Liquidity Patterns in the U.S. Corporate Bond Market

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Abstract

Liquidity commonality exists and empirical evidence (e.g. Lin et al., 2011) indicates that exposure to this common liquidity factor is priced in the cross-section of corporate bonds. The existence of commonality implies that part of a bond's illiquidity is left as idiosyncratic. In this paper, we study how illiquidity components explain the cross-section of bond yields and how this relationship varies over time and across bond categories. We use a factor decomposition to break down total illiquidity into a common and an idiosyncratic component and analyze how yields relate differentially to each of these two components. We find that a bond's idiosyncratic illiquidity is important, which might reflect informational asymmetries compounded by the lack of diversification in the institutional investors' portfolios. Moreover, the relation between illiquidity and yield spreads appears to be negative during the recent crisis period.

Keywords: Idiosyncratic liquidity, Corporate bonds, Yield spreads, Global Financial Crisis

1. Introduction

The recent global financial crisis has seen a deterioration of market-wide liquidity across all assets, which has been especially detrimental to markets for fixed income securities and their derivatives, particularly those with credit risk, including the corporate bond market.

Furthermore, despite the large volumes traded on this market, the demand for corporate bonds on the secondary market, especially for those of shorter maturities, remains scarce. Managing this illiquidity risk constitutes a big challenge for investors, as the ease with which they will be able to trade and at what cost, is a centrepiece of the investment decision. In light of these challenges posed by liquidity we intend to provide a deeper understanding on the interactions between liquidity and bond yield spreads. In particular, we focus in this paper, on the relation between corporate bonds yield spreads and a bond's idiosyncratic level of liquidity.

There is large empirical evidence for the existence of commonality in liquidity (Chordia et al., 2000; Hasbrouck and Seppi, 2001, among others) and for the existence of a premium for systematic liquidity risk (Pastor and Staumbaugh, 2003; Sadka, 2006) in the equity market, and similarly in the corporate bond market (Lin et al., 2011; Bao et al. 2011; Dick-Nielsen et al. 2012). In addition, Rösch and Kaserer (2013) provide evidence that commonality is time-varying and that it peaks during major crisis events.

When looking at the pricing implications of liquidity and liquidity risk, most studies focus on the total level of liquidity or on the sensitivity to a common liquidity factor, respectively. Expected corporate bond returns are related to systematic risk associated with a common liquidity factor. Given the specific institutional settings of the corporate bond market, it is reasonable to believe that an important part of the bond's liquidity may remain idiosyncratic or bond specific. In fact, trading on the corporate bond market is generally dominated by a small group of institutional investors and the market remains very opaque to the general public. Unlike equities there is a large diversity in the securities provided, the bonds trade very infrequently and there is rarely a constant supply of buyers and sellers looking to trade sufficiently to sustain a central pool of investor provided liquidity. In such a setting we argue that some bonds potentially exhibit higher idiosyncratic illiquidity because they are less accessible or less known by the investor.

Liquidity has many facets and generally encompasses the time, cost and volume of a trade. It can notably be defined as the ability to trade large quantities of an asset and at a low cost. Therefore it is reflected in trading costs, which are arguably well proxied by bid-ask spreads or in the impact of a single trade on prices. In our study we use several liquidity measures that capture different dimension. We use Amihud's (2002) measure and the standard deviation thereof to capture the price impact of a trade. We use the imputed roundtrip cost, its standard deviation, and Roll's (1984) measure as a proxy of trading cost. Finally we use the ratio of a bond's zero trading days within a period to capture trading activity.

In a view of increased transparency in this market, FINRA has, since 2003, been gradually releasing transaction data of the secondary corporate bond market. Since 2005 almost 99% of the transactions in this market have been reported in TRACE (trade reporting and compliance engine). The availability of this data has created a new avenue for research investigating the effects of illiquidity in the cross-section of asset returns.

Using this dataset we aim to make a contribution to the literature in the following way. We decompose a bond's individual liquidity into a common and an idiosyncratic component and study how these two components interact in driving bond yields. We start by measuring the magnitude of liquidity commonality of this market and define the residual as the idiosyncratic bond liquidity. The commonality in liquidity can be seen as the part that is driven by common factors of the market and which is common to all bonds. The idiosyncratic liquidity is seen as the order flows related to bond specific components or characteristics. We test whether only commonality exhibits a relation to yield spread, whether idiosyncratic liquidity can have some explanatory power, and how the prevalence between both varies over time. We expect that in stressed financial markets, spreads are more sensitive to commonality in liquidity, while under normal times, the sensitivity to idiosyncratic liquidity might be important as well. However, even in stressed times exposure to systematic liquidity risk may account for no more than little of returns, especially anomalous returns of bonds with high idiosyncratic illiquidity. We do have some anomalous findings and hence decided to investigate further. By disentangling the commonality from the idiosyncratic part we are able to provide evidence on the specific relationship of yield spreads to these measures.

We use factor decomposition with 3 factors to derive the common liquidity part of each bond. The common part accounts for 13% of the liquidity variation on average, which leaves and important part of liquidity defined as the idiosyncratic component. We then use cross-sectional regressions to measure the extent of the sensitivity of yield spreads to commonality and idiosyncratic liquidity and look at the time series behavior of the coefficients on these measures. We find that a significant relationship exists between yield spreads and both common and idiosyncratic illiquidity. The finding that the idiosyncratic part is important may result from the fact that on such a very opaque market some bonds might not be available or known to all investors.

The remainder of the paper is organized as follows. In section 2 we present a survey of the relevant literature. In section 3 we describe our dataset and the methodology. In section 4 we discuss the empirical results. Section 5 concludes.

2. Literature review

Since Amihud and Mendelson (1986) liquidity has been considered as an important element in asset pricing. A number of studies, especially on stock markets, investigate the pricing implications and provide evidence of a premium for systematic liquidity risk (see for example, Amihud 2002; Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005; Chen, 2005; Sadka, 2006). Pastor and Stambaugh (2003) consider market liquidity as a state variable. They find that expected stock returns are related cross-sectionally to the sensitivities of returns to fluctuations in aggregate liquidity.

Liquidity has many facets and there is not one single measure that has been accepted unanimously. Several proxies have emerged in the literature and are usually considered as reliably measuring transaction related costs. Roll's (1984) measure essentially relates to transaction costs and bid-ask spreads. The idea behind is that the price bounces back and forth between bid and ask prices and higher percentage bid-ask spreads lead to higher negative covariance between consecutive returns. This measure is indeed able to capture liquidity dynamics above and beyond the effect of bid-ask bounce as shown in Bao et al. (2011). Amihud (2002) develops a measure that relates the price impact of a trade to the trade volume. Pastor and Stambaugh (2003) build their illiquidity measure as the temporary price changes induced by trading volume. Mahanti, et al. (2008) derive a "latent liquidity" measure from custodian banks' turnover, which is defined as the weighted average turnover of investors who hold a bond, in which the weights are the fractional investor holdings. Jankowitsch et al. (2011) propose a price dispersion measure, based on the dispersion of market transaction prices of an asset around their consensus valuation by market participants.

Corporate bonds and liquidity

Recent papers in the finance literature show that liquidity and liquidity risk are important components in explaining the credit spread puzzle exhibited in corporate bond returns. Bao et al. (2011) use a modified version of Roll's measure as a proxy for liquidity and show that this measure relates to other bond characteristics that are commonly used as liquidity proxies. This measure exhibits commonality across bonds, which tends to go up during periods of market crisis. Illiquidity is found to have pricing implications, to the extent that it is an important factor in explaining the time variation in bond indices and the cross-section of individual yield spreads. Dick-Nielsen et al. (2012) use a principal component analysis of eight liquidity measures to define a factor, which is used as a new liquidity proxy. They find that illiquidity contributes to spreads and does so even more for speculative bonds. The contribution is only small before the crisis but increases strongly at the onset of the crisis for all bonds except AAA-rated bonds. This finding underscores the flight-to-quality effect that occurred in AAA bonds. Friewald et al. (2012) study the pricing of liquidity in the US corporate bond market in periods of financial crisis using a comprehensive dataset. Their liquidity measures are derived from standard liquidity measures such as Roll and Amihud, bond characteristics, trading activity variables and price dispersion. Liquidity is found to account for 14% of the explained time-series variation in corporate bond yields and its economic impact is almost doubled in crises periods.

Liquidity risk implications are analyzed in De Jong and Driessen (2012) and Lin et al. (2011). De Jong and Driessen (2012) use a linear factor models in which corporate bond returns are exposed to market risk factors and a liquidity risk factor. Yields are measured at the index level and liquidity risk factors are derived from shocks to equity market and government bond market liquidity, respectively. Expected corporate bond returns are found exposed to fluctuations in both treasury market and equity market liquidity. Lin et al. (2011) focus instead on liquidity risk, which is measured by bond returns' sensitivity to changes in aggregate liquidity rather than by the absolute liquidity level. Using the Fama and French (1993) five factor model for bond returns, augmented by a liquidity factor, they find that liquidity risk is priced in expected corporate bond returns and this result is robust to the inclusion of default, term and stock market risk factors, bond characteristics, the level of liquidity and the rating. Acharya et al. (2013) study the exposure of US corporate bond returns to liquidity shocks on the stock market and the Treasury bond market over more than 30 years. They find a conditional impact of liquidity shocks on bond prices defined over two regimes. In the first regime, characterized by normal times, liquidity shocks do not affect bond prices. However in the second regime, which is characterized by macroeconomic and financial distress, there is a differential impact of liquidity on investment grade bonds versus speculative bonds. Junk bond returns respond negatively to illiquidity shocks, while investment grade bond returns respond in a positive and significant way.

Finally, a number of studies demonstrate that liquidity exhibits a systematic common component and that this commonality is time-varying and especially strong during crisis periods. Chordia, Roll and Subrahmanyam (2000) are the first ones to show that individual liquidity measures of stocks co-move. Hasbrouck and Seppi (2001) provide evidence of common factors in returns and order flows. Kamara et al. (2008) look at the cross-sectional variation of liquidity commonality and show how it has increased over time and how it depends on institutional ownership. The presence of this commonality involves that part of a security's liquidity remains idiosyncratic or unexplained by the market. The literature so far does not account for this component when studying pricing implication. Nevertheless in a very opaque market, with a large number of different securities and a large number of small dealers this idiosyncratic component may remain important.

There are several important differences between the prior papers and our own research. We go further into the analysis of liquidity by decomposing it into two parts, a common and an idiosyncratic component. We look at the pricing implications of these two measures over time and whether these relations change substantially over different periods. To our knowledge, no study so far has investigated the impact of idiosyncratic illiquidity, which might be quite important in such an opaque market. Indeed the large diversity of products confronted to a large number of dealers with small market shares does not offer an optimal transparency on all bonds that may be available to the investors. In this context, we conjecture that some bonds might exhibit a stronger idiosyncratic illiquidity simply because they are not broadly available or known to all investors. Further, while previous studies look at monthly or quarterly liquidity series, by constructing weekly liquidity measures, we are able to analyze finer variations in the relationship between yield spreads and bond liquidity. Finally our sample allows us to conduct a thorough analysis of the relation pre- and post- financial crisis as we have equal-length periods of data before and after the crisis at our disposal.

3. Data and methodology

3.1. *Liquidity measures*

We built weekly series of 6 liquidity measures that have been used in recent studies, notably in Dionne and Chun (2011) and in Dick-Nielsen et al. (2012). Our weekly measures are computed over weeks starting on Wednesday and ending on Tuesday, to avoid weekend effects.

1. <u>Amihud price impact</u>

Amihud (2002) measures the price impact of a trade per unit traded and takes the absolute value of the return over the trading volume. We follow Dionne and Chun by constructing this measure on all days when at least 3 transactions of the bond are observed. For each individual bond i, we construct a daily Amihud measure, which is then aggregate weekly by taking the mean:

$$Ami_{i,d} = \frac{1}{N}\sum_{j=1}^{N}\frac{|return^{i}{}_{j,d}|}{volume^{i}{}_{j,d}}$$

where N is the number of returns during each day d, $return^{i}{}_{j,d}$ is the return on the j-th transaction during day d and $volume^{i}{}_{j,d}$ is the volume of this j-th transaction. The measure reflects how much the price moves due to a given volume of a trade.

2. Imputed roundtrip cost

The measure is developed by Feldhüter (2009) and is based on the observation that bonds might trade 2 or 3 times within a short interval, after a long interval without any trade. This is likely to occur because a dealer matches a buyer and a seller and collects the bid–ask spread as a fee. The dealer buys the bond from a seller, and further sells it to the buyer. The price difference can be seen as the transaction fee or the bid ask spread. The imputed roundtrip cost (IRC) is therefore defined as

$$\frac{P_{max} - P_{min}}{P_{max}}$$

where P_{max} and P_{min} are the largest and smallest prices in the set of transactions with the same volume, within a day. For each bond we obtain the daily IRC as the average of roundtrip costs on that day for different sizes and we then take averages of daily estimates to obtain weekly estimates.

3. Amihud and IRC risk

As in Dick-Nielsen et al. (2012) and in Dionne and Chun (2011), we use the standard deviations of the measures defined above as additional liquidity proxies. The measures capture the variation of liquidity and therefore offer another dimension to the liquidity level. The daily estimates of these measures are calculated as the standard deviation of daily Amihud and IRC values over a rolling window of 21 days. Weekly estimates are obtained as averages of daily values.

4. Roll bid-ask spread

Roll (1984) shows that the bid-ask spread can be approximated as follows:

$$Roll_t = -\sqrt{cov\ (\Delta\, p_t, \Delta p_{t-1})}$$

The idea behind this measure is that adjacent price movements can be interpreted as bid-ask bounces and this results in a negative correlation between transitory price movements. A higher negative covariance therefore indicates higher bid-ask spreads and hence higher transaction costs. We compute this measure daily for each bond, using a rolling window of 21 days in which we require at least 4 transactions.

5. Bond's zero trading days

Another indicator of liquidity is the frequency at which the bonds trade. Many studies therefore compute the ratio of the number of zero trading days over the total number of trading days during a period. Less trading days indicate less liquidity of the bond. We compute this ratio every day for each bond, over a period of 21 trading days.

$$Bond\ zero = \frac{number\ of\ bond\ zero\ trades\ within\ the\ rolling\ window}{number\ of\ days\ in\ the\ rolling\ window}$$

In our sample we have 519 weeks, starting on 21 January 2004 and ending on 31 December 2013. Since the number of bonds in the sample is not fixed, the number of bonds entering the computation of the illiquidity measures varies over the weeks of the sample. In total we obtain 1,235,539 bond/week pairs for which an individual illiquidity measure is observed.

3.2. *Sample construction*

We obtain detailed transaction data of the OTC US corporate bond market from TRACE (Trade Reporting and Compliance Engine) that has been launched by the NASD (National Association of Securities Dealers), now called FINRA (Financial Industry Regulatory Authority), in a view to increase price transparency on the corporate debt market. The database contains detailed trade-by-trade records with the timestamp of the transaction, the clean price and the par value traded, although the par value traded is truncated at $1 million for speculative grade bonds and at $5 million for investment grade bonds. All FINRA members are responsible for reporting all OTC corporate bond transactions in the secondary market to the system. The information disseminated by TRACE makes it a most valuable tool for microstructure research of bond market liquidity. For our analysis we require the bonds to have frequent enough trading to be able to construct a liquidity measure at a weekly frequency. We include only bonds that are present in the sample for more than a year and are traded on at least 30 business days each year. Further once liquidity measures are computed we restrict the set to bonds, for which a liquidity measure is observed 50% of the weeks of its presence in the sample. This selection criterion leaves us with a sample of 9,670 bonds. We use this bond list to retrieve bond characteristics from Bloomberg. Based on this information we implement a further selection and retain only dollar denominated bonds with a bullet or callable repayment structure, without any other option features. We also require having information available on bond characteristics such as its issue size and date, its rating and its coupon. We end up with a selection of 7,535 bonds for which we obtain the complete transaction data in TRACE. Even if the reporting requirements are well specified, the database nevertheless contains many erroneous and cancelled reports. We follow Dick-Nielsen (2009) to manually filter out error reports, cancelation, reversals and agency transactions. After cleaning the data we end up with a total of 34,682,963 records related to the bonds in our sample. In Table 1 we report summary statistics on the bonds' characteristics of our final sample and provide information about their trading activity.

Table 1: Summary statistics

Our sample consists of 7,535 unique bonds and we obtain trades over a period of ten years, from 2004 to 2013 included. The number of bonds in the sample gradually increases over the years, from 1,251 in 2004 to 5,635 in 2013. Average issue size of the bonds increases slightly over the years. In all years, average maturity is close to fifteen years. The gradual decrease in maturity can be explained by our sample selection, as a bond usually stays in the sample once it is selected. We can see from the table that these bonds trade very little. Median number of trades a week ranges from 11 to 20, while the mean lies between 20 and 40. Both values are highest in 2009. Overall mean and median number of trades increases considerably towards the end of the sample. Turnover, measured as the total monthly trading volume over issue size has been decreasing between 2004 and 2008, where it attains 4.7%. In 2009 it has been higher but then experienced a steady decrease until the end of the sample, which might also be related to the fact that average issue size has been increasing. The number of trading days is higher in the second half of the sample, which comes along with a higher activity on this market and with the fact that over the years more and more bonds have become subject to reporting. Average daily and weekly returns have alternatively been positive and negative. The strongest negative values have been observed in 2008, which corresponds to the onset of the financial crisis in the US.

