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Essays on European bond markets

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Chapter 1

Introduction

This dissertation focuses on a number of issues that are of importance in the current European bond market. In the past years, the fiscal policy of the Eurozone members, advances in the technology of trading platforms and the introduction of a single currency have reshaped the fixed income markets in Europe. These developments have resulted in a far going integration of European capital markets. Moreover, the massive amounts of debt issued by Japan and the United States combined with the deteriorating stock markets in 2000-2002 have also resulted in an increased asset allocation to European bonds. Currently, the Eurozone bond market is the third largest market in the world with the German Schäfte, Bobl and Bund futures contracts among the heaviest traded financial contracts.¹

This dissertation can be divided into two parts. The first part, which is also the lion's share of this dissertation, focuses on the microstructure of European bond markets. In chapter 2 we start with an overview of some basic market microstructure topics. Some of these topics are not necessarily specified towards fixed income markets. Chapter 3 focuses on the trading costs of European sovereigns bonds and analyzes the impact of news on bond returns under a time-varying trading intensity. Chapter 4 focuses on the yield differences in European bonds. It questions the role

¹ After Japan and the United States
of liquidity and default risk as the sole rationale in explaining yield spreads and it motivates the role of hedging quality as an explanatory factor. Chapter 5 of this dissertation focuses on the growing European inflation-linked bond market. We analyze the yield spread between nominal and real bonds and we propose a method for estimating the inflation and liquidity component in these securities.

1.1 Part I: The Microstructure of European Fixed Income Markets

The first three chapters of this dissertation focus on the microstructure of fixed income markets. The empirical work on the microstructure of financial markets has received considerable attention in the academic literature. In the early years, most of the empirical work pertains to stock markets. Given the emphasis on stock markets in the theory and the availability of data, this is understandable. On the other hand, in terms of both capitalization and trading volume, foreign exchange and bond markets are bigger than stock markets. Due to this importance, empirical research on the microstructure of bond markets has increased in recent years. Research on fixed income markets is also interesting because of their special structure. It is centered around a large number of professional dealers and outside customers trade with the dealer of their choice. Volume is high and interdealer trading can be commonly observed.

Interestingly, European bonds are not regarded as perfect substitutes and this is reflected through the yield differences between bonds of different issuers (countries). These yield differences are often associated with either a credit risk or a liquidity premium. Although the impact of liquidity and credit risk are undoubtedly important, they do not provide a full explanation for the yield differences observed in these markets. In chapter 4 we show that markets with a lower liquidity might turn to be equally expensive in terms of yields compared to a more liquid market with
the same credit rating. There may be a number of alternative reasons why yields differ across European bonds. First, trading costs among European sovereign bonds may be different in the secondary market. In order to calculate these trading costs, one can use a number of measures. The quoted bid-ask spread, the realized and the effective spread are among the measures often used. These measures are however static as they do not allow for the study of dynamic effects in subsequent periods. Taking dynamic effects into consideration is important for several reasons. First of all, order flows exhibit strong autocorrelation as they are followed by additional orders in the same direction. This effect creates a much larger price impact of trading than in a static approach. Moreover, the usage of high frequency data brings additional problems. For instance, the arrival of news generates time-varying trading intensity and this in turn, has a profound impact on the price. Taking these arguments into consideration, we study the trading costs of European sovereign bonds. The results are reported in chapter 3 and are based on trading data from the MTS platform. This platform proved to be very successful in Europe and by now is the largest interdealer trading system for European sovereign bonds. Chapter 3 also provides a study on the impact of news releases and the role of time-varying trading intensity on price dynamics. Second, besides trading costs, some importance should be addressed to the hedging quality of European sovereign bonds. Hedging European sovereigns often require strategies involving positions in both the futures and spot-market. These positions are called basis strategies and the risk associated with its payoff is called basis risk. Chapter 4 shows that the quality of a hedge depends on the basis risk and is therefore a relevant factor in determining the price of a fixed income security. Using simulations based on a risk-averse model, we show that a market maker increases his quoted spread modestly when basis risk increases. If the basis risk becomes very large, the quoted spread increases more than proportionally. This convexity in spread suggests the following: the market maker increases

\footnote{Liquidity in terms of issuance in the primary market and trading activity in the secondary market.}
his spread as a compensation for the increased hedge difficulty. When the basis volatility becomes very large however, the quoted spread becomes even larger indicating his unwillingness to trade. In chapter 4 we also estimate the basis risk for some Eurozone government bonds using transaction data from the MTS trading system and bund future data from the EUREX. We find that bonds with larger basis volatility are traded at a premium. This provides an additional explanation for the yield differences in the Eurozone besides credit risk or liquidity.

