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**Research Report**

## Implications for liquidity from innovation and transparency in the European corporate bond market

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EUROPEAN CENTRAL BANK

## OCCASIONAL PAPER SERIES

NO. 50 / AUGUST 2006

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by Marco Laganá,  
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## ABSTRACT

This paper offers a new framework for the assessment of financial market liquidity and identifies two types: search liquidity and systemic liquidity. Search liquidity, i.e. liquidity in “normal” times, is driven by search costs required for a trader to find a willing buyer for an asset he/she is trying to sell or vice versa. Search liquidity is asset specific. Systemic liquidity, i.e. liquidity in “stressed” times, is driven by the homogeneity of investors: the degree to which one’s decision to sell is related to the decision to sell made by other market players at the same time. Systemic liquidity is specific to market participants’ behaviour. This framework proves fairly powerful in identifying the role of credit derivatives and transparency for liquidity of corporate bond markets. We have applied it to the illiquid segments of the European credit market and found that credit derivatives are likely to improve search liquidity as well as systemic liquidity. However, it is possible that in their popular use today, credit derivatives reinforce a concentration of positions that can worsen systemic liquidity. We also found that post-trade transparency has surprisingly little bearing on liquidity in that where it improves liquidity it is merely acting as a proxy for pre-trade transparency or transparency of holdings. We conclude that if liquidity is the objective, pre-trade transparency, as well as some delayed transparency on net exposures and concentrations, is likely to be more supportive of both search and systemic liquidity than post-trade transparency.

JEL classification: G14, G15 and G18

Keywords: financial market functioning, liquidity, transparency, credit markets and financial innovation

## NON-TECHNICAL SUMMARY

The ongoing debate on the MiFID transparency requirements has led to some unease amongst market participants, commentators and policy-makers that a combination of financial innovation in the credit risk transfer markets and some regulatory initiatives could undermine the capacity of financial markets to be reasonably and consistently liquid. This is not an arcane concern, especially with regard to the extension of equity transparency requirements to corporate bond markets. To date the analysis of the role of credit derivatives and trading transparency requirements for liquidity has been constrained by the absence of a solid basis for what drives liquidity and liquidity risk (liquidity risk is the likelihood that an instrument cannot be sold for cash instantaneously). We offer a new framework that identifies two types of liquidity: search liquidity and systemic liquidity. In “normal” times, liquidity is driven by search costs required for a trader to find a willing buyer for an asset he/she is trying to sell or vice versa. Search liquidity is asset specific. In “stressed” times liquidity is driven by the homogeneity of investors: the degree to which one’s decision to sell is related to the decision to sell made by other market players at the same time. Systemic liquidity is specific to market participants’ behaviour. We feel an overemphasis has been placed on search liquidity and instruments, when systemic liquidity and behaviour is just as important, if not more so. This indicates that policy-makers, when taking initiatives, need to take both types of liquidity into consideration because a trade-off may exist between the two. This framework proves fairly powerful in identifying the role of credit derivatives and transparency for liquidity. We have applied it to the illiquid segments of the European credit market and found that credit derivatives are likely to improve search liquidity as well as systemic liquidity. However, it is possible that in their popular use today, credit derivatives reinforce a concentration of positions that can worsen systemic liquidity.

We also found that post-trade transparency has surprisingly little bearing on liquidity in that where it improves liquidity it is merely acting as a proxy for pre-trade transparency or transparency of holdings. We conclude that if liquidity is the objective, pre-trade transparency, as well as some delayed transparency on net exposures and concentrations, is likely to be more supportive of both search and systemic liquidity than post-trade transparency.

## I INTRODUCTION

Developed, well-functioning financial markets play a vital role in today’s economy. They are used to allocate capital resources and manage risks and so they ultimately contribute to economic growth. It is often said that one of the reasons for the comparatively strong economic growth in the United States in recent years has been the depth and liquidity of its financial markets in general and its corporate bond market in particular. This viewpoint is well reflected in the following statement from 2002:

The openness of the U.S. financial system, its depth and liquidity, and fierce competition have strongly contributed to our economy’s growth potential and efficiency. Countless academic studies show that efficient capital markets are a potent disciplinary force that enhance productivity, strengthen consumer choice and welfare, and offer borrowers capital at costs best suited to promoting investment.<sup>1</sup>

The liquidity of US markets may be related to their size, the size of the US economy and the consequent use of the US currency as a vehicle currency for international investments. These are reasons why many non-US companies issue

<sup>1</sup> Testimony by Assistant Secretary of the Treasury for International Affairs, Randal Quarles, 22 May 2002, Congressional hearing on the EU’s Financial Services Action Plan (FSAP).

dollar-denominated corporate bonds.<sup>2</sup> But financial market liquidity is also linked to the functioning of the markets and the way in which they are organised and regulated – features that, unlike market size, can be directly influenced by the authorities.<sup>3</sup> Indeed, financial innovation is often a response to regulation and such innovation can play a big part in the evolution of financial liquidity.<sup>4</sup>

This paper is concerned with trading liquidity, which is related to the depth, immediacy, tightness and resiliency of a market, and in particular with the factors that may influence trading liquidity in the EUR 1,500 billion euro area corporate bond market.<sup>5</sup> The wider economic effects of trading liquidity are as important in the corporate bond market as anywhere else. Large liquidity premia, i.e. the additional cost a borrower has to pay because the instrument of borrowing cannot be easily turned into cash, will raise the cost of capital for companies, which would in turn dampen investment spending. It is commonly thought that liquidity premia are generally very negligible, except in small emerging markets, but while this may be true for euro-denominated sovereign debt issued by euro area governments or frequently traded equities, liquidity premia can be significant for many markets. It is important to note that only a few European corporate bonds trade on a daily or weekly basis, while the majority of tradable debt issues trade less than once a month or even once a quarter.

Liquidity premium is the additional yield that compensates investors for the risk of being unable to liquidate a position immediately. Its measurement is not straightforward because of difficulties in recording and standardising liquidity measurements, and in the case of bond markets there is also an absence of published data of the same detail and frequency that the retail equity markets demand. We will discuss these issues in greater depth later. But our starting point is that liquidity risk premia can be significant, even in developed market

economies. Partial and indirect evidence for this comes from the outperformance of liquid equity exchanges by private equity funds, which are in large part earning a liquidity risk premium by investing in less liquid assets. Between 1990 and 2004, for example, these funds returned an average 160 basis points more every year than the S&P 500.

Market participants argue that it is not just the level of trading liquidity that concerns them, but also its variability.<sup>6</sup> An old banker's joke is that a banker is someone who lends you an umbrella when it is sunny and asks for it back when it starts to rain. It is easier to manage investments when the degree of liquidity is low but steady than if liquidity appears when you are passing by and do not need it, but disappears when you do. An extreme form of variability is a liquidity crisis. Almost all major financial crises, such as the Tequila crisis (1994-95), the Asian financial crisis (1997-98) and the LTCM debacle (1998), started off life as a trading liquidity crisis in markets or sectors that were considered reasonably liquid.<sup>7</sup> The financial, economic and social costs of these crises may be large.<sup>8</sup> Liquidity crises can destroy companies and paralyse countries. Preventing them is an important concern of the authorities.