3.3. *Liquidity decomposition*

We would like to gain a deeper insight into liquidity dynamics and their pricing implications. Knowing that these bonds are usually held in largely undiversified portfolios, we expect that there remains an important part of idiosyncratic component, which may affect bond yields. Since the focus of this paper is on liquidity, we propose to decompose our liquidity measure into a common part and an idiosyncratic part. The common part is assumed to reflect liquidity shocks that are common to all bonds, while the idiosyncratic part is assumed to reflect shocks that are specific to the individual bond. We follow the asymptotic principal component analysis developed in Conner and Korajczyk (1986) and used in Korajczyk and Sadka (2008). The method is similar to traditional principal component analysis except that it relies on asymptotic results, as the number of cross-sections grows large. Since in our case the number of assets N, is much greater than the number of time periods the method can be applied to our dataset. Conner and Korajczyk show that the eigenvector analysis of the T×T covariance matrix of asset returns is asymptotically equivalent to traditional factor analysis. More specifically, let L be the n×T matrix of observations of individual bond liquidity measures, at a weekly frequency. We define the matrix N to be an n×T matrix for which $N_{i,t}$ is equal to one if liquidity of bond i at time t is observed and zero otherwise. We build the matrix Ω that accommodates missing data as follows:

$$\Omega_{t,\tau} = \frac{(L'L)_{t,\tau}}{(N'N)_{t,\tau}}$$

Element (t, τ) of matrix Ω $(T\times T)$ is defined over the cross-sectional averages of the observed liquidity measures only. The factors used for the factor decomposition are obtained by calculating the eigenvectors for the k largest eigenvalues of Ω.

We run time series regressions of individual illiquidity series on the identified common factors, alternatively using one, two or three factors. The choice of three factors is arbitrary and follows Korajczyk and Sadka (2008). Furthermore the three first factors are able to capture between 44% and 98% of the variance in the data. Adding more factors increases the amount of variance captured by 1% only for each factor, which also explains why we stop at 3 factors. Next we define the fitted and residual values obtained with three factors in these regressions as our common and idiosyncratic illiquidity measures. Hence for each bond we obtain weekly time series of common and idiosyncratic illiquidity over the time period a bond is in the sample. Table 2 reports the average R-squared and adjusted R-squared that we obtain by fitting our weekly illiquidity measures to one, two or three latent factors.

Table 2: Factor decomposition

Results in Table 2 indicate that there is evidence for commonality within individual bond liquidity measures. Most of the commonality seems to be captured by the first factor, as evidenced in the t-statistics of factors two and three. Using the 3 factors model, we are able to explain between 9% and 32% for

Amihud and zero trade bond measures, respectively. This leaves an important part that can be attributed to idiosyncratic components. The aggregate series of commonality and idiosyncratic illiquidity are plotted in Figure 1**.** We see from this graph that aggregate illiquidity exhibits a large spike towards the end of 2008. Hence along with the general market illiquidity induced by the financial crisis, corporate bonds have also experienced higher illiquidity, which peaked shortly after the fall of Lehman Brothers in the US. We further see that aggregate illiquidity is composed of a positive common part and a negative idiosyncratic. The large spike is caused by liquidity commonality as expected, as all assets were hit by this event. At the aggregate level the idiosyncratic component is very low and very close to zero after the financial crisis. While the idiosyncratic component may be large at the individual level, it is largely canceled out when looking at aggregate series.

Figure 1: Aggregate series of two liquidity components

In Table 3 we report some descriptive information on our liquidity decomposition and number of observations. We know from previous research that liquidity is an even more important factor in times of distress (Friewald et al. 2012, Dick-Nielsen et al. 2012). To focus on the behavior of liquidity during financial crisis, we decompose the sample period into three parts to detect different behaviors pre-, during and post-crisis. Even if the financial crisis has extended over a longer period, we decide to focus on the most tormented period on the US market, which is usually assumed to be the fall of Lehman Brother. We therefore define our crisis period starting in September 2008 and lasting until December 2008. We further look at our illiquidity measures in different subgroups of bonds, designated according to the maturity, the rating, the issuance size and the industry of the bond. Most groups and sub-periods contain a few hundred bonds on which means and standard deviations are computed. For ratings AAA and C and for maturity around 2Y however we obtain only a few observations, at least at the beginning of the sample, and results should therefore be interpreted with care. Notice that all liquidity proxies are built with a positive sign and hence higher values refer to higher illiquidity. As expected, we see that illiquidity is highest during the crisis and that post-crisis it falls below its pre-crisis level. This relation is verified throughout all liquidity proxies. We know that commonality in liquidity has been much more important during crisis periods. Better liquidity conditions after the crisis might be the result of the stimulus program initiated by the Fed starting in May 2009. It is also important to note that this pattern appears for our aggregate liquidity measure and for the commonality measure but not for idiosyncratic illiquidity. Idiosyncratic illiquidity instead has been increasing over time and gets very close to zero towards the end of the sample. In the pre-crisis sample idiosyncratic illiquidity as measured by Amihud, IRC, IRC risk and Roll is negative indicating that all illiquidity of the bonds in the sample stemmed from the market and that individual bond characteristics might instead improve a bond's liquidity.

Next we look at the values of these liquidity components across several bond groups. Starting with the rating classification, we surprisingly find that in the pre-crisis period, the lowest illiquidity levels are exhibited by junk bonds (rating C or below). This finding is confirmed by all measures except the *zero bond* measure. For this proxy the ratio of zero trading days is highest for the lowest graded bonds. This behavior is also observed for the common part of all these measures. During the crisis period, the bonds with best liquidity measures are AAA rated bonds, interestingly followed by C rated bonds. When we look at the decomposition of liquidity values, we find that both bond categories exhibit around the same values of liquidity commonality but that for the best rated bonds, idiosyncratic illiquidity reduces the total illiquidity level, while for the lowest rated bonds, idiosyncratic illiquidity adds up to the common part. Hence idiosyncratic illiquidity is positive essentially for lower graded bonds, which might have undergone the strongest selling pressure during the crisis, as investors start by selling the least credit-worthy assets. Hence illiquidity generated by bond intrinsic features is important as well. After the crisis, we observe that the liquidity measures are gradually increasing with a bond's rating. Idiosyncratic illiquidity is also highest for the lower rated bonds. Hence all bonds are exposed to common liquidity shocks but illiquidity of lower rated bonds has an additional idiosyncratic part, due to a bond's characteristics and notably its credit quality.

For maturity based groups, all measures indicate lower liquidity for bonds with a longer time to maturity. This observation remains throughout the three sub-periods. Idiosyncratic components are quite volatile in the sample and add up positively or negatively to the liquidity measure. Further we find that financial bonds exhibit the lowest liquidity, while industrial bonds exhibit the highest.

Table 3: Summary statistics of liquidity components

4. Yield spreads and liquidity components

4.1. *Regression analysis*

In this section we investigate whether a bond's yield spread is related to our two liquidity components and how this relation evolves over time. We follow the Fama-MacBeth (1973) methodology applied to panel data and perform weekly cross-sectional regressions of individual yield spreads on a bond's illiquidity measure – common and idiosyncratic- and some control variables. A bond's yield spread is defined with respect to Treasury yields, matched according to their respective maturities. More specifically, we adopt the following cross-sectional regression:

$$yield\ spread_i = \alpha + \beta\gamma_i + \partial Z_i + \varepsilon_i$$

where i refers to a bond, γ_i is the individual illiquidity measure – either aggregate or decomposed - and Z_i contains the control variables. In all specifications, we systematically include a bond's credit rating to control for credit risk, a callable dummy to control for the bond's maturity type, the average transaction volume during the week and the bond's remaining time to maturity. A bond that is traded more frequently or that has lower trading costs is expected to be more liquid. Some of these variables have been used in previous literature as proxies for a bond's liquidity. While there is some overlapping of different measures, we expect that they are not mutually exclusive and that they capture different aspects of liquidity. In our first set of regressions we consider a bond's aggregate liquidity measure only, while in the second set we consider the two liquidity components of our central measure (commonality and idiosyncratic).

4.2. *Correlations*

Before turning to the empirical results we report the correlations between individual bond variables in Table 4. The correlations between two variables are compute first within each week using pairwise complete observations and then averaging over the sample. As expected there is some correlation across the different measure. Amihud and IRC are most strongly correlated with their corresponding standard deviations. The correlation between Amihud and IRC level is also lower than that between their standard deviations. The Roll measure is mostly correlated with the standard deviations of Amihud and IRC. Quite naturally the correlation between measures computed over a 21 days window is stronger than for measures that are computed on one day. We also find that the correlation with other explanatory variables is moderate, which will allow us to include these variables in the same cross-sectional regression.

We further look at the correlations between the two liquidity components. For all measures the common and idiosyncratic parts exhibit an important negative correlation. Individual common components of all measures also exhibit an important correlation, which is higher than the correlation observed between the total measures. Hence there is a large common dimension observed through all liquidity measures that becomes apparent with this decomposition. These measures are subject to common dynamics captured in their commonality component but each of them exhibits some noise that is specific to the measure.

Table 4: Correlations

4.3. *Aggregate results*

Table 5 reports the results of alternative specifications of the regression model. In a first step we analyze each liquidity measure individually along with other explanatory variable. The table presents four different specifications. In model 1, we use a specification without liquidity measures, our baseline model, where individual bond yields are regressed on a bond's rating, time to maturity, average trading volume per day and a maturity type dummy, which is one if the bond is redeemable at maturity and zero if it is callable. This baseline model is already able to explain a substantial part of yield spread variation, as the R-squared attains a value of 39%. Rating is measured on a numerical scale, where higher values represent less creditworthy bonds. The coefficient estimate is positive suggesting that less creditworthy bonds obtain higher yields. If the rating of a bond increases by one, its yield will increase by almost 50 points. The coefficient on time to maturity is -0.01 meaning that bonds with longer time to maturity have slightly lower yields. The effect of maturity is surprising as bonds with long maturities are generally considered to be less liquid since they are often detained in "buy-and-hold" portfolios and therefore trade less regularly. This contrasts Bao et al. (2011) who find a positive coefficient on maturity. Our finding can however be the result of our sample selection in which we have a large fraction of bonds with a small maturity towards the end of the sample period. In any case, results should not be compared in a strict sense, as the sample selection and the time period covered are quite different.

In model 2 we add each liquidity variable which increases the explanatory power of the model. The R-squared values increase to 40% when *bond zero* measure is added and up to 44% when the *Amihud* measure is added. These results confirm previous findings that liquidity variables contribute to the explanation of yield spreads, as has been shown in Bao et al. (2011) and Dick-Nielsen et al. (2012). We find statistically significant results for the coefficients on our liquidity proxies. The magnitude of the effect depends on the measure that is used and the sign is always positive indicating that illiquidity contributes to higher yield spreads. Illiquidity as reflected by Amihud's price impact involves higher yields and an increase of the price impact by one, increases the yield spread by 0.15. If the cost per 100K dollars of a round-trip transaction increases by 1 dollar, yields increase by 0.87.

Table 5: Yield spread regressions on liquidity variables

4.4. *Decomposition*

We now turn to the analysis of our liquidity decomposition and the impact of both components on yield spreads. In the cross-sectional regressions, we analyze each component separately along with other explanatory variables. In the table we report time-series averages of the coefficients and their Fama-MacBeth t-statistics. From Table 5 we can see that in all regression specifications both liquidity components are significant. The coefficients on the common components are usually stronger, but idiosyncratic liquidity remains important and has a statistically significant impact on yield spreads. This finding is important and indicates that the relation between liquidity and yield spreads does not only stem from common market dynamics. The signs of the coefficients are most of the time positive and bonds with higher idiosyncratic illiquidity have higher yield spreads. Investors are thus compensated for holding securities that are less liquid due to their idiosyncratic features. Especially in this over-the-counter and quite opaque market it is not surprising that idiosyncratic illiquidity still plays a role and those investors, who largely hold undiversified portfolios get remunerated or can buy these securities at a lower price than otherwise equivalent ones. Interestingly, when liquidity is proxied by the *IRC risk* measure, we find a negative coefficient on idiosyncratic illiquidity. The positive relation between illiquidity and yield spreads does entirely stem from liquidity commonality and the idiosyncratic part of illiquidity does not require any compensation and investors holding these bonds accept to obtain lower yields. This finding could be rationalized if we consider that a bond with higher IRC risk is a bond that has exhibited more price variation in its imputed round-trip cost, beyond the variations stemming from the market, and that this bond therefore exhibits a higher chance of obtaining low round-trip costs in the future, which will decrease its yield.

4.5. *Time series analysis*

To gain further insights into the differential relation between liquidity and yield spreads over time, we propose to look at the time-series behavior of the coefficients in individual cross-sections and we plot the time series of the betas in Figure 2. We expect that liquidity effects, and especially liquidity commonality impacts are more important in times of distress. In the figure we already see that most of the variation in yield spreads can be attributed to commonality, hence the systemic part of illiquidity. The sensitivity is mostly positive and very large around the crisis period. The sensitivity of yields to the idiosyncratic part is lower and exhibits much variation during the crisis period. It seems also that it has been increasing over time for most of the liquidity proxies, except the zero bond measure.

Figure 2: Coefficients on liquidity components in cross-sectional regressions

In those graphs, we clearly see that the relation between liquidity and yield spreads is time varying and that taking simple averages of cross-sectional betas remains imprecise. To focus on the role of liquidity in financial crises, we therefore consider our cross-sectional regressions in three different periods: As before, we define the crisis period as going from mid-September 2008 to end of December 2008. The periods before and after are assumed to correspond to more normal market conditions. In Table 5 we report the results of several model specifications. Control variables are always included. We report the coefficients on these variables in the three distinct time periods. In all specifications we find a statistically significant effect of liquidity commonality on yield spread, and this impact is much stronger during the crisis period. This finding confirms our expectations and previous findings of Dick-Nielsen et al. (2012) that liquidity commonality gets more important in distress times. All bonds are exposed to same liquidity shocks and all yields are affected by this increased illiquidity. At the same time we see that idiosyncratic liquidity is not significant at all, or much less significant than in the two other periods. Results are usually valid throughout any liquidity measure. The coefficient on liquidity commonality stays positive in all three periods, indicating that common liquidity shocks, that affect all securities and therefore cannot be diversified away, will always increase yield spreads. Idiosyncratic illiquidity on the other hand has a differential impact on yield spreads and we find that its coefficient is sometimes negative. Hence the liquidity shock that is specific to the bond is not necessarily compensated in the yield spread. Investors may have perceived it safer to hold their bonds rather than selling them in a hurry at a discounted price. This might especially be true for investors with a long-term investment horizon, which is the case of insurance companies or pension funds. In particular, a large part of bond investors are insurance companies, who given their long-term investment strategy usually adopt a "buy-and-hold" strategy for a bond rather than selling it on the secondary market. Therefore if the bond is detained in a buy and hold portfolio investors are not affected by its idiosyncratic illiquidity as they do not expect to sell it quickly. After the crisis however, the coefficient on idiosyncratic illiquidity turns positive as well. Hence investors might have changed their attitude since then and now require a compensation for holding bonds with higher idiosyncratic illiquidity.

All in all we thus confirm that during the distress period only liquidity commonality matters. We observe an important and reversed impact of idiosyncratic illiquidity on yield spreads, before and after the crisis. Before the crisis investors did not require any compensation for detaining bonds with high idiosyncratic illiquidity but this has changed after this period.

4.6. *Bond portfolios*

To further understand the time series behavior of the illiquidity coefficient, we propose to analyze it in subgroups of bonds formed on the characteristics of the bond. We divide our sample into two rating groups, investment grade and high yield, and into three maturity groups – 1-7y, 7-17y, 17-30y. We run the cross-sectional regressions in each bond group and focus our attention on the coefficients of the liquidity variable. We consider the regression model where yield spreads are regressed on each liquidity component, rating, maturity, volume and call dummy. We discuss the behavior of the coefficient on liquidity variables in the different groups below, as presented in Table 6. The time series of the betas are plotted in the graphs in Figure 3 and Figure 4.

Figure 3: Coefficients on liquidity components in rating groups

Figure 4: Coefficients on liquidity components in maturity groups

Table 6: Cross-sectional regressions in bond groups

Rating

The common trends that we identified before are confirmed. However the magnitude of the impact changes considerably from one rating group to the other. Overall, there is still a strong sensitivity of yield spreads to liquidity commonality, which peaks during the crisis. In terms of magnitude this impact is much stronger for high yield bonds. This finding is in line with previous studies showing that the contribution of illiquidity to yield spreads is much stronger for speculative grade bonds (Dick-Nielsen et al. 2012). For instance, if we consider the results with IRC as liquidity proxy, we find that if the IRC increases by 0.001 for instance (its average value is around 0,003 and its standard deviation at 0,001), yields of investment grade bonds will increase by 0,019 and those of high yield bonds by 0,18. Only for the zero bond measure we find that high yield bonds exhibit a strong negative sensitivity to the number of trades over the past 21 days interval. A higher zero bond measure implies a higher ratio of days without trade on the bond, and this ratio is negatively related to spreads. Hence if the ratio increases, this is related to lower yield spreads. As we have seen this bond category is most sensible to liquidity shocks and this finding would imply that if the number of trades decreases (ratio increases) this is not seen as a bad signal and prices can still increase. This is reasonable in a setting where bonds are held until maturity or at a long horizon and where decreasing number of trades are not followed by selling pressures.
Overall, even if statistically significant, the impact of idiosyncratic liquidity on investment grade bond spreads remains low. The coefficient is very low, exhibiting more volatility around the crisis period. Hence for investment grade bonds, we can say that essentially the common liquidity shocks are compensated in yield spreads. For high yield bonds instead, both liquidity components are reflected in spreads, essentially in the post-crisis period.

