



A dynamic factor model with time-varying loadings for euro area bond markets during the debt crisis

Jens Boysen-Hogrefe*

Kiel Institute for the World Economy, Germany

ARTICLE INFO

Article history:

Received 31 July 2012

Accepted 14 September 2012

Available online 24 September 2012

JEL classification:

C11

C23

C25

Keywords:

Bond markets

Euro crisis

Dynamic factor models

Time-varying loadings

Bayesian estimation

ABSTRACT

The debt crisis in the euro area led to obvious changes in the structure of euro area bond markets. To model the process of disintegration that has taken place as a result of this crisis, this analysis uses a dynamic factor model with time-varying loadings and two factors. While some core countries load rather stably on one factor, this factor loses its impact on many peripheral countries over time. At least for some periods, countries that are affected by the debt crisis load highly on a second factor, especially Spain and Italy. Ireland, Portugal, and Greece, which all load highly on the second factor for some periods, show signs of decoupling at the current edge.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

The debt crisis in the euro area has led to structural changes on euro area bond markets. Several studies observed that the evaluation of typical risk measures for government bond spreads has undergone huge changes during the financial crisis and the following debt crisis (see e.g. [Aßmann and Boysen-Hogrefe, 2012](#), and [Bernoth and Erdogan, 2012](#)). This analysis focuses on the structural changes on bond markets from a different perspective and seeks to monitor the structural changes in the co-movements between bond returns by means of a dynamic factor model with time-varying loadings. A similar model has been used by [Del Negro and Otrok \(2008\)](#) to model business cycle co-movements. Factor models are a common tool in the analysis of international bond markets. For an early example, see [Dungey et al. \(2000\)](#). [Pozzi and Wolswijk \(2012\)](#) introduced time-varying loadings for factor models that model bond markets. They apply a one-factor model with deterministic convergence dynamics and idiosyncratic errors following a GARCH process. [Pozzi and Wolswijk \(2012\)](#) find perfect integration for almost all countries in their analysis in the

sense that the single factor became the most dominant source of variation until the beginning of the financial crisis.

The factor model in this analysis differs in several ways from the model by [Pozzi and Wolswijk \(2012\)](#) since its main focus is not to analyze the integration of euro area bond markets but to analyze in more depth the disintegration during the financial crisis and the debt crisis that has already been mentioned in [Pozzi and Wolswijk \(2012\)](#). For this purpose, the model used here allows for a stochastic time-variation of loadings instead of a deterministic time-variation that has a single direction only. Further, a second factor is introduced. In doing so, the analysis departs from the framework of the CAPM that is used in [Pozzi and Wolswijk \(2012\)](#), in which the single factor can be interpreted as market returns. However, the introduction of a second factor allows for an extended analysis of the euro area bond markets rather than a pure division in joint dynamics reflected by a single factor and idiosyncratic dynamics. The second factor may be able to capture effects that are relevant for some, but not for all countries in the euro area. Thus, the second factor could provide evidence for segregation or contagion in euro area bond markets.

The major results of the analysis are that there are dramatic changes of factor loadings over time and a huge increase of idiosyncratic volatility for almost all countries measured by the time-varying error variance. While the impact of a first factor that is identified by the restriction that it was the only factor Germany

* Correspondence to: Hindenburgufer 66, 24105 Kiel, Germany. Tel.: +49 431 8814210.

E-mail address: jens.hogrefe@ifw-kiel.de.