Two connected concepts relevant to liquidity crises are (i) “artificial liquidity” – liquidity that appears to be there but disappears when it is needed; and (ii) “liquidity black holes” – specific periods when liquidity disappears, only to reappear a few days or weeks later. There is

2 In the first three quarters of 2005, for example, USD 161 billion of dollar-denominated debt was issued by non-US borrowers, which represented almost 60% of total US dollar issuance over the period. See BIS (2005).

3 See O'Hara (2001) for an excellent overview of these issues.

4 See Kane (1986) for early work on this subject, and Tufano (2002) for a comprehensive review of the literature.

5 See ECB (2006).

6 See Appendix.

7 See Cai (2003).

8 For example, Eichengreen (2004) estimates that the cost of financial crises in emerging markets in the last quarter of the 20th century reduced the incomes of the countries concerned by 25%.



some evidence that both artificial liquidity and liquidity black holes have become more plentiful as a result of the way in which markets are organised and regulated and new instruments traded. In particular, there is evidence in the more liquid equity and government bond markets of greater positive feedback between prices and the direction of trades.<sup>9</sup>

Given the importance of trading liquidity in the corporate bond market for the functioning of the economy, given assertions that it is related to factors under the control of the authorities such as transparency, funding and trading rules, and given worries that both artificial liquidity and black holes are increasingly prevalent, there are more than enough reasons for European authorities to be interested in a better understanding of trading liquidity. In fact, trading liquidity ranks high in central banks' financial stability concerns because if it suddenly disappears down a "black hole" it may cause a liquidity crisis with systemic implications. If a central bank, as is the case for the Eurosystem, accepts corporate bonds as collateral in its credit operations, the trading liquidity of the assets – and of the markets on which these assets are traded – is also relevant for operational reasons. The ability to properly price and rapidly liquidate collateral is one of the core requirements for efficient collateral management.

To help address these issues, this paper sets out a simple and testable analytical framework for trading liquidity that is designed to apply to a wide range of markets but in particular to the many European corporate bonds that trade infrequently. We examine what this framework tells us about two developments: financial innovations in the credit arena and the role of any increased disclosure and transparency in European corporate bond trading. The focus is therefore on the liquidity impact. We do not aim to assess the broader implications for market efficiency and fairness.

But before we do that, we put this study in context by describing regulatory developments

and market participants' concerns (which we expand on in the Appendix), reviewing the academic literature and commenting on differences between the European corporate bond market and those markets from which most of the academic literature is derived: US equity markets.

## **2 THE CONTEXT: REGULATORY INITIATIVES, ACADEMIC RESEARCH AND LESSONS TO BE DRAWN FROM THE UNITED STATES**

### **2.1 RECENT REGULATORY DEVELOPMENTS AND MARKET CONCERNS**

Recently, regulatory focus and activity in the trading area has been on increasing disclosure of trade information in the bond markets, especially post-trade information.<sup>10</sup> In large part this is an extension of disclosure requirements that exist in equity markets. These efforts have been particularly pronounced in the United States, where the Securities and Exchange Commission (SEC) has mandated the National Association of Securities Dealers (NASD) with developing a platform through which, ultimately, trades in most corporate bonds will be disclosed almost instantly.<sup>11</sup> EU regulators, although they have not formulated such a requirement as yet, are, in preparation for the Markets in Financial Instruments Directive (MiFID), studying the possibility of enlarging the scope of the primarily equity-oriented trading information disclosure requirements to "instruments other than shares".

<sup>9</sup> See Persaud (2003), Cohen (2003) and Nesvetailova (2005) for a description of the concept of liquidity black holes and Hasbrouck (2000) for further analysis on the US treasury and stock markets.

<sup>10</sup> Pre-trade transparency relates to information on current trading interest. Transparency of orders and/or dealer quotations provides the market-place with information on prices and sometimes also quantities in which market participants are willing to trade. Post-trade transparency relates to the prices and volumes of completed transactions.

<sup>11</sup> This platform, called the Trade Reporting and Compliance Engine (TRACE), facilitates the mandatory reporting of OTC transactions in eligible fixed income securities.

According to financial industry associations, this spread of transparency rules to the corporate bond market does not appear to be in response to any groundswell of concern that these markets are suffering from a problem that needs a solution – a necessary requirement for regulatory intervention.<sup>12</sup> Moreover, many market participants, especially the large banks and dealers, have expressed concern that a simple “mechanistic” transfer of transparency requirements from equity to bond markets is inappropriate and may have an adverse impact on the liquidity of some important market segments.

Regulatory interest in bond market transparency appears to have been stimulated by changes in the pattern of demand for bonds. There are indications that the bond markets in general, and corporate bond markets in particular, play an increasing role in investors’ portfolios. Several factors are likely to contribute to this increased role, one of the most important being the changing trend in demography, especially in Europe. It is expected that an ageing population will invest more in bond markets, be it directly or indirectly through means of collective investment, and, as a consequence, increased interest by regulators in the bond markets and their functioning may be anticipated. Related trends are already visible. Today, market participants complain of a bubble in bond prices as a result of extra demand from pension funds. New measures related to, or aimed primarily at, retail investor protection are being taken or proposed on both sides of the Atlantic.

However, regulators would not wish to increase transparency in order to protect consumers only to find that their actions had reduced liquidity. In turning to the literature for help in assessing concerns expressed by market participants on a potential trade-off between liquidity and transparency it becomes clear that this is an area that is generally poorly researched. Most conclusions are guided by the results of studies that are focused on US equity markets, which have both different liquidity conditions and different reasons for transparency rules. We

will discuss these differences in greater detail later.

## 2.2 DIFFERENT DEFINITIONS OF LIQUIDITY IN THE LITERATURE

Studies on liquidity in equity and government bond markets are relatively numerous, and this may be attributable to the availability of pricing data and trading turnover on these markets. Most of these studies concentrate on some quoted measure of trading liquidity, such as bid-ask spread or trading volume. However, data on trading activity for corporate bond markets are more difficult to obtain and the number of studies dedicated to corporate bonds is much smaller. To some extent the introduction of the TRACE corporate bond trade reporting system in the United States on 20 March 2002 has led to a few more studies on corporate bond market liquidity, but this is still too recent to provide a rich vein of analysis and conclusion. Almost no attention is paid to illiquid, infrequently traded instruments, not least because bid-ask spreads or trading volume data for these instruments are often non-existent. The paradox is that data on liquidity is most available for those markets where liquidity is not a problem.