Maturity

We consider three maturity groups, the first one, abbreviated by MAT5, includes bonds with a time to maturity ranging from 1 to 7 years, the second one, MAT10 contains bonds with time to maturity from 7 to 17 years and the last one MAT30, those with time to maturity above 17 years. Bonds with a very short time to maturity are discarded from the sample. Further our sample does not allow for enough cross-sectional variation for bonds of the MAT5 group and the time series therefore start in November 2004. The picture is different according to which liquidity measure is considered. We find that commonality of Amihud's price impact and of its risk has a significant effect on long term bonds; while it's idiosyncratic part is important for short-term bonds. All long term yields will be affected by liquidity shocks, while short-term yields are only affected by bond specific liquidity shocks that are not necessarily common to all bonds. For other measures we do not necessarily find a monotonic pattern throughout the maturity spectrum. We find nevertheless that there is a negative sensitivity of yield spreads to the idiosyncratic component.

5. Conclusion

In this paper we provide evidence on the relation between corporate bond spreads and two illiquidity components, common and idiosyncratic. Illiquidity is priced in corporate bond yields (Bao et al. 2012, Dick-Nielsen et al. 2012, among others). We extend these studies in two ways. First, we use the trade reports provided in TRACE to compute weekly illiquidity measures for each bond. By computing weekly measures we are able to provide a finer analysis of liquidity as previous studies usually provide monthly or quarterly measures. Second, we decompose liquidity into two parts: a common part and an idiosyncratic part. Liquidity commonality prevails between assets and is time-varying. By disentangling the commonality from the idiosyncratic part we are able to provide evidence on the specific relationship of yield spreads to these two measures. We find that a significant relationship exists between yield spreads and both common and idiosyncratic illiquidity. The finding that the idiosyncratic part is important may result from the fact that on such a very opaque market some bonds might not be available or known to all investors. Our data also allows for a finer analysis between bond groups, where we find that high yield bonds and bonds with a shorter time to maturity are more sensitive to idiosyncratic illiquidity.

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Table 1: Summary statistics of the sample

	2004			2005			2006			2007			2008		
	Mean	*Med*	*SD*	*Mean*	*Med*	*SD*	*Mean*	*Med*	*SD*	*Mean*	*Med*	*SD*	*Mean*	*Med*	*SD*
Bonds	1251			1619			1930			2607			3071		
Issue size	489	322	583	496	350	566	537	400	577	586	400	637	625	450	684
Maturity	16.87	15	8.6	16.3	14	8.6	16.11	12	8.7	15.82	11.5	8.95	15.27	10	9.08
Coupon	6.24	6.38	1.35	6.16	6.2	1.5	6.15	6.15	1.56	6.12	6.12	1.64	6.13	6.1	1.63
Rating	9.25	9	3.55	9.22	9	3.67	9.2	9	3.6	9.12	9	3.61	8.92	8.5	3.6
Turnover	8.2	5.5	9.1	7.4	5.1	7.8	7.3	4.9	7.2	6.2	4.3	5.9	4.7	3.6	4.2
Weekly trades	24.8	11.9	43.8	19.6	11.5	30.7	18.7	11.1	23.5	19.2	10.2	28.4	25	11.3	42.8
Trading days	110	64	82	162.9	168	65.4	158.6	166	64.9	144.1	151	70.4	154.8	155	63.6
Price	103.3	101.3	8.8	100	100.1	11.4	97.5	97.8	8.7	98	98.6	7.4	89.5	93.5	14
Daily returns	0.02	0.01	0.16	-0.04	-0.02	0.12	0.01	0	0.1	-0.03	-0.01	0.11	-0.22	-0.06	1.1
Weekly returns	0.05	0.02	0.32	-0.12	-0.05	0.3	0.05	0	0.23	-0.08	-0.04	0.29	-0.52	-0.21	1.48

	2009			2010			2011			2012			2013		
	Mean	*Med*	*SD*	*Mean*	*Med*	*SD*	*Mean*	*Med*	*SD*	*Mean*	*Med*	*SD*	*Mean*	*Med*	*SD*
Bonds	3874			4938			5708			5905			5635		
Issue size	661	500	712	672	500	714	680	500	705	661	500	686	654	500	685
Maturity	14.1	10	9.02	13.24	10	8.85	12.98	10	8.74	13.55	10	8.86	14	10	9
Coupon	6.19	6.12	1.73	6.08	6	1.92	5.88	5.9	2.04	5.7	5.75	2.15	5.57	5.65	2.14
Rating	8.79	8.33	3.61	8.77	8.33	3.65	8.73	8.33	3.65	8.76	8	3.65	9	8	4
Turnover	6.80	4.90	6.60	6.70	4.50	6.70	4.20	3.60	2.90	3.50	2.90	2.50	3.30	2.70	2.80
Weekly trades	39.7	20.2	59.1	35	19.3	49.3	26.5	15.2	32.5	25.4	13.3	35.3	22.9	13	30.3
Trading days	170.9	181	64.5	183	197	63.1	199.1	207	46.3	188.3	196	51.2	179.3	191	63.1
Price	94.20	99.40	16.10	103.90	104.20	10.70	105.60	105.70	10.70	108.50	107.40	14.00	108.90	107.90	12.10
Daily returns	0.13	0.06	0.29	0.02	0.02	0.08	-0.04	0.00	2.28	0.01	0.01	0.42	-0.02	-0.02	0.60
Weekly returns	0.44	0.24	0.69	0.05	0.05	0.28	-0.04	0.01	2.29	0.07	0.06	0.51	-0.07	-0.07	0.83

The table provides summary statistics of the bonds used in the empirical analysis. To be included in the sample a bond must trade on a least 30 business days of the year and remain in the sample for at least one year. The sample is from January 2004 to December 2013. Bonds gives the number of unique bonds in the sample in a given year. Issue size is the average issuance of bonds in the sample in millions. Maturity is measured in years and gives the number of years to maturity. Rating is an average of ratings provided by the three rating agencies, measured on a scale from 1 (high rated) to 21 (low rated). Coupon is the coupon payment in percent. Turnover is the sum of the volume traded during one month over issue size, measured in percentage. We provide the average number of trades per day/per week/per month. Return is the mean of a daily or weekly return series obtained over the year (returns are shown in percentage). Price is the average price of the bond during the year.

Table 2: Asymptotic principal components of liquidity variables

Variable	Statistic	Factor 1	*T-stat 1*	Factor 2	*T-stat 2*	Factor 3	*T-stat 3*
Amihud	R-squared	0.06	*0.43*	0.07	*0.41*	0.09	*0.38*
	Adj. R-squared	0.04		0.05	*0.14*	0.05	*0.14*
	% Inertia	0.38		0.42		0.44	*0.14*
IRC	R-squared	0.09	*0.62*	0.11	*0.59*	0.13	*0.59*
	Adj. R-squared	0.08		0.09	*0.30*	0.10	*0.30*
	% Inertia	0.53		0.56		0.58	*0.29*
Amihud risk	R-squared	0.07	*0.52*	0.10	*0.47*	0.13	*0.44*
	Adj. R-squared	0.06		0.08	*0.33*	0.10	*0.31*
	% Inertia	0.45		0.48		0.51	*0.29*
IRC risk	R-squared	0.13	*0.72*	0.17	*0.66*	0.20	*0.59*
	Adj. R-squared	0.12		0.15	*0.45*	0.17	*0.41*
	% Inertia	0.70		0.74		0.76	*0.04*
Roll	R-squared	0.11	*0.60*	0.14	*0.63*	0.16	*0.57*
	Adj. R-squared	0.10		0.12	*0.37*	0.14	*0.33*
	% Inertia	0.66		0.69		0.71	*0.32*
Zero bond	R-squared	0.17	*0.76*	0.27	*0.75*	0.32	*0.75*
	Adj. R-squared	0.16		0.26	*0.67*	0.31	*0.66*
	% Inertia	0.96		0.98		0.98	*0.58*

The table reports distribution statistics of time-series regressions of the liquidity variables on three factors. The factors are extracted separately for each different measure using the asymptotic principal component method. The table presents averages of the R-squared and adjusted r-squared as well as the percentage of explained variance obtained with three factors. The column t-stat shows the percentage of bonds for which the extracted factor is statistically significant in it's time series

Table 3: Summary statistics of liquidity components and number of observations

PANEL A	Amihud			Amihud Commonality			Amihud Idiosyncratic			Number of obs		
	Jan 2004 - Aug 2008	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*
Overall	1.1405	1.9875	0.7527	1.1993	1.871	0.5477	-0.0588	0.1155	0.2052	815	1374	2838
	0.1878	*0.3612*	*0.3686*	*0.2541*	*0.3862*	*0.3733*	*0.1643*	*0.1315*	*0.0563*	*315*	*126*	*412*
Rating AAA	1.1442	1.5821	0.6519	0.8474	1.343	0.4212	0.2973	0.239	0.2308	49	105	256
	0.2971	*0.2974*	*0.2948*	*0.1648*	*0.2581*	*0.2514*	*0.2994*	*0.1975*	*0.101*	*19*	*11*	*61*
Rating A	1.0548	2.1412	0.7537	1.1343	2.0239	0.5776	-0.0796	0.1147	0.1761	421	807	1612
	0.1835	*0.4072*	*0.3845*	*0.2074*	*0.4003*	*0.3795*	*0.1546*	*0.1604*	*0.0653*	*170*	*82*	*259*
Rating B	1.437	2.1575	0.8041	1.6277	2.0818	0.6218	-0.1905	0.078	0.1826	156	184	441
	0.5162	*0.5829*	*0.4732*	*0.5215*	*0.6655*	*0.5098*	*0.3943*	*0.3599*	*0.1507*	*67*	*32*	*112*
Rating C	0.5161	1.3979	0.8816	0.2178	1.0433	0.0976	0.2982	0.3629	0.785	22	31	68
	0.3341	*0.7718*	*0.3298*	*0.2961*	*0.5071*	*0.2362*	*0.3248*	*0.777*	*0.2931*	*13*	*7*	*15*
Maturity 2Y	0.4705	0.4372	0.194	2.0656	1.3175	0.2128	-0.9321	-0.6397	-0.0161	1	2	571
	0.907	*1.2953*	*0.198*	*0.8587*	*1.5811*	*0.2245*	*0.9477*	*0.9133*	*0.1115*	*1*	*1*	*192*
Maturity 5Y	0.384	0.6859	0.2974	0.5979	0.8962	0.2387	-0.1639	-0.0795	0.0619	220	599	1088
	0.1539	*0.1438*	*0.1131*	*0.2098*	*0.1709*	*0.1765*	*0.1573*	*0.0738*	*0.047*	*160*	*58*	*140*
Maturity 10Y	0.491	0.976	*0.4148*	0.7953	1.1433	0.2656	-0.2159	0.0257	0.1411	431	438	694
	0.1212	*0.2114*	*0.167*	*0.2249*	*0.2925*	*0.2308*	*0.1186*	*0.0879*	*0.0591*	*106*	*49*	*76*
Maturity 30Y	0.7198	1.4748	*0.5296*	1.0519	2.0588	0.3935	-0.064	-0.0861	0.0928	220	322	483
	0.172	*0.2935*	*0.3718*	*0.2185*	*0.4601*	*0.4233*	*0.108*	*0.1381*	*0.073*	*69*	*37*	*48*
Issuance Small	0.532	0.8973	*0.4055*	0.6907	1.1935	0.2643	-0.0684	-0.0434	0.1225	377	594	1266
	0.0991	*0.2313*	*0.1736*	*0.1437*	*0.2875*	*0.2307*	*0.0855*	*0.0831*	*0.0416*	*140*	*80*	*183*
Issuance Medium	0.2751	0.7722	*0.2223*	0.6397	1.024	0.2108	-0.2102	-0.0881	0.0348	200	414	829
	0.1159	*0.1568*	*0.1527*	*0.1465*	*0.2631*	*0.2034*	*0.1018*	*0.0955*	*0.0392*	*95*	*45*	*131*
Issuance Large	0.4377	0.9218	0.2673	0.6986	1.0094	0.2253	-0.1703	-0.0505	0.0363	100	290	615
	0.092	*0.2129*	*0.1701*	*0.2048*	*0.2023*	*0.2049*	*0.1306*	*0.089*	*0.0335*	*66*	*13*	*110*
Fiancials	0.7158	1.2169	0.4388	1.2244	1.8196	0.4351	-0.3082	-0.2194	0.0084	390	545	1062
	0.2101	*0.3286*	*0.0288*	*0.3476*	*0.4012*	*0.3766*	*0.1608*	*0.1515*	*0.0575*	*128*	*54*	*156*
Industrial	0.2698	0.5818	0.2307	0.4721	0.7869	0.1596	-0.0752	-0.014	0.0782	277	580	1244
	0.11	*0.1558*	*0.01179*	*0.0921*	*0.1654*	*0.169*	*0.0687*	*0.0558*	*0.0343*	*139*	*67*	*191*
Other	0.5055	0.8031	0.3044	0.7685	0.9875	0.185	-0.0962	0.0132	0.0993	142	251	512
	0.1726	*0.2111*	*0.1518*	*0.2462*	*0.2916*	*0.1879*	*0.1275*	*0.0697*	*0.0437*	*56*	*31*	*75*

This table provides the average value and standard deviation (in brackets) of our total illiquidity measures and their decomposition into a common and idiosyncratic component. We consider different subgroups and subperiods. The bonds are classified according to their rating, maturity, issuance and industry. The average rating of a bond is converted on a numerical scale from 1 to 21. Rating AAA, A, B and C refer to bonds with a numerical rating below 4.5, between 4.5 and 10.5, between 10.5 and 16.5, above 16.5 respectively. Maturity groups are formed with bonds of maturity between 1 and 2 years, between 2 and 7 years, between 7 and 17 years and of more than 17 years. Issuance small, medium and large refer to issue sizes below 500Mln, between 500Mln and 1Bln, and above 1Bln respectively. We also provide the number of observation of each measure in each subperiod.

PANEL B	**IRC**			**IRC Commonality**			**IRC Idiosyncratic**			**Number of obs**		
	Jan 2004 - Aug 2008	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*
Overall	0.0034	0.0059	0.0028	0.0047	0.0065	0.0029	-0.0013	-0.0006	-0.0002	1174	1954	3540
	0.0005	*0.0009*	*0.0014*	*0.0006*	*0.0008*	*0.0014*	*0.0004*	*0.0005*	*0.0002*	*481*	*74*	*509*
Rating AAA	0.033	0.0059	0.0027	0.0047	0.0068	0.0029	-0.0014	-0.0009	-0.0002	71	135	314
	0.0088	*0.0011*	*0.0015*	*0.0006*	*0.0007*	*0.0018*	*0.0007*	*0.0008*	*0.0004*	*27*	*5*	*77*
Rating A	0.003	0.0053	0.0026	0.0044	0.0061	0.0029	-0.0014	-0.0008	-0.0003	606	1109	1966
	0.0005	*0.0006*	*0.0014*	*0.0005*	*0.0006*	*0.0014*	*0.0003*	*0.0005*	*0.0002*	*252*	*38*	*339*
Rating B	0.0042	0.0081	0.0032	0.0051	0.008	0.003	-0.0009	0.0002	0.0001	219	293	548
	0.0015	*0.0032*	*0.0015*	*0.0018*	*0.0027*	*0.0014*	*0.0008*	*0.0013*	*0.0003*	*96*	*37*	*119*
Rating C	0.0025	0.0078	0.0042	0.0024	0.0067	0.0029	0.0001	0.0011	0.0013	31	51	83
	0.0012	*0.0015*	*0.0015*	*0.0015*	*0.0008*	*0.0013*	*0.0011*	*0.0017*	*0.0008*	*18*	*7*	*13*
Maturity 2Y	0.0015	0.0043	0.0006	0.0153	0.0043	0.0018	-0.013	-0.001	-0.0009	2	2	688
	0.0032	*0.0057*	*0.001*	*0.0069*	*0.0105*	*0.001*	*0.0052*	*0.0065*	*0.0003*	*1*	*1*	*238*
Maturity 5Y	0.0012	0.003	0.0011	0.0035	0.0048	0.0021	-0.0019	-0.0017	-0.0007	307	810	1353
	0.0006	*0.0007*	*0.0009*	*0.0008*	*0.0004*	*0.0011*	*0.0005*	*0.0005*	*0.0003*	*226*	*27*	*180*
Maturity 10Y	0.0012	0.0035	*0.0014*	0.0041	0.0056	0.002	-0.0021	-0.0016	-0.0003	620	649	855
	0.0004	*0.0009*	*0.0009*	*0.0005*	*0.0007*	*0.0013*	*0.0004*	*0.0006*	*0.0004*	*164*	*47*	*80*
Maturity 30Y	0.0015	0.0033	*0.0011*	0.0038	0.0053	0.0018	-0.0011	-0.001	-0.0004	322	505	609
	0.0005	*0.0008*	*0.0013*	*0.0004*	*0.0006*	*0.0014*	*0.0004*	*0.0005*	*0.0002*	*111*	*25*	*44*
Issuance Small	0.0011	0.0027	*0.0013*	0.0036	0.0051	0.0021	-0.0015	-0.0016	-0.0005	635	1007	1738
	0.0004	*0.0008*	*0.001*	*0.0004*	*0.0005*	*0.0012*	*0.0003*	*0.0006*	*0.0003*	*243*	*50*	*233*
Issuance Medium	0.0008	0.0029	*0.0007*	0.0032	0.0044	0.0016	-0.002	-0.0014	-0.0007	252	528	999
	0.0004	*0.0008*	*0.0009*	*0.0004*	*0.0004*	*0.001*	*0.0004*	*0.0006*	*0.0003*	*128*	*16*	*170*
Issuance Large	0.0013	0.004	0.0011	0.0041	0.0052	0.0019	-0.0024	-0.0012	-0.0007	108	316	661
	0.0005	*0.0009*	*0.001*	*0.0006*	*0.0005*	*0.0012*	*0.0006*	*0.0004*	*0.0003*	*74*	*5*	*121*
Fiancials	0.0018	0.0044	0.0017	0.0053	0.0079	0.0032	-0.0025	-0.0021	-0.0009	564	788	1354
	0.0007	*0.0008*	*0.0014*	*0.0009*	*0.0009*	*0.0018*	*0.0004*	*0.0007*	*0.0004*	*203*	*52*	*174*
Industrial	0.0008	0.0025	0.0008	0.0029	0.0041	0.0015	-0.0015	-0.0012	-0.0006	412	813	1544
	0.0003	*0.0008*	*0.00008*	*0.0004*	*0.0004*	*0.0009*	*0.0003*	*0.0005*	*0.0003*	*201*	*36*	*241*
Other	0.001	0.0023	0.0008	0.0031	0.0041	0.0015	-0.0013	-0.001	-0.0004	199	356	651
	0.0006	*0.0008*	*0.0009*	*0.0006*	*0.0004*	*0.001*	*0.0004*	*0.0006*	*0.0002*	*84*	*14*	*101*

