

An analysis of fixed income trading activity in the context of MiFID II

September 2012

Over the last few months, AFME has undertaken a detailed analysis of fixed income trading activity to help inform policy makers in the context of the MiFID legislative process. This AFME Report outlines the key findings and supporting data, including an Executive Summary.

The major findings of the Report are that individual fixed income instruments have material differences in trading activity and that the market maker model is essential for the functioning of the secondary markets across fixed income sectors – a major provider of capital to governments, companies and consumers for economic growth. This means that any transparency requirements will need to be carefully calibrated and dynamic to take into account secondary market liquidity, issuance size and trade size.

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Table of contents

Executive summary	1
Introduction	4
Overview of the methodology	5
Section 1: The composition of the fixed income market	6
1.1 What are fixed income cash bonds	6
1.2 Features of the fixed income market: maturity date	6
1.3 Features of fixed income products: categorisation	6
1.4 Features of the fixed income market: composition	7
1.5 Features of the fixed income market: heterogeneity and size	9
1.6 Fixed income investment strategies	11
Section 2: Secondary market liquidity and its importance	12
2.1 The definition of secondary market liquidity	12
2.2 The importance of secondary market liquidity	12
2.3 How secondary market liquidity translates into market structure	13
2.4 Factors impacting secondary market liquidity	14
Section 3: Measuring secondary market liquidity	16
Section 4: Trading activity of the fixed income market	18
4.1 Comparison of monthly trading values and number of transactions within the fixed income market	19
4.2 Total monthly number of transactions for each asset class	20
4.3 Comparison of monthly trading volumes and number of transactions within the fixed income market – a closer look at individual asset classes	22
4.5. Trade sizes in the fixed income market	28
Appendix 1 – Features of fixed income bonds	30
Appendix 2	31

Executive summary

The review of the Markets in Financial Instruments Directive (MiFID II) proposes to mandate new market structure and pre and post trade transparency for the fixed income markets. However, it is essential that new requirements are appropriate for the inherent characteristics of the market and that they safeguard secondary market liquidity. In this context, this study is an educational piece and is intended to assist policy makers by analysing trading activity data to provide an overview of fixed income cash secondary market liquidity in terms of purchase and sale. The analysis provides insight into the role of secondary market liquidity in the market maker model and its importance to the transparency requirements. The data demonstrates that the market maker model is essential for the functioning of the secondary markets and the preservation of liquidity and that there is a great deal of diversity of trading activity, which means that any transparency requirements must be appropriately calibrated.

The secondary market in terms of the purchase and sale of assets is an important source of liquidity and is one of a number of components of the overall liquidity framework. For discussions on determining the liquidity of assets and building a macro view of liquidity, other central sources of liquidity, such as collateral eligibility and the repo and securities lending markets, must be considered. This report does not therefore seek to identify or provide insight into assets that can provide liquidity for the purposes of meeting the requirements of the Liquidity Coverage Ratio (LCR) under Basel III or the Capital Requirements Directive (CRDIV) or for meeting other regulatory measures and standards in the prudential supervision of bank liquidity. Indeed, the factors that are most relevant in the consideration of the market characteristics for MiFID are very different from those that are relevant to the management of institution-specific liquidity under Basel III or CRDIV, which concern the ease at which firms can realise value from the sale or repo of individual or portfolio of assets (which may or may not already be traded) using appropriate haircuts. For example, a good quality security (e.g. a high quality securitisation or covered bond), may have a low trading activity (e.g. due a buy-to-hold investor base or a high number of comparable securities¹) but is often inherently liquid. Future work on other sources of liquidity including the repo and collateralised lending market, as well as the aforementioned inherently liquid assets, would be essential to inform discussions on liquidity in the context of the LCR. Additionally, further consideration of the nature of the buy to hold market would be necessary.

Key findings

1. The market maker model is essential for the functioning of the fixed income secondary markets and the preservation of liquidity

On the basis of the analysis in this report, AFME recommends that the market maker model is essential for the functioning of the fixed income secondary markets. In the market maker model, the

¹ Fixed income securities often have a number of very similar (i.e. “comparable”) securities (e.g. other bonds of similar tenor and from the same creditor but with slightly different coupons; other master trust securities with the same issuer, credit rating and currency). Therefore, taking these securities together as a group will more accurately reflect the liquidity of any single security.

market maker holds an inventory of assets to enable them to facilitate their clients' needs by offering a price on any asset based on the risks and costs of the specific immediate transaction; the market maker will then hedge or unwind risk their position in the secondary markets.

As a predominantly institutional market with a buy to hold investor base due to the nature of the products, fixed income instruments can turnover large monthly volumes but trade relatively infrequently. The analysis of trading activity shows that fixed income instruments can turnover large monthly volumes, although, trading is generally infrequent. Average trade sizes of the fixed income asset classes are also sizable with significant distributions. This indicates that whilst there is a large amount of fixed income volume traded (in terms of currency value), the investment strategy of a large proportion of investors is buy-to-hold (e.g. pension funds and insurance companies). This can be explained by the fact that fixed income instruments are generally low volatility products that offer returns over the long term. Given that fixed income assets trade relatively infrequently and often in large sizes, this requires that market makers are present to immediately offer a market to those investors managing their portfolios and to take on large risk positions. Specific data points are²:

- Of all the fixed income asset classes, government bonds, with the greatest average issuance size at EUR 15.1bn and a combined US and European market proportion of 51% in terms of currency value, on average traded the greatest volume and frequency. However, 69.7% of the sampled government bonds traded less than 400 times in a month (and of the remainder, none traded more than 3345 times per month). In terms of volume, the turnover amount was concentrated in the range of EUR 0-20bn, EUR 20bn being greater than the average issue size.
- The other asset classes trade at an even lower frequency, concentrated at less than 200 trades per month. Within the sample, 63.8% of the corporate bonds and 82.1% of covered bonds traded less than 20 times per month but in volumes usually up to EUR 50mm.
- The average trade sizes show that on average, government bonds trade in sizes of EUR 21.2mm with a distribution of ±EUR 77.1mm and corporate bonds trade in sizes of EUR 1.1mm with a distribution of ±EUR 12.2mm.

2. For fixed income, pre and post trade transparency must be dynamic and calibrated appropriately to consider secondary market liquidity, issuance size and trade size at instrument level

The analysis demonstrates that there is a wide spectrum of secondary market liquidity across fixed income asset classes and within each asset class, such that the level of trading activity is instrument specific. In fact, the trading activity of a single instrument also changes over time. For example, government bonds generally have instruments with the greatest level of trading activity compared to other fixed income asset classes. However, even within the government bonds asset class, there is a large spectrum of liquidity and a significant overlap with other asset classes. The

² Trading activity data points are from the period of July 2010 to June 2011

diversity and trading behaviour above can be accounted by the large number of products and the huge amount of heterogeneity in the fixed income market.

- Government bond instruments generally trade from zero to 2000 times per month (the maximum of any one of the instruments at 3345 trades) at monthly turnover volumes of up to EUR 120bn. 16.7% traded less than 100 times per month and 30.3% traded more than 400 times in a month.
- Non-government asset classes generally trade from zero to 200 times per month at monthly volumes of up to EUR 5bn. For example, 63.8% of the corporate bonds sampled traded less than 20 times per month, 10.1% traded 50 to 100 times and 0.6% traded 200-400 times in a month.
- Companies usually only issue one or a handful of equities but will issue many bonds³, which are large in value. For example, Bayerische Landesbank currently has one equity security but has approximately 645 different corporate bonds outstanding.
- The average trade size of the sample of government bonds was EUR 21.2mm and the median trade size was EUR 4.2mm. The distribution of the trade size from the mean was \pm EUR 77mm.

Additionally, fixed income instruments trade in a large range of trade sizes. This means that there is no standard trade size for fixed income, which can be explained by the nature of investor investment strategies and the large range of issuance sizes.

- 38.9% of corporate bond transactions were in sizes less than EUR 100,000 and 16.9% in sizes greater than EUR 5mm. The median trade size was EUR 150,000, meaning that 50% of all corporate transactions were equal to or less than EUR 150,000 size. However, the average trade size was EUR 1.12mm with a distribution of \pm 12.2mm.
- 45.4% of supranational bond transactions were in sizes of less than EUR 100,000. However, the median trade size was EUR 100,000, meaning that 50% of all trades were equal to or less than EUR 100,000 in size. The average trade size was EUR 7.3mm with a distribution of \pm EUR 85.1mm.
- The average issuance size of the government bonds⁴ sample are EUR 15.1bn with a distribution of \pm 8.4bn. The average issuance size of the corporate bonds sample was EUR 722mm with a distribution of \pm 528mm.

Generally, the greater the size of an instrument the more volume available for trading; therefore, issuance size is an important factor when considering secondary market liquidity.

At the asset class level, government bonds generally had the highest level of trading in terms of volume and frequency. Supranationals had the second highest. This is consistent with government bonds making up the largest proportion in terms of currency value of the combined European and US fixed income market ⁵(51%) and its large issuance size (EUR 15bn \pm 8.4bn) and supranationals having the second largest issuance size of EUR 3.1bn \pm 2bn.

Finally, generally fixed income instruments can turnover large monthly volumes but trade relatively infrequently, meaning that market makers can take on large risk positions when facilitating liquidity in the secondary market.

³ Banks often issue in the thousands

⁴ Q1 2011 – Source Xtrakter

⁵ Those that are index eligible

Introduction

As banks continue to deleverage globally, bank financing is becoming more difficult to secure. It is expected that this reduction in lending capacity will be further exacerbated in Europe because of a weaker economy, the sovereign debt crisis, more highly leveraged balance sheets and the implementation of Basel III⁶ and other regulations. The debt capital markets are already an important source of long term funding for governments and companies. However, as bank financing decreases, the role of the debt markets in financing Europe's growth will become more critical.

A functioning and liquid fixed income secondary market is vital for ensuring that governments and companies can raise new funding in the primary market. Specifically, the secondary markets enable investors to manage their portfolios and thereby allow new issues to be placed with investors⁷. A functioning and liquid secondary market is dependent on a market structure and a level of transparency that supports the features of the instruments and the market, including the nature of the investors in the debt markets and the inherent secondary market liquidity of fixed income instruments.

In Europe, new policy and legislation are being proposed to promote fair and transparent markets and ensure financial stability. For example, the review of the Markets in Financial Instruments Directive (MiFID II) proposes to mandate new market structure and pre- and post trade transparency for the fixed income markets. However, it is essential that new requirements are appropriate for the inherent characteristics of the market and safeguards secondary market liquidity. In a critical time for Europe's growth, if secondary market liquidity were to be adversely impacted, governments and companies, already restricted in securing bank financing, would also find it difficult to raise funding through the capital debt markets.

In light of the above, in this report, the Association for Financial Markets in Europe (AFME) uses data to analyse market features and secondary market liquidity in terms of purchase and sale of assets to assist regulators in their discussions with regard to market structure and transparency.

⁶ Standard and Poor's – "The Credit Overhang: Is a \$26 Trillion Perfect Storm Brewing?"

⁷ TABB Group – "MiFID II and Fixed Income Price Transparency: Panacea or Problem?"

Overview of the methodology

AFME believes that the data in this report provides the best overview of secondary market liquidity currently available for the fixed income cash markets. It should be noted that parts of the analysis in this report are intended to be illustrative rather than representative. Different time periods are sampled at different points in this report; however, all the data points compared are comparable. The data sources and data selection process of the analysis is briefly outlined below. A comprehensive methodology with the limitations and assumptions of the analysis is provided in **Appendix 2** of this report. Further detail on the methodology and selection process is available upon request from AFME.

