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State-varying illiquidity risk in sovereign bond spreads

Paul Docherty*, Steve Easton

Newcastle Business School, University of Newcastle, NSW 2308, Australia

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ABSTRACT

Illiquidity and default risk are determinants of bond spreads that models suggest vary across market states. The Australian sovereign debt market, where the Australian government provided an explicit guarantee over semi-government debt, provides an environment in which to examine these separate factors. We find little evidence that the factors proposed by reduced-form models can explain sovereign spreads, while, consistent with flights to liquidity, illiquidity risk is relevant particularly important during periods of market stress. These flights to liquidity are substantially more prominent at the shorter end of the term structure, whereas volatility predominantly explains longer-maturity sovereign spreads. The term spread of sovereign yields is shown to be negatively related to illiquidity during periods of stress, indicating that theoretical models that incorporate flights to liquidity need to be expanded to include the impact of such flights on both the level and slope of yields.

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1. Introduction

Two key factors have been shown to be determinants of time-varying bond spreads; namely illiquidity risk and default risk.¹ Theoretical models of the price of illiquidity risk by, for example, [Acharya and Pedersen \(2005\)](#) and [Ericsson and Renault \(2006\)](#), provide three central implications; namely that aversion towards illiquidity is time-varying and positively related to volatility, that cross-asset correlations are positively related to illiquidity, and that illiquid assets demonstrate greater price sensitivity than do liquid assets to aggregate market-wide illiquidity. Consistent with predictions from these models, studies such as those by [Acharya et al. \(2013\)](#) and [Dick-Nielsen et al. \(2012\)](#) report that illiquidity premia are significantly larger during periods of crisis than they are in normal states.

However, as demonstrated by [Beber et al. \(2009\)](#), the relative importance of default risk and illiquidity risk in sovereign yield spreads differs depending on the market state, resulting in flights to both quality and liquidity that occur at different times and for different reasons. Specifically, [Beber et al. \(2009\)](#) report that while default risk is the key determinant of bond spreads during normal periods, illiquidity is the key driver of spreads during crises when investors increase their aversion towards risky and illiquid assets. Similarly, [Acharya et al. \(2013\)](#) report that there is a flight-to-liquidity during crisis periods, where investors have a preference for liquid investment grade bonds rather than less liquid sub-investment grade bonds.

However the correlation between default risk and illiquidity risk, and the concomitant correlation between flight-to-quality and flight-to-liquidity, creates empirical challenges when attempting to disentangle their impacts on bond spreads. Where proxies for illiquidity and default risk are positively correlated, regressions may produce unreliable test statistics, overestimating the role

* Corresponding author.

E-mail address: paul.docherty@newcastle.edu.au (P. Docherty).¹ For a survey of the impact of illiquidity risk on asset prices, see for example [Amihud et al. \(2005\)](#).

of liquidity (Helwege et al., 2014). Crucially, as most extant studies focus on bonds with different default risks, namely US corporate bonds and European sovereign bonds respectively, they are not able to provide a clean examination of the differential impact of illiquidity risk across market states.² Ericsson and Renault (2006) show that default risk and illiquidity risk are usually positively correlated in the United States corporate bond market, while Beber et al. (2009) report a negative correlation between default risk and illiquidity for European sovereign debt.

This study provides an examination of bond spreads by exploiting an environment that permits the separate identification of default risk and illiquidity risk factors. We examine the spread between Australian government bonds and semi-government bonds. On 25 March 2009, the Australian government announced that they would provide a guarantee on semi-government debt across the period from 24 July 2009 to 31 December 2010 (Australian Government, 2012). For this period the spread between Australian government and semi-government debt will solely reflect illiquidity risk.

There is a *a priori* reason to suggest that the factors affecting variation in spreads to Australian semi-government yields may differ from those that have been proposed in other markets, such as corporate bonds (for example, Longstaff and Schwartz, 1995; Duffee, 1998). Default risk-related factors are expected to be less prevalent in these spreads, given that vertical fiscal integration between the States and Commonwealth Government minimises the probability of a state defaulting conditional on the Commonwealth Government not defaulting over the period before and after the explicit Australian government guarantee was implemented.