	Amihud risk Illiquidity			Amihud risk Commonality			Amihud risk Idiosyncratic			Number of obs		
	Jan 2004 - Aug 2008	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*
Overall	1.1524	1.9738	0.7884	1.1448	1.8263	0.5442	0.008	0.1482	0.2444	956	1586	3193
	0.1693	*0.3302*	*0.3822*	*0.2037*	*0.3302*	*0.3943*	*0.1045*	*0.0791*	*0.0543*	*371*	*61*	*447*
Rating AAA	1.1534	1.4458	0.6673	0.9066	1.2572	0.3953	0.2468	0.1886	0.273	57	120	288
	0.2542	*0.2411*	*0.2711*	*0.162*	*0.2137*	*0.246*	*0.2533*	*0.1807*	*0.0979*	*22*	*7*	*69*
Rating A	1.0743	2.0671	0.7729	1.0422	1.8948	0.5507	0.0328	0.1731	0.2224	488	927	1796
	0.1636	*0.3525*	*0.3825*	*0.1477*	*0.3517*	*0.3877*	*0.1079*	*0.1006*	*0.0632*	*197*	*64*	*289*
Rating B	1.4701	2.3594	0.8872	1.6503	2.3326	0.7043	-0.1798	0.0279	0.1821	183	225	495
	0.5087	*0.5378*	*0.549*	*0.4619*	*0.5108*	*0.5825*	*0.435*	*0.2702*	*0.1499*	*79*	*23*	*117*
Rating C	0.5557	1.7875	1.0581	0.0401	1.2542	0.1501	0.5156	0.5401	0.9085	26	37	75
	0.27	*0.8712*	*0.4011*	*0.3141*	*0.5155*	*0.2822*	*0.272*	*0.7039*	*0.3546*	*15*	*4*	*14*
Maturity 2Y	0.422	0.3739	0.2201	1.6964	1.9442	0.1893	-0.9609	-0.1435	0.0338	2	2	628
	0.8706	*1.6369*	*0.1624*	*1.1584*	*1.4606*	*0.2665*	*1.1935*	*1.0527*	*0.0751*	*1*	*1*	*211*
Maturity 5Y	0.4307	0.7036	0.3098	0.6259	0.8712	0.2104	-0.101	-0.0108	0.1173	257	644	1205
	0.1147	*0.1572*	*0.1053*	*0.21*	*0.1546*	*0.1869*	*0.2133*	*0.0597*	*0.486*	*178*	*43*	*153*
Maturity 10Y	0.51	0.9101	*0.4111*	0.8156	1.1116	0.2285	-0.1358	0.0839	0.1694	493	501	770
	0.0935	*0.208*	*0.1518*	*0.1664*	*0.2076*	*0.2337*	*0.0947*	*0.0647*	*0.0458*	*124*	*24*	*80*
Maturity 30Y	0.7558	1.5051	*0.5804*	0.9638	1.7558	0.3273	0.0458	-0.0022	0.1746	249	380	540
	0.1298	*0.2036*	*0.3279*	*0.1624*	*0.3364*	*0.3929*	*0.0956*	*0.0839*	*0.073*	*78*	*22*	*46*
Issuance Small	0.569	0.9243	*0.416*	0.6809	1.1713	0.2345	-0.0125	0.0081	0.1754	465	731	1491
	0.0758	*0.1874*	*0.1664*	*0.1116*	*0.2344*	*0.231*	*0.0587*	*0.0528*	*0.0391*	*171*	*51*	*195*
Issuance Medium	0.356	0.8571	*0.2738*	0.6358	1.0999	0.2071	-0.0996	-0.0137	0.0771	226	483	928
	0.0982	*0.1872*	*0.1561*	*0.0982*	*0.2203*	*0.2258*	*0.0949*	*0.0526*	*0.0389*	*108*	*28*	*147*
Issuance Large	0.4243	0.7771	0.2575	0.6263	0.8273	0.1543	-0.06	0.0411	0.1093	104	305	637
	0.0563	*0.1959*	*0.126*	*0.1439*	*0.1493*	*0.1811*	*0.1065*	*0.1317*	*0.0381*	*70*	*10*	*115*
Fiancials	0.6939	1.3297	0.4195	1.1497	1.7032	0.3992	-0.2013	-0.1203	0.0622	462	649	1222
	0.158	*0.29*	*0.2664*	*0.2868*	*0.3041*	*0.3742*	*0.1225*	*0.1049*	*0.0521*	*153*	*26*	*168*
Industrial	0.3661	0.6658	0.2747	0.4358	0.7851	0.1447	0.0137	0.0681	0.1406	331	669	1392
	0.0903	*0.1352*	*0.1153*	*0.0868*	*0.1579*	*0.1644*	*0.0527*	*0.0383*	*0.0345*	*161*	*44*	*209*
Other	0.5664	0.8503	0.3394	0.752	0.9891	0.1764	-0.0379	0.0537	0.1524	167	307	577
	0.1575	*0.1288*	*0.1479*	*0.2687*	*0.2141*	*0.196*	*0.1349*	*0.0405*	*0.0393*	*65*	*24*	*80*

	IRC risk			IRC risk Commonality			IRC risk Idiosyncratic			Number of obs		
	Jan 2004 - Aug 2008	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*	*Jan 2004 - Aug 2008*	*Sept - Dec 2008*	*Jan 2009 - Dec 2013*
Overall	0.0045	0.0078	0.0035	0.0058	0.0078	0.0034	-0.0012	0	0.0001	1231	2141	3638
	0.0006	*0.0011*	*0.0016*	*0.0008*	*0.0011*	*0.0017*	*0.0005*	*0.0004*	*0.0001*	*520*	*47*	*507*
Rating AAA	0.0045	0.0065	0.0033	0.0045	0.0061	0.0027	0	0.0004	0.0006	75	114	325
	0.0006	*0.001*	*0.0013*	*0.0004*	*0.0007*	*0.0014*	*0.0005*	*0.0006*	*0.0004*	*30*	*2*	*78*
Rating A	0.004	0.0066	0.0032	0.0048	0.0066	0.0029	-0.0008	0	0.0002	642	1187	2008
	0.0004	*0.0009*	*0.0014*	*0.0004*	*0.0008*	*0.0015*	*0.0003*	*0.0002*	*0.0002*	*272*	*16*	*342*
Rating B	0.0059	0.0124	0.0042	0.0083	0.0127	0.0047	-0.0024	-0.0002	-0.0005	230	326	564
	0.0016	*0.0029*	*0.0024*	*0.0022*	*0.0029*	*0.0023*	*0.0011*	*0.0012*	*0.0003*	*102*	*38*	*118*
Rating C	0.0035	0.0094	0.0054	0.0035	0.008	0.004	0	0.0014	0.0014	34	58	86
	0.0013	*0.0019*	*0.0022*	*0.0019*	*0.001*	*0.0017*	*0.0012*	*0.0015*	*0.0009*	*19*	*4*	*13*
Maturity 2Y	0.0025	0.007	0.0012	0.015	0.0021	0.0018	-0.013	0.0008	-0.0005	2	2	688
	0.0024	*0.0029*	*0.0009*	*0.0044*	*0.0084*	*0.001*	*0.0037*	*0.0078*	*0.0003*	*1*	*1*	*238*
Maturity 5Y	0.0023	0.0043	0.0019	0.004	0.0052	0.0021	-0.0016	-0.0008	-0.0001	307	807	1352
	0.0006	*0.0007*	*0.0008*	*0.0016*	*0.0006*	*0.0011*	*0.0013*	*0.0002*	*0.0003*	*225*	*27*	*181*
Maturity 10Y	0.0029	0.0053	*0.0027*	0.0046	0.0059	0.0025	-0.0017	0	0.0002	619	643	854
	0.0005	*0.0007*	*0.0009*	*0.0004*	*0.0007*	*0.0009*	*0.0006*	*0.0002*	*0.0002*	*164*	*47*	*80*
Maturity 30Y	0.0039	0.0075	*0.0029*	0.0052	0.007	0.0028	-0.0006	0.0001	0	321	502	609
	0.0007	*0.0006*	*0.0018*	*0.0004*	*0.0009*	*0.0017*	*0.0005*	*0.0005*	*0.0002*	*110*	*26*	*44*
Issuance Small	0.0034	0.0061	*0.0028*	0.0048	0.0063	0.0025	-0.0008	-0.0006	0.0002	682	1105	1822
	0.0004	*0.0009*	*0.0012*	*0.0003*	*0.0008*	*0.0014*	*0.0003*	*0.0006*	*0.0002*	*271*	*8*	*229*
Issuance Medium	0.0019	0.0044	*0.0015*	0.0039	0.0053	0.0019	-0.0017	-0.0006	-0.0003	256	553	1020
	0.0004	*0.0008*	*0.0009*	*0.0003*	*0.0006*	*0.001*	*0.0005*	*0.0002*	*0.0001*	*133*	*5*	*174*
Issuance Large	0.0018	0.0037	0.0013	0.0034	0.0042	0.0014	-0.0015	-0.0004	-0.0001	110	320	664
	0.0003	*0.0008*	*0.0006*	*0.0005*	*0.0005*	*0.0007*	*0.0005*	*0.0006*	*0.0001*	*75*	*4*	*122*
Fiancials	0.0043	0.0069	0.0028	0.0063	0.0081	0.0032	-0.0019	-0.0005	-0.0003	591	903	1396
	0.0012	*0.0008*	*0.0016*	*0.0009*	*0.0012*	*0.002*	*0.0005*	*0.0004*	*0.0003*	*223*	*50*	*169*
Industrial	0.0022	0.0043	0.0016	0.0037	0.0047	0.0018	-0.0011	-0.0004	0	432	864	1580
	0.0003	*0.0008*	*0.0009*	*0.0003*	*0.0006*	*0.0009*	*0.0004*	*0.0003*	*0.0001*	*214*	*8*	*243*
Other	0.0025	0.0048	0.0017	0.0037	0.0049	0.0018	-0.0011	-0.0001	0.0001	208	380	673
	0.0007	*0.001*	*0.0009*	*0.0008*	*0.0005*	*0.0009*	*0.0004*	*0.0004*	*0.0001*	*89*	*5*	*103*

	Zero Bond			Zero Bond Commonality			Zero Bond Idiosyncratic			Number of obs		
	Jan 2004 - Aug 2008	Sept - Dec 2008	Jan 2009 - Dec 2013	Jan 2004 - Aug 2008	Sept - Dec 2008	Jan 2009 - Dec 2013	Jan 2004 - Aug 2008	Sept - Dec 2008	Jan 2009 - Dec 2013	Jan 2004 - Aug 2008	Sept - Dec 2008	Jan 2009 - Dec 2013
Overall	0.5617	0.5882	0.4931	0.5208	0.5744	0.5058	0.0409	0.0318	-0.0217	1238	2205	3643
	0.0318	0.0218	0.0335	0.0603	0.0134	0.0441	0.0489	0.0184	0.0316	517	52	503
Rating AAA	0.5546	0.5414	0.4908	0.4138	0.4712	0.4807	0.1408	0.0702	0.0102	76	146	326
	0.0392	0.0197	0.0302	0.0472	0.0161	0.0438	0.0743	0.0111	0.0411	30	1	77
Rating A	0.558	0.5705	0.4728	0.6893	0.6748	0.5639	-0.1314	-0.1044	-0.0911	655	1219	2014
	0.0311	0.0236	0.0334	0.0311	0.0228	0.0395	0.0131	0.004	0.0133	275	9	340
Rating B	0.5818	0.636	0.5045	0.3573	0.4576	0.4141	0.2244	0.1784	0.0904	236	334	566
	0.0974	0.0216	0.0502	0.1535	0.0545	0.0626	0.0767	0.0626	0.0829	96	39	117
Rating C	0.6086	0.6723	0.5145	0.4594	0.5467	0.4716	0.1492	0.1256	0.0428	34	61	87
	0.1005	0.0336	0.0601	0.1158	0.0211	0.0598	0.0846	0.0223	0.0704	19	3	12
Maturity 2Y	0.6599	0.5714	0.4082	0.1943	0.2736	0.4314	0.4743	0.2375	-0.0072	2	2	688
	0.0868	0.0783	0.0487	0.1506	0.2017	0.1078	0.1768	0.262	0.104	1	1	238
Maturity 5Y	0.4915	0.4966	0.4286	0.3109	0.4174	0.44	0.1447	0.0576	-0.0229	307	810	1353
	0.0511	0.0341	0.037	0.1096	0.0245	0.0437	0.1118	0.0201	0.042	226	27	180
Maturity 10Y	0.5306	0.5714	0.4524	0.348	0.3609	0.5066	0.1061	0.0884	-0.0729	620	649	855
	0.0618	0.0332	0.0388	0.061	0.0304	0.0943	0.046	0.0196	0.0889	164	47	80
Maturity 30Y	0.5578	0.5952	0.483	0.5932	0.6124	0.5182	-0.0415	-0.0177	-0.0386	322	505	609
	0.0514	0.0238	0.0483	0.0338	0.0148	0.035	0.0335	0.0136	0.0211	111	25	44
Issuance Small	0.6259	0.6735	0.5306	0.6417	0.7114	0.5698	-0.0338	-0.072	-0.0555	688	1151	1826
	0.038	0.0257	0.0425	0.0592	0.0178	0.0415	0.0419	0.0064	0.0177	272	6	225
Issuance Medium	0.4354	0.4762	0.3946	0.474	0.4538	0.4754	-0.0234	0.0203	-0.0655	257	557	1023
	0.0509	0.0325	0.0415	0.0376	0.0194	0.0667	0.0277	0.0097	0.0525	132	3	174
Issuance Large	0.3197	0.333	0.3197	0.1896	0.2294	0.3767	0.1357	0.1172	-0.0446	110	322	665
	0.0306	0.0251	0.032	0.0294	0.0074	0.0767	0.0276	0.0141	0.0758	76	4	122
Industrial	0.534	0.5544	0.4286	0.5657	0.5015	0.4867	-0.0029	0.032	-0.052	434	888	1586
	0.0379	0.0356	0.039	0.034	0.0172	0.0597	0.0208	0.0119	0.0515	214	3	242
Other	0.517	0.5578	0.449	0.5124	0.5064	0.4692	-0.0137	0.038	-0.0235	209	389	674
	0.0475	0.031	0.0382	0.041	0.0219	0.0532	0.0237	0.0106	0.0472	89	3	103
Financial	0.5646	0.6259	0.4762	0.2709	0.4216	0.4392	0.1643	0.0872	-0.0111	595	924	1405
	0.0627	283	0.051	0.1191	0.0544	0.0522	0.0735	0.0304	0.0596	220	54	166

Table 4: Correlations

PANEL A	Amihud	IRC	Amihud risk	IRC risk	Roll	Zero bond	Maturity	Rating	Volume	Call dummy	Yield spread
Amihud	1	0.32	0.53	0.31	0.2	0.03	0.15	0.04	-0.2	-0.04	0.1
IRC		1	0.21	0.52	0.16	0.01	0.14	0.09	-0.19	-0.02	0.17
Amihud risk			1	0.33	0.22	0.01	0.14	0.05	-0.16	-0.04	0.11
IRC risk				1	0.35	0.1	0.19	0.13	-0.24	-0.04	0.26
Roll					1	0.31	0.19	0.08	-0.16	0	0.17
Zero bond						1	0.09	0.06	0	0	0.03
Maturity							1	-0.12	0.1	-0.08	-0.1
Rating								1	-0.05	-0.22	0.59
Volume									1	-0.22	-0.11
Call dummy										1	-0.11
Yield spread											1

PANEL B	Amihud C	Amihud I	IRC C	IRC I	Amihud risk C	Amihud risk I	IRC risk C	IRC risk I	Roll C	Roll I	Zero bond C	Zero bond I
Amihud C	1	-0.35	0.41	-0.1	0.77	-0.3	0.42	-0.18	0.26	-0.08	-0.09	0.08
Amihud I		1	-0.04	0.19	-0.24	0.47	-0.07	0.17	-0.01	0.08	0.05	-0.03
IRC C			1	-0.43	0.3	-0.04	0.67	-0.33	0.15	0	-0.08	0.07
IRC I				1	-0.05	0.08	-0.25	0.42	0.03	0.02	0.06	-0.04
Amihud risk C					1	-0.47	0.38	-0.16	0.27	-0.09	-0.1	0.09
Amihud risk I						1	-0.1	0.19	-0.04	0.1	0.06	-0.05
IRC risk C							1	-0.63	0.31	-0.08	-0.1	0.11
IRC risk I								1	-0.07	0.13	0.08	-0.06
Roll C									1	-0.57	0.12	-0.03
Roll I										1	-0.07	0.09
Zero bond C											1	-0.93
Zero bond I												1

Panel A of this table reports the correlations observed between aggregate series of the variables of interest. Every week we compute pairwise correlations on the observed variables and present their average in the table. We consider 6 liquidity measures, Amihud, IRC, Amihud risk, IRC risk, Roll and zero bond. Rating is the average rating of the bond measured on a numerical scale from 1 (high-rated) to 21 (low rated). Maturity is a bond's time remaining to maturity, measured in years. Volume is the average trade size of a bond in the week. Call dummy is one if the bond is redeemable at maturity. Yield spreads are bond yields in excess of Treasury yields. In Panel B of this table we report the correlations observed between the the liquidity components following their decomposition with APC method.