AFME obtained the trade data for this report from a number of sources. Xtrakter⁸ provided issuance sizes for 3751 fixed income bonds for the period Q1 2011.

For the trading activity analysis, AFME obtained trade data from nine AFME members for the period of July 2010 to June 2011 for a random sample of 608 tradeable securities⁹. It should be noted that there are many hundreds of thousands of fixed income bonds, each with a specific permutation of features. AFME has randomly selected a small proportion of the large universe of available securities to illustrate the diversity of liquidity even within a small sample of fixed income instruments. The analysis in this report provides an insight into the trading behaviour of bonds but is not intended to be fully representative of the fixed income market. Additionally, the data has been provided by nine large dealers, which represents approximately 50% of the major dealers in Europe.

⁸ Xtrakter is a leading provider of capital markets data, operational risk management, trade matching and regulatory reporting services to the global securities market. Xtrakter data represents a large share of the European fixed income market data.

⁹ Approximately 100 ISINs randomly selected for each asset class. Please refer to Appendix (D) for the methodology

Section 1: The composition of the fixed income market

In order to analyse and understand the secondary market liquidity of a market and how this impacts market structure and transparency, it is crucial to consider the composition of the markets and their features. For fixed income cash bonds, this section describes:

- (i) The key features of fixed income products;
- (ii) The composition of their respective markets; and
- (iii) Fixed income product investment strategies;

1.1 What are fixed income cash bonds

Cash bonds provide no ownership interest in the issuing entity: they are a form of debt. A cash bondholder, in return for a sum of money, receives regular interest payments for a set period of time (“*coupon*”) together with repayment of the original sum (“*principal*”) repaid at the end of the period (“*the maturity date*”).

1.2 Features of the fixed income market: maturity date

Almost all cash bonds exist for a finite length of time: the “*term*”. Most bonds are issued with a fixed term. The principal on the bond is usually repaid at the end of the term, which is referred to as the maturity date. The bond market consists of instruments with an array of terms (e.g. 1 year, 3 year, 5 year, 10 year, 30 year, etc.). There are, however, variations and exceptions. For example, perpetual bonds are cash bonds, which do not have a maturity date and pay a coupon indefinitely. Additionally, securitised bonds do not have a fixed term, as the length of the bond is dependent on the cash flow from the collateral pool¹⁰.

The primary consequence of a bond having a maturity date is that investors can purchase a bond and hold it until the stipulated maturity date. This means that long term investment or buy-to-hold investment strategies are the norm for cash bonds. Therefore, a large number of fixed income securities are never traded in the secondary markets.

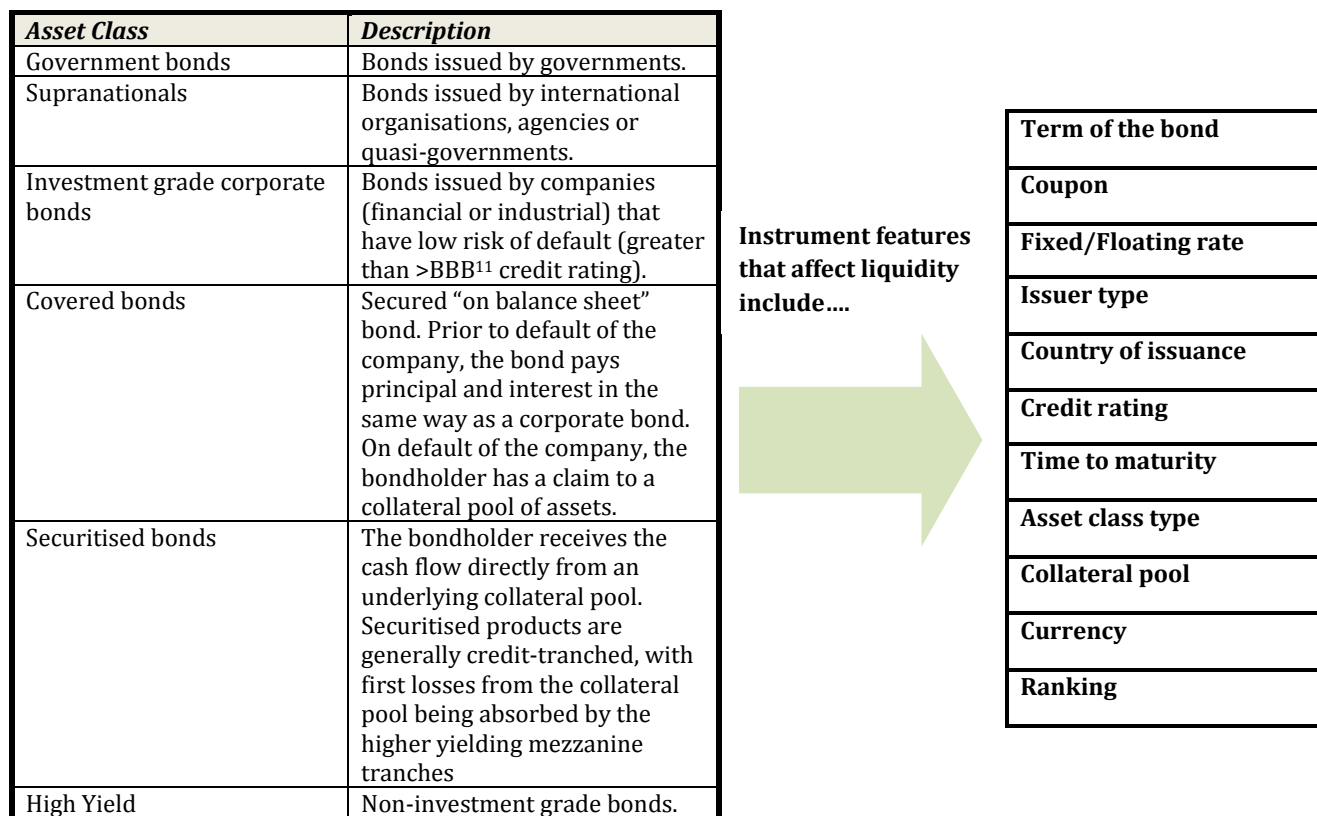
1.3 Features of fixed income products: categorisation

Fixed income is a large and complex product class. In the fixed income cash bond market, the nature of each bond changes significantly depending on the issuer and other features that make each bond distinct. As such, all these features have an impact on the secondary market liquidity of the asset.

Diagram 1.1 illustrates the asset classes and some features of the fixed income cash bond market. Specifically, **Diagram 1.1** shows that for each instrument there are many permutations of features available resulting in a heterogeneous market. A more detailed diagram of the many features and permutations of fixed income products features is provided in **Appendix 1**.

¹⁰ For securitised bonds, there is a final legal maturity but this is often very far into the future

Diagram 1.1: Fixed income asset classes and features of the fixed income market



It should be noted that, the specific impact of the individual features listed in **Diagram 1.1** on the secondary market liquidity of fixed instruments is not analysed in this report.

1.4 Features of the fixed income market: composition

Charts 1.1(a) and **(b)** provide the composition (and thereby market weights) of the tradable total US and European fixed income market by asset class on the basis of (i) the total number of securities outstanding for index eligible securities¹² each asset class (**Chart 1.1(a)**) and (ii) the total value outstanding of each asset class (**Chart 1.1(b)**). The composition of the indices chosen provides an indication of the proportional composition of the tradable securities market; however, as indices only include securities that are “eligible”, they do not give an indication as to the actual composition of the fixed income market.

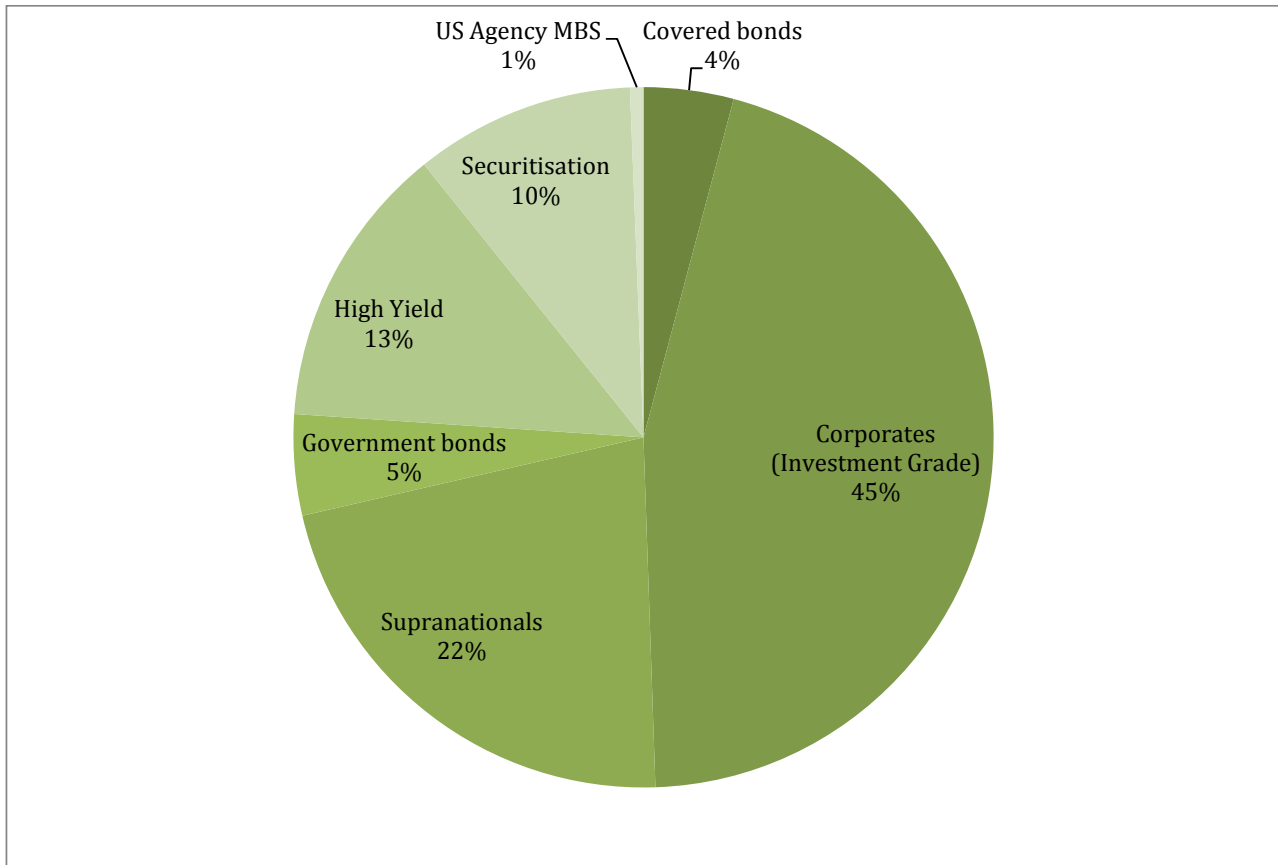
The charts show that when considering the market composition in terms of the number of securities, corporate bonds make up the largest part of the fixed income tradable at 45%. Covered bonds make up the smallest in proportion at 4%.

¹¹ Please note that different credit rating agencies have different notations and different indices have different criteria for a high yield bond

¹² Index eligible means the market proportions are not based on all securities outstanding but only those that are eligible for the indices analysed.

