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Testing for a break in the persistence in yield spreads of EMU government bonds

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ABSTRACT

This study tests for a break in the persistence of EMU government bond yield spreads examining data from France, Italy and Spain and using German interest rates as a kind of benchmark. The results reported here provide evidence for breaks between 2006 and 2008. The persistence of the yield spreads against German government bonds has increased significantly after this period. This could be a sign of higher sovereign credit risk (and possibly even redenomination risk) caused by the debt crisis in the euro area. We find clear indications for non-stationary behavior after the breakpoints and empirical evidence for positive excess kurtosis and GARCH-effects when persistence increases.

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1. Introduction

The sovereign debt crisis in the euro area has had major consequences for European bond markets. Already before the Greek debt swap was implemented, the difficult fiscal situation in some member countries caused growing concerns among investors about increasing sovereign credit risk. As a matter of fact, after the credit event in Greece redenomination risk due to fears of a potential end of the Euro became a phenomenon of relevance. The return of exchange rate risk after the collapse of a currency union or some other system of fixed exchange rates can indeed be of some importance for financial markets. While the literature has not focused too strongly on historical experiences with exits from currency unions, Rose (2007) documented quite a number of cases after the end of World War II. Moreover, there is also a vivid discussion about the breakdown of the Bretton Woods system (e.g., Basse, 2006). Moreover, Kang (2013) examined the process of the abandonment of the fixed exchange rate regime in South Korea during the East Asian crisis.

As a consequence of the crisis in Europe the low yield spreads among government bonds issued by the member states of the European Monetary Union (EMU) – which mainly were a result of the introduction of the common currency – now seem to be a phenomenon of happier times. In fact, creditors have started to distinguish clearly between the different member states of the euro area. We use techniques of time series analysis to examine how sovereign credit risk and redenomination risk have affected government bond yields in the eurozone. While we do not use the classical event study methodology our approach still focuses on timing issues by searching for structural breaks in yield differentials. The paper examines data on interest rates from the four economically most important member states of the euro area (namely France, Germany, Italy and Spain). Following Lund (1999) we use German government bond yields as some kind of benchmark because this country is generally assumed to pursue a relatively prudent fiscal policy. Baum and Barkoulas (2006) have shown that there could be fractional cointegration among European government bond yields. Therefore, we employ a new test procedure recently proposed by Sibbertsen and Kruse (2009) which allows for fractional integration to test for constant persistence behavior of the spreads to identify possible changes to the risk premia compensating investors for default risk and exchange rate risk.

The insights gained from this exercise in financial econometrics should be important for a number of reasons. First of all, Abad et al. (2010) argued convincingly that there is a large literature on

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international equity market linkages but that there are only few papers examining bond systemic risk or international bond market co-movements and have noted that this fact is remarkable because the market capitalization of international bond markets is much larger than that of international equity markets. Moreover, they argued that international bond market linkages have to be analyzed in more detail because empirical findings with regard to this topic can have implications for the cost of financing, monetary policymaking, interest rate forecasting and bond portfolio diversification. Therefore, we will try to add some additional empirical findings to this important literature. Moreover, there could be important consequences for risk managers in financial institutions. Especially European life insurers that hold large amounts of EMU long-term sovereign debt to neutralize the interest rate risk inherent to their liabilities have to answer the question whether German, French, Italian and Spanish government bonds still are almost perfect substitutes (e.g., Basse et al., 2012).

The paper is structured as follows: The second section gives a brief review of the relevant literature. Section 3 then introduces the data examined and also discusses some methodological issues. Before concluding in the 5th section the results of our empirical investigations are reported and discussed in Section 4.

2. Literature overview

The introduction of the Euro in 1999 has had major implications for the European bond market. In fact, Lund (1999) argued that the advent of the common European currency has eliminated the exchange rate risk for investors buying fixed income securities issued by other EMU countries and that the Euro already ought to have affected the relationship among interest rates before 1999 because a binding time table for the introduction of the new currency was already presented in late 1991. Stated somewhat differently, the prospects of a monetary union in Europe seem to have caused interest rate convergence among government bond yields in a number of European countries. Focusing on yield spreads to German government bonds he calculated “EMU probabilities” for many European countries and essentially documented a 100% probability of EMU membership for France and the Benelux countries since 1995. Interestingly, the bond market was less optimistic with regard to Italy, Spain, and Portugal according to Lund (1999) the “EMU probabilities” for these countries were rather low until late 1996. Given the new environment it is no surprise that in the last decades numerous empirical studies examined the relationship among interest rates in Europe.