Besides data, another factor holding up the growth of analysis in liquidity is a lack of common definitions or measures. A review of the literature on liquidity in general reveals that “liquidity” has many different meanings in different, though to add to the confusion, related, contexts. Macro-economists, for example, often refer to high-powered liquidity when they are referring to money supply. The instruments of liquidity in this case would be activities such as open-market operations by the central bank, shifts in the level of interest rates and foreign exchange intervention. These issues are in many ways distinct from, for instance, the bid-ask spread quoted for a specific corporate bond issue, but the premium to be paid for the immediate liquidation of this

12 See also FSA (2005) and the response by the BMA.

bond is related to how much macro-liquidity there is in the system. Again at a macro level, central banks are more concerned about the factors that relate to liquidity crises.<sup>13</sup> These factors are quite different, but are also related to the micro-structure of trading and what we may refer to as trading liquidity.

As indicated above, our focus is on trading liquidity. Most of the general literature on trading liquidity suggests that it is related to the depth, immediacy, tightness and resiliency of a market. What these terms imply is that a liquid market is one where you can buy a bond without having to wait long to obtain a price quote, sell it immediately when needed, and pay a tight spread between the buying and selling price without the price level changing much. In such a market the forced liquidation of assets by a distressed seller does not cause the price to collapse. If, however, a market-maker buys a particular asset and loses money when he tries to sell it soon after, he would start to offset that risk by raising the difference, or spread, between his buying (bid) and selling (offer) price to the market. Consequently, it is conventionally thought that the best measure of trading liquidity is the bid-offer spread or more commonly described bid-ask spread. The liquidity risk premia – the extra yield required to compensate an investor for the inability to sell immediately without suffering a loss – should be closely related to the bid-ask spread.

There has been some empirical work to try to identify the liquidity risk premia in corporate bond markets and what drives it. Most of the results confirm that liquidity is related to credit quality (Houweling 2005, Driessen 2005), but this could be the result of a poor choice of instrumental variables used to measure the liquidity component of the yield spread, a large part of which is the credit risk premia. We would argue that liquidity risk is an important concept because it is not the same as credit risk. It is possible to imagine an instrument that has low liquidity but high credit quality, such as many asset-backed securities.

Other studies have found a connection between the time after issuance and liquidity, the maturity of the bond and its liquidity (Chakravarty 1999, Goldreich 2003) or issue size (Fleming 2002). This seems to imply that the prospect of cash on redemption is a determining avenue of liquidity. It would make sense that a 12-month note was more liquid than a 10-year bond (the note would be redeemed for cash in a few months), but does that mean that a 5-year bond is more liquid than a 10-year bond?

It would be fair to say that the empirical work on corporate bonds has not yet revealed much that we find compelling. That said, there are three elements of the literature that we draw on in this paper. Our definition of liquidity is that it is related to the discount you have to pay in order to sell an instrument immediately, compared with the price you would receive if you could afford to wait until a buyer willing to pay the “market” price appears. This follows from Ericsson (2005), though it is closely related to the well-known concept of the price impact of trading, i.e. the risk that the actual price of a transaction may be significantly different from the price quoted just before the transaction was made.<sup>14</sup> We prefer this measure to quoted bid-ask spreads, which are increasingly related not to the actual difference between the price to buy and sell but commercial and regulatory pre-trade requirements. (One of the consequences of this is that dealers often quote a wide spread if they are forced to quote, or, if they do not have to quote, they will often just withdraw from the market in times of stress). Measures of liquidity that relate to factors other than bid-ask spreads often conflict during periods of stress – see Upper (2000).

<sup>13</sup> See O’Hara (2004) and BIS (2001), for example.

<sup>14</sup> This definition can be inverted to provide a definition of time liquidity: the time it would take to sell an instrument without accepting a price discount. While much of the literature focuses on the price discount (see Fleming (2003) for an example of this approach applied to the US Treasury market), the time premia may be more relevant to market participants considering the maturity of the instruments they may use to fund an asset or invest against a liability – see Persaud (2006). See also Bervas (2006) for a description of impact measures.

The second point that we can draw from the existing literature is the role of investor behaviour in general and the heterogeneity of investor behaviour in particular. Persaud (2002, 2004) has argued that the less heterogeneous are investors' valuations, investment horizons and risk management, the less trading liquidity there is when you need it – in times of market stress. This would help to explain concerns about the growth of artificial liquidity and liquidity black holes and has a bearing on transparency, which under certain circumstances may lead to more homogeneity. Indeed, a third element follows directly from Scalia (1999), who suggests that, in a specific case in the Italian government bond market, improved trading transparency has harmed the liquidity of bonds. This interesting but controversial view has been developed by others (O'Hara 2004) and we shall return to these issues later.

Before we leave the literature on liquidity in the corporate bond market, we must touch on the credit derivatives markets. In just a few years the use of credit derivatives has changed the way corporate bond markets operate, and it seems that the influence of credit derivatives will become more significant as these develop further.<sup>15</sup> In a growing academic literature increasing attention is being paid to the functioning of credit derivatives and their links to other segments of the credit markets, as evidenced by several papers that have become available over the past few years. Zhu (2004), for example, examines more deeply the relationship between credit default swaps (CDS) and cash bond markets, concluding that their prices are highly correlated, especially in quiet times; in distressed markets the relationship is looser with CDS spreads becoming significantly wider than the spreads of corporate bonds.<sup>16</sup> Another interesting finding is that the difference between the corporate bond spread and CDS spread, known as CDS basis, is highly correlated with the CTD (cheapest-to-deliver) option value, i.e. the value of the different assets eligible to be delivered to the protection seller in the case of a credit event. Hull (2004) suggests using the CDS market to extract or

confirm the risk-free rate on which credit market participants rely. Gomez (2003) finds that looking only at the relationship between credit derivatives and cash bond markets is insufficient, and suggests including equity markets as well in the analysis. Indeed, Cremers (2004) and Zhang (2005) find similar evidence, connecting the prices of CDS, corporate bond and equity markets.<sup>17</sup>

The main distinction of the credit derivatives markets is their almost uninhibited liquidity during quiet times, at least compared with the cash bond markets. This feature has been the subject of several studies (see, for instance, Longstaff (2004)), as by comparing prices of cash bonds and credit derivatives a measure of the liquidity risk price can be derived. Also the CDS-bond basis is being increasingly studied (Levin, 2005). The credit derivatives market development in recent years also needs to be taken into account when considering the effects of the above-mentioned regulatory changes in the United States (Edwards, 2004).<sup>18</sup>

At the end of the day, however, the empirical literature on trading liquidity and credit markets in general and European credit markets in particular is still relatively sparse and inconclusive, so that the perceived wisdom that shapes policy initiatives in this area is based on research carried out in US equity markets or relatively liquid US bond markets. These markets are so different from European corporate bond markets that extreme care must be exercised. This is well illustrated by looking at the reasons behind regulatory requirements

15 For a more detailed description of market innovations see Box 1 Chapter 4.

16 It may be worthwhile to examine further whether the real reason may not lie in the fact that the cash bonds stop trading in distressed times and the real activity is going on in the CDS market, as suggested e.g. in CRMPG II (2005) or Naifar (2005).