Conversely, **Chart 1.1(b)** shows that when considering the fixed income market in terms of value outstanding, government bonds make up the greatest proportion of the tradable market at 51%. Securitisation and high yield make up the smallest proportion of the market at 2% and 3% respectively.

Chart 1.1(a): Composition of the global fixed income market¹³ by number of securities¹⁴

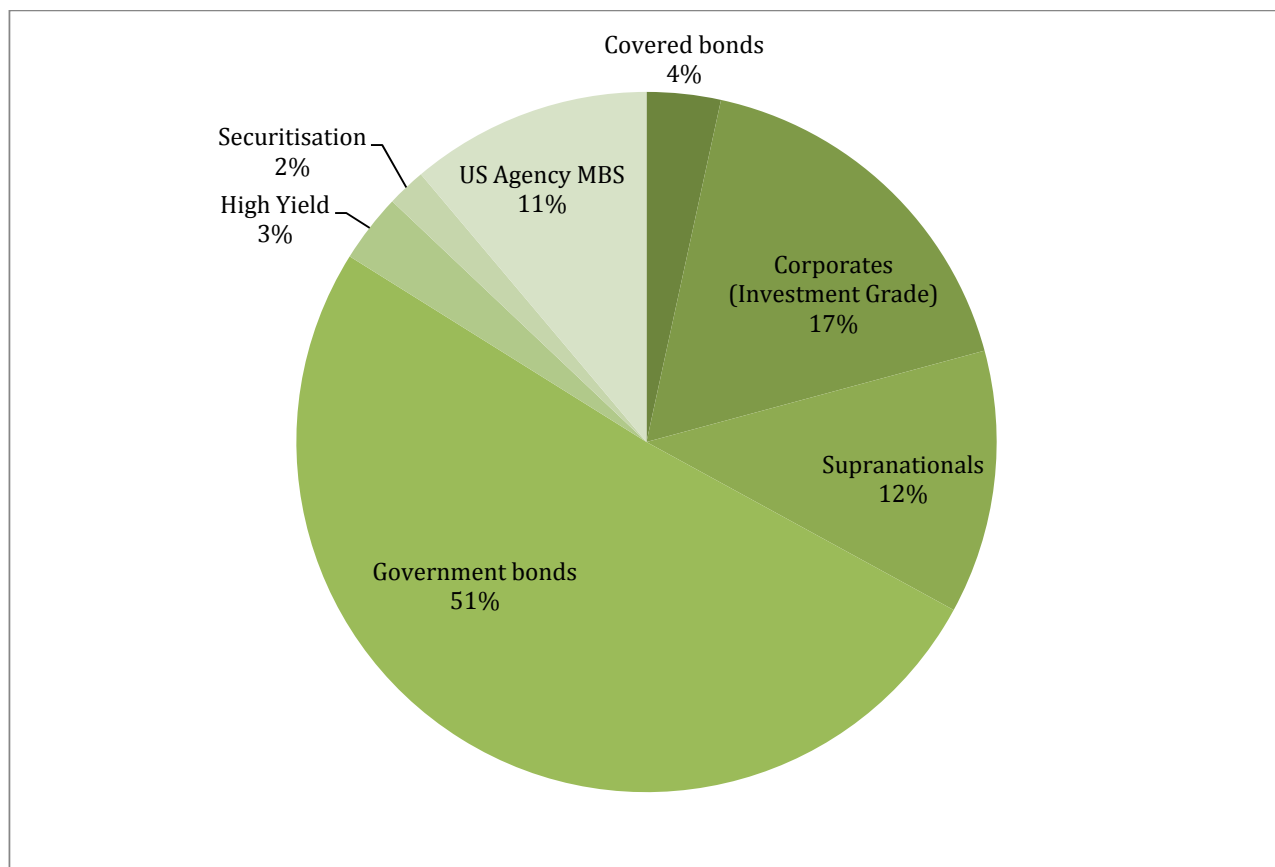


Source: Bank of America-Merrill Lynch, Barclay's Capital Global Indices

¹³Composition as at 30 June 2011

¹⁴ See Appendix 2(A) for the methodology and assumptions. Please note that the composition is based on values from market indices – therefore the values will only consider those instruments the market considers tradable.

Chart 1.1(b): Composition of the global fixed income market¹⁵ by value outstanding¹⁶



Source: Bank of America-Merrill Lynch, Barclay's Capital Global Indices

1.5 Features of the fixed income market: heterogeneity and size

As discussed above, each fixed income instrument will have a combination of the many different features illustrated in **Diagram 1.1**, meaning that bonds are inherently highly heterogeneous. This means that issuers can issue a large number of bonds that will each be distinct from one another with differing levels of secondary market liquidity. Equities products have different features that impact secondary market liquidity. Issuers will usually only issue a handful of different equity securities, which will each contain a large number of identical, fungible unit shares. By contrast, an issuer will usually issue many different types of bond securities, which are each large in value¹⁷. For example, Bayerische Landesbank currently¹⁸ has a single equity security (common shares) but has approximately 645 different, non-fungible corporate bonds outstanding¹⁹. In terms of value, Bayerische has approximately EUR 117bn in bonds outstanding (the average size of a single bond is

¹⁵Composition as at 30 June 2011

¹⁶ See Appendix 2(A) for the methodology and assumptions

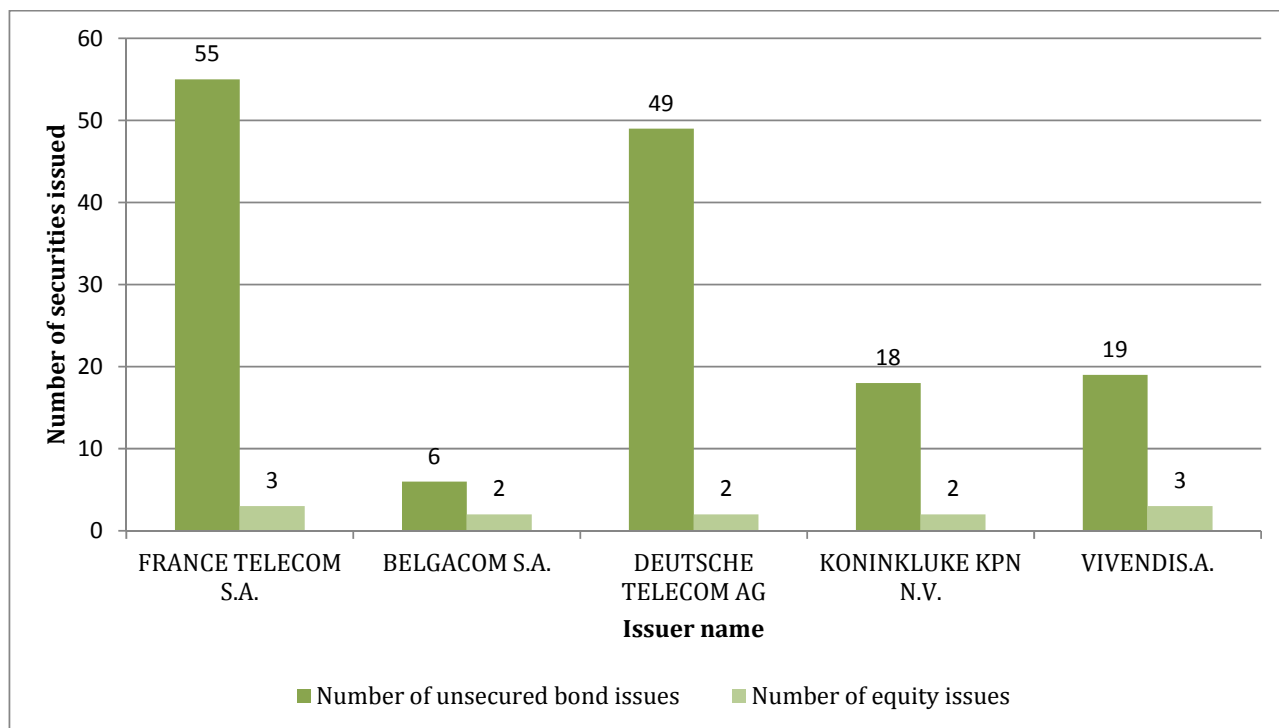
¹⁷ Banks often issue thousands of bonds

¹⁸ As at 28 June 2012

¹⁹ Outstanding is the amount of debt all owed

EUR 182mm)²⁰ and EUR 14.2bn²¹ equity outstanding. As another example, Heidelberg, the cement company, has only one equity security outstanding²² (common stock) and has 14 bonds outstanding²³. In terms of value, Heidelberg has approximately EUR 7.2bn in bonds outstanding (the average size of a single bond is EUR 516mm)²⁴ as compared to EUR 6.89bn equity outstanding. **Chart 1.2** provides further examples.

Chart 1.2: Debt issuance compared to equity issuance



Source: TABB Group and Bloomberg²⁵

Table 1.1 provides the average and median issuance sizes and the standard deviation²⁶ (i.e. distribution of trade sizes) for bonds by asset class. The results show that government bonds have the largest average issuance size in fixed income at EUR 15.1bn with a standard deviation of \pm EUR 8.4bn²⁷. This means that government bonds usually have issuances ranging from EUR 6.7bn to EUR 23.5bn. Corporate bonds are much smaller; the average issue size is EUR 722mm with a standard deviation of EUR \pm 528mm. This indicates that corporate bonds usually range in issuances from EUR 194mm to EUR 1.3bn. High yield bonds have an average issue size of EUR 488mm with a standard

²⁰ Source: Bloomberg. Please note that this does not include structured notes. BayernLB Q1 2012 Financial Report provides that all credit outstanding in December 2011 was EUR 220bn

²¹ As at December 2011. Source: BayernLB Q1 2012 Financial Report. Please note that BayernLB is not a listed company and therefore does not trade on the secondary market.

²² Source: Bloomberg

²³ Source: Bloomberg

²⁴ Source: Bloomberg

²⁵ Source: Tabb Group, "MiFID II and Fixed Income Price Transparency: Panacea or Problem?", July 2012

²⁶ Please see Glossary and Appendix 2(B) for the methodology and Appendix (2) for the definition of the terms

²⁷ Outstanding bonds selected in the period Q1 2011. The issue sizes may not correspond to the value at the issue date; if the bond is part of a program whereby additional value is added (e.g. for a government bond), or there has been a TAP or there has been a restructuring, the issue size will be the value of the ISIN following the event

deviation of ±308mm. The smallest bonds are securitisations, with an average issue size of EUR 415mm and a median size of only EUR 176mm. This can be explained by the fact that a large proportion of securitised bonds are small junior mezzanine tranches. It should be noted that at issuance securitisation deals are tranching²⁸; therefore, despite a single issuance being large in size (very often greater than EUR 1bn), the deal is split into smaller tranches. These tranche sizes vary: the largest sizes are the senior tranches and the mezzanine tranches are smaller in size. Therefore, as shown in **Table 1.1**, the average issue size of securitised bonds is significantly smaller than those of other bonds.

Table 1.1: Comparison of fixed income average issuance sizes

Asset class	Average issue size (EURmm)	Median issue size (EURmm)	Standard deviation of issue size (EURmm)
Government bonds	15,124	14,231	8,410
Supranationals	3,165	3,000	2,001
Corporate bonds	722	560	528
Covered bonds	1,461	1,275	594
High Yield	488	404	308
Securitisation	415	176	485

Source: Xtrakter

1.6 Fixed income investment strategies

Investors in cash bonds can receive two types of return on their investment: (1) coupon payments and repaid principal; and (2) a profit (or loss) on their original investment upon selling the bond in the secondary market.

