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Liquidity and credit premia in the yields of highly-rated sovereign bonds

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ABSTRACT

This paper quantifies liquidity and credit premia in German and French government bond yields. For this purpose, we estimate term structures of government-guaranteed agency bonds and exploit the fact that differences in their yields vis-à-vis government bonds are mainly driven by liquidity effects. Adding information on benchmark rates, we estimate liquidity and credit premia as latent factors in a state-space framework. The results allow us, first, to quantify the price impact of safe-haven flows on sovereign yields, which strongly affected very liquid bond markets during the recent financial crisis. Second, we quantify credit premia for highly rated governments, offering an important alternative to the information based on CDS markets.

1. Introduction and related literature

The term structure of government bond yields is a key source of information regarding investors' outlook for inflation and economic growth. However, the financial crisis has demonstrated that other factors can also be reflected in government yields. First, in the past few years, periods of significant shifts in demand for highly rated and liquid assets have been observed in the bond markets, often referred to as safe-haven flows. Second, as governments have taken on more liabilities in the course of the crisis, the very premise that government bonds are default-free has been questioned and the notion of credit premia in bond yields has become relevant even for the highly rated sovereign issuers.

This paper quantifies liquidity and credit premia in the term structures of German and French government bond yields. Our analysis is based on the fact that differences in the yields of government-guaranteed agency bonds vis-à-vis government bonds can be mainly attributed to liquidity effects. Using the information on the benchmark rates, as measured by the overnight-indexed swap curve, we estimate liquidity and credit premia as latent factors in a state-space framework. The results are important for quantifying the price impact of safe-haven flows on the government bonds, as well as for assessing credit risk of highly-rated sovereigns independently of CDS market data.

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Liquidity premium is understood in this paper as a higher price of an asset due to its higher liquidity relative to other assets, i.e., it can be traded in large volumes at lower costs. Credit premium is understood as a price discount on an asset due to the risk that the issuer fails to repay coupon or principal. The importance of liquidity and credit effects in sovereign bond yields has gained wide acceptance in the light of the recent financial crisis. Still, the quantification of these premia for very liquid and highly rated government bonds still poses problems.

Generally, the literature on decomposing sovereign yields into liquidity and credit factors can be divided into two strands. The first strand uses proxies for credit quality and liquidity to explain the movements in yield spreads vis-à-vis benchmark rates. For example, Beber et al. (2009) explain spreads between long-term bond yields of ten euro area countries and euro area swap rate using CDS premia as a proxy for credit quality and trading-based liquidity measures like bid-ask spreads or market depth. More recently, models of euro area sovereign yield spreads over German bonds used CDS spreads as a credit measure and an agency-government spread as a liquidity measure (Schwarz (2011)) or the U.S. Treasury-swap spread as a global credit risk factor and bid-ask spreads for liquidity (Favero et al. (2010)). This literature draws to some extent also from the work on extracting credit and liquidity components in the corporate bond markets.[1]

The second strand of literature disentangles liquidity and credit effects by directly controlling for one of them, e.g., by focusing on bonds with the same credit quality but with different liquidity. Perhaps the best known example of a liquidity measure constructed using this logic is the so-called "on-the-run premium", i.e., the yield spread between off-the-run and on-the-run U.S. Treasury securities, as documented by Warga (1992).[2] Using data from other markets, Longstaff (2004) proposed a so-called "flight-to-liquidity premium", measured as the yield spread between the Treasury and Refcorp bonds, the latter being guaranteed by the U.S. government and thus having the same credit quality as Treasury securities. This measure is based on an assumption that agency bond yields are not influenced by any strong liquidity effects.[3] Recently, some studies have modelled yields in a state-space framework with latent factors driving liquidity and credit risk components. For example, Duffie et al. (2003) models sovereign credit risk along with latent term-structure factors, but does not account for liquidity premia. Fontaine and Garcia (2009) introduce liquidity as an additional factor in a dynamic term structure model and identify it by estimating the model for a panel of on- and off-the-run Treasury yields.[4] Still, none of these papers is able to extract both credit and liquidity components. Furthermore, they focus on relatively small bond markets, rather than on large and highly-rated sovereigns.