Table 5: Yield spread regression on liquidity variables

Amihud	M1	M2	M3	M4	M3			M4		
					Pre-crisis	*Crisis*	*Post-crisis*	*Pre-crisis*	*Crisis*	*Post-crisis*
Constant	-1.09	-1.42	-1.48	-1.35	-0.32	-4.46	-2.36	-0.16	-3.72	-2.28
	-19.74	*-22.44*	*-22.91*	*-22.03*	*-9.14*	*-12.27*	*-32.99*	*-5.94*	*-10.26*	*-36.65*
Rating	0.46	0.47	0.47	0.48	0.26	1.39	0.60	0.27	1.44	0.61
	29.24	*31.26*	*31.54*	*30.96*	*24.00*	*17.32*	*34.06*	*23.61*	*16.79*	*32.59*
Liq Tot		0.15								
		22.98								
Liq Com			0.14		0.17	0.66	0.08			
			12.72		*14.49*	*11.34*	*4.73*			
Liq Idi				0.07				-0.01	-0.01	0.14
				11.69				*-4.93*	*-0.51*	*16.86*
Maturity	-0.01	-0.01	-0.01	-0.003	-0.01	-0.11	-0.001	-0.003	-0.07	0.001
	-6.74	*-6.25*	*-5.06*	*-3.18*	*-4.73*	*-13.17*	*-0.58*	*-2.58*	*-14.24*	*1.00*
Volume	-0.0001	-0.0001	-0.0002	-0.0003	-0.0002	-0.0001	-0.0003	-0.0003	-0.0007	-0.0003
	-28.34	*-28.26*	*-31.18*	*-26.67*	*-18.95*	*-1.55*	*-32.03*	*-18.25*	*-5.27*	*-22.01*
Call dummy	0.26	0.31	0.31	0.31	-0.11	0.61	0.68	-0.14	0.68	0.69
	13.19	*14.21*	*14.89*	*13.76*	*-7.95*	*5.70*	*37.25*	*-8.85*	*5.97*	*35.31*
R squared	0.3932	0.4422	0.4499	0.4389	0.4133	0.4831	0.4812	0.3926	0.4443	0.481
Adj. R squared	0.3908	0.4328	0.4461	0.4351	0.4066	0.4808	0.4801	0.3858	0.4418	0.4799

The table reports FMB cross-sectional regressions using weekly variables. T-stats are obtained with FMB methodology and are reported in brackets. The sample period goes from January 2004 to December 2013. The first model is the baseline regression. In model 2, a liquidity variable is added. In models 3 and 4 this liquidity variable is considered with its components. Other explanatory variables are the bond's rating, it's maturity, hence the number of years remaining till maturity, it's volume, hence the average trading volume of the bond during the week and a call dummy equal to 1 if the bond is redeemable at maturity. The reported R-squared are the time-series averages of the cross-sectional R-squared.

IRC	M1	M2	M3	M4	M3			M4		
					Pre	*crisis*	*Post crisis*	*Pre*	*crisis*	*Post crisis*
Constant	-1.09	-1.18	-1.57	-1.08	-0.38	-5.79	-2.39	-0.03	-2.87	-1.94
	-19.74	*-19.94*	*-19.91*	*-19.68*	*-8.74*	*-15.25*	*-23.52*	*-1.63*	*-9.04*	*-31.92*
Rating	0.46	0.45	0.46	0.46	0.25	1.37	0.59	0.25	1.44	0.59
	29.24	*29.09*	*29.44*	*29.06*	*23.40*	*17.49*	*29.25*	*23.49*	*18.09*	*28.87*
Liq Tot		86.7								
		24.14								
Liq Com			100.55		75.23	503.59	97.68			
			18.07		*13.50*	*15.32*	*13.98*			
Liq Idi				14.25				-8.66	-8.74	36.88
				8.08				*-8.12*	*-1.05*	*13.90*
Maturity	-0.01	-0.02	-0.01	-0.01	-0.01	-0.13	-0.010	-0.006	-0.11	-0.006
	-6.74	*-10.9*	*-8.24*	*-7.25*	*-5.88*	*-19.53*	*-4.57*	*-4.95*	*-21.07*	*-3.59*
Volume	-0.0001	-0.0001	-0.0002	-0.0003	-0.0001	0.0001	-0.0002	-0.0002	-0.0009	-0.0004
	-28.34	*-26.38*	*-29.01*	*-28.03*	*-22.97*	*1.07*	*-25.54*	*-19.95*	*-11.05*	*-22.00*
Call dummy	0.26	0.24	0.28	0.26	-0.08	0.47	0.60	-0.14	0.28	0.63
	13.19	*13.52*	*16.18*	*13.14*	*-7.60*	*8.46*	*39.08*	*-9.88*	*3.21*	*37.41*
R squared	0.3932	0.4133	0.4223	0.3984	0.3839	0.5339	0.4505	0.3495	0.4045	0.4432
Adj. R squared	0.3908	0.4103	0.4194	0.3954	0.3788	0.5324	0.4495	0.3442	0.4026	0.4422

Amihud risk	M1	M2	M3	M4	M3			M4		
					Pre	*crisis*	*Post crisis*	*Pre*	*crisis*	*Post crisis*
Constant	-1.09	-1.36	-1.39	-1.31	-0.23	-4.20	-2.28	-0.13	-3.73	-2.24
	-19.74	*-21.83*	*-21.97*	*-21.31*	*-7.02*	*-12.58*	*-33.04*	*-4.85*	*-10.49*	*-35.27*
Rating	0.46	0.47	0.47	0.47	0.26	1.38	0.60	0.26	1.45	0.60
	29.24	*30.81*	*31.32*	*30.39*	*23.98*	*18.35*	*33.27*	*23.32*	*18.01*	*31.58*
Liq Tot		0.16								
		25.11								
Liq Com			0.13		0.14	0.72	0.08			
			12.53		*11.42*	*19.28*	*5.88*			
Liq Idi				0.05				-0.01	-0.06	0.11
				11.31				*-2.22*	*-2.19*	*18.55*
Maturity	-0.01	-0.01	-0.01	-0.004	-0.01	-0.11	-0.002	-0.004	-0.07	0.001
	-6.74	*-7.32*	*-5.77*	*-4.01*	*-5.41*	*-19.70*	*-1.01*	*-3.74*	*-19.98*	*0.52*
Volume	-0.0001	-0.0001	-0.0001	-0.0003	-0.0002	-0.0003	-0.0003	-0.0003	-0.0008	-0.0003
	-28.34	*-29.61*	*-34.91*	*-28.98*	*-20.51*	*-3.76*	*-34.10*	*-19.09*	*-8.81*	*-23.62*
Call dummy	0.26	0.29	0.29	0.2983	-0.12	0.44	0.67	-0.14	0.57	0.69
	13.19	*13.94*	*14.41*	*13.74*	*-8.87*	*4.55*	*39.50*	*-9.50*	*6.02*	*38.08*
R squared	0.3932	0.4332	0.4395	0.429	0.4014	0.4877	0.4715	0.3833	0.4418	0.4703
Adj. R squared	0.3908	0.4297	0.4361	0.4255	0.3953	0.4856	0.4704	0.3771	0.4396	0.4692

IRC risk	M1	M2	M3	M4	M3			M4		
					Pre	*crisis*	*Post crisis*	*Pre*	*crisis*	*Post crisis*
Constant	-1.09	-1.28	-1.36	-1.11	-0.27	-4.27	-2.18	-0.02	-2.90	-1.99
	-19.74	*-22.01*	*-20.97*	*-19.82*	*-8.26*	*-14.11*	*-27.08*	*-1.24*	*-9.07*	*-33.16*
Rating	0.46	0.43	0.42	0.46	0.23	1.16	0.56	0.25	1.44	0.59
	29.24	*30.32*	*31.51*	*29.07*	*24.47*	*16.79*	*33.24*	*23.52*	*17.94*	*29.20*
Liq Tot		142.91								
		32.13								
Liq Com			104.56		79.45	502.18	101.84			
			18.28		*14.58*	*20.22*	*13.15*			
Liq Idi				-4.06				-16.15	-36.57	9.22
				-2.82				*-8.84*	*-3.17*	*5.05*
Maturity	-0.01	-0.02	-0.02	-0.01	-0.01	-0.16	-0.015	-0.006	-0.11	-0.004
	-6.74	*-13.98*	*-8.76*	*-6.52*	*-6.27*	*-19.80*	*-5.21*	*-4.64*	*-20.96*	*-2.75*
Volume	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	0.0002	-0.0002	-0.0002	-0.0009	-0.0003
	-28.34	*-21.38*	*-20.71*	*-28.18*	*-20.55*	*3.55*	*-17.00*	*-19.79*	*-10.97*	*-22.32*
Call dummy	0.26	0.25	0.29	0.26	-0.07	0.53	0.61	-0.14	0.29	0.63
	13.19	*14.38*	*16.64*	*13.2*	*-6.87*	*8.33*	*39.13*	*-9.92*	*3.38*	*37.62*
R squared	0.3932	0.4342	0.4376	0.3986	0.4025	0.5933	0.4598	0.3543	0.4067	0.439
Adj. R squared	0.3908	0.4313	0.4347	0.3956	0.3974	0.592	0.4589	0.349	0.4048	0.438

Roll	M1	M2	M3	M4	M3			M4		
					Pre	*crisis*	*Post crisis*	*Pre*	*crisis*	*Post crisis*
Constant	-1.09	-1.31	-1.3	-1.18	-0.19	-3.71	-2.17	-0.05	-3.36	-2.09
	-19.74	*-21.96*	*-21.32*	*-20.15*	*-6.33*	*-11.28*	*-31.44*	*-2.38*	*-10.01*	*-33.41*
Rating	0.46	0.45	0.45	0.46	0.25	1.41	0.58	0.26	1.45	0.59
	29.24	*29.52*	*29.9*	*29.65*	*23.87*	*17.24*	*31.21*	*23.41*	*18.11*	*30.11*
Liq Tot		0.19								
		41.2								
Liq Com			0.16		0.14	0.32	0.18			
			24.53		*13.62*	*6.10*	*21.38*			
Liq Idi				0.02				0.02	0.01	0.02
				8.77				*6.69*	*0.20*	*6.71*
Maturity	-0.01	-0.01	-0.01	-0.01	-0.01	-0.11	-0.008	-0.006	-0.09	-0.001
	-6.74	*-11.49*	*-8.56*	*-5.56*	*-6.26*	*-33.10*	*-4.46*	*-4.92*	*-23.85*	*-0.96*
Volume	-0.0001	-0.0001	-0.0003	-0.0003	-0.0002	-0.0007	-0.0003	-0.0003	-0.0009	-0.0003
	-28.34	*-25.97*	*-30.22*	*-29.1*	*-22.12*	*-9.01*	*-24.42*	*-19.38*	*-10.90*	*-23.62*
Call dummy	0.26	0.24	0.24	0.27	-0.15	0.21	0.60	-0.14	0.35	0.65
	13.19	*12.25*	*12.39*	*13.23*	*-9.73*	*2.60*	*39.91*	*-9.71*	*4.47*	*38.15*
R squared	0.3932	0.4217	0.4207	0.409	0.3815	0.4321	0.4561	0.3637	0.4212	0.45
Adj. R squared	0.3908	0.4186	0.4176	0.4058	0.3761	0.4301	0.4551	0.3582	0.4191	0.449

Zero bond	M1	M2	M3	M4	M3			M4		
					Pre	*crisis*	*Post crisis*	*Pre*	*crisis*	*Post crisis*
Constant	-1.09	-1.25	-0.74	-1.04	0.40	-1.25	-1.76	0.02	-2.41	-1.93
	-19.74	*-15.07*	*-13.88*	*-19.92*	*29.54*	*-3.61*	*-40.88*	*1.15*	*-8.04*	*-36.97*
Rating	0.46	0.45	0.46	0.45	0.24	1.44	0.59	0.24	1.39	0.58
	29.24	*30.48*	*28.67*	*29.19*	*23.06*	*17.49*	*29.14*	*23.56*	*17.25*	*29.99*
Liq Tot		0.51								
		5.71								
Liq Com			-0.69		-0.77	-3.12	-0.46			
			-20.71		*-22.86*	*-12.31*	*-11.98*			
Liq Idi				0.81				0.89	4.01	0.53
				18.33				*22.18*	*13.58*	*9.53*
Maturity	-0.01	-0.01	-0.01	-0.01	0.00	-0.09	-0.002	-0.004	-0.10	-0.003
	-6.74	*-6.95*	*-4.72*	*-5.24*	*-2.71*	*-19.36*	*-1.35*	*-3.18*	*-18.78*	*-1.80*
Volume	-0.0001	-0.0001	-0.0003	-0.0003	-0.0002	-0.0010	-0.0004	-0.0002	-0.0010	-0.0004
	-28.34	*-29.14*	*-25.19*	*-24.88*	*-17.96*	*-11.23*	*-21.52*	*-17.70*	*-11.68*	*-21.33*
Call dummy	0.26	0.26	0.29	0.3	-0.07	0.28	0.63	-0.06	0.33	0.63
	13.19	*13.56*	*16.29*	*16.93*	*-6.05*	*3.43*	*37.96*	*-5.18*	*4.23*	*38.66*
R squared	0.3932	0.3991	0.4219	0.4261	0.3988	0.4453	0.4417	0.4038	0.463	0.4443
Adj. R squared	0.3908	0.3961	0.419	0.4232	0.3937	0.4435	0.4407	0.3988	0.4613	0.4433

Table 6: Yield spread regression on liquidity variables in bond groups

Amihud	M3		M4		M3			M4		
	IG	*HY*	*IG*	*HY*	*MAT5*	*MAT10*	*MAT30*	*MAT5*	*MAT10*	*MAT30*
Constant	-0.11	-0.82	-0.08	-0.39	0.21	-1.89	0.97	0.10	-2.01	0.94
	-7.02	*-8.67*	*-4.85*	*-3.93*	*0.40*	*-18.95*	*28.02*	*0.19*	*-18.87*	*27.13*
Rating	0.21	0.49	0.21	0.50	0.55	0.43	0.25	0.55	0.46	0.25
	33.24	*29.38*	*32.26*	*28.20*	*36.83*	*25.45*	*34.86*	*36.86*	*23.89*	*35.04*
Liq Tot										
Liq Com	0.08	0.19			-0.03	0.32	-0.02			
	21.35	*7.03*			*-1.81*	*18.96*	*-5.68*			
Liq Idi			0.01	0.19				0.18	-0.01	0.01
			7.85	*12.12*				*14.04*	*-2.13*	*5.20*
Maturity	0.02	-0.06	0.02	-0.06	-0.32	0.07	-0.04	-0.30	0.10	-0.03
	19.85	*-22.08*	*26.03*	*-25.31*	*-4.51*	*19.83*	*-20.68*	*-4.41*	*22.35*	*-20.26*
Volume	-0.0001	-0.0006	-0.0001	-0.0009	-0.0001	-0.0003	-0.0001	-0.0001	-0.0005	-0.0001
	-13.47	*-18.12*	*-22.29*	*-15.39*	*-5.81*	*-31.00*	*-14.42*	*-6.37*	*-22.67*	*-11.94*
Call dummy	0.41	0.00	0.42	-0.06	0.73	0.10	0.25	0.78	0.09	0.25
	27.44	*0.10*	*27.10*	*-1.24*	*23.41*	*4.35*	*20.90*	*23.01*	*3.87*	*21.05*
R squared	0.25	0.3606	0.2438	0.3369	0.4973	0.548	0.3129	0.5003	0.5236	0.3116
Adj. R squared	0.2432	0.3457	0.2369	0.3215	0.467	0.5414	0.2981	0.4688	0.5166	0.2968

The table reports FMB cross-sectional regressions using weekly variables. T-stats are obtained with FMB methodology and are reported in brackets. The sample period goes from January 2004 to December 2013. Yield spreads are regressed cross-sectionnally on each liquidity component - common and idiosyncratic- within bond groups formed on rating and maturity. The two rating groups are investment grade and high yield. The maturity groups are from 2 to 7 years, from 7 to 17 years and more than 17 years. Other explanatory variables are the bond's rating, it's maturity, hence the number of years remaining till maturity, it's volume, hence the average trading volume of the bond during the week and a call dummy equal to 1 if the bond is redeemable at maturity. The reported R-squared are the time-series averages of the cross-sectional R-squared.