Bonds are generally low risk products from a credit standpoint because the investor is legally entitled to receive the set coupon during the term of the bond and principal upon maturity unless the issuing entity defaults. As the risk associated with a bond is based on the probability of default of the issuing entity, both the returns and losses on bonds investments are typically low. Therefore, the general investment strategy for fixed income cash bonds is mainly institutional and long term with an expectation of lower returns (i.e. low yield). However, it should be noted that there is a large spectrum of risk profiles in the cash bond market.

²⁸ A tranche is a portion of a deal that is sold separately to investors. Tranches form separate securities and usually have different risk profiles to other tranches.

Section 2: Secondary market liquidity and its importance

2.1 The definition of secondary market liquidity

In terms of secondary market liquidity (i.e. the secondary purchase and sale market), a highly liquid market in an asset can be defined as one in which there are ready and willing buyers and sellers at all times. Or more narrowly, as a market where an unlimited amount of the asset can be executed immediately and at low cost²⁹.

The secondary market, in terms of the purchase and sale of assets is an important source of liquidity and is one of a number of components of the overall liquidity framework. For discussions on determining the liquidity of assets and building a macro view of liquidity, other sources of liquidity, such as collateral eligibility and the repo and securities lending market needs to be considered. Therefore, an analysis of secondary market liquidity cannot not identify or provide insight into assets that provide liquidity for the purposes of meeting requirements of the LCR in Basel III or CRD IV or for meeting other regulatory measures and standards in the prudential supervision of bank liquidity. In other words, secondary market liquidity does not demonstrate the ease at which firms can realise value from the sale or repo of individual or a portfolio of assets using appropriate haircuts.

2.2 The importance of secondary market liquidity

Debt instruments are an important source of funding for governments and companies. For example, the Swedish National Debt Office reported that on 31 July 2012, the Swedish Central Government had approximately SEK 1.0trn of debt outstanding³⁰. The German Debt Management Office forecasts that the debt markets will contribute EUR 255bn of German central government funding by the end of 2012³¹. As bank financing is becoming more difficult to secure, the role of the debt markets in financing Europe's growth will become more critical.

A functioning and liquid fixed income secondary market is vital for ensuring that governments and companies can raise new funding in the primary market. Specifically, the secondary markets enable investors to manage their portfolios and thereby allow new issues to be placed with investors³². Additionally, an active secondary market ensures that investors can assess the price and thereby the value of assets.

Secondary market liquidity is not static; it may increase or decrease for many reasons. Changes in secondary market liquidity may be a result of the inherent features of the asset and market or due to events in the wider economy, such as the introduction of new policy.

If the secondary market liquidity of debt instruments is constrained, it becomes more difficult for new issues to be placed with investors, thereby making it more difficult for governments and corporates to raise funding through new debt. Additionally, transaction costs for investors will increase and

²⁹<http://www.fsa.gov.uk/library/communication/speeches/2012/0426-ja.shtml>; Larry Harris, Trading and Exchanges, Oxford University Press, 2002

³⁰ Riksgälden (Swedish National Debt Office) – “Sweden’s Central Government Debt” July 2012, sum total of money market funds and capital debt markets (excludes retail and derivatives)

³¹ Federal Republic of Germany Finance Agency: “Issuance Outlook of the Federal Government 2012”; sum total of money market fund and capital debt markets

³² TABB Group – “MiFID II and Fixed Income Price Transparency: Panacea or Problem?”

borrowing costs for issuers will increase further restricting the ability of governments and companies to issue debt.

All trades in the secondary market involve transaction costs, which incorporate the liquidity risk premium and trading costs. The liquidity risk premium represents the additional charge that market participants factor into the price that they are willing to pay for an asset according to their ability to sell it easily in the future. Trading costs are the costs associated with operationally executing the trade, including: venue fees, settlement costs and broker commission. Whether buying or selling an asset, a market participant, in addition to the value of the asset, will factor transaction costs into the price that it is willing to pay or offer to investors.

The greater the secondary market liquidity of an asset, the quicker and more efficiently the market participant can monetise their position in that asset. Therefore, there will be a low liquidity risk premium and transaction costs associated with the asset³³. A lower transaction cost will mean that the investor will receive a price that more accurately reflects the true value of the asset. For markets with low secondary market liquidity, market participants find it difficult to buy or sell the assets; therefore, there will be a high liquidity risk premium and transaction costs will be high. Prices may significantly deviate from the true value of the assets— here, a liquid secondary market ensures that it is easier for investors to buy and sell their assets at low cost. If an investor holds an illiquid position, it will be more difficult for them to exit from that position and the associated costs will be higher.

Higher transaction costs also result in higher borrowing costs for sovereign, corporate and structured finance issuers. The lower the secondary market liquidity, the greater the liquidity risk premium that will be demanded by investors. For fixed income instruments, a lack of liquidity in the secondary market would require higher yields on their bonds to compensate the investor for the higher transaction costs, which means that the cost of incurring debt for the issuer is greater.

This is a critical time for Europe's growth. If secondary market liquidity were to be adversely impacted, governments and companies, already restricted in securing bank financing, would also find it difficult to raise funding through the debt markets.

2.3 How secondary market liquidity translates into market structure

There are many factors that play a role in determining secondary market structure. Market structure includes the way in which buying and selling interests are brought together and transactions executed. Factors that impact market structure include secondary market liquidity, client investment strategy, risk transfer, the size of the trade, client needs (e.g. whether they do or do not wish to interact with specific counterparties) and pricing factors.

For example, instruments with low secondary market liquidity generally trade less frequently but can have a high or low turnover volume (in terms of currency value)³⁴. The trading behaviour of instruments with low secondary market liquidity means that at any given time the number of buyers

³³ Speech by David Lawton, Acting Director, Markets, FSA at the TradeTech Liquidity Conference, London, 26 April 2012

³⁴ It is important to note that some good quality instruments, especially certain securitisations and covered bonds, are inherently liquid but due to reasons such as buy-to-hold investment strategies of investors do not trade frequently.

and sellers in the asset may be significantly different--whereby at any given time, an investor may not find an immediate buyer or seller of the required volume of asset. In such a market, facilitation of trading is essential. Applying an order book or agency broker model for such a market would result in investors either having to wait for a buyer or seller or accept a price that does not reflect the quality of the asset. In the market maker model, the market maker facilitates the investors' needs by acting as the buyer to every seller and the seller to every buyer by holding an inventory of assets.

As stated above, other factors also impact market structure. For example, for highly liquid assets, intermediation may be required, amongst other reasons, for reasons of risk transfer or due to the size of the trade.

2.4 Factors impacting secondary market liquidity

As discussed above, the secondary market liquidity of an asset may be a result of the inherent features of the asset and market or due to events in the wider economy, such as the introduction of new policy.

As demonstrated in **Diagram 1.1** (and in more detail in **Appendix 1**) each fixed income instrument will have one of a large number of permutations of the features listed. This means that in the fixed income market there is a large degree of heterogeneity of secondary market liquidity and as such is instrument-specific. Additionally, the secondary market liquidity of instruments, or of the wider market, changes over time.

In addition to the particular features of an instrument, factors that impact secondary market liquidity include:

- **Level of new issuance** – for example, in some areas of fixed income there is a low issuance level, which means that the level of secondary market liquidity is limited.
- **New policy and regulations** – for example, the introduction of the LCR in CRD IV and asset-liability matching regulations mean that banks have to hold onto more products. This results in a decline of products available for trading in the secondary markets and therefore a decrease in secondary market liquidity.
- **Market quoting obligations** – for example, in the government bond market, Debt Management Officers of Central Governments (DMOs) contractually require primary dealers to quote each bond a minimum number of times per day. Dealers generally fulfill this requirement by quoting the instruments in the interdealer market.
- **Cost/availability of hedging**
- **Seasonal effects**
- **Rating volatility**
- **Spread volatility**
- **Availability of indices** – for example, there is generally more activity around those bonds that are eligible for indices than those that are not.
- **Issuance of new instruments** – if an issuer issues a new bond, trading in their other bonds often decreases.
- **Functioning of the repo market**

- **The time left until maturity**
- **Investor types**
- **Number and breadth of market participants**
- **Supply/demand in primary and secondary markets**
- **Functioning of the Credit Default Swap (CDS) market**

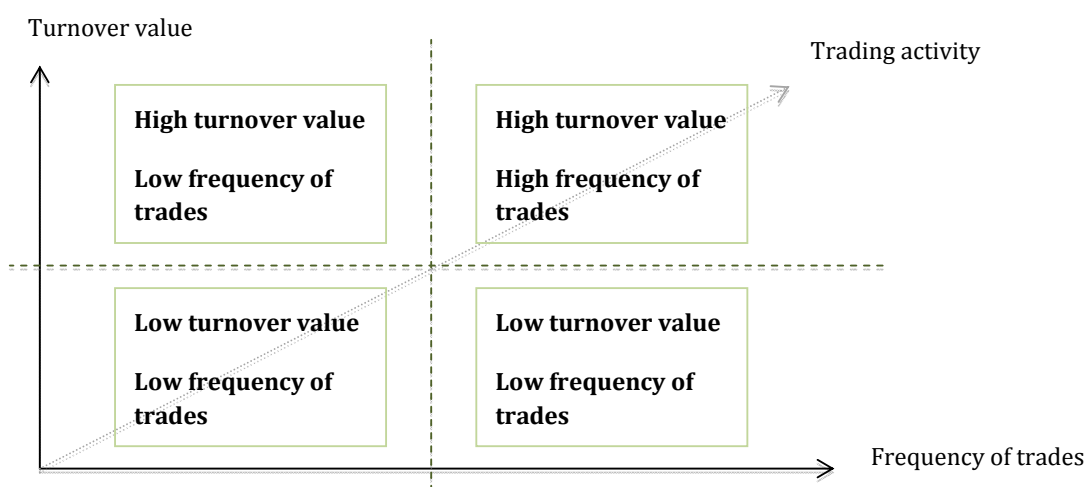
An example of economic events impacting trading activity is the financial crisis; the level of bond trading has fallen significantly since the beginning of the financial crisis. The data analysed in this report focuses on this period (July 2010 to June 2011). However, it is expected that the reduction in trading levels could continue because of low interest rates and, if liquidity is not safeguarded, new policy and regulation.

Section 3: Trading activity as a measure of secondary market liquidity

There is currently no single widely-agreed measure of secondary market liquidity. However, academics and market participants generally agree on a number of factors that, in combination, can be used as proxies. Even so, none of these measures should be read as being completely representative. In this report, AFME assesses secondary market liquidity of the fixed income cash market through the analysis of trading activity. Bid-offer spread is another important measure of liquidity; however, in the context of fixed income secondary market, bid-offer spread data has limited value. The fact that fixed income issues trade infrequently means that bid and offer prices are usually one way and relevant for a specific size of trade at one specific moment in time. In fixed income, bid-offer spread is most useful as a measure of secondary market liquidity for benchmark government bonds that trade very frequently.

Trading activity, total value (in terms of currency) in combination with the total number of transactions traded within a specified time period (e.g. monthly), is recognised by market participants and academics³⁵ as a measure of secondary market liquidity. The trade value and number of transactions indicate the level of activity and interest in a market. Greater secondary market liquidity is generally indicated by both a higher value and a higher number of transactions. It is necessary to consider the total value and total number of transactions together because an asset may trade a large value in a month, but may not necessarily be liquid (as it may trade this value in a small number of transactions). Conversely, an asset may trade very frequently, but may turn over a low value relative to the market. **Diagram 3.1** illustrates the relationship between trading activity, turnover value and trading frequency.