While the introduction of the Euro marks an important milestone for bond markets in Europe many econometricians also examined data before 1990 arguing that the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS) already could have caused convergence of interest rates in Europe (e.g., Siklos and Wohar, 1997; Baum and Barkoulas, 2006). Because of this institutional arrangement – which reduced exchange rate risk – German government bond yields should have played a special role for the European bond markets thereby “causing” interest rate movements in other ERM countries. This assumption is the so-called German Dominance Hypothesis. Generally speaking, testing this hypothesis produced mixed empirical findings. Hassapis et al. (1999), for example, noted that the ERM did not strongly increase the linkage between interest rates in Germany and the rates of other ERM member states. Only the Netherlands seem to be an exception. This is probably no surprise because already back then, monetary policymakers in the Netherlands were trying to imitate the strategies of the Deutsche Bundesbank (see Knot and de Haan, 1995). Interestingly, there exists also some empirical evidence supporting the German Dominance Hypothesis to a by far stronger degree. Most importantly, Baum and Barkoulas (2006) used techniques of fractional cointegration analysis to test the German Dominance Hypothesis and reported results supporting this theory. Moreover, Fountas and Wu (1998) noted that the presence of structural breaks is of some importance and that there is clear empirical evidence for interest rate convergence in the period from 1979 to 1995. Additionally, Siklos and Wohar (1997) reported some empirical evidence for interest rate convergence among ERM countries during specific periods of time.

As already noted, the advent of the Euro recently revived the debate about interest rate convergence in Europe. Kim et al. (2006), for example, documented a structural change in the bond market caused by the advent of the Euro. Moreover, Laopodis (2008), for example, reported an increase in the correlation of the returns on Euro government bonds after the introduction of the common currency, examining data from 10 EMU countries. Employing techniques of cointegration analysis, Laopodis (2008) also identified two groups of EMU countries a core group of members (including Germany and France) and a number of peripheral countries (including Italy and Ireland). Jenkins and Madzharova (2008) reported that cointegration among nominal interest rates in the Euro area is a phenomenon of economic relevance after the introduction of the common currency. As will be discussed later on, this empirical finding does imply the existence of a strong long-term equilibrium among bond yields and does indicate that interest rates have converged. Interestingly, real interest rates do not seem to be cointegrated according to these authors. Basse et al. (2012) focused on government bond yields in Germany and Italy and have reported that there is empirical evidence for cointegration with two structural breaks. The first breakpoint seems to be a consequence of the US subprime crisis and the second break might be a result of the increase of Italian sovereign credit risk (and probably even redenomination risk) caused by the current financial and economic crisis in Europe. Basse (forthcoming) used an identical approach and found that Austria, Belgium, Finland and the Netherlands seem to belong to the group of EMU core member states because interest rates in these countries are cointegrated with German government bond yields and there has been no sign for structural change caused by the current crisis increasing the risk premia market participants demand for holding government bonds from these four countries. Interestingly, Ang and Longstaff (2013) reported empirical evidence from a multivariate cluster analysis examining the cross-sectional structure of default risk from 2008 to 2011 and have noted that there are three groups of EMU countries. According to their results one cluster consists of Greece, Ireland, Italy, Portugal and Spain. Austria, Finland and the Netherlands can be found in a second cluster; France and Belgium are the members of the third cluster. Ang and Longstaff (2013) also argued that there is much less systemic risk among US sovereigns (which means states) than among EMU sovereigns (which means Eurozone countries). They tried to explain this result by arguing that large banks hold high amounts of EMU government bonds while US state debt is mainly held by individual investors.

3. Data and methodology

We examine bond yields from Germany, Italy, Spain and France with maturities of five, seven and ten years. The weekly data from 2002-01-04 to 2012-08-24 are taken from Bloomberg. The time series are generic interest rates based on bid prices of the relevant government bonds. Since our methodology requires an insight of the trending behavior of the interest rates (as will be discussed later on), we use the approach suggested by Ng and Perron (2001) to test for unit roots. According to this test, reported in Table A.1, all yields seem to be integrated of order 1 ($I(1)$). Other unit root tests

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