IRC	M3		M4		M3			M4		
	IG	*HY*	*IG*	*HY*	*MAT5*	*MAT10*	*MAT30*	*MAT5*	*MAT10*	*MAT30*
Constant	0.13	-0.52	0.21	0.53	0.77	-1.99	1.08	1.38	-1.83	1.13
	7.32	*-6.02*	*14.31*	*5.51*	*1.18*	*-17.74*	*27.34*	*2.06*	*-18.98*	*31.95*
Rating	0.18	0.43	0.18	0.45	0.54	0.42	0.24	0.54	0.45	0.24
	29.45	*29.70*	*30.03*	*27.98*	*35.07*	*24.76*	*31.63*	*34.51*	*22.53*	*32.48*
Liq Tot										
Liq Com	19.01	180.78			147.19	154.08	-0.13			
	9.76	*16.19*			*19.89*	*16.94*	*-0.10*			
Liq Idi			11.30	31.17				32.39	-7.93	6.64
			19.44	*7.42*				*7.37*	*-5.74*	*8.30*
Maturity	0.01	-0.04	0.02	-0.07	-0.45	0.05	-0.04	-0.45	0.10	-0.04
	20.57	*-26.09*	*23.50*	*-24.98*	*-5.13*	*16.53*	*-21.46*	*-4.95*	*25.82*	*-22.58*
Volume	-0.0001	-0.0006	-0.0001	-0.0010	-0.0001	-0.0003	-0.0001	-0.0002	-0.0005	-0.0001
	-17.76	*-18.48*	*-21.71*	*-16.75*	*-7.31*	*-37.20*	*-16.81*	*-11.62*	*-22.52*	*-13.16*
Call dummy	0.35	-0.02	0.37	-0.13	0.58	0.01	0.20	0.77	-0.02	0.20
	27.58	*-0.64*	*27.77*	*-2.70*	*21.47*	*0.40*	*18.37*	*22.11*	*-0.77*	*18.92*
R squared	0.211	0.3492	0.2033	0.2935	0.4604	0.285	0.5194	0.4507	0.2823	0.476
Adj. R squared	0.2058	0.3377	0.198	0.2812	0.4389	0.2739	0.5141	0.4284	0.2713	0.4704

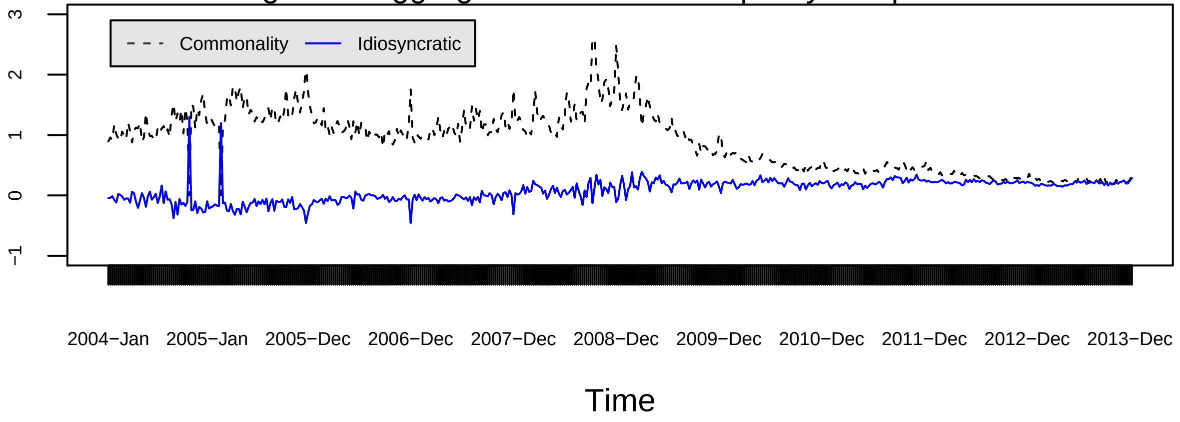
Amihud risk	M3		M4		M3			M4		
	IG	*HY*	*IG*	*HY*	*MAT5*	*MAT10*	*MAT30*	*MAT5*	*MAT10*	*MAT30*
Constant	-0.02	-0.62	-0.01	-0.27	0.67	-1.83	1.01	0.58	-1.97	0.96
	-1.39	*-6.69*	*-0.63*	*-2.82*	*1.14*	*-18.72*	*31.43*	*1.03*	*-18.37*	*29.17*
Rating	0.20	0.49	0.20	0.49	0.54	0.43	0.25	0.55	0.46	0.25
	33.83	*29.01*	*31.96*	*27.72*	*37.43*	*24.72*	*33.93*	*37.16*	*23.29*	*34.07*
Liq Tot										
Liq Com	0.05	0.17			0.02	0.24	-0.03			
	11.35	*7.84*			*1.12*	*16.93*	*-8.78*			
Liq Idi			0.01	0.13				0.14	-0.01	0.02
			6.97	*12.09*				*15.51*	*-2.99*	*10.45*
Maturity	0.01	-0.06	0.02	-0.05	-0.38	0.07	-0.04	-0.37	0.10	-0.04
	19.08	*-22.47*	*25.17*	*-26.47*	*-4.90*	*21.12*	*-22.46*	*-4.85*	*22.28*	*-21.54*
Volume	-0.0001	-0.0007	-0.0001	-0.0010	-0.0001	-0.0003	-0.0001	-0.0002	-0.0005	-0.0001
	-16.39	*-19.51*	*-23.50*	*-17.01*	*-6.53*	*-28.39*	*-15.14*	*-8.16*	*-23.29*	*-12.18*
Call dummy	0.40	-0.02	0.41	-0.07	0.73	0.06	0.24	0.81	0.05	0.24
	28.15	*-0.57*	*27.67*	*-1.62*	*25.39*	*2.72*	*21.67*	*24.43*	*2.25*	*21.98*
R squared	0.2385	0.3418	0.2323	0.3223	0.484	0.5348	0.305	0.4835	0.5139	0.3046
Adj. R squared	0.2323	0.328	0.2261	0.3079	0.458	0.5287	0.2919	0.4565	0.5075	0.2914

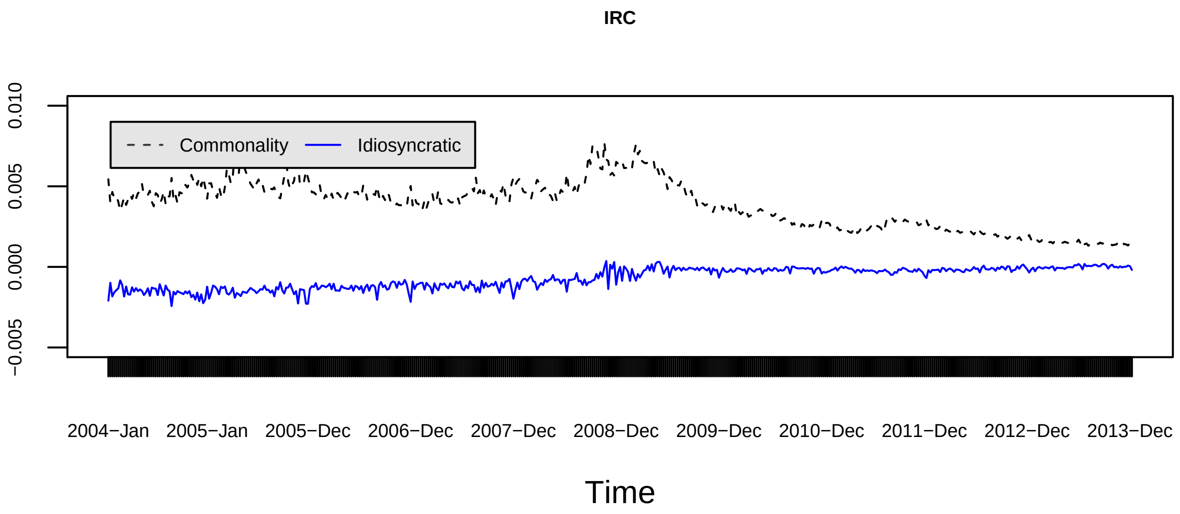
IRC risk	M3		M4		M3			M4		
	IG	*HY*	*IG*	*HY*	*MAT5*	*MAT10*	*MAT30*	*MAT5*	*MAT10*	*MAT30*
Constant	0.11	-0.13	0.19	0.49	0.67	-1.30	0.96	1.02	-1.80	1.12
	7.02	*-1.56*	*13.00*	*5.01*	*1.19*	*-24.31*	*23.53*	*1.61*	*-18.96*	*32.21*
Rating	0.18	0.41	0.18	0.45	0.50	0.37	0.24	0.54	0.45	0.24
	31.06	*30.20*	*30.41*	*27.93*	*34.47*	*29.22*	*32.05*	*33.87*	*22.56*	*32.53*
Liq Tot										
Liq Com	25.74	118.10			133.80	127.84	11.43			
	11.83	*15.56*			*19.22*	*15.98*	*7.86*			
Liq Idi			9.24	7.50				13.65	-22.29	1.51
			10.38	*3.10*				*3.37*	*-11.08*	*1.77*
Maturity	0.01	-0.06	0.02	-0.06	-0.39	0.02	-0.04	-0.40	0.10	-0.04
	14.36	*-21.26*	*23.88*	*-23.06*	*-5.20*	*5.47*	*-20.82*	*-4.75*	*26.11*	*-22.59*
Volume	0.0000	-0.0006	-0.0001	-0.0010	-0.0002	-0.0002	0.0000	-0.0002	-0.0005	-0.0001
	-10.48	*-19.47*	*-21.30*	*-16.84*	*-8.54*	*-37.53*	*-13.27*	*-11.69*	*-22.64*	*-13.29*
Call dummy	0.36	0.02	0.37	-0.12	0.56	0.08	0.22	0.76	-0.02	0.20
	27.98	*0.54*	*27.89*	*-2.52*	*26.97*	*4.03*	*19.36*	*25.50*	*-0.61*	*19.22*
R squared	0.2138	0.3447	0.2048	0.2884	0.4657	0.5337	0.2876	0.4497	0.48	0.2822
Adj. R squared	0.2086	0.3332	0.1996	0.276	0.4462	0.5286	0.2766	0.4287	0.4744	0.2711

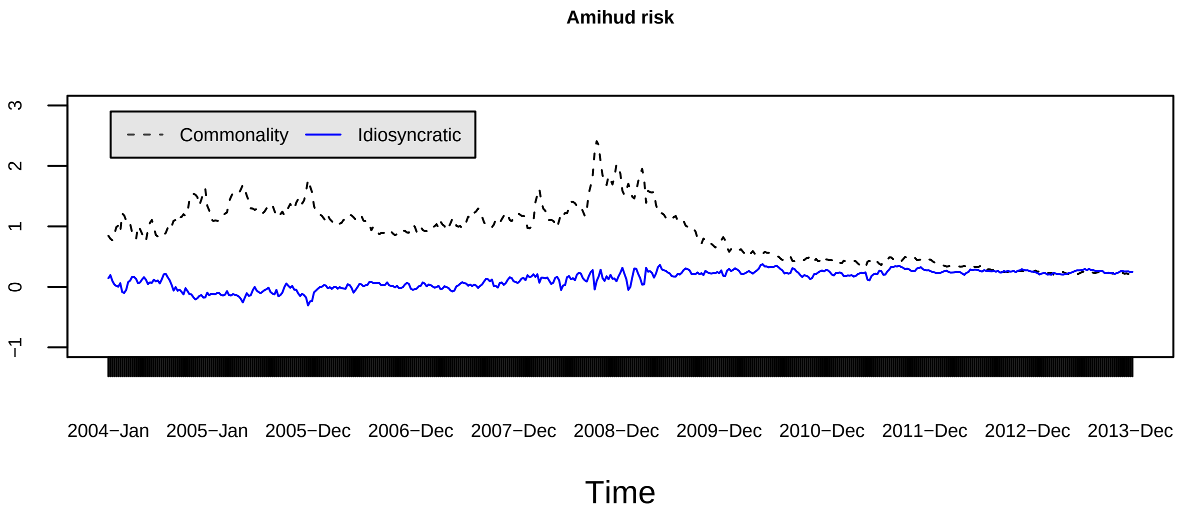
Roll	M3		M4		M3			M4		
	IG	*HY*	*IG*	*HY*	*MAT5*	*MAT10*	*MAT30*	*MAT5*	*MAT10*	*MAT30*
Constant	0.09	-0.17	0.12	0.16	0.55	-1.79	1.05	0.49	-1.87	1.07
	6.65	*-1.88*	*8.15*	*1.66*	*1.01*	*-19.21*	*31.60*	*0.93*	*-18.52*	*31.68*
Rating	0.17	0.46	0.19	0.47	0.53	0.43	0.24	0.54	0.45	0.24
	34.57	*28.04*	*30.97*	*27.65*	*35.71*	*23.12*	*34.23*	*35.54*	*22.84*	*33.62*
Liq Tot										
Liq Com	0.09	0.27			0.21	0.18	0.01			
	18.34	*21.27*			*22.95*	*20.01*	*4.14*			
Liq Idi			0.00	0.04				0.03	0.00	0.01
			1.38	*6.49*				*6.73*	*-0.03*	*3.80*
Maturity	0.01	-0.07	0.02	-0.06	-0.38	0.07	-0.04	-0.34	0.10	-0.04
	16.36	*-20.78*	*25.01*	*-23.45*	*-5.18*	*18.63*	*-23.50*	*-4.72*	*23.90*	*-22.60*
Volume	-0.0001	-0.0008	-0.0001	-0.0010	-0.0002	-0.0004	-0.0001	-0.0002	-0.0005	-0.0001
	-17.63	*-15.73*	*-22.97*	*-17.12*	*-8.32*	*-22.48*	*-13.96*	*-10.44*	*-22.72*	*-13.29*
Call dummy	0.36	-0.19	0.38	-0.10	0.69	-0.02	0.22	0.75	0.00	0.22
	28.27	*-4.07*	*27.65*	*-2.15*	*23.45*	*-0.82*	*20.43*	*23.28*	*-0.08*	*20.58*
R squared	0.2252	0.3351	0.2112	0.3024	0.4652	0.506	0.2927	0.4526	0.4937	0.2899
Adj. R squared	0.2197	0.3241	0.2057	0.2899	0.4404	0.5003	0.2812	0.4277	0.4879	0.2782