17 Blanco (2005) concluded that CDS spreads led bond spread changes. Zhu (2004) and Norden (2004) came to a similar conclusion.

18 Several market participants pointed to methodological inconsistencies in the argumentation about the causality of the introduction of TRACE and the fall in transaction costs for corporate bonds in the United States.

of pre- and post-trade transparency that exist for equity markets and are being considered for European corporate bond markets.

## **2.3 WHAT LESSONS CAN BE DRAWN FROM US BOND OR EQUITY MARKETS?**

### **2.3.1 CORPORATE BONDS VERSUS EQUITIES: INVESTORS**

The equity market is a market for corporate control.<sup>19</sup> There are many institutions that cannot or do not wish to raise finance by ceding control to investors, and there are many institutions that cannot own issuer-specific risk. Official institutions are a case in point. One of the consequences of this is that while equity markets have a large number of small retail investors and few official institutions, bond market investors tend to be dominated by institutions, many of them official.<sup>20</sup>

It is generally supposed that retail investors need more protection than official institutions and therefore consumer protection is more of an issue in equity markets than in bond markets. In order to ensure that retail equity investors are not disadvantaged against professional brokers and intermediaries, regulators insist that much of the trading information that a broker or intermediary may be able to access is also easily accessible by retail investors. As the bond markets are dominated by a handful of institutional investors with a better ability to obtain market intelligence, the need for transparency regulation has not been seen as a priority.

### **2.3.2 CORPORATE BONDS VERSUS EQUITIES: INSTRUMENTS**

Many institutions are often just an agent for retail investors and so need protecting too. But there may be other reasons why investor protection issues have been relatively less important in the bond markets than in the equity markets. Unlike equities, bonds usually have a maturity date on which the principal is repaid. The bondholder can wait for his investment to mature to get the principal value back. The equity holder wanting to retrieve his investment

has to rely solely on the secondary market, which makes the issue of trading transparency and investor protection from abusive trading practices more critical. The price of a bond relates to publicly available data on the overall level of interest rates, credit conditions and shifts in default risks. Most companies do not slip in and out of default and so, on a day-to-day basis, the scope for insider knowledge to damage the interests of “outside” bond investors is narrower than the scope for insider knowledge in equity markets, where price is determined by any shift in likely future earnings.

One of the principal avenues to dissuade and catch insider trading is through transparency of trade activity. Therefore, in equity markets the issue of post-trade transparency has a lot to do with investor protection and not very much to do with liquidity. This is different in bond markets, where retail investor participation is limited, so that investor protection could arguably play a less, and liquidity considerations a more, prominent role. Of course, as we mentioned earlier, the balance between liquidity and investor protection concerns may be shifting over time in the bond markets.

### **2.3.3 US VERSUS EUROPEAN MARKETS**

The US corporate bond market is larger and more diversified than European markets. Bonds of various credit quality, from investment grade to speculative grade, are sold to a diversified investor base. Public credit ratings are widely used as a reference by both issuers and investors. The corporate bond market benefits significantly from the well-functioning US government bond market, which serves as a reference for pricing corporate issues. Trading activity is also highly concentrated, with a handful of large banks/dealers controlling the lion’s share of the trading and syndication. Market supervision is performed by a single regulator, the SEC, and the self-regulatory functions are also highly concentrated. Client intermediation, especially

<sup>19</sup> See Scott (2004) for an overview of these issues.

<sup>20</sup> For example, at the end of the 1990s, the UK household sector held 20% of UK equity assets but just 1% of bond market assets (Davis, 2000).





in the less liquid segments of the market, seems to be performed increasingly on an agency basis, without the dealers committing their own capital.

The European Union and specifically the euro area corporate bond markets have experienced remarkably fast development, especially since the introduction of the single currency. According to Casey (2005), the outstanding volumes almost quadrupled in the euro area between 1999 and 2004, while the ratio of outstanding corporate bond issues to GDP closed significantly the gap to the United States' long-term average of 25% of GDP, to stand at more than 16% at the end of 2004 (in 1999 the euro area share was a mere 5%). The credit quality of issuers – previously limited mainly to high-quality large issuers or retail-oriented “household names” – is diversifying; the growth of the high yield markets has been remarkable, even though it started from a very low base. The use of ratings, previously limited to large high-quality issuers, is also becoming more common. When pricing corporate issues in euro, the swap market is generally used, as the existence of several government bond yield curves makes it difficult to refer the pricing to a single benchmark.

The supervisory functions are performed by several national bodies, and remaining differences in the national implementation of regulations add to the complications that banks encounter in order to be able to operate under the same rules across the European Union. The intermediation market is less concentrated than in the United States, with several dozen banks/dealers competing for trading and syndication business.

There is a higher level of competition in the European bond markets,<sup>21</sup> and this is reflected in the level of pre-trade transparency in wholesale markets, which is greater than in the United States. Indeed, the pre-trade transparency in some liquid market segments is so high that it makes the real-time post-trade transparency for price discovery purposes obsolete. The

interesting feature is that, when servicing their clients, banks in Europe act more often as principals, using their own capital even in some of the less liquid segments of the market.

A widely held view is that trading liquidity is about market size, turnover and the availability of information, and so the US market should be more liquid than the European market. However, there is evidence from equity markets that trading liquidity and market size are not synonymous<sup>22</sup> and there are some theoretical and empirical challenges to the notion that transparency will improve liquidity.<sup>23</sup>

One potentially very important distinction between the two markets is the different list of eligible assets that can be put forward to the central bank as collateral for credit operations. In the Eurosystem, the list includes non-government, euro-denominated, fixed-income securities, and from January 2007 will include bank loans of sound credit quality. For all eligible assets the minimum acceptable credit rating corresponds to “A-”. The eligibility status of non-government assets is likely to make these instruments more “liquid”. In the United States, the Federal Reserve System only allows a narrow range of public-sector related bonds to be used as collateral for open-market operations. Allowing certain corporate bonds to be used as collateral for credit operations should have a significant impact on their liquidity. This impact may prove greater than issues of transparency and financial innovation, for instance, and deserves further study.

### 3 WHAT ACTUALLY DRIVES LIQUIDITY? AN ANALYTICAL FRAMEWORK OF LIQUIDITY

Financial instruments yield the risk-free rate of return (for the purposes of this paper, we define it as the corresponding maturity point on the

21 This is also highlighted in the response to the FSA discussion paper on trading transparency in the UK secondary bond market – see BMA (2005).