1.2 Part II: The European Inflation-Linked Bond Market

Another interesting development in the Eurozone bond market is the growing supply of inflation-linked bonds. We consider this market in chapter 5. The recent commitment by the French Treasury to issue inflation-linked bonds almost every month in 2004 and the announcement by the Italian and Greek Treasury agent to issue inflation-linked bonds in the coming years reflect the growing importance of these instruments for the Eurozone debt market. Interestingly, most research on inflation-linked bonds is conducted for the UK and US market while little has been said about the inflation-linked bond market in the Eurozone. Given the attention of issuers and investors on the Eurozone inflation-linked market, this is not justified. According to a survey by RISK magazine\textsuperscript{3}, the Eurozone “is now the most advanced (in terms of products and market participants) and most liquid (both on the bonds and on the derivatives side) inflation-linked bond market in the world.” Nowadays, a reasonable European real yield curve has emerged, containing maturities varying from 2006 to 2032. Along with this real government curve a relatively liquid and economically significant Eurozone real swap market has evolved. The yield difference between nominal and index-linked bonds includes an inflation premium as index-

\textsuperscript{3}See RISK December 2003: special report on index-linked bonds.
linked bonds provide a hedge against unexpected inflation. In this paper we analyze the inflation premium contained in French inflation-linked government bonds using the extended Kalman filter.

The real interest rate and expected inflation are key unobservable variables in this analysis. If real interest rates are reflected through index-linked bonds, it is common practice to use a break-even approach. The expected inflation is then the yield difference between a nominal and an index-linked bond with the same maturity. Albeit simple, this method suffers from a number of problems. First, only the maturities of nominal and real bonds are taken into consideration so it does not generate a complete term structure of interest rates. Second, and more importantly, the method assumes that the Fisher equation holds and this implies that the inflation premium is set to zero. This is very unlikely. Knowing the inflation premium is valuable for issuers, policy makers and investors. For issuers of debt, inflation-linked securities appears to be a simple and cheap way of reducing financing costs as the treasury can eliminate the inflation premium assigned to nominal securities when the inflation premium is sufficiently high. The growing commitment by numerous European governments to issue index-linked bonds appears to confirm the role of cheaper funding to finance government expenditure. On the other hand, if the inflation premium is low, it may be optimal for governments to issue conventional bonds because real bonds contain a liquidity premium. For policy makers, index-linked bond provide an instrument to monitor the markets perception of expected inflation. In the Eurozone, this gives us the opportunity to test how well the inflation policy of the European Central Bank is being adapted by financial markets. For investors, the main advantage of inflation-linked default free bonds is its hedge against future price developments. For a number of investors like pension funds, the role of liquidity is less important as inflation-linked securities are regarded as typical buy-and-hold securities. For these investors, a sufficient hedge against future price developments is more important than the costs associated with infrequent trading. For portfolio managers however, the trade-off between the inflation and liquidity
premium is still important. For example, if the inflation premium is too large, it may be non-optimal to hedge inflation as the price associated with a (perfect) inflation hedge is too high. Moreover, if an investor expects the inflation being higher than the break-even inflation, it becomes more interesting to buy inflation protection through real bonds rather than conventional bonds because real bonds are expected to outperform. In chapter 5, we estimate the inflation premium by taking liquidity into account. This allows us to study the empirical properties of the term structure of real rates in the Eurozone bond market. We use data from French index-linked and nominal bonds and estimate the inflation and liquidity premium in a state space framework using the extended Kalman filter and quasi-maximum likelihood.