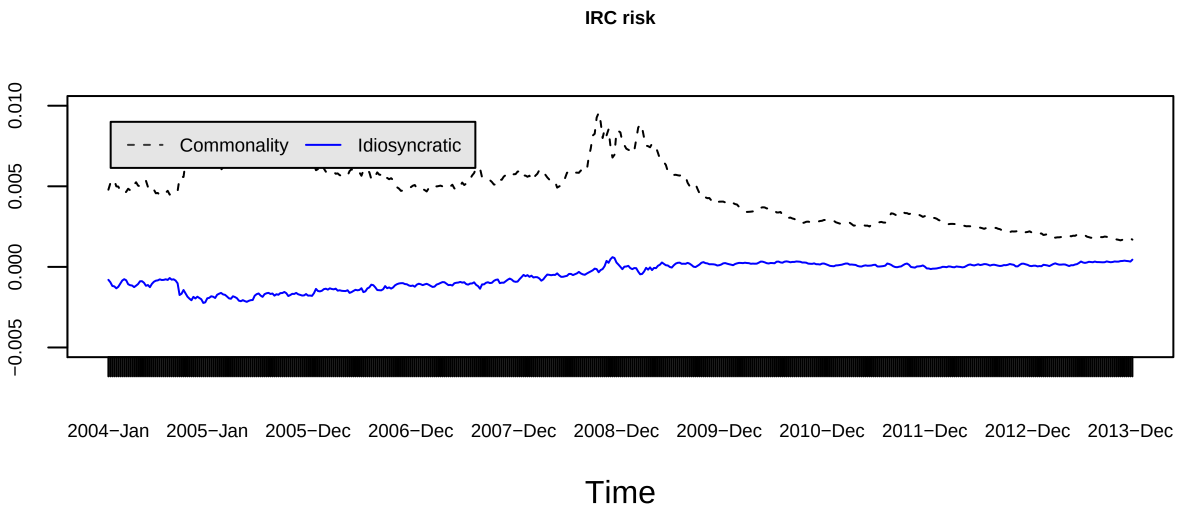
Zero bond	M3		M4		M3			M4		
	IG	*HY*	*IG*	*HY*	*MAT5*	*MAT10*	*MAT30*	*MAT5*	*MAT10*	*MAT30*
Constant	0.15	0.97	0.19	0.23	0.75	-1.26	1.11	0.00	-1.59	1.10
	9.76	*8.01*	*12.74*	*2.55*	*1.41*	*-17.71*	*34.83*	*0.01*	*-19.95*	*30.32*
Rating	0.17	0.44	0.17	0.44	0.55	0.44	0.24	0.54	0.43	0.24
	33.17	*27.73*	*32.00*	*28.71*	*34.52*	*22.24*	*32.88*	*34.41*	*22.95*	*32.65*
Liq Tot										
Liq Com	0.14	-1.38			-0.72	-1.03	-0.01			
	8.75	*-15.79*			*-21.48*	*-17.22*	*-0.66*			
Liq Idi			-0.16	1.60				0.96	1.17	-0.06
			-11.12	*15.57*				*18.74*	*15.85*	*-4.38*
Maturity	0.02	-0.05	0.02	-0.06	-0.32	0.10	-0.04	-0.25	0.08	-0.04
	22.51	*-22.34*	*24.19*	*-20.55*	*-4.42*	*26.41*	*-22.10*	*-4.09*	*27.22*	*-21.44*
Volume	-0.0001	-0.0008	-0.0001	-0.0008	-0.0002	-0.0004	-0.0001	-0.0002	-0.0004	-0.0001
	-19.60	*-15.91*	*-20.02*	*-16.41*	*-12.00*	*-21.08*	*-14.82*	*-14.80*	*-21.59*	*-13.15*
Call dummy	0.38	0.23	0.38	0.26	0.78	0.09	0.22	0.76	0.10	0.22
	27.41	*6.74*	*27.42*	*8.01*	*24.40*	*4.04*	*20.88*	*25.50*	*5.22*	*21.23*
R squared	0.2084	0.3343	0.207	0.3477	0.4563	0.5105	0.2886	0.4673	0.5174	0.2877
Adj. R squared	0.2032	0.3227	0.2018	0.3363	0.4361	0.5052	0.2778	0.4489	0.5121	0.2768

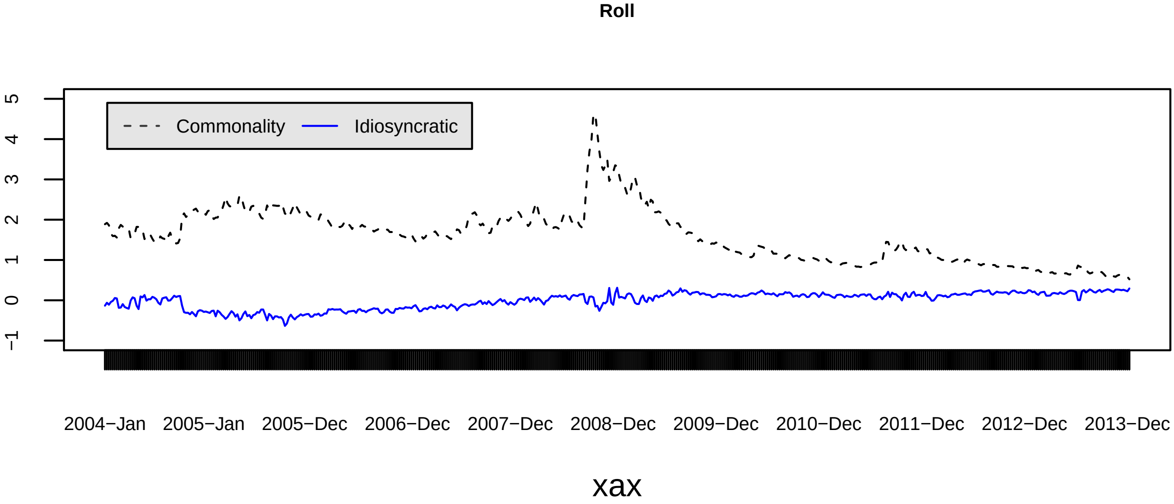
Figure 1: Aggregate series of two liquidity components

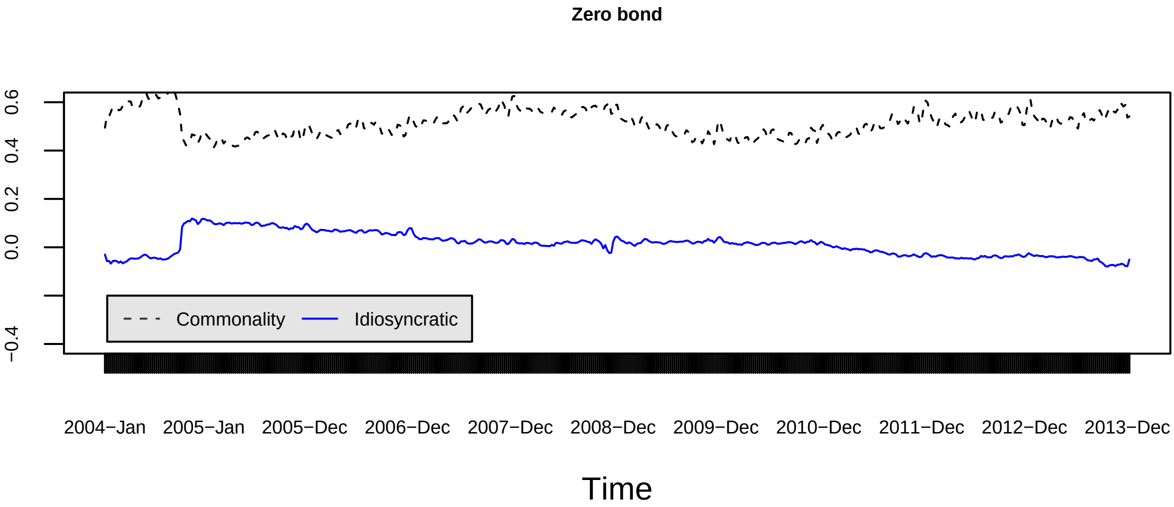





Amihud risk
Commonality
Idiosyncratic
3
2
1
0
−1
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec
Time

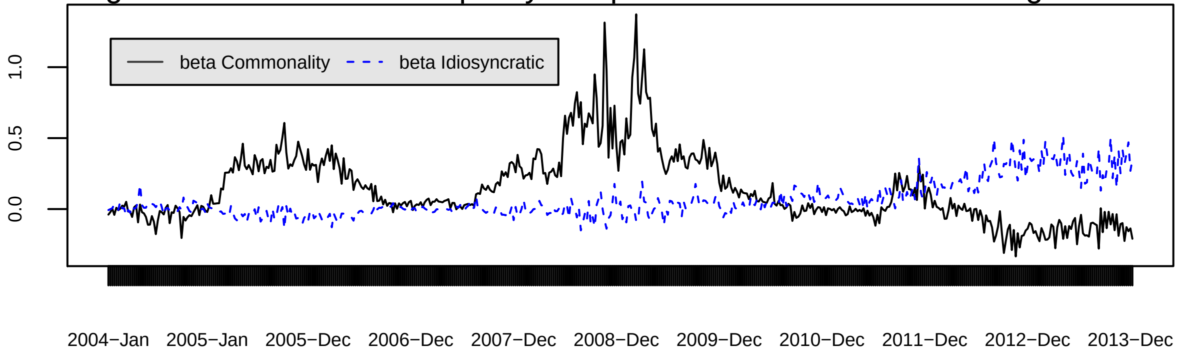

IRC risk
Commonality
Idiosyncratic
0.010
0.005
0.000
−0.005
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec
Time


Roll
Commonality
Idiosyncratic
5
4
3
2
1
0
−1
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec
xax

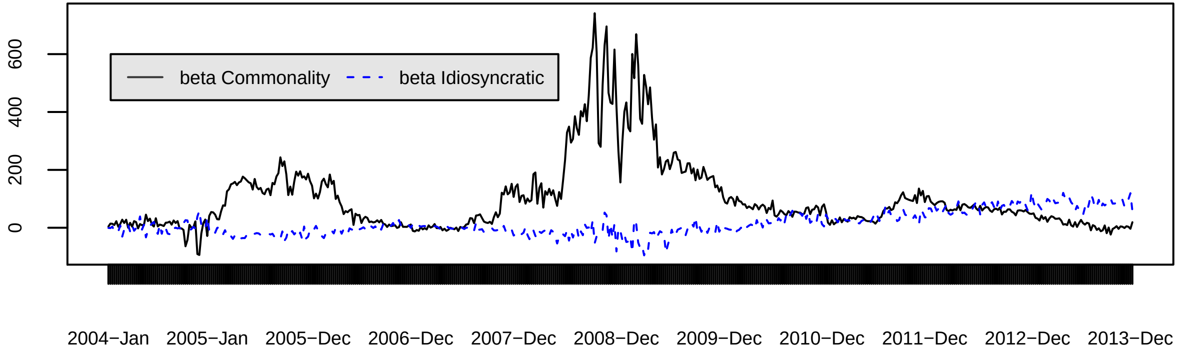

Zero bond
Commonality
Idiosyncratic
0.6
0.4
0.2
0.0
−0.4
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec
Time

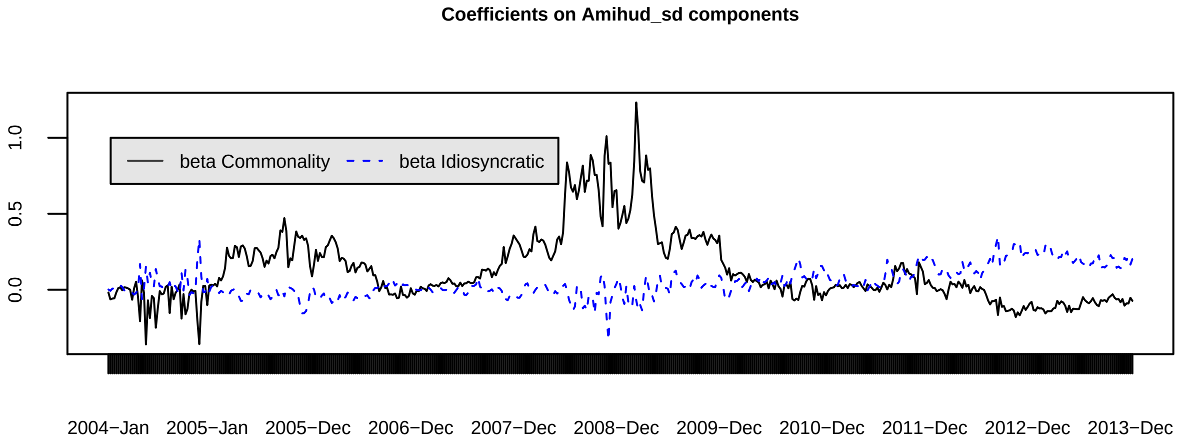
Coefficients on Amihud components

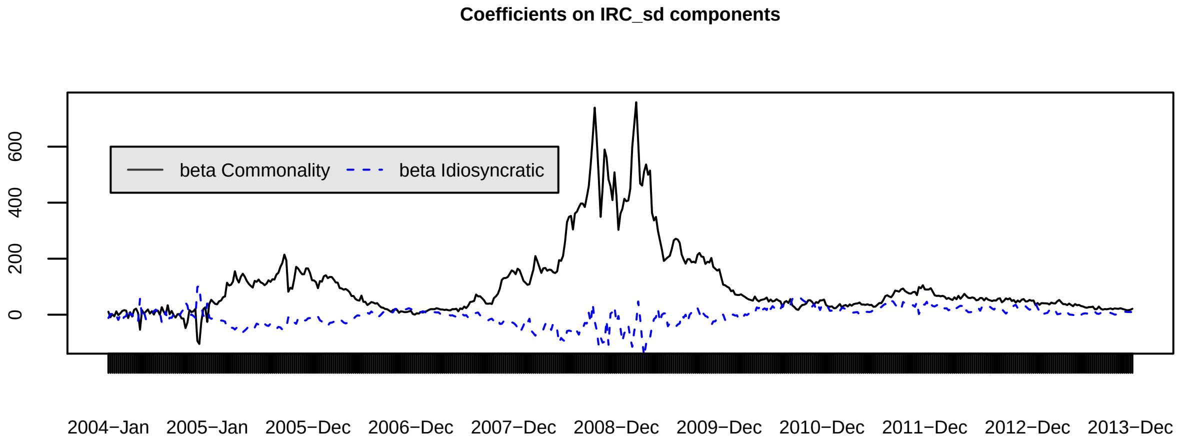
Figure 2: Coefficients on liquidity components in cross−sectional regressions

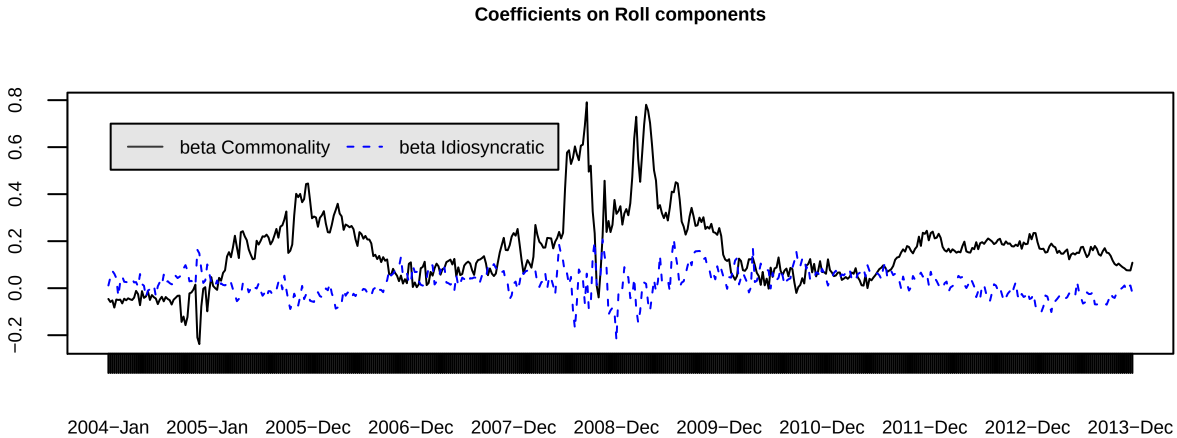


Coefficients on IRC components




Coefficients on Amihud_sd components
beta Commonality
beta Idiosyncratic
1.0
0.5
0.0
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec


Coefficients on IRC_sd components
beta Commonality
beta Idiosyncratic
600
400
200
0
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec


Coefficients on Roll components
beta Commonality
beta Idiosyncratic
−0.2
0.0
0.2
0.4
0.6
0.8
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec

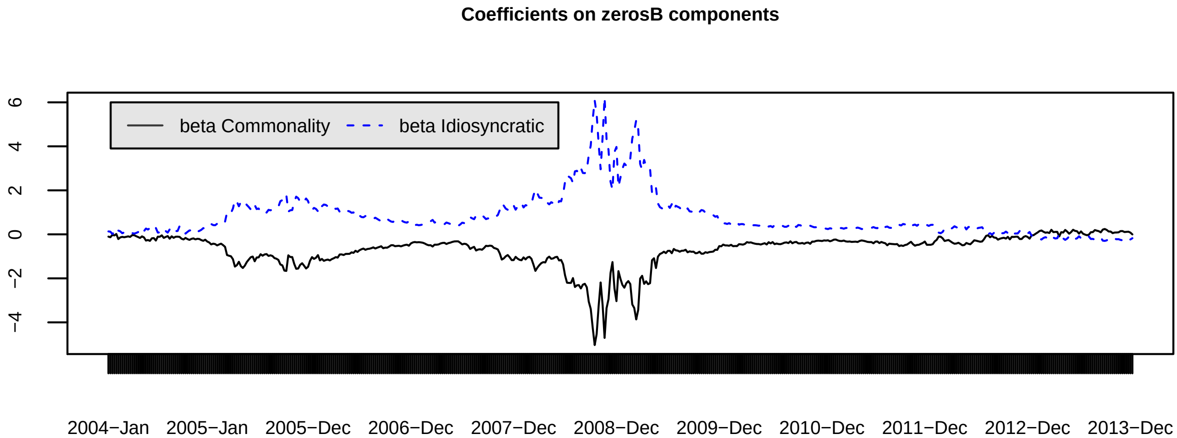
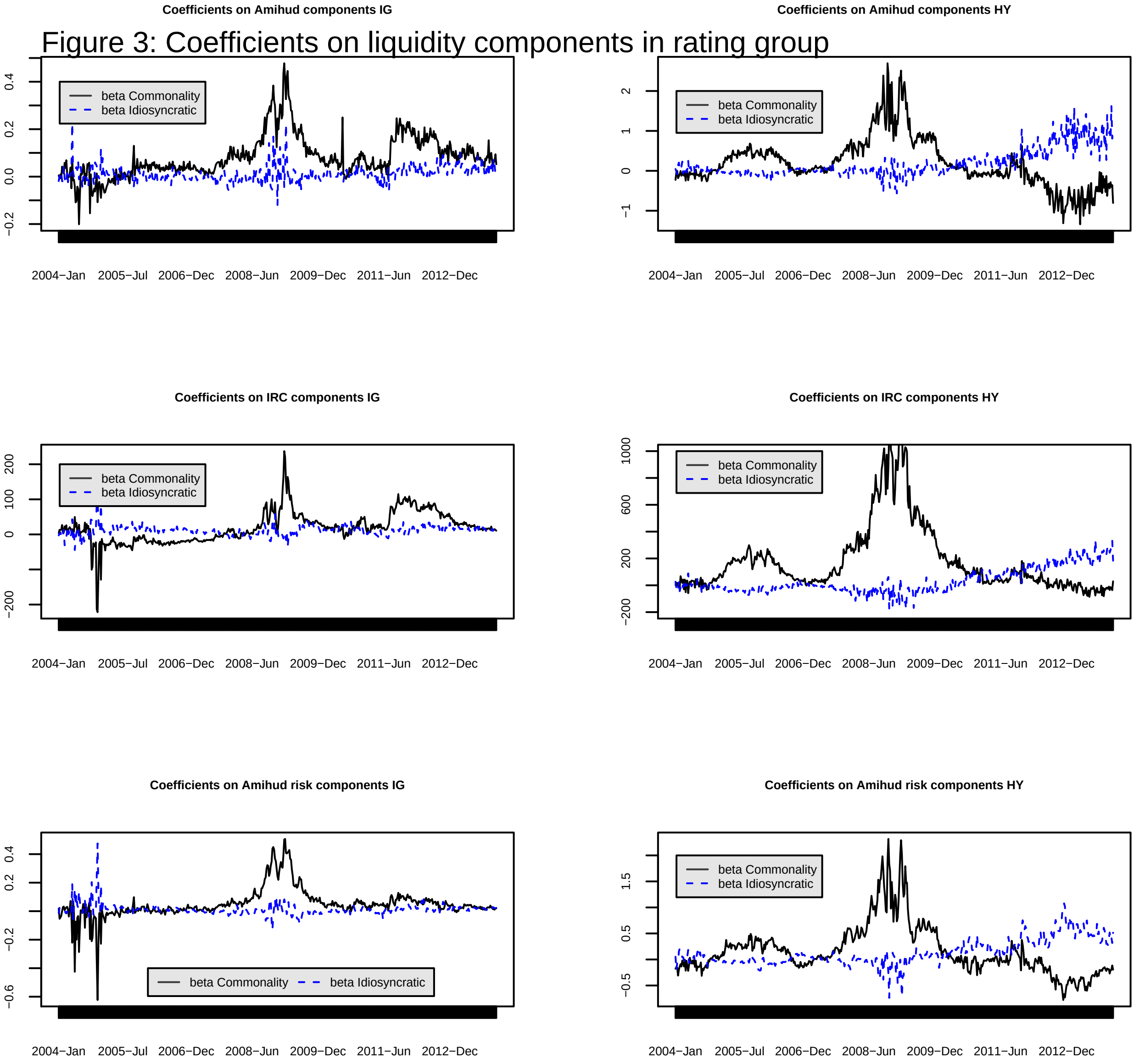

Coefficients on zerosB components
beta Commonality
beta Idiosyncratic
−4
−2
0
2
4
6
2004−Jan
2005−Jan
2005−Dec
2006−Dec
2007−Dec
2008−Dec
2009−Dec
2010−Dec
2011−Dec
2012−Dec
2013−Dec

Figure 3: Coefficients on liquidity components in rating group



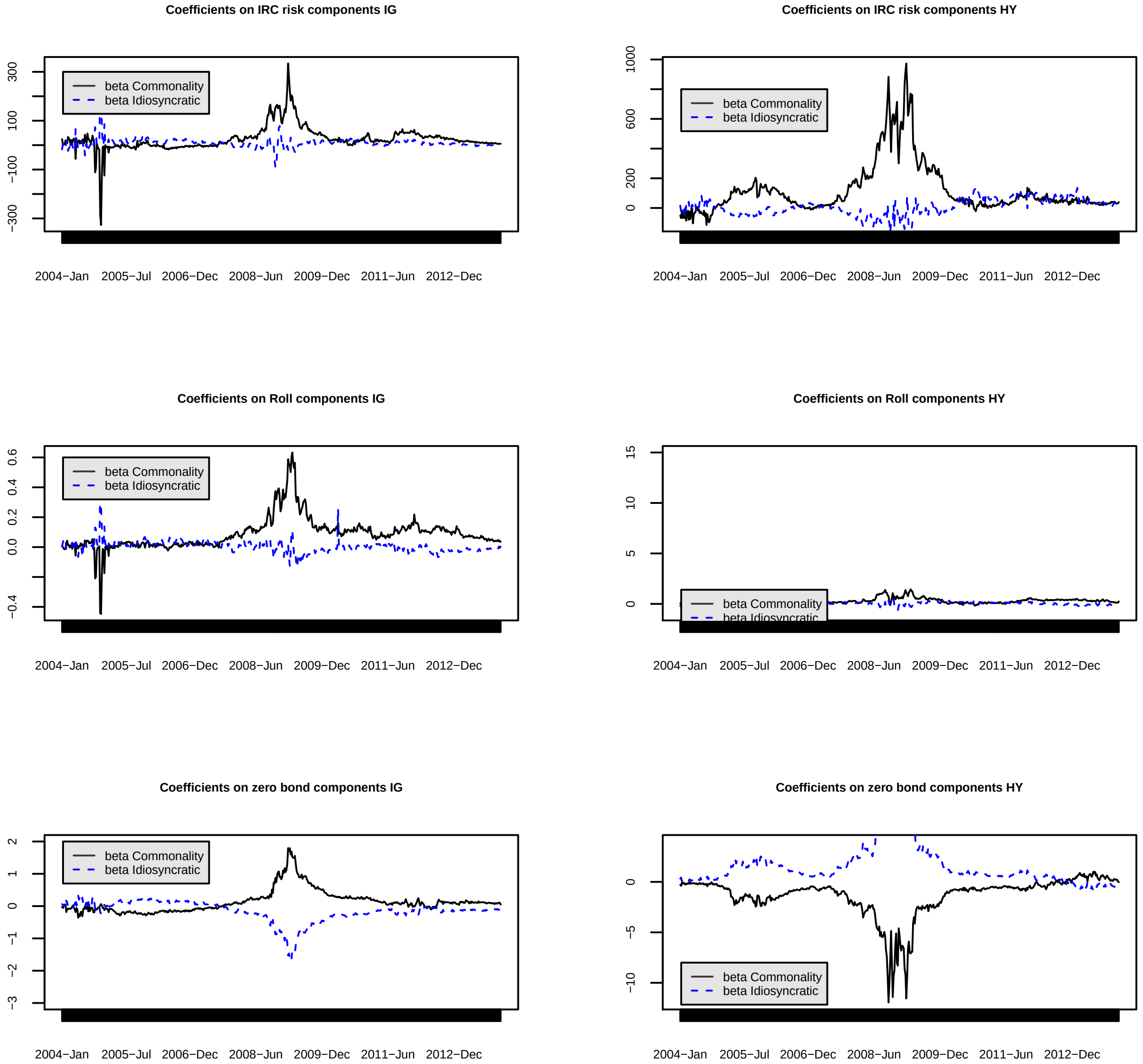
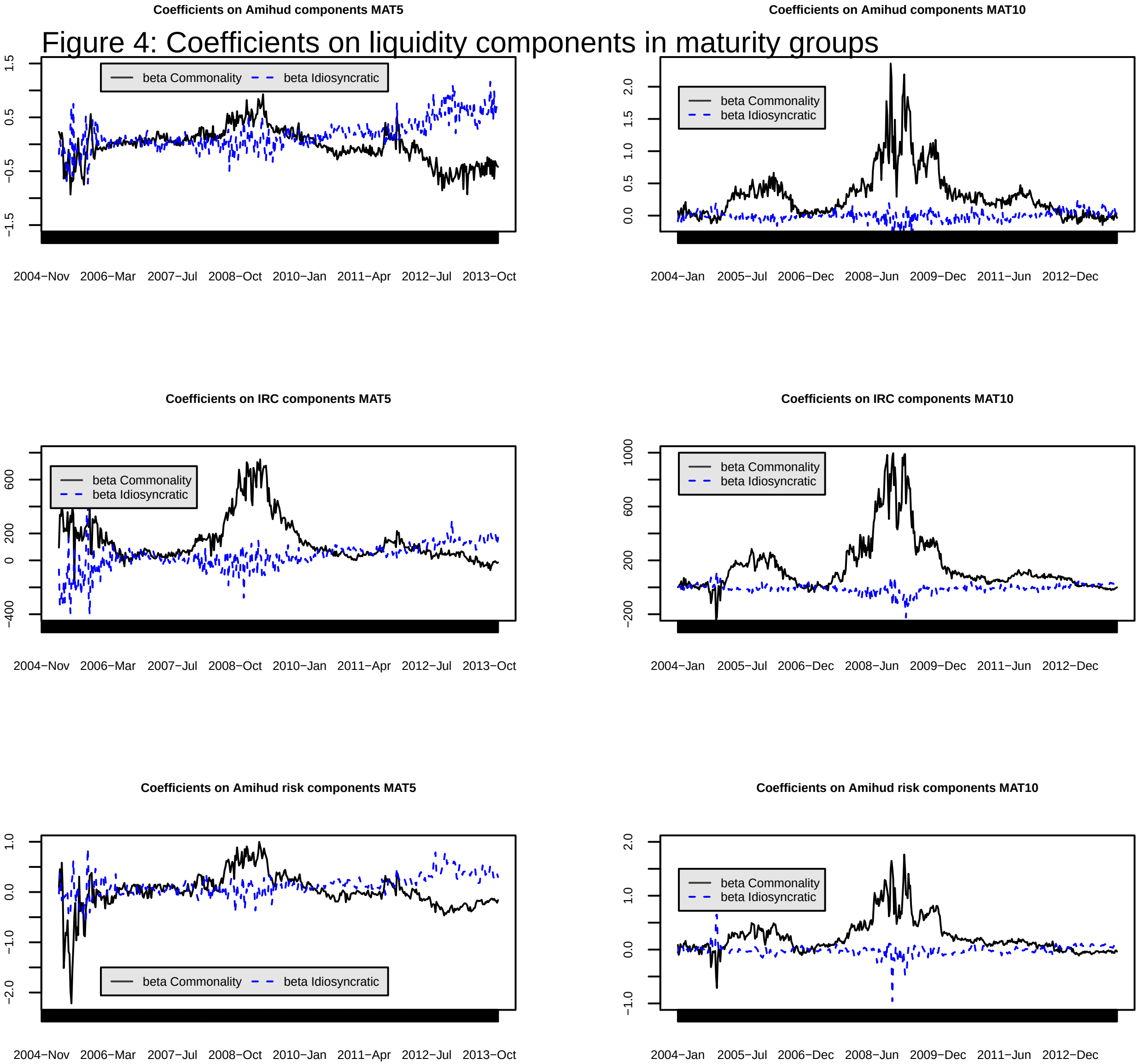
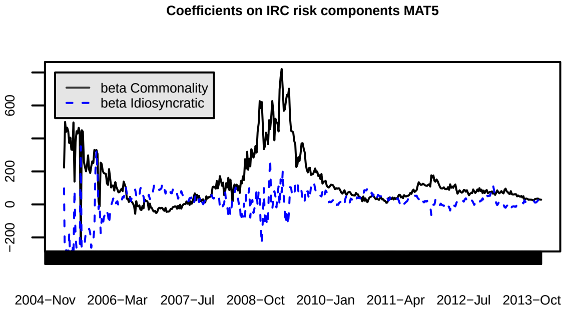
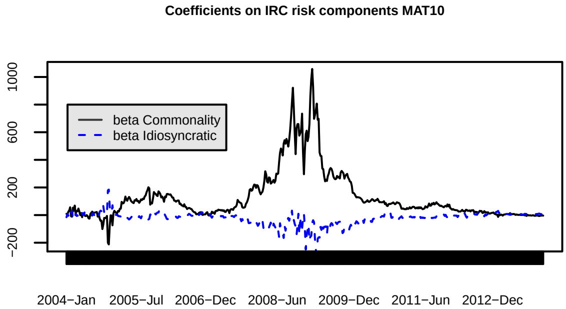
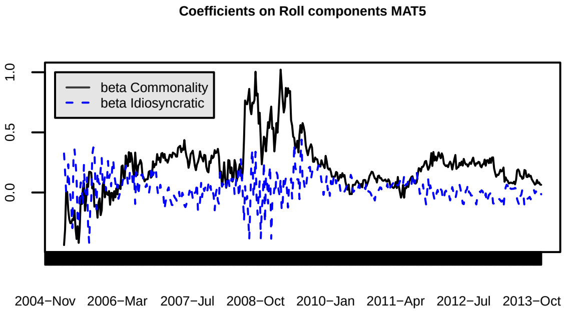

Coefficients on IRC risk components IG
beta Commonality
beta Idiosyncratic
300
100
−100
−300
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec
Coefficients on IRC risk components HY
beta Commonality
beta Idiosyncratic
1000
600
200
0
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec
Coefficients on Roll components IG
beta Commonality
beta Idiosyncratic
0.6
0.4
0.2
0.0
−0.4
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec
Coefficients on Roll components HY
beta Commonality
15
10
5
0
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec
Coefficients on zero bond components IG
beta Commonality
beta Idiosyncratic
2
1
0
−1
−2
−3
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec
Coefficients on zero bond components HY
beta Commonality
beta Idiosyncratic
0
−5
−10
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec

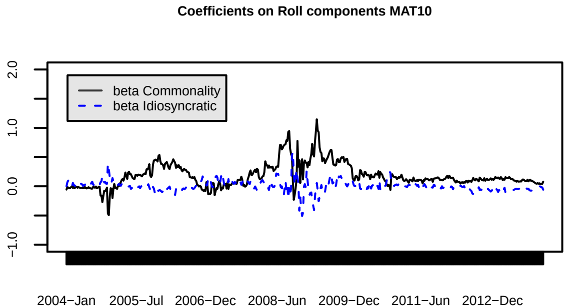
Figure 4: Coefficients on liquidity components in maturity groups

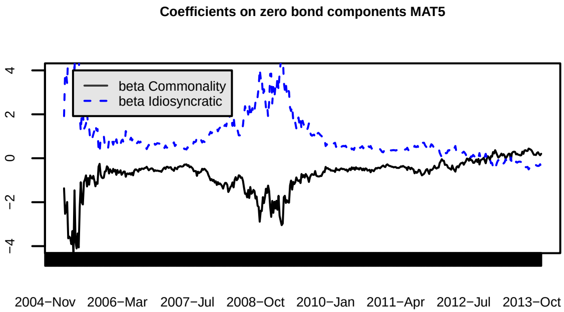


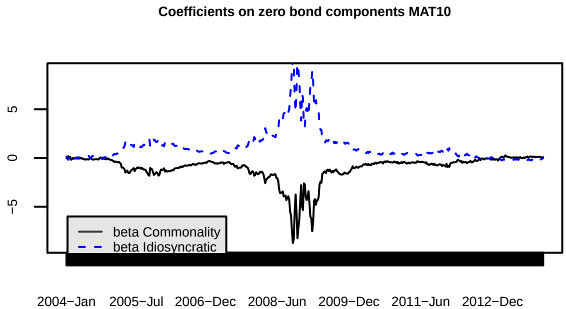

Coefficients on IRC risk components MAT5
beta Commonality
beta Idiosyncratic
600
200
0
−200
2004−Nov
2006−Mar
2007−Jul
2008−Oct
2010−Jan
2011−Apr
2012−Jul
2013−Oct


Coefficients on IRC risk components MAT10
beta Commonality
beta Idiosyncratic
1000
600
200
−200
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec


Coefficients on Roll components MAT5
beta Commonality
beta Idiosyncratic
1.0
0.5
0.0
2004−Nov
2006−Mar
2007−Jul
2008−Oct
2010−Jan
2011−Apr
2012−Jul
2013−Oct


Coefficients on Roll components MAT10
beta Commonality
beta Idiosyncratic
2.0
1.0
0.0
−1.0
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec


Coefficients on zero bond components MAT5
beta Commonality
beta Idiosyncratic
4
2
0
−2
−4
2004−Nov
2006−Mar
2007−Jul
2008−Oct
2010−Jan
2011−Apr
2012−Jul
2013−Oct


Coefficients on zero bond components MAT10
beta Commonality
beta Idiosyncratic
5
0
−5
2004−Jan
2005−Jul
2006−Dec
2008−Jun
2009−Dec
2011−Jun
2012−Dec