Analyzing hedging strategies for fixed income portfolios: A Bayesian approach for model selection

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ABSTRACT

During the recent European sovereign debt crisis, returns on EMU government bond portfolios experienced substantial volatility clustering, leptokurtosis and skewed returns as well as correlation spikes. Asset managers invested in European government bonds had to derive new hedging strategies to deal with changing return properties and higher levels of uncertainty. In this environment, conditional time series approaches such as GARCH models might be better suited to achieve a superior hedging performance relative to unconditional hedging approaches such as OLS. The aim of this study is to test innovative hedging strategies for EMU bond portfolios for non-crisis and crisis periods. We analyze single and composite hedges with the German Bund and the Italian BTP futures contracts and evaluate the hedging effectiveness in an out-of-sample setting. The empirical analysis includes OLS, constant conditional correlation (CCC), and dynamic conditional correlation (DCC) multivariate GARCH models. We also introduce a Bayesian composite hedging strategy, attempting to combine the strengths of OLS and GARCH models, thereby endogenizing the dilemma of selecting the best estimation model. Our empirical results demonstrate that the Bayesian composite hedging strategy achieves the highest hedging effectiveness and compares particularly favorable to OLS during the recent sovereign debt crisis. However, capturing these benefits requires low transactions cost and efficiently functioning futures markets.

1. Introduction

The introduction of the Euro in 1999 caused yields of German government bonds and bonds of other European countries to converge so that yield spreads since then were low and relatively stable (Fig. 1). Consequently trading activity in bond futures began to concentrate in the most liquid German Bund, Bobl, and Schatz futures contracts. As a consequence, futures based on government bonds of other European countries such as of Italy, France and Spain were finally taken from the market (Blanco, 2001). With the emergence of the financial crisis in mid 2008, however, sovereign risk became increasingly important for investors in European (EMU) government bonds as yields spreads between EMU member countries started to diverge back to historical levels. Hence, the challenge for investors and asset managers was to derive optimal strategies for hedging their risks exposure in European government bonds. For futures exchanges such as Eurex a critical question was whether new futures contracts needed to be designed or whether efficient risk reduction in Europe was still possible with the currently traded futures contracts, but with the implementation of statistically more sophisticated hedging models.

The objective of our study is to analyze hedging strategies for portfolios of European government bonds for the pre-crisis and the sovereign debt crisis period. While several earlier studies test hedging strategies for commodities, foreign exchange, and stocks indices (Baillie & Myers, 1991; Myers, 1991; Kroner & Sultan, 1993; Tong, 1996; Lien, Tse, & Tsui, 2002; Alexander & Barbosa, 2007), the results of these studies are not automatically transferable to fixed income securities and bond portfolios. One reason is that government bond returns were highly affected by ECB policy and political decisions during the European sovereign debt crisis (Fig. 2). Moreover, EMU government bond returns exhibited positive excess kurtosis and GARCH-effects (Sibbertsen, Wegener, & Basse, 2014). Even exchange rates usually do not show such patterns. In addition, spreads between different commodity futures are generally less volatile and even commodity cross hedges often do not require extremely sophisticated hedging approaches. Therefore, hedging fixed income portfolios is quite unique and typically requires more sophisticated modeling and strategies, particularly during the European sovereign debt crisis period.

Our research contributes to the hedging literature in several dimensions. First, we focus on the recent sovereign debt crisis and analyze the success of different hedging strategies for fixed income securities. Hedging during the crisis period was particularly important because sovereign bonds default spreads were highly volatile and the probability of severe losses increased. Moreover, so far there is little empirical

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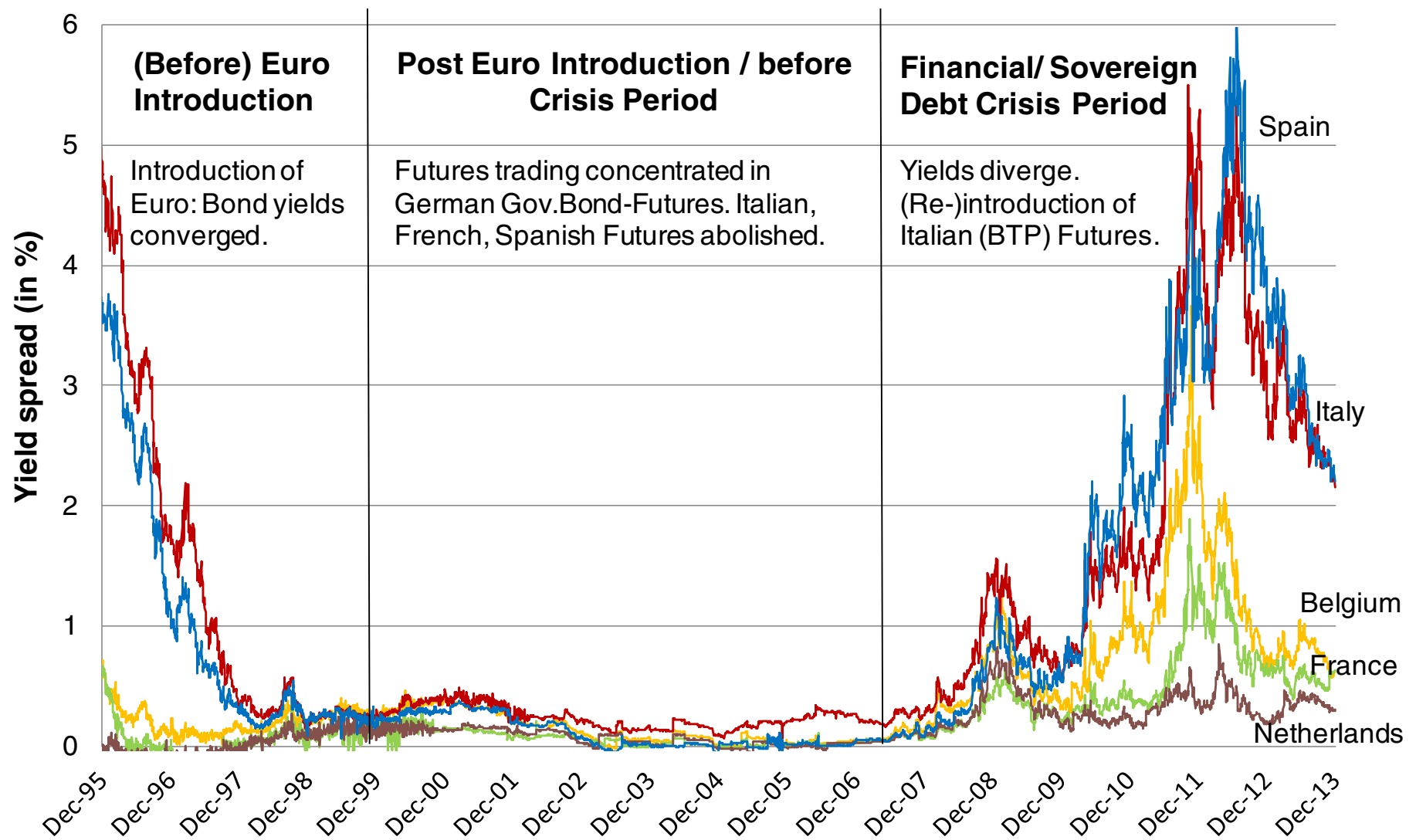*E-mail address:* Wolfgang.Bessler@wirtschaft.uni-giessen.de (W. Bessler).

Fig. 1. Yield spreads to German government bond yields. This figure presents the yield spreads of government bonds of different European countries relative to the German government bond yield (maturity 10 years) during the period from January 1995 to December 2013.