22 See Persaud (2001).

23 See O'Hara (1995) and Persaud (2000).

government or swap yield curve) plus a premium for additional risks, principal among them being credit and liquidity premia. The credit premium is the additional yield that investors demand as compensation for the risk of default as well as the volatility and unpredictability of this risk. The liquidity premium<sup>24</sup> of a corporate bond is the additional yield investors demand as compensation for the potential reduction in price they may have to accept if they require cash immediately and are forced to sell the bond.

Liquidity risk is often thought of as the price impact of trading. The change in price of the financial instrument as a consequence of a trade has different drivers during different market environments, leading us to believe that there are two types of trading liquidity, which, interestingly, may pull against each other. During “quiet times”, the liquidity premium is driven by “search” costs: the cost in time, information asymmetries and uncertainties, as well as capital, funding, inventory and research costs required for a trader<sup>25</sup> to locate a willing buyer for a “stock” that it has recently purchased. It is likely that the quoted bid-ask spread during quiet times is a representation of this search cost, and that these search costs are differentiated across different market instruments, being smallest for US government bonds and much larger for small European corporate bonds. We call this type of liquidity “*search liquidity*”. This type of liquidity is asset specific.

For the instruments that concern us – bonds and tradable debt that do not trade on a daily basis and sometimes not even on a monthly or quarterly basis – an important element of the liquidity premium that relates to “search costs” is the uncertainty premium attached to estimates of these costs.

It is probable that technology and transparency help to improve “search liquidity”. At one extreme, if a seller of a corporate bond could go to a common trading venue and potential buyers of bonds with similar characteristics are there looking for bonds to buy, search costs could be

kept low. The advent of electronic trading platforms with extensive pre-trade disclosure is supporting a reduction in search costs and search cost uncertainties.

During times of market stress, when investor risk-appetite has fallen, uncertainties increase and a “herd of investors” are bailing out of their positions, a very substantial price reduction is required to turn a seller into a buyer. This contrarian buyer must consider that while he can go against the market today and perhaps come out on top tomorrow, he runs the risk of being forced to sell at a lower price if the market falls for longer than he can remain solvent. The buyer needs to be compensated for this risk before he contemplates it. This is also a liquidity problem – the intrinsic worth of the asset has not changed and sometime in the near future buyers will again be plentiful at current prices. But this liquidity is not really about long-term search costs. On this occasion the driver of the liquidity premium is the homogeneity of investors. If investors are homogeneous in their information, valuation, risk management and thus behaviour, and are reducing their exposure to certain risks simultaneously, finding a buyer is almost impossible.<sup>26</sup> The liquidity to sell disappears down a black hole. We call this *systemic liquidity*.<sup>27</sup> This type of liquidity is related to the behaviour of market participants. It is not well measured by bid-ask spreads, not

24 The liquidity premium approximates the difference between the observed corporate bond yield spreads and the smaller theoretical spreads derived from default probabilities.

25 There are various types of liquidity providers, that is traders that act as intermediaries by buying and selling. The main types of such traders are market-makers, banks’ proprietary traders and hedge funds. Furthermore, for a detailed analysis of capital and funding costs see Brunnermeier (2005a) and Weill (2004). Information asymmetries and inventory costs are also dealt with by Kyle (1985), Glosten (1985) and Grossmann (1988).

26 Other authors point out that a financial crisis is a disruption to financial markets caused by excessive information asymmetries. See, for instance, Mishkin (1991).

27 Another term sometimes used to describe systemic liquidity is “endogenous liquidity” as opposed to “exogenous liquidity” or search costs. See Bervas (2006) for a comprehensive review, including methods to capture extreme liquidity risk. Other analysts have called search liquidity “fair weather liquidity”. Finally, relevant classifications such as market liquidity and funding liquidity as well as predatory trading are introduced by Brunnermeier (2005a and 2005b).

least because it is highly variable and, at times of stress, market participants complain that the size of trade for which the quoted spreads are applicable collapses to the regulatory minimum size. In such situations, quoted spreads are often not representative of the spreads that market participants are paying, and sometimes the quotes disappear altogether. It raises a point we will come back to, that trading liquidity is often seen through the prism of instruments (some instruments are said to be liquid and others illiquid), although this is perhaps better understood through the prism of market behaviour (a change in behaviour may make the same instrument go from liquid to illiquid or vice versa).

One testable definition and identification of systemic illiquidity and a liquidity black hole is where the normal correlation of falling prices attracting buyers reverses, so that falling prices lead to further selling. If falling prices, thanks to investors' heterogeneous expectations and behaviour, attract buyers, the price impact of a sell order is limited and liquidity would be considered to be good. If, on the other hand, a sell order leads to falling prices which consequently lead to further selling and further price falls, the price impact of the sell order is substantial and liquidity would be considered to be poor.

This measure provides evidence of a number of periods of systemic illiquidity (and liquidity black holes) for instruments that trade frequently, usually with tight bid-ask spreads, and would normally be considered highly liquid.<sup>28</sup> However, in order to carry out this measurement information is required on prices and flows which is seldom available for assets that do not trade daily. (One impact of post-trade transparency on liquidity is that we would be better able to measure liquidity.)

In addition to the emerging empirical evidence, few traders and market commentators doubt that this behaviour exists. The issue is what causes it. What makes investors change from considering falling prices as a buying

opportunity to perceiving them a selling signal? It is likely that the increasing standardisation of valuation (such as mean-variance optimisation) and risk-management tools and real-time post-trade transparency promotes homogeneity. Because market prices are increasingly part of a similar risk-return calculation for investors, the market conditions that lead one investor to sell also lead others to do so at the same time.

It is possible too to see a tension between systemic liquidity and search liquidity. An environment where transparent electronic communication networks or exchanges undermine the role of market-makers and their balance sheets could be one where search liquidity is improved at the expense of systemic liquidity, and where reported bid-ask spreads narrow, but occasions of severe market dislocation become more significant and frequent. Foreign exchange markets are an example of markets where, during quiet times, quoted bid-ask spreads are wafer thin and for the euro/dollar market less than 2 basis points, reflecting minute search costs. However, the foreign exchange markets also frequently exhibit occurrences where the market appears to be in dislocation, jumping to new levels.<sup>29</sup>

Factors that increase systemic liquidity may reduce search liquidity. For example, *heterogeneity in the behaviour* of market players may improve systemic liquidity. If insurance companies and pension funds behave as long-term investors and so, for example, a fall in the banking sector's risk appetite for corporate bonds does not have an impact on them and they buy what the banking sector is selling, systemic liquidity is preserved. However, long-term investor behaviour usually results in a "locking-up" of stock in various places away from the market-place, reducing the "free-float" of a bond issue and therefore increasing the search costs of trying to match buyers with sellers during quiet times.

<sup>28</sup> See Cohen (2003) and Hasbrouck (2000) for further analysis on the US treasury and stock markets. See also Tambakis (2006) and Gibson (2000).

<sup>29</sup> See Persaud (2003).