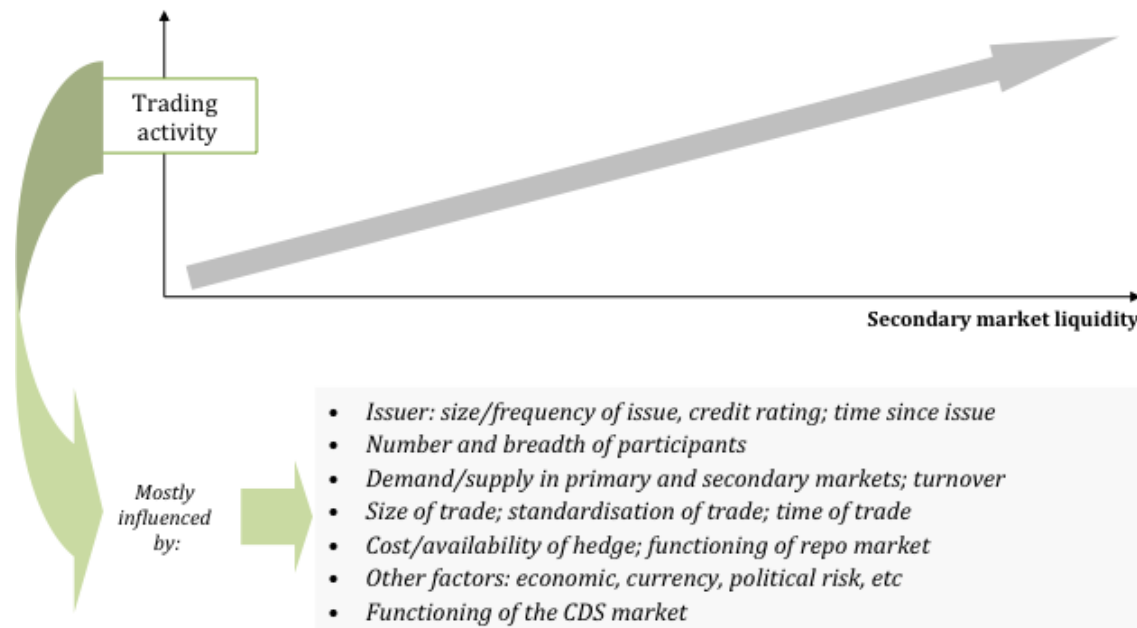
Diagram 3.1: Trading activity as a combination of turnover value and number of transactions



³⁵Sarr, Abdourahmane and Lybek, Tonny (2002) "Measuring Liquidity in the Financial Markets" IMF Working Paper WP/02/232; Bank for the International Settlements (1999) "Market Liquidity: Research Findings and Selected Policy Implications"; ChoudryMoorad (2010) "Measuring bond market liquidity: devising a composite aggregate liquidity score" *Applied Financial Economics* 20:955-973

Diagram 3.2 illustrates the general relationship between trading activity and secondary market liquidity: as trading activity increases, the secondary market liquidity increases.

Diagram 3.2: Illustration of the relationship between trading activity and secondary market liquidity



However, **trading activity does not take account of good quality liquid instruments that are not traded due to specific reasons such as buy to hold investment strategies and other comparable instruments.** As discussed above, some instruments, such as certain covered bonds, corporates and securitisations, trade very infrequently as investors in these products often hold them until the maturity date (“buy to hold investment strategy”). For example, a reason for an investor to buy and hold is that many pension fund and insurance investors prefer not to trade securities as it may adversely impact their accounting and mark to market treatment. However, despite trading infrequently, when investors sell these products, they trade quickly, efficiently and at low cost. This means that such assets are liquid. Trading activity does not account for these types of instruments.

Additionally, fixed income instruments often have a number of very similar (i.e. “comparable”) securities (e.g. other bonds of similar tenor and from the same creditor but with slightly different coupons; other master trust securities from the same issuer, credit rating and currency). Therefore, taking these securities together as a group will more accurately reflect the liquidity of the single security. This is especially true for securitisations and often for covered and corporate bonds.

Finally, it is important to consider trading activity in the context of issuance size. An instrument that has a larger issuance size (e.g. a government bond with an issuance size of EUR 15bn) will have more volume available to trade than an instrument with a smaller issuance size (e.g. a mezzanine tranche of an ABS of EUR 20mm).

Section 4: Trading activity of the fixed income market

In this section, the following will be addressed:

- (i) The secondary trading activity of different fixed income asset classes will be compared by analysing trading activity;
- (i) The trading activity within asset classes will be assessed by analysing trading activity; and
- (ii) The trade sizes between and within different asset classes will be compared.

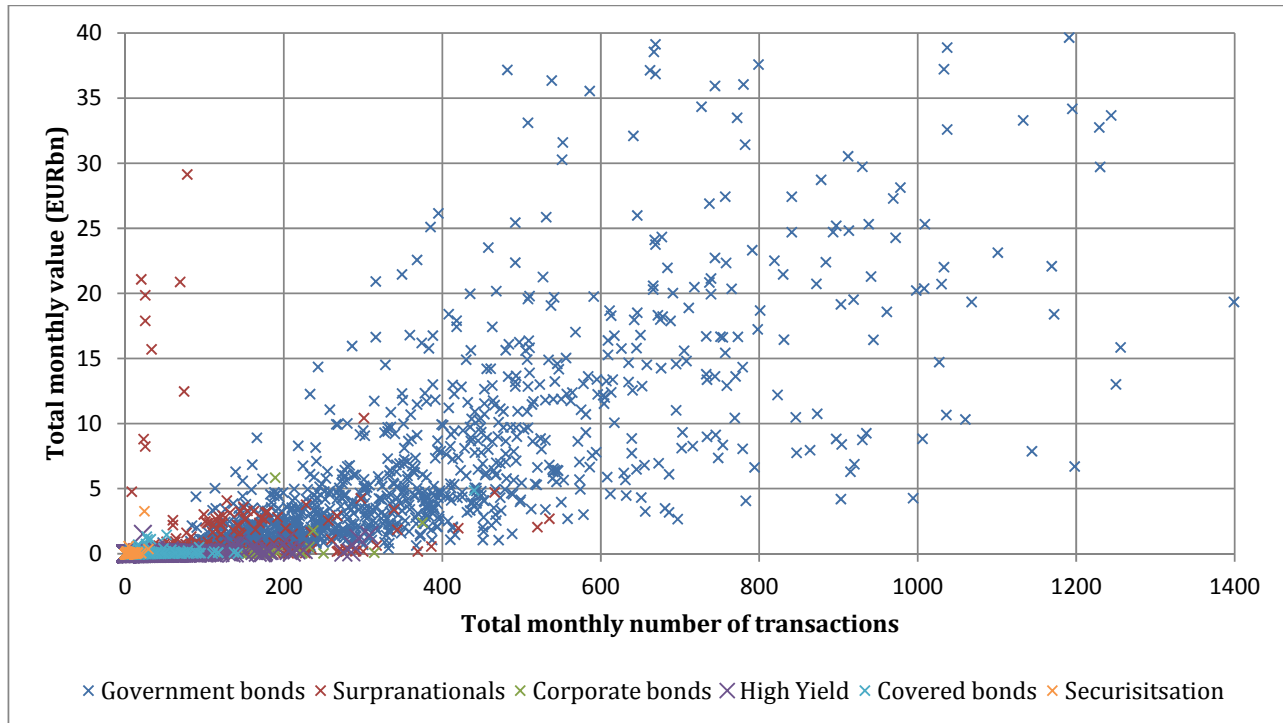
The analysis of the trading activity of the fixed income market has been based on the monthly number of transactions and value turnovers of 608 fixed income ISINs over the period July 2010 to June 2011. These fixed income ISINs are randomly selected tradable ISINs. The ISINs have been selected at random to prevent biasing of the results. Please refer to **Appendix 2(C)** for the number of ISINs in each asset class.

It should also be noted that 608 ISINs is a small subset of all fixed income securities outstanding; there are many hundreds of thousands of fixed income bonds each with a specific permutation of features. Therefore, while the analysis below provides an insight into the trading behavior of fixed income bonds, it is not intended to be comprehensive or representative of the entire market. Additionally, the data has been provided by nine large investment firms, which is a subset of all the investment firms active in the market. AFME believes that this and the data provided by Xtrakter for other parts of the analysis in this report are currently the best available sources of fixed income trade information. Once an appropriately calibrated post trade reporting regime is introduced, there will be an improvement on the availability of fixed income trade data.

4.1 Comparison of monthly trading values and number of transactions within the fixed income market

Chart 4.1 provides the distribution of the monthly traded value versus the monthly number of transactions for a sample set of 608 ISINs for the period July 2010 to June 2011.

Chart 4.1: Distribution of fixed income trading activity by asset class from July 2010 to June 2011³⁶



Source: investment firms

The distribution in **Chart 4.1** shows the following:

- **The dispersion of trading activity is very wide across and within asset classes meaning that the assessment of secondary market liquidity for fixed income needs to be instrument specific**

The differences in trading activity between asset classes confirm that a whole market assessment of liquidity is not appropriate for fixed income. By inspection, government bonds trade more frequently and in larger volumes than all of the other asset classes. However, at the individual instrument level, there is a great deal of overlap between government bonds and other asset classes. Generally, all asset classes have a disperse spectrum of trading activity, confirming that secondary market liquidity in fixed income should be measured at the instrument level.

³⁶ Appendix 2(C) for methodology and assumptions

- **Turnover volume can be large but the frequency of trading fixed income instruments is generally low confirming that the fixed income investor base is predominantly buy-to-hold**

Chart 4.1 shows that for all fixed income asset classes, the monthly number of transactions is concentrated at less than 400 times per month and at a monthly value at no more than EUR 5bn. Further, all asset classes, with the exception of government bonds, are concentrated at a level where the frequency of trading is less than 200 times per month. Only a very limited number of corporate bonds and high yield bonds trade in values of more than EUR 1bn and 200 tickets per month. Generally, non-government bonds trade even lower value (around EUR 100mm) and transaction frequency (<100). **Charts 4.2 to 4.7** below explore this further.

- **Issuance size is an important factor in trading activity: government bonds have the widest spectrum and highest levels of trading activity, consistent with their larger issuance sizes**

Government bonds have the greatest dispersion and are the only asset class to trade more than 400 times per month and with a monthly value greater than EUR 5bn; this is consistent with **Table 1.1**, which shows that government bonds have the largest average issue size (of EUR 15bn ±8.4bn) and standard deviation and therefore, the greatest volume available on which to trade. However, it is important to note that there is overlap between the government bonds spectrum, whereby some instruments in some other classes have a greater level of trading activity than some government bonds. Supranationals also have a wide spectrum of trading activity but generally have the second greatest level of trading activity. This is also consistent with their large average issuance size of EUR 3.2bn±2bn. Again, it is important to note that there is a great deal of overlap between supranationals and other asset classes.

- **There is a large range of trade sizes and transaction sizes can be very large**

Chart 4.1 shows that for fixed income there is a large range of trade sizes as there is no general positive correlation between total volume traded and total number of transactions. Also, the chart indicates that trades can be very large. This is particularly notable for supranationals, whereby the total monthly value reached approximately EUR 30 billion within less than 100 trades.