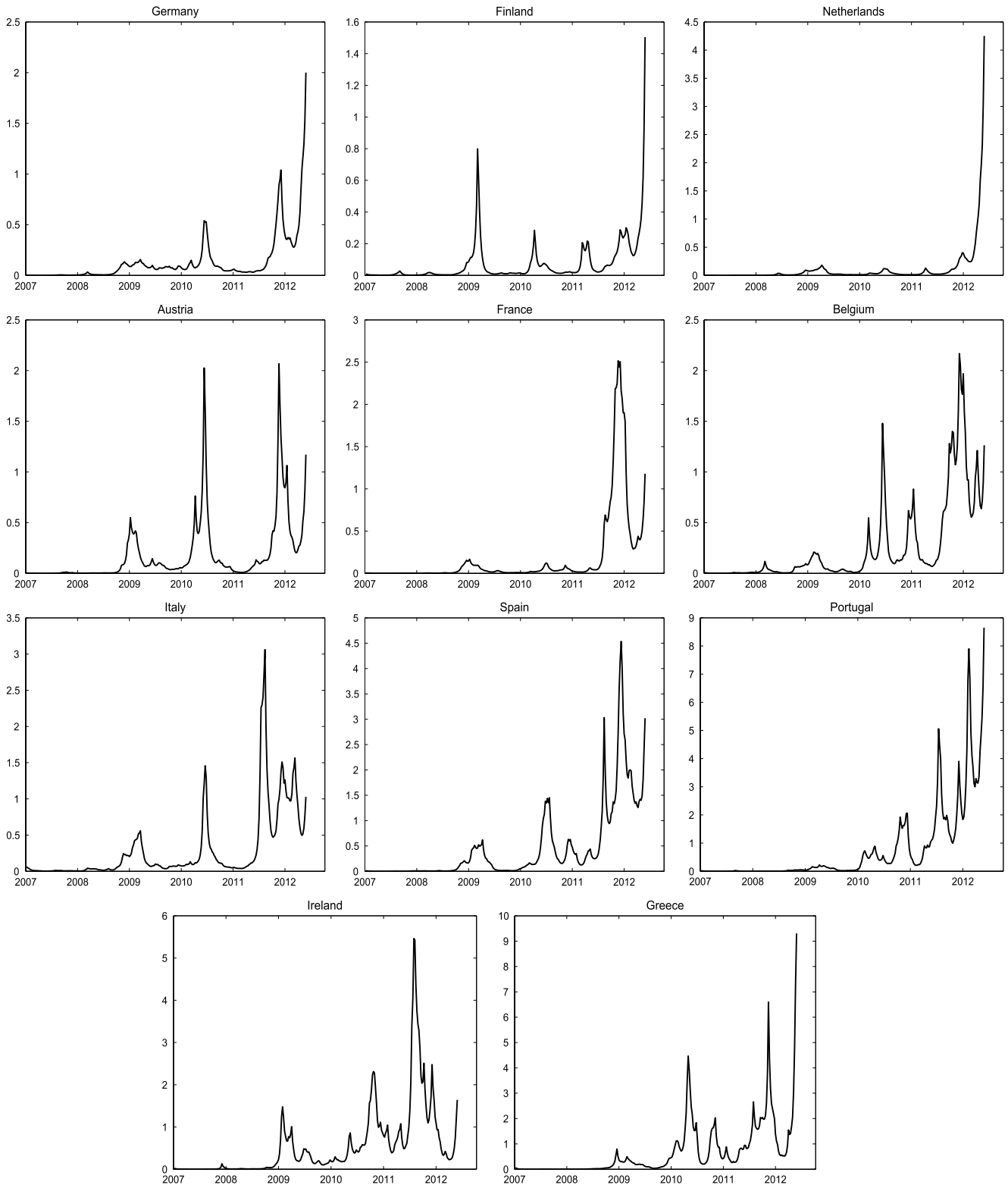


Fig. 1. Idiosyncratic variances. Median from 2000 draws of the posteriori sampler after burn-in.

loads on are rather stable for countries like Germany, Finland, and the Netherlands, this factor lost its relevance in many other countries like Greece, Ireland, Italy, or Spain. Further, a second factor played a role in many countries, especially in Italy and Spain. Interestingly, the factor lost its relevance for some of the countries hit hardest by the debt crisis after it had a sizeable impact before. This finding can be interpreted as decoupling.

2. The model

The model aims to analyze the time-varying co-movements of sovereign bond returns. Therefore, a dynamic factor model with time-varying factor loadings and time-varying idiosyncratic variances is applied.

The model is denoted as follows. Demeaned and standardized first differences of weekly bond returns are the observable

Download English Version:

<https://daneshyari.com/en/article/5060337>

Download Persian Version:

<https://daneshyari.com/article/5060337>

[Daneshyari.com](https://daneshyari.com)