the Outright Monetary Transactions (OMT), the latter being initiated by the ECB with the aim to safeguard the appropriate monetary policy transmission and to ensure the singleness of the monetary policy. The decision of the European leaders to create a "banking union" under a single bank supervision contributed to a significant decline into the overall risk on the European financial markets and also into the sovereign bond yields. This has contributed to the improvement of the liquidity conditions and the return of investors into the countries considered as being under financial stress.

Since 2007 onwards, the European leaders as well as the ECB have provided statistics, information and analyses about the progress of the financial integration process, either claiming the occurrence of divergence paths only in the short, but not in the long term, or defending the long-term convergence process by arguing that the increase in yield spreads observed in recent periods does not necessarily signify

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the decline in bond market integration. For instance, the differences in perceived credit risk are found by the ECB as determinants of the bond spread differences. The ECB therefore recommends not associating the recent high bond spreads in the Euro area with the lack of integration.

However, the onset of financial crisis has definitely affected the process of financial integration within the euro area and also within the EU, but it is not clear whether the European financial integration can be seen now as still being a solid piece of the complex European integration process, and to what extent the financial integration is a viable and realistic objective in the years to come for the EU-27 area. While the progress of financial integration in the euro area has been yearly followed and analyzed by the ECB, the overall process of financial integration within the EU has received little attention. Without trying to go into the deep explanations of the factors underlying the divergences occurring in European integration process, this paper rather aims to provide a complex and real picture of the overall process of European financial integration, by underlying the nonlinearities and divergences occurring in this process.

In this paper, contrary to the traditional convergence measures, we relax the assumptions of linearity and normal distribution, and follow a nonparametric approach to identify the convergence clubs interfering with the “smoothness” and “linearity” of the European financial integration. The paper is structured as follows: the introduction is followed by the second section which provides a literature review. The third section presents the data and the fourth section describes the methodology. The fifth section is the empirical research and the last section concludes.

2. Literature review

There is a clear consensus that despite the efforts undertaken by European leaders and the ECB, the degree of financial integration has decreased in the euro area since the beginning of the financial turmoil in 2007 (e.g. ECB, 2010–2013). Overall, the money market and the governmental bond markets are found to be the most integrated financial markets in the euro area countries, and also the degree of integration is found to be higher in the euro area than at the level of the EU.

A large body of the literature, including the ECB studies, analyzes the process of financial integration just within the group of the euro area countries, but the number of papers including into the analysis all EU Member States (EU-27, EU-28) or just the New Member States (NMS) is rather small. This is because the governmental bond market is a relatively new one in the NMS, where the lack of institutional market participants and of secondary markets led in the early period of transition to underdevelopments in the NMS financial markets (Fink et al., 2004). But despite the significant progress made in the development of financial markets, the NMS bond markets are still characterized by structural differences (Baltzer et al., 2008).

The empirical evidence on the process of financial convergence in the NMS area is generally mixed, with different results especially when using more measurement methods. The European Commission (2009) considers that the integration between the NMS and Old Member States (OMS) has been advancing rapidly. When dividing the pre-crisis period of time in two subcategories, i.e. 2000–2002 and 2003–2005, Cappiello et al. (2006) finds that the financial integration between the euro area country and a group of selected NMS is rather heterogeneous between countries. At the level of the NMS, only the Czech Republic, Poland and Hungary exhibit signs of financial convergence, according to the return co-movements, and beta-convergence coefficients (Baltzer et al., 2008; Cappiello et al., 2006; Reininger and Walko, 2006). Babetskii et al. (2009) find evidence of gradually increasing financial integration of the NMS with the euro area countries from 1995 to 2007, when applying both news- and price-based measures. In turn, Reininger and Walko (2006), as well as Baltzer et al. (2008), finds that yield-based and news-based measures of the bond market integration within the NMS area lead to contrasting conclusions. Baltzer et al. (2008) provides an additional explanation of this discrepancy, making reference at the lack of liquidity on these markets. Despite the contrasting results obtained when applying all measures suggested by Baele et al. (2004), Baltzer et al. (2008) concludes that the financial integration between the euro zone countries and the NMS has gradually increased from 2000 to 2006, but the financial markets in the NMS are significantly less integrated than those in the euro area.

The literature of financial integration is not as broad as it is the literature of economic convergence, but generally applies the same methodological instruments to assess the stage of convergence on different segments of financial market. There is no standard methodology to assess the degree of financial integration, because the area of investigation is a broad one, involving the analysis of various aspects, such as the nature, intensity and effectiveness of barriers to international capital flows or the investment opportunities. However, most papers rely on the Baele et al. approach (2004), who advance three categories of financial integration measures: (i) price-based measures (yields-based or country effect measures), (ii) news-based measures, and (iii) quantity-based measures. In line with the Baele et al. (2004) classification, the most commonly used measures to assess financial integration on the governmental bond markets are:

1. Price-based measures: (i) yield-based measures: spreads between yields using a reference asset, standard deviation of a government bond yield spreads for 10-, 5-, and 2-year maturities, evolution of beta coefficients, average distance of intercept/beta from values implied by complete integration, variance ration and cross-sectional dispersion, and (ii) country-effect measures: proportion of cross-sectional variance explained by various factors, estimated coefficients of country dummies and cross-sectional dispersion of country parameters;
2. News-based measures: percentage of asset price change explained by common factors;
3. Quantity-based measures: Share of assets invested in bond funds with a European-wide investment strategy.

From the set of measures presented above, the most popular measure of cross-border integration of bond markets, which is also widely used in the economic convergence measurement, is the regression of changes in governmental bond yields of individual countries against changes in yields of a benchmark. Based on this method, the ECB studies (ECB, 2009, 2010, 2011) have shown a convergence close to perfect integration from 1998 to 2008. Since in 2008 the beta convergence has indicated the end of the period of perfect convergence, the problems arise especially over the course of 2010 and 2012. The ECB identifies that the perception of the euro area country risk profiles partially drives the pre-crisis convergence of bond yields. The divergence occurring after 2008 in the bond yields can be therefore explained by the differential pricing of the underlying risks.

The empirical findings in the literature indicate that the measures presented above lead to different results. For instance, news-based indicators applied on the governmental bond market suggest an incomplete financial integration from 1999 to 2008 (Abad et al., 2009), while most studies using price-based indicators find evidence of a high degree of financial integration during this period of time. As also presented above, the same contrasting results were also reported by Baltzer et al. (2008), and also by Reininger and Walko (2006).

One of the most important factors influencing European financial integration is the financial crisis. The empirical results in this sense are not homogenous, but different, depending upon the measures, country groups and financial market segments. The banking crisis and sovereign crisis have been separately addressed (Angeloni, 2011), because their effects seem to be also different. Most studies analyze the group of euro area countries and find divergent patterns occurring in the short term (ECB, 2009, 2010, 2011, 2012, 2013).

The analysis of the degree of financial integration can be also approached from the perspective of the traditional convergence theories. In this theoretical framework, the traditional measures of convergence are the regression-based approach (β-convergence) and