4.2 Total monthly number of transactions for each asset class

Table 4.1 provides the percentage of sampled ISINs³⁷ within each asset class traded within monthly number of transaction categories³⁸. The results show that the majority of the sampled government bonds traded more than 100 times in a month. However, even within the government bonds asset class, approximately one-sixth trades less than 100 times a month (i.e. 5 times a day or less) and 7.60% trades less than 20 times per month (i.e. less than once a day). The maximum any one given ISIN traded in a month was 3345 times.

For the remaining asset classes, more than 40% of the ISINs in the sample set traded less than 20 times per month. Securitisation and covered bonds had the highest percentage of ISINs weighted by issuance volume in this category, with 99.70% and 82.17% of trades traded less than 20 times a

³⁷ISINs only include those that have traded

³⁸ It is important note that some securities will make up a larger part of the market in terms of volume than others and therefore contribute the most to traded volume (e.g. there may only be a handful of ISINs that trade regularly but these may make up the largest part of the market in terms of volume). **Table 4.1** does not consider this behavior.

month. There are liquid ISINs trading more than 400 times in a month and very illiquid ISINs that do not trade at all. The proportion of liquid to illiquid ISINs varies within each asset class.

For supranationals, the largest proportion of ISINs for each month weighted by issuance volume traded less than 20 times (48.19%), 40.72% traded 20 to 100 times per month and the remainder traded more than 100 times per month (0.31% traded more than 400 times per month). For corporate bonds, 63.80% of ISINs weighted by volume traded less than 20 times per month, 31.23% traded 20 to 100 times per month and 4.97% traded from 100-400 times per month. The maximum any one corporate ISIN traded was 375 times.

For covered bonds, 82.17% of ISINs weighted by volume in each month traded less than 20 times, 17.29% traded 20-100 times and 0.47% traded 100-200 times. For this category, 0.08% traded more than 400 times in a month. The maximum any one given ISIN traded in a month was 440 times.

For high yield, 53.83% of ISINs traded less than 20 times per month, 42.75% traded 20-100 times and 3.42% traded 100-400 times. The maximum any one given ISIN traded in a month was 308 times. For securitisation, 99.70% of ISINs volume traded less than 20 times per month, 0.3% traded 20 to 50 times. This illustrates that while high yield bonds are generally considered to be a more risky investment than covered bonds and securitisations, they tend to trade more frequently than those two other asset classes. Covered bonds and securitisations are predominantly held by long-term investors while high yield bonds are held by both long-only investors and investors that actively trade their investment portfolios. In addition, lower credit rated assets are more actively managed and traded than securities that have higher credit ratings because they are more susceptible to macroeconomic conditions³⁹.

No ISINs traded more than 400 times in a month in the corporate bond, high yield and securitisation asset classes.

Table 4.1: % ISINs (for each month) traded within monthly number of transactions categories ⁴⁰

Asset Class	% ISINs (for each month) traded within 'monthly number of transactions' categories					
	< 20 trades	20-50 trades	50-100 trades	100-200	200-400 trades	>400 trades
Government bonds	7.60%	1.32%	7.82%	22.95%	29.97%	30.34%
Surpranationals	48.19%	24.84%	15.88%	8.33%	2.44%	0.31%
Corporate bonds	63.80%	21.13%	10.10%	4.38%	0.59%	0.00%
Covered bonds	82.17%	14.33%	2.96%	0.47%	0.00%	0.08%
High Yield	53.83%	32.33%	10.42%	2.50%	0.92%	0.00%
Securitisation	99.70%	0.30%	0.00%	0.00%	0.00%	0.00%

Source: nine investment firms

³⁹ Macroeconomic conditions include event risk. The colour codes represent the density of ISINs in the category (dark green >40%, medium green 10-40%, light green <10%).

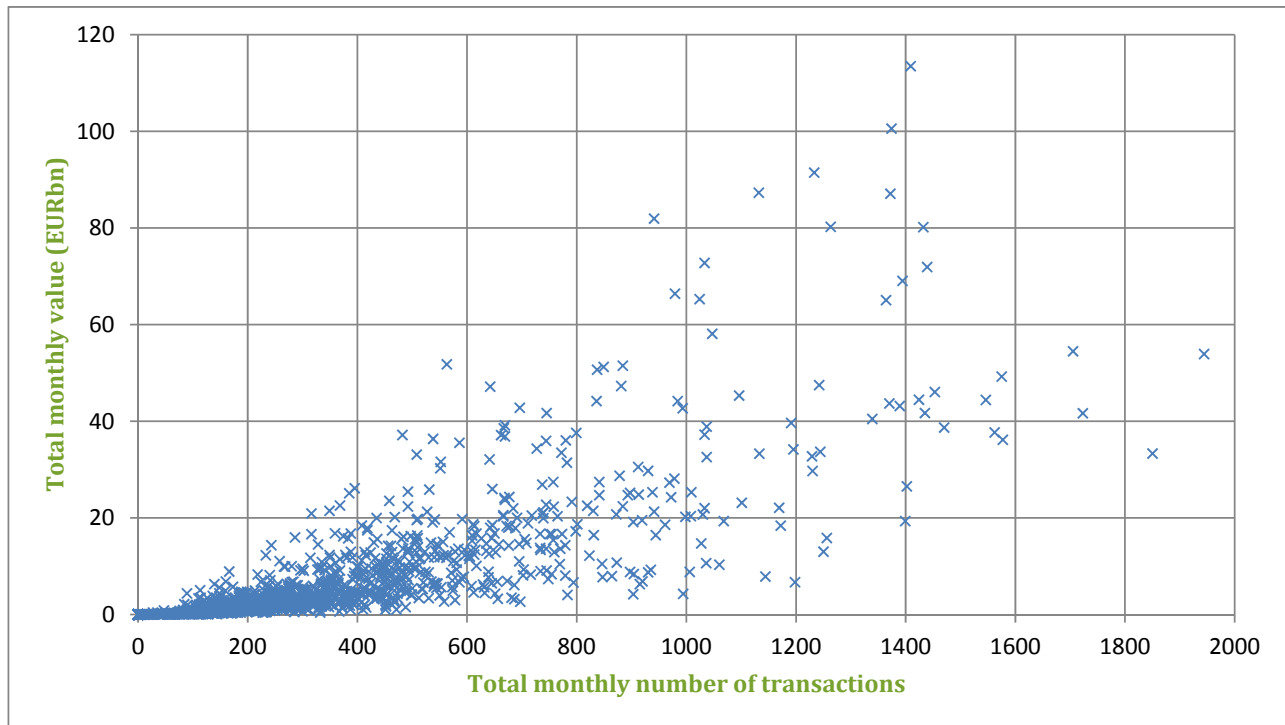
⁴⁰ Appendix 2(C) for methodology and assumptions

4.3 Comparison of monthly trading volumes and number of transactions within the fixed income market – a closer look at individual asset classes

Charts 4.2 to 4.7⁴¹ provide a closer look at the distribution of the total monthly volume traded vs. the total number of transactions for government bonds, corporate bonds and covered bonds. An extrapolated chart is also provided for each of these.

Government bonds

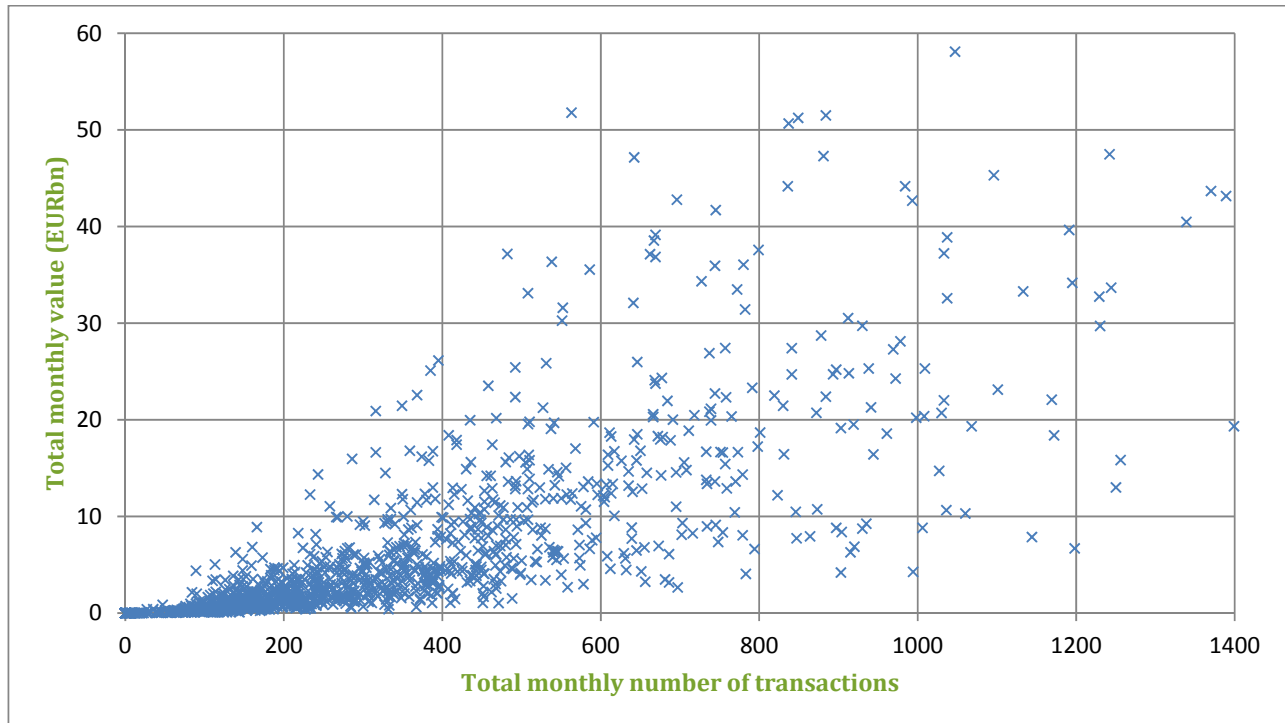
Chart 4.2: Distribution of government bond trading activity by asset class from July 2010 to June 2011



Source: Nine investment firms

⁴¹ Appendix 2(C) for methodology and assumptions

Chart 4.3: Extrapolation of distribution of government bond trading activity by asset class from July 2010 to June 2011



Source: Nine investment firms

Charts 4.2 and 4.3 show that for the government bonds sampled:

- Trading value versus number of transactions is relatively linear up to 600 trades and EUR 10bn, meaning that up to these limits there is generally a regular spectrum of trade sizes;
- There are many large individual trades outside of the above limits and some within the above limits;
- The bonds mostly trade less than 1000 times in a month;
- Trading is concentrated at less than 400 trades in a month;
- The bonds mostly trade at less than EUR 20bn in a month; and
- Trading is concentrated at less than EUR 10bn in a month