The contribution of this paper is to decompose the yields of highly rated and very liquid government bonds, extracting credit and liquidity premia. Economically, understanding the price impact and the dynamics of these components is important, as highly rated and very liquid government bonds are often used as benchmarks for pricing other assets. In the spirit of the above-mentioned second strand of the literature, we control for credit risk using the comovement between government bonds and government-guaranteed agency bonds. As an addition to the existing literature, we estimate sovereign liquidity and credit premia as latent factors in a state-space framework. This allows us to identify the magnitude and dynamics of these premia in German and French sovereign yields.

The estimation of liquidity and credit premia proposed in this paper does not rely on any proxies commonly used in the related literature on corporate bonds or smaller sovereign markets. With respect to the liquidity, there is a large literature proposing various trading-based measures.[5] These measures are very informative for assets traded on electronic platforms. However, in the case of sovereign bonds, the majority of transactions are conducted over the counter. For example, for German sovereign bonds, only 2% of all trades are made on the largest European electronic platform, MTS. Although the data from this platform is reliable in terms of pricing, the assessment of liquidity of the overall market based only on the liquidity measures derived from this segment may be very misleading. The reason is that during crisis periods, the share of trades conducted on the electronic platform tends to decrease due to shifts towards the over-the-counter market. This effect is illustrated in Fig. A-1 in Appendix A, which shows the overall monthly trading volume of euro area sovereign bonds on MTS, distinguishing also the volumes for German and French bonds. Moreover, for very liquid markets like the market for German government bonds, other traditional trading-based measures like bid-ask spreads are very low. This implies that the effect of a sudden increase in liquidity due to, for example, a safe-haven flow, would not necessarily be possible to quantify based on the already very low bid-ask spread. Rather, the effect would be visible in the pricing of the asset itself.

With respect to the measures of credit premia, information from the CDS market which is usually used for corporate bonds or smaller sovereigns can be distorted for large AAA-rated governments. In the case of a default of a large systemically important AAA sovereign, some of the counterparties who sold the credit protection in form of a CDS on such a sovereign are likely to also be insolvent

[1] For corporate bond markets, Bongaerts et al. (2012) analyse trading-based liquidity measures and default probability estimates for single assets, while Dick-Nielsen et al. (2012) use information on CDS spreads and ratings to extract rating-dependent liquidity components before and during the crisis. Similar studies for this market include Covitz and Downing (2007) who use trading volume and maturity as proxies for bond's liquidity and credit rating, as well as issuer's equity return volatility as proxies for credit quality. A similar analysis employing bid-ask spreads for liquidity of corporate bonds for various rating classes is provided by Chen et al. (2007). Ericsson and Renault (2006) use on- and off-the-run Treasury spread as a proxy for liquidity and a difference between Moody's BAA- and AAA-rated corporate bond yield indices for credit quality. Longstaff et al. (2005) show that the majority of corporate yield spreads is due to default risk, as measured by CDS spreads.

[2] Amihud and Mendelson (1991) confirm the liquidity effects for Treasury bills and notes, relating their magnitude to the residual maturity, while Goldreich et al. (2005) relate the observed on-the-run premium to both, current and future expected liquidity.

[3] Using a similar approach for a broader set of assets, Reinhart and Sack (2002) decompose swap, corporate and Treasury yields into several components, including a risk-free rate, liquidity and credit premia. In a related study, Krishnamurthy and Vissing-Jorgensen (2010) isolate the impact of net supply of Treasuries on the price of risk and liquidity. Risk in this study, as in Reinhart and Sack (2002), regards the corporate risk and not the sovereign risk.

[4] Liu et al. (2006) use a similar framework to jointly model the Treasury, repo and swap term structures, identifying the liquidity component as the difference between general collateral government repo rates and on-the-run Treasury yields and the default component as the difference between swap and repo rates. A similar approach is followed by Feldhütter and Lando (2008) who model Treasury bonds, corporate bonds and swap rates and decompose the latter into convenience yield, credit risk and swap-specific factors.

[5] For a comprehensive overview of liquidity proxies used for sovereign bonds, see e.g. Fleming (2003) or Elton and Green (1998).

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