The differential impact of illiquidity premia across the term structure has also garnered recent attention. Ericsson and Renault (2006) provide a theoretical model where illiquidity premia are positively correlated with default risk and the illiquidity premia is a decreasing function of time to maturity. Only two studies have undertaken an empirical examination of this relationship in an environment that controls for default risk (Longstaff, 2004; Kempf et al., 2012). Longstaff (2004) reported a U-shaped liquidity term structure when comparing the yield between Treasuries and so-called Refcorp bonds, that is, bonds issued by a government agency and where their principal is fully collateralised by Treasury bonds and full payment of coupons is guaranteed by the Treasury. However, his sample was limited as only six Refcorp bonds were available for comparison. Kempf et al. (2012) reported that separate economic factors drive short and long-term illiquidity premia. They showed that asset market volatility explains the short-term illiquidity premium, while long-term economic risks explain the long-term illiquidity premium.

There is an extensive literature documenting both the magnitude and determinants of bond yields across market states (see, for example Huang et al., 2015; Helberg and Lindset, 2016). Our sample period from 2002 to 2012 also includes two periods of significant market stress: the Global Financial Crisis and the subsequent European sovereign debt crisis. By minimising the impact of default risk over this extended period, we are better able to isolate the impacts of illiquidity risk and flight-to-liquidity across market states. Extant studies of the term structure of the illiquidity premia focus on the period prior to the Global Financial Crisis and do not examine the differential impact of illiquidity and default risk on the term structure across different market states. Our sample period permits us to examine the differential impact of the term structure of illiquidity across different market states and to extend upon Beber et al. (2009) to determine whether the flights to liquidity observed in sovereign yields is more pronounced at either the short or long end of the term structure. While the determinants of innovations in Australian debt spreads have been examined for Australian dollar-denominated Eurobonds (Batten and Hogan, 2003) and domestic corporate bonds (Lepone and Wong, 2009), this is the first study to examine the spread in Australian semi-government securities.

The paper proceeds as follows. Section 2 provides a discussion of the institutional features of the Australian sovereign debt market. The data are described in Section 3 with the results presented in Sections 4. A summary is provided in Section 5.

2. Institutional features of the Australian sovereign debt market

Semi-government bonds have traditionally been considered to be an extension of the Australian government bond asset class (Lancaster and Dowling, 2011). This belief may have been derived from the explicit guarantee provided by the respective state governments over the semi-government debt they issue, along with the close fiscal relationship between the Commonwealth and states of Australia. As detailed in Twomey and Withers (2007, p. 37), the level of vertical fiscal integration resulting from the Australian Constitution is 'the most extreme of any federation in the industrial world'. As they document, across the 1990s for the five major federations that they examined (Australia, Canada, Germany, Switzerland and the United States), Australia had the highest share of federal government spending, the highest share of federal taxation, and the largest relative gap between these two measures. The effect of strong vertical fiscal integration in Australia is that, while there is no explicit Commonwealth guarantee of State and Territory debts, the system of revenue sharing results in cash flows to State and Territory governments that are relatively uncorrelated with economic conditions within those jurisdictions.

In addition to the extreme vertical fiscal integration that exists in Australia, there is also a widely held perception that the Commonwealth provides an implicit guarantee over the debt of its states. This perception may be influenced by the fact that on two occasions during the Great Depression, the New South Wales government defaulted on its debt by failing to make a coupon payment. On both occasions, the Commonwealth government sought and was granted an extension of its constitutional power over state debt and took authority to pay these coupons and avoid default (National Archives of Australia, 2012). The

² One exception is Helwege et al. (2014), who examine illiquidity effects in corporate bond spreads using pairs of bonds issued by the same firm. However, they do not examine the performance of their illiquidity variables across different market states.

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