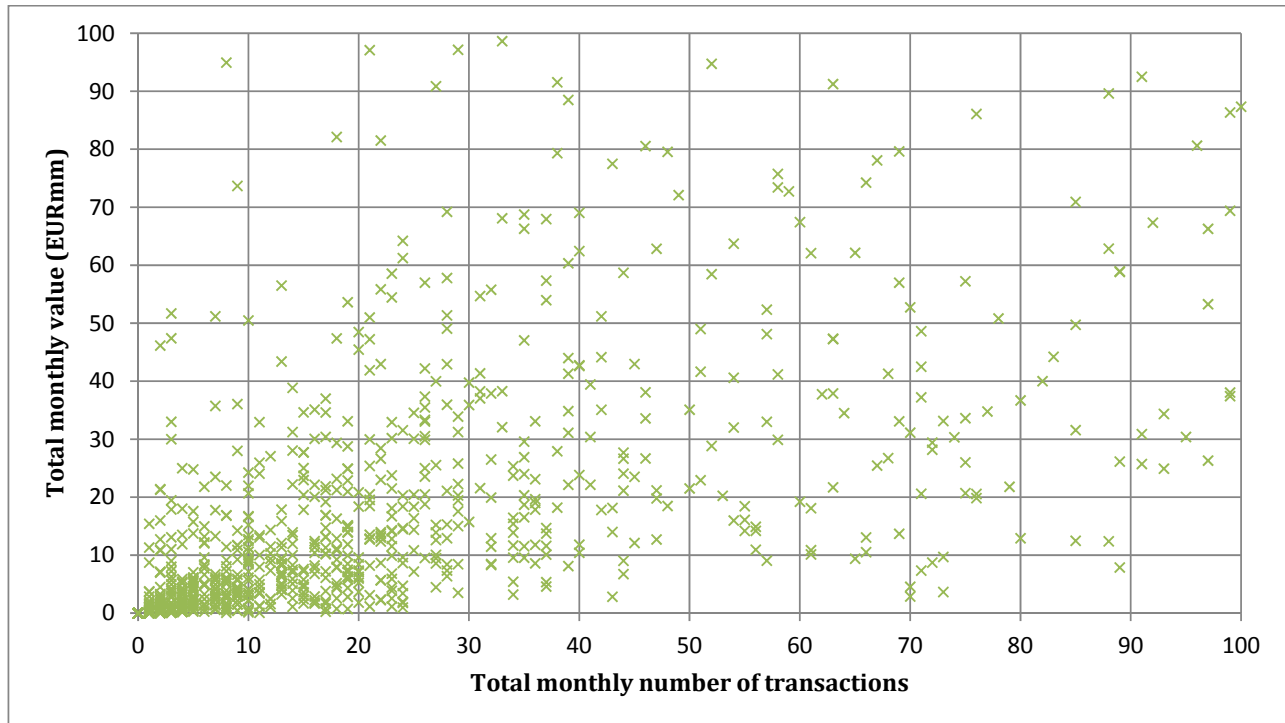
Corporate bonds

Chart 4.4: Distribution of corporate bond trading activity by asset class from July 2010 to June 2011



Source: Nine investment firms

Chart 4.5: Extrapolation of corporate bond trading activity by asset class from July 2010 to June 2011



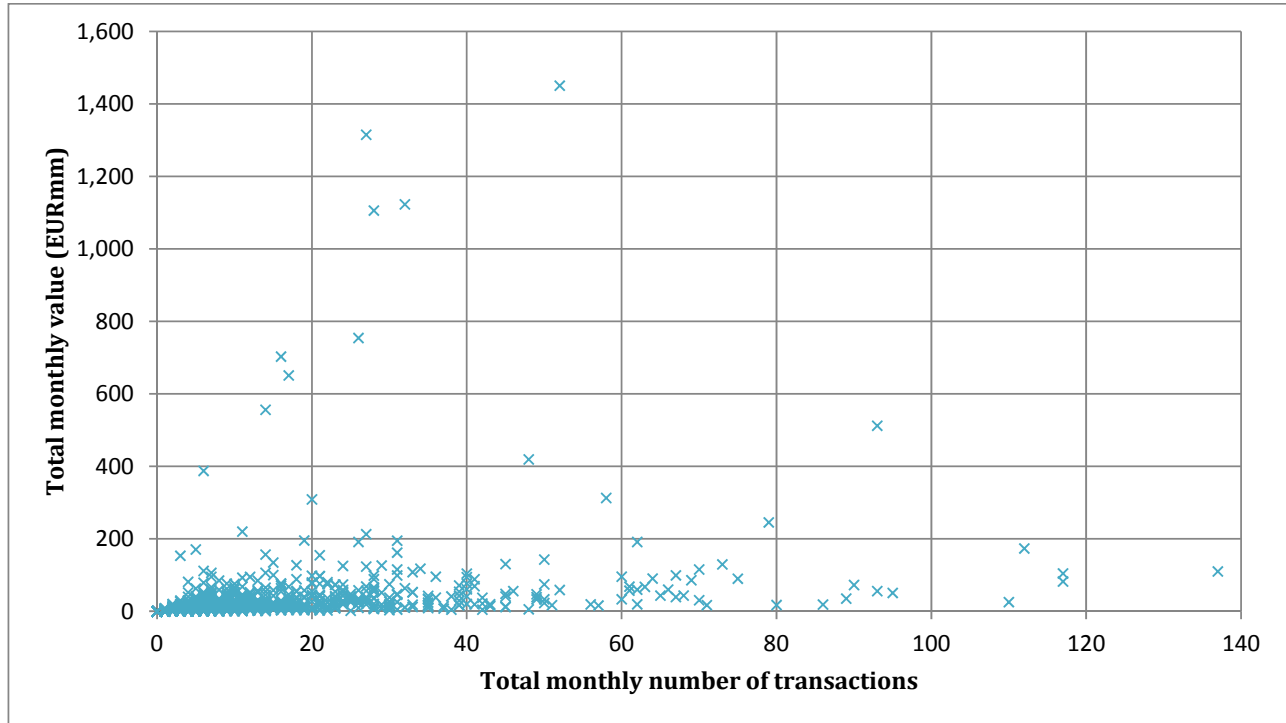
Source: nine investment firms

Charts 4.4 and 4.5 show that for the corporate bonds sampled:

- There is no correlation at all between trading value and trading activity; therefore, there is no clear range of regular trade sizes;
- The bonds mostly trade less than 100 times in a month;
- Trading is concentrated at less than 20 trades in a month;
- The bonds mostly trade at less than EUR 100mm in a month; and
- Trading is concentrated at less than EUR 30mm in a month.

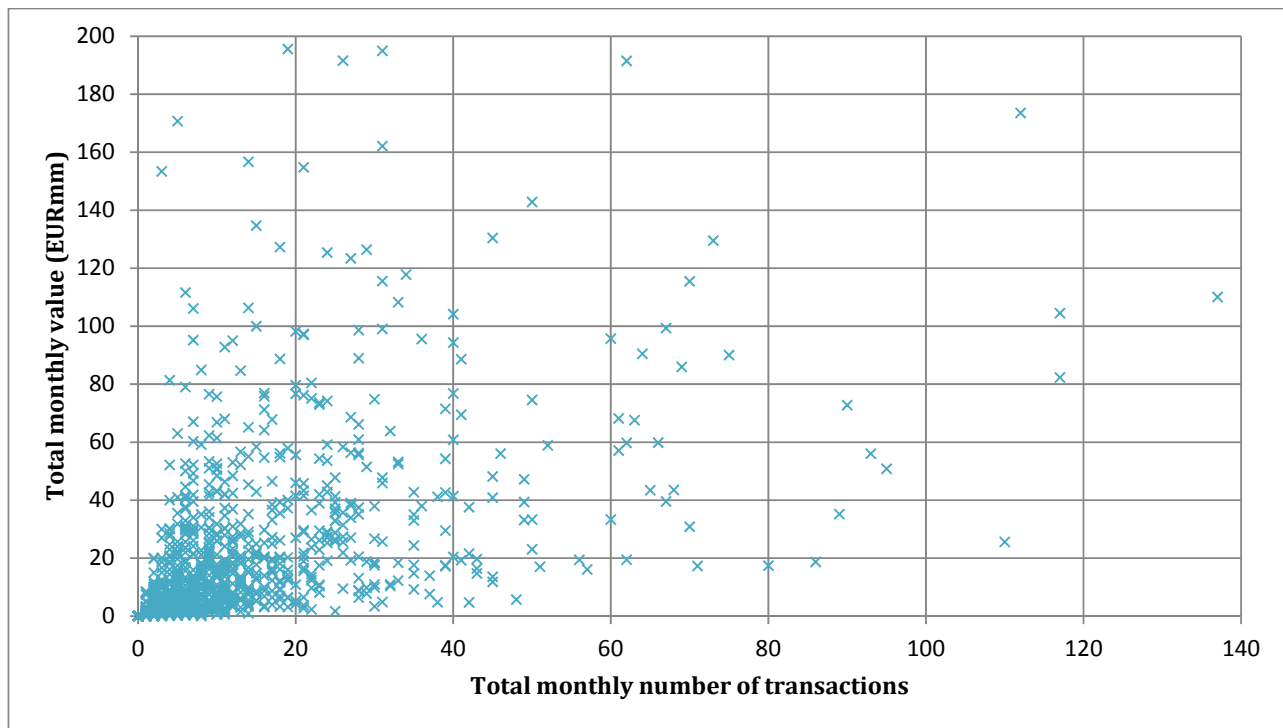
Covered bonds

Chart 4.6: Distribution of covered bond trading activity by asset class from July 2010 to June 2011



Source: Nine investment firms

Chart 4.7: Extrapolated distribution of covered bond trading activity by asset class from July 2010 to June 2011



Source: nine investment firms

Charts 4.6 and 4.7 show that for the corporate bonds sampled:

- The bonds mostly trade less than 40 times in a month;
- Trading is concentrated at less than 20 trades in a month;
- The bonds mostly trade at less than EUR 200mm in a month; and
- Trading is concentrated at less than EUR 40mm in a month.

4.5. Trade sizes in the fixed income market

i. Average trade sizes

Table 4.2 provides the average and median trade sizes for fixed income instruments⁴². For fixed income, it provides the average trade sizes for the 608 sampled ISINs over the period July 2010 to June 2011.

Table 4.2: Average size trade information for the fixed income asset classes⁴³

Asset class	Median trade size (EUR)	Average trade size (EUR mm)	Standard deviation (EUR mm)
Government bonds	4,200,000	21.20	77.09
Supranationals	100,000	7.31	85.12
Corporate bonds	150,000	1.12	12.24
High Yield	500,000	1.18	6.72
Covered bonds	250,000	2.44	19.29
Securitisation	3,000,000	9.63	27.18

Source: nine investment firms

Table 4.2 shows that:

- Fixed income instruments trade in a large range of trade sizes indicated by the large standard deviations (from EUR 6.72mm to EUR 85.12mm)
- A significant proportion of turnover value is traded in large trade sizes because the average trade size of all the asset classes are large;
- A large proportion of fixed income trades are traded in smaller trade sizes, indicated by the median trade sizes; and
- Within fixed income, government bonds have the largest average and median trade size with a standard deviation of EUR 77.09mm.

⁴² Fixed income average trade sizes from June 2010 to July 2011.

⁴³ Appendix 2(D) for methodology and assumptions

ii. Trade size distribution

Table 4.3 provides the percentage distribution of trade sizes for the 608 ISINs from July 2010 to June 2011.

Table 4.3: Trade size distribution for fixed income asset classes from July 2010 and June 2011⁴⁴

Asset Class	% Transactions traded within transaction size categories						
	<100k	100-500k	500k-1mm	1-5mm	5-10mm	10-20mm	>20mm
Government bonds	9.35	10.55	6.67	24.58	11.56	12.03	25.26
Surprationals	45.42	22.29	5.11	10.30	7.25	1.28	8.36
Corporate bonds	38.90	29.43	10.92	17.14	2.41	0.83	0.38
Covered bonds ⁴⁵	29.81	28.39	10.30	20.33	5.46	3.46	2.25
High Yield	16.49	33.45	12.24	34.89	2.17	0.48	0.28
Securitisation ⁴⁶	2.97	14.95	9.56	34.62	20.88	9.89	7.14

Source: Nine investment firms

Table 4.3 shows that:

- A large proportion of corporate bond (38.90%), covered bond (29.81%) and surprational (45.42%) transactions are less than EUR 100,000 in size.
- Just under 50% of high yield transactions (49.94%) are less than EUR 500,000 in size.
- There is a wide spectrum of trade sizes in government bond transactions. 9.35% of transactions are less than EUR 100,000 in size, 24.58% trade in sizes between EUR 1-5mm and 25.26% are greater than EUR 20mm in size.
- All the asset classes have trades greater than EUR 20mm in size.