Our framework suggests that these trade-offs may exist. But do they? Is search liquidity really getting better at the expense of systemic liquidity? It is hard to tell with certainty, but the partial evidence that exists is cause for concern. In some large transparent markets, there is evidence of a worsening frequency of liquidity black holes, yet bid-ask spreads, where reported, have shrunk over time although they appear to have reached a floor in many markets. In a study using exchange data on flows and prices, McCoy (2004)<sup>30</sup> found positive feedback between prices and flows (today's price declines bring out more sellers, not stabilising bargain hunters) in several markets, where quoted spreads were a fraction of one tenth of a per cent. The analysis focused on a range of currency markets (USD/JPY, USD/CHF, USD/CAD) between 1999 and 2002 and also on the US Treasury market (two-year and ten-year notes) between 1992 and 1997. The implication is that markets that exhibit good search liquidity were exhibiting frequent periods of systemic illiquidity.

To sum up, our simple analytical framework for trading liquidity distinguishes between two types of liquidity, search and systemic liquidity, which may act against each other, depending on market conditions. During “quiet” times, the liquidity premium is driven by “search” costs, i.e. the cost in time, information asymmetries, as well as capital, funding, inventory and research costs required for a trader to locate a willing buyer for an asset that he has purchased. In distressed market conditions, the driver of the liquidity premium is the homogeneity of investors. If investors are homogeneous in their

behaviour, the liquidity disappears down a black hole. This framework allows for an examination of the search or systemic avenues along which any development, be it financial innovation or improved transparency, will have an impact on liquidity. It also indicates that policy-makers need to show concern for both search and systemic liquidity. They should be alert to the possibility that initiatives which appear to improve the most visible form of liquidity – “search liquidity” – may be doing so at the expense of another important form of liquidity – “systemic liquidity”.

#### 4 THE IMPACT OF FINANCIAL INNOVATION ON TRADING LIQUIDITY

Over the last few years, European credit markets have seen rapid innovation. Financial innovations are affecting the management of credit risk, hence the functioning of credit markets and ultimately the liquidity risk of corporate bonds, both in quiet and distressed market conditions. This chapter provides some initial considerations on the impact that financial innovations and, in particular, the enhanced interaction of cash and derivatives markets may have on search and systemic liquidity. Further work is needed to gain a better understanding of developments that, unhelpfully from an analytical perspective, are unfolding and are rapidly changing previously reached conclusions.

<sup>30</sup> See also Fleming (1999) and Cohen (2003).

#### Box I

##### RECENT FINANCIAL INNOVATIONS AFFECTING LIQUIDITY IN CREDIT MARKETS

The main market-driven innovations that have an impact on the liquidity of credit risk markets are mentioned below (see also the Appendix). They have enhanced the trading of corporate bonds and in particular credit derivatives, whose markets are nowadays more innovative, diversified and often more liquid than the underlying cash markets. Also in terms of price efficiency, prices available in the CDS market are increasingly accepted as a reference price

source for *pricing* corporate bonds. According to BIS data, notional amounts outstanding of credit default swaps rose by 60% from \$6.4 to \$10.2 trillion between December 2004 and June 2005. Growth was particularly strong in multi-name contracts, whose notional amounts more than doubled to \$2.9 trillion. Single-name credit default swaps (CDS) increased by 43% to \$7.3 trillion. The ISDA market survey confirms a substantial growth of CDS notional principal outstanding volume from \$12.4 trillion (June 2005) to \$17.3 trillion (December 2005). This information confirms that the size of the market has increased significantly in nominal terms, also because it does not include a substantial amount of CDS contracts that have been terminated before maturity by TriOptima (since inception in November 2004 until February 2006 around \$4.5 trillion of notional volumes have been terminated).

a) *Credit risk derivatives* have facilitated the separate trading of credit risk, and thereby enhanced the management of issuer/debtor credit risk. The management of issuer/debtor credit risk may be considered in terms of transfer, aggregation and structuring. Single issuer/debtor credit risk transfer is possible thanks to financial instruments such as *CDS*, which allow credit risk to be singled out from other sources of risk (e.g. interest rate or currency risk).<sup>1</sup> Subsequently, the aggregation of single credit risk into *portfolio CDS* (e.g. CDS indices<sup>2</sup>, facilitating credit risk diversification, make risk-return profiles less sensitive to the performance of individual issuers. In addition, these instruments are particularly efficient as hedging tools for dealers when issuing or trading structured credit products such as cash-flow CDOs or synthetic CDOs, which package a portfolio of corporate bonds or CDS respectively and slice them into tranches.

b) *Common market standards* in credit derivatives are continuously promoted both for trading and post-trading services: legal documentation (e.g. ISDA novation and settlement protocols), language for financial data communication (e.g. Financial Products Mark-up Language), trade confirmation formats, definitions of reference entities in credit derivatives (e.g. Reference Entity Database), CDS indices standards (e.g. as managed by the International Index Company), regular tradable credit fixings (as developed by Creditex and Markit), etc.

c) *Electronic trading services and transparency*: a number of structural developments have occurred, in particular targeting credit derivatives where an increasing number of inter-dealer platforms are operating. In addition, there is a growing trend for integrating trading services, information delivery and analytical tools into single platforms for credit-related financial instruments. Finally, considerable attention is also being devoted to price transparency on CDS (also provided by Markit) as well as applications offering post-trading efficiency gains through straight-through processing, trade confirmation/matching, multilateral early termination or portfolio reconciliation (e.g. DTCC, GlobeOp, T-Zero, Scrittura, TriOptima).

d) In the underlying cash market, ongoing structural developments in the *repo and securities lending* market are having a notable impact on liquidity. Tri-party agents, central securities depositories, inter-dealer ETPs or voicebrokers are constantly enhancing their services. Moreover, there are demand-driven efforts to expand their services to other less traditional asset classes, including corporate bonds. The International Capital Markets Association

1 Other risks which cannot as yet be traded, such as liquidity risks, are being examined by market participants. For instance, the CDS-bond basis expresses the degree of dislocation between the cash and CDS markets. Liquidity situation and supply/demand imbalances may be reflected in the development of the CDS-bond basis. See also the Appendix.

2 After the June 2004 merger into a unique set of CDS indices, these standardised financial instruments have become particularly important for investment, trading and hedging strategies in various regional and sectoral markets.



European repo market survey number 9, conducted in June 2005 and published in September 2005, recalls that “the share of collateral issued in EU countries accounted for by government bonds fell to 85.7%, its lowest level ever in the survey (since 2001 when it was 91.2%) and down from 87.8% in December 2004”. Finally, important transparency enhancements have been promoted by market-driven initiatives in the securities lending market (see DataExplorer). These initiatives, together with a broader investor universe interested in securities lending, help reduce funding/borrowing costs as cash and securities become more easily available.

#### 4.1 THE IMPACT OF RECENT INNOVATIONS IN CREDIT MARKETS ON THE CONCEPT OF SEARCH AND SYSTEMIC LIQUIDITY

One of the most significant financial innovations in recent years has been the creation of liquid instruments that facilitate the separate trading of credit risk. Single-name CDS are the building blocks of those instruments. CDS contracts have nurtured a more liquid secondary market in credit for two main reasons. First, CDS contracts are more standardised than traditional credit risk transfer instruments. Second, CDS contracts allow market participants to go long credit risk without a cash payment, and go short credit risk with less difficulty and at lower cost than with corporate bonds.

##### IMPACT ON SEARCH LIQUIDITY

The possibility to trade credit risk separately using credit derivatives is likely to have an impact on *search liquidity* in the following way: in the past, market-makers in credit markets were constrained in their ability to provide liquidity because of limits on the amount of credit exposure they could have on one company or sector. More efficient *hedging* strategies, facilitated by credit derivatives, have helped market-makers to trade credit risk more efficiently while employing less capital or enhancing the productivity of the existing capital. Credit derivatives allow market-makers to hold their inventory of bonds while remaining neutral in terms of credit risk.<sup>31</sup> As a consequence, there is less urgency to find a counterparty when intermediating a trade. At the same time, while in the past larger inventories were needed to intermediate corporate bonds, now many more market participants can trade credit derivatives

without holding the bond or without knowing where to find it, thereby increasing the ability to intermediate credit risk exposures with limited *funding costs and use of capital*.

Moreover, the ability to take new credit positions, repackage them into structured credit products and sell them profitably, for instance in order to meet investors’ demand for diversified collateralised debt obligation (CDO) portfolios, has reduced the risk of having to hold an asset for a prolonged period of time. Since credit derivatives do not involve an upfront funding obligation, they have also reduced funding costs and risks when keeping a position open. Finally, traders’ costs and risks for *pricing* bonds are reduced. This is a direct consequence of the increased price transparency in the CDS market, which is increasingly accepted as a *reference price source* against which corporate bonds are priced.

In sum, it is likely that financial innovations in credit markets are *decreasing search costs*, especially via the reduction of hedging and funding costs and risks.

##### IMPACT ON SYSTEMIC LIQUIDITY

Credit derivatives have the potential to have a positive impact on systemic liquidity via the following channels:

- 1) *Credit derivatives can strengthen the resilience of the cash bond market to adverse market events.* The rapid development of credit derivatives is one of the reasons for the smooth behaviour of the corporate bond

31 See CRMPG II (2005).

markets in the aftermath of the GM and Ford credit rating downgrades in May 2005. Cash bond investors can effectively unwind their exposures to individual bond issuers or to entire sectors through the use of credit derivatives. This gives investors the possibility to withstand the immediate impact of possible downgrades and it would thus become less pressing to liquidate the affected issuers' bond holdings. Moreover, investors involved in trading-oriented strategies (such as some hedge funds) have a limited impact on the cash market as they typically trade in credit derivatives markets which offer them greater flexibility and liquidity, as well as facilitate the *dispersion of credit risk*.<sup>32</sup> This seems to some extent to have sheltered the cash market from a rise in volatility after the credit event and is believed to enhance systemic liquidity.

- 2) *Credit derivatives can provide additional liquidity during periods of market distress.* As explained very well in CRMPG II (2005), the credit derivatives market can provide additional liquidity during periods of market distress. Before the CDS market, a holder of a distressed or defaulted bond often had difficulty selling it, even at a reduced price. This is because cash bond traders are typically long risk as they own an inventory of bonds. As a result, they are often unwilling to purchase bonds and assume more risk in times of market stress. By contrast, credit derivative traders typically hold an inventory of protection (short risk), having bought protection through CDS. In distressed markets, investors may be able to reduce long risk positions by purchasing protection from credit derivatives traders, which in turn may be better placed to sell protection (i.e. go long risk) and change their inventory position from short risk to neutral. Furthermore, the CDS market creates natural buyers of defaulted bonds, as protection holders (short risk) buy bonds to deliver to the protection sellers (long risk). CDS markets, therefore, help to improve liquidity across many credit market segments.

However, while these factors may help to improve systemic liquidity in times of market distress, two important caveats need to be made. First, even though it is likely that the increasing use of credit derivatives reduces the need to buy/sell a bond to manage such credit risk, there may still be *reasons why many participants could continue to be forced to sell a specific corporate bond without delay*. Further work is needed to analyse the circumstances that could lead to such occurrences. In particular, a distinction should be made between a) firm-specific reasons (e.g. constrained credit risk management, reduction of credit lines due to counterparty risk, margin calls, early redemptions, etc.), b) market-specific reasons (e.g. changes to the benchmark, access to repo and securities lending, etc.) and c) regulatory reasons (e.g. accounting rules, capital requirements, etc.).

It should also be borne in mind that in the event of liquidity distress credit derivatives facilitate the hedging of credit risk but do not necessarily help to stabilise corporate bond prices, as they have only an indirect impact on the funding risk of market participants, i.e. the inability to raise liquid funds by offloading assets or borrowing.<sup>33</sup> To mitigate *funding risk*, a well-functioning repo and securities lending market also in distressed market conditions therefore remains essential.<sup>34</sup>

32 Over the last decade, new investors have entered the credit markets, including the credit risk transfer markets. These new participants, with differing risk management and investment objectives (including other banks seeking portfolio diversification), help to mitigate and absorb shocks to the financial system, which in the past affected primarily a few systemically important financial intermediaries. See IMF (2006), as well as Geithner (2006), for a recent speech on credit derivatives, risk management and related financial stability issues.

33 Various causes may trigger funding risk: (i) at a counterparty level because of deteriorating counterparty risk, margins and capital constraints, or (ii) at a market level because investors are forced to convert bonds into cash or market-makers face funding constraints. See also Borio (2004) and Brunnermeier (2005a).

34 In this sense the fact that a central bank may be willing to accept a wide variety of assets as collateral may be an important factor in mitigating funding risk under stress conditions.

The second caveat is that through their uninhibited liquidity during quiet times, credit derivatives have the ability to reinforce herd-like behaviour. Whereas crowded trades<sup>35</sup> in the cash bond market would reveal the crowd through quickly rising prices, crowded trades in the credit derivatives market are less visible and potentially larger still. Crowds and concentration cause systemic problems when they unwind. It is important to note that the driver of the problem here is not the credit instrument, but the thinking behind the crowd. We will return to this important point in the next section.

#### 4.2 HOW DOES THE INCREASING INTERACTION BETWEEN PLAIN VANILLA AND COMPLEX STRUCTURED CREDIT PRODUCTS AFFECT SYSTEMIC LIQUIDITY?

The standardised wholesale market in single-name CDS has promoted the creation of new composite products including bespoke synthetic CDOs and standardised CDS index tranches that transfer credit risk in portfolio form. The rapid growth of those composite products, which are often highly structured and leveraged and involve correlation and model risk, may have an impact on systemic liquidity.