⁴⁴ Appendix 2(D) for methodology and assumptions. The colour codes represent the density of ISINs in the category (dark green >20%, medium green 10-20%, light green <10%).

⁴⁵ At the time of the data sample, trade sizes of covered bonds were mostly likely to have decreased due to the covered bond buyback program

⁴⁶ Notional trade size values (i.e. not factored)

Appendix 1 – Features of fixed income bonds

Asset Class	Description
Government bonds	Bonds issued by governments.
Supranationals	Bonds issued by international organisations, agencies or quasi-governments.
Investment grade corporate bonds	Bonds issued by companies (financial or industrial) that have low risk of default (greater than >BBB ⁴⁷ credit rating).
Covered bonds	Secured “on balance sheet” bond. Prior to default of the company, the bond pays principal and interest in the same way as a corporate bond. On default of the company, the bondholder has a claim to a collateral pool of assets.
Securitised bonds	The bondholder receives the cash flow directly from an underlying collateral pool. Securitised products are generally credit-tranched, with first losses from the collateral pool being absorbed by the higher yielding mezzanine tranches
High Yield	Non-investment grade bonds.



Term of bond Ultra short Short Medium Long Ultra long	Registration SEC IYYA Global Regional	Execution Public Private placement Quasi public Club deals
Country EU Non-EU Periphery EU/non-periphery EU	Market participants Insurance companies Pension funds Hedge funds Banks	Currency EUR GBP USD Other Multiple currency
Execution Public Private placement Quasi public Club deals	Core vs. periphery issuer Sovereign Bank Industrial High yield vs. investment grade Structured finance Convertibles Supranationals Municipals Quasi governments	Coupon structure Fixed Floating Bullet Pass through Scheduled Extendable Convertible Turbo
Structure Index/no index UCITs/non-UCIT eligible Liquidity buffer eligible Repo haircut	Credit rating	Ranking
Time to maturity	Collateral	

⁴⁷ Please note that different credit rating agencies have different notations and different indices have different criteria for a high yield bond

Appendix 2

A. Calculation of fixed income market composition

(i) *Charts and tables*

- Chart 1.1(a)
- Chart 1.1(b)

(ii) *The data used*

AFME used the following indices from the Barclay's Capital Index to calculate the total global number of securities and the total value outstanding on the 30 June 2011 for securitisation: Pan-European ABS and U.S. Aggregate Securitised.

Global Bank of America-Merrill Lynch global indices were used to calculate the aggregate total value and total number of securities outstanding on the 30 June 2011 for the other fixed income cash bond asset classes.

(iii) *The calculation*

The % market weight of each asset in terms of market value was calculated using the following formula:

% Market weight for asset class (X) in terms of market value =

Total market value for the asset class (X) / Total market value for all securities

The % market weight of each asset in terms of number of securities was calculated using the following formula:

% Market weight for asset class (X) in terms of number of securities =

Total number of securities in asset class (X) / Total number of securities

(iv) *Assumptions and limitations*

- Not all securities qualify to be part of the indices; therefore, the calculations will not consider all available indices.
- The Barclay's Capital Indices are updated on a monthly basis and only those securities that meet all the specific eligibility criteria will be included in an Index⁴⁸.
- The Barclay's Capital U.S Securitized Index includes both fixed rate agency passthroughs and hybrid ARM Mortgage Backed securities. The Index excludes buydowns, graduated equity mortgages, mega pools, prepayment penalty mortgages, 10 year securities, interest only, project

⁴⁸ See: A Guide to the Lehman Brothers Global Family of Indices, March 2008

loans, manufactured homes, graduated payment mortgages, whole loans and jumbos, quarter coupon fixed rate securities and Collateralised Mortgage Obligations.

- The Barclay's Capital Pan European ABS Index includes fixed and floating rate securities. Rules for eligibility are:
 - Bonds have to be issued out of a special purpose vehicle (SPVs)
 - Bonds can have fixed or floating coupons. Floating rate bonds are included with no restructure on the quoted benchmark used. However, bonds whose coupon is linked to inflation or other indices are excluded
 - All amortization types are permitted
 - Bonds must be denominated EUR or GBP
 - The deals from which the bonds are drawn must have nominal value or at least EUR 500mm equivalent
 - AAA rated bonds must have at least EUR 300mm outstanding
 - Floating rate bonds below AAA must have at least EUR 25mm equivalent outstanding to be eligible
 - The bond must be rated Baa3/BBB-/BBB or higher using the middle rating of Fitch, S&P and Moody's
 - The remaining average life of the bond must be at least one year
- The securitisation values do not include bonds issued outside Europe or the US. For example, Australian securitised bonds are not included in the calculations. The majority of securitised bonds are issued in Europe and the US. There is a small market in Australia and there are minimal issuances in Asia. Therefore, the US and European market is a proxy for the global market values.
- The Bank of America Merrill Lynch Indices only includes fixed rate bonds; therefore, no floating rate bonds are included
- These Indices only include the more liquid securities from within each asset class; therefore, using indices as a measure for market composition should only be considered as a reflection of "tradable" bonds.

B. Calculation of issuance sizes for fixed income bonds

(i) Charts and tables

- Table 1.1

(ii) Data used

Xtrakter provided issues sizes for: 366 government bonds 117 supranational bonds, 2236 corporate bonds, 470 covered bonds, 130 high yield bonds, 432 securitised bonds. The data was provided as at Q1 2011.

(iii) The calculation

$$\text{Average issue size} = \frac{\sum_n \text{Issue Size}}{n}$$

- Taken as at Q1 2011. Therefore, if there has been a TAP, restructuring or is part of a program, the value following the event is used.

C. Distribution of fixed income trading activity

(i) Charts and tables

- Chart 4.1
- Table 4.1
- Charts 4.2-4.7

(ii) The data used

Trade data for a random sample of 608 'traded' ISINs over the period 1 July 2010 to 30 June 2011 was used for the back-testing analysis. The list of sample ISINs used is provided below. AFME requested its member firms to provide the following trade by trade information for each ISIN for the aforementioned period. Nine investment firms provided the data.

ISIN	Trade date	Notional (Volume Traded)	Currency	Whether 'buy' or 'sell'	Interdealer Global/Interdealer Europe/Client trade

The total number of ISINs selected for each asset class was:

Asset Class	Number of ISINs	Percentage of distribution
Government Bonds	114	18.75%
Supranationals	106	17.43%
Corporate	99	16.28%
High Yield	100	16.45%
Covered Bonds	107	17.60%
ABS	82	13.49%
Total	608	

In summary, the analysis is based on the following trade data:

Time period:	1 July 2010 to 30 June 2011
Asset classes:	<ul style="list-style-type: none"> • Government Bonds • Suprationals • Corporate • HY • Covered Bonds • ABS
ISINs:	608
Total trade volume:	EUR10.6 trillion
Number of transactions:	604,620

The specific securities used can be provided on request.

(iii) Calculation

Step 1: the total trade value (EUR) for each ISIN was summed on a monthly basis

$$VALUE_{ISIN,asset\ class,month} = \sum_{trade}^{n_{ISIN,asset\ class,month}} VALUE_{ISIN,asset\ class,month,trade}$$

$VALUE_{ISIN,asset\ class,month}$
= The total value traded on the ISIN within the specifc asset class within the specific month

$VALUE_{ISIN,asset\ class,month,trade}$
= The value traded on the ISIN in a specific trade within a specific asset class and month

Step 2: the total number of transactions for each ISIN was summed on a monthly basis

$$T_{ISIN,asset\ class,month} = \sum_{trade}^{n_{ISIN,asset\ class,month}} T_{ISIN,asset\ class,month,trade}$$

$T_{ISIN,asset\ class,month}$
= The total number of transactions wrt the ISIN within the specifc asset class within the specific month

$T_{ISIN,asset\ class,month,trade}$
= The total number of transactiosn wrt the ISIN in a specific trade within a specific asset class and month

Step 3: For **Chart 4.1**, $T_{ISIN,asset\ class,month}$ was plotted on the x-axis and $VALUE_{ISIN,asset\ class,month}$ was plotted on the y-axis.

Step 4: For **Charts 4.2** and **4.3**, $T_{ISIN,government\ bond,month}$ was plotted on the x-axis and $VALUE_{ISIN,government\ bond,month}$ was plotted on the y-axis.

Step 5: For **Charts 4.4** and **4.5**, $T_{ISIN,corporate\ bond,month}$ was plotted on the x-axis and $VALUE_{ISIN,corporate\ bond,month}$ was plotted on the y-axis.

Step 6: For **Charts 4.6** and **4.7**, $T_{ISIN,covered\ bond,month}$ was plotted on the x-axis and $VALUE_{ISIN,covered\ bond,month}$ was plotted on the y-axis.

Step 7: For **Table 4.1**, all the $T_{ISIN,asset\ class,month}$ data points were sorted into the monthly number of transactions and asset class categories. The total number of ISINs in each category were then summed.

(iv) Assumptions and limitations

- This analysis is based on nine data sets, which does not reflect the entire market
- It is likely that different data sets contain the opposite sides of the same trades. As there is no way for AFME to match trades to avoid double counting, AFME requested that members identify European interdealer trades so that these could be aggregated and halved to approximate the true volume of trade. In this report, AFME has not aggregated and halved European interdealer trades as it believed there were too few data sets provided for the aggregate and halved numbers.
- All the data was converted into Euros. Transactions using ECB exchange rates.
- The trades do not contain any primary activity; however, as there is no consistent way of identifying primary trades, there may be some that have been included in the analysis
- There has been no rounding of numbers;
- The trades used are master trades (they are not settled amounts);
- The trade volumes are the notional amounts and not factored;
- All trades have been aggregated (including interdealer European, dealer-client and interdealer Global);
- The x-axis on **Chart 4.1** has been set to a maximum limit of 1400 transactions and the y-axis has been set to a maximum limit of EUR 40bn. There were data points beyond these limits that are not shown on the chart (**Chart 4.2** shows this);
- **Chart 4.3** is an extrapolation of **Chart 4.2**. The x-axis has been set to a maximum limit of 1400 transactions and the y-axis has been set to a limit of EUR 60bn;
- **Chart 4.4** is an extrapolation of **Chart 4.5**. The x-axis has been set to a maximum limit of 100 transactions and the y-axis has been set to a limit of EUR 100mm; and
- **Chart 4.7** is an extrapolation of **Chart 4.6**. The x-axis has been set to a maximum limit of 140 transactions and the y-axis has been set to a limit of EUR 200mm.

D. Average trade size information for fixed income

(i) Charts and tables

- Table 4.2
- Table 4.3

(ii) The data used

Please refer to Appendix 2(C) for the details of the sample set of fixed income data used.

(iii) Calculation

Each trade within each asset class was grouped into the trade size categories in **Table 4.4**. The total number of trades within each asset class was summed and the percentage of trades within each category was calculated.