On the one hand, *portfolio instruments allow for a more efficient dispersion of credit risk across a broadened investor base*. Those instruments provide the flexibility to customise financial transactions to match the individual risk/return profile of investors, and have become the main vehicle to transfer credit risk from banks to non-banks. Also, the enhanced price transparency, increased availability of analytical and risk management tools, the recent involvement of both electronic communication networks and multi-dealer to client platforms help to support this development. Fitch Ratings global derivative surveys confirm that the growth of this market is also driven by the greater variety of market participants, which now include a broader range of banks, insurance companies, hedge funds and, to a lesser extent, pension funds and asset managers. In particular it is reported that “hedge funds appear to be

adding liquidity to the credit markets, as a growing number of individual funds pursue differing strategies even within the same sectors”. As discussed in Chapter 3, a more heterogeneous investor base helps to increase systemic liquidity.

Synthetic portfolio instruments also increase interlinkages between different segments of the bond, loan and equity markets. Stronger interconnections between markets can help to retain a broader investor base, also in distressed market conditions, helping systemic liquidity.

On the other hand, *complex portfolio credit products have the potential to accentuate market volatility* for a number of reasons: first, the more structured the products, and hence the narrower the potential investor universe, the less liquid their markets will be in times of stress. Pricing and risk measurement models routinely presume markets will always have the same liquidity as they exhibit during quiet times. However, for complex credit products assumptions about asset liquidity may not hold, especially in times of stress, exacerbating price movements. Second, complex credit products tend to be highly leveraged, often relying on short-term financing. The likelihood that they have to be liquidated in the event of an adverse market environment is greater for such instruments, as is the potential market impact. Third, the risk that leveraged investors are in “crowded trades” seems to be quite pronounced for complex credit products. A firm-specific or adverse market event could trigger the attempted simultaneous unwinding of “crowded” positions. Fourth, Europe has been moving to more mark-to-market derivatives accounting, resulting in high mark-to-market sensitivity for synthetic CDOs, which may lead to forced selling in a downturn. The downgrade of the credit ratings of GM and Ford in May 2005

<sup>35</sup> CRMPG II (2005) defines a crowded trade “as multiple parties entering into correlated trading strategies across one or more markets, where the aggregate volume of trades in the market(s) is sufficient to constrain the ability of traders to exit from the position on a simultaneous basis without significantly impacting prevailing prices”.

demonstrated the potential of correlation-intensive products to dislocate parts of the credit markets, particularly from a liquidity perspective.<sup>36</sup>

While it is too early to draw concrete conclusions we can make a subtle but important distinction between instruments and their uses. Taken at face value, financial innovations such as credit derivatives have the clear capacity to increase market resilience. To the extent that they enhance hedging capabilities, keep trading strategies varied and make the investor base broader and more diversified, credit derivatives could have a positive impact on systemic liquidity, even in stressed market conditions. However, as there has not yet been a downturn of the credit cycle, this could not have been sufficiently tested. Guided by our framework, we are concerned that these instruments also provide a greater capacity for investors to crowd into trades than in the cash market, where such congestion would be more visible. Moreover, because these instruments have, to some extent, been shifted from the hands of credit experts (banks who originate credit instruments) to those who lack this expertise (general investors),<sup>37</sup> they may have indirectly led to a rise in the use of common sell “triggers” in valuations and correlations which lead to a crowd trying to exit a particular exposure or exposures at the same time. Our framework tells us that the focus of concern should shift from instruments to investor behaviour, in particular gaining a better overview of net exposures and concentrations, common strategies, as well as harmonised valuation and risk management techniques.

#### 4.3 HOW DOES THE INTERACTION BETWEEN CASH AND DERIVATIVE MARKETS CHALLENGE TRADITIONAL LIQUIDITY CONCEPTS AND MEASURES?

The enhanced trading of cash and derivative credit-related financial instruments deepens the *interaction between cash and derivatives markets*. This fact challenges the traditional concepts of trading liquidity: an asset is liquid

if a large size can be immediately executed with a limited impact on price.

- 1) *Quantitative measures of corporate bond liquidity*: Information on turnover of corporate bonds alone, while still important, is no longer sufficient to reflect the “real” activity in credit markets. In fact, relatively large size trades are increasingly executed in credit derivatives markets and to a lower extent in the corporate bond market.
- 2) *Efficient price formation and liquidation value*: When there is an idiosyncratic shock to the issuer credit risk, market participants tend to take positions first in the CDS market. As a consequence, changes in CDS spread levels are only priced into bond spreads in a second step, reversing the assumed pricing formation chain. The flexibility brought about by credit derivatives and the enhanced functioning of securities financing and lending facilities offer new investment, trading and hedging strategies to both dealers and investors. The former see their ability to provide liquidity at lower costs substantially enhanced, mainly thanks to more efficient and cheaper hedging tools; the latter are now able to exploit newly available arbitrage opportunities between the cash and the derivatives market, to manage more efficiently portfolio rebalancing or take desired credit/capital structure exposures. This affects the traditional way of measuring a price impact.

<sup>36</sup> These credit events demonstrated the model risk incurred by CDOs as assumptions in correlation trading models proved to be wrong. For example, prior to the GM-Ford downgrades, Morgan Stanley calculated that implied correlation among CDS index equity tranches had been running at 19% to 20%, but following those events it plunged to 9%. Price movements were exacerbated by the fact that leveraged investors tended to use similar models and risk management frameworks and, as a result of mark-to-market losses, had to unwind their positions in equity tranches simultaneously. As a consequence prices in equity tranches plunged, dislocating temporarily also the market for mezzanine tranches and the single credit default swap market that was used to hedge positions.

<sup>37</sup> Although the welfare consequences of losses by households can be significant, it can also be argued that they or their investment agents have much larger equity and a lower probability of default.

As a result of all the new investment and trading strategies for both dealers and investors, the price formation for some corporate bonds can no longer be treated separately from derivative instruments.<sup>38</sup> To illustrate this point, a lower bond turnover activity is not in contradiction with improved liquidity and perhaps lower bid-ask spreads.

instrument may be affected. Instead of being only attached to an individual corporate bond (asset-specific), it could be related to an issuer credit risk, and therefore be regarded as issuer-specific.<sup>39</sup>

## 5 THE ROLE OF TRANSPARENCY: SOME PRELIMINARY THOUGHTS

- 3) *New indicators reflecting changed liquidity conditions:* As described in more detail in the Appendix, the so-called default swap basis or CDS-bond basis, namely the difference between the CDS spread and the par bond spread, expresses the degree of dislocation between the cash and the (unfunded) CDS market. A relevant proportion of the basis and its changes may be explained in terms of liquidity factors and supply/demand imbalances. When there are no credit risk shocks, changes to the basis mostly reflect variations in funding risk, depending closely on funding costs and the functioning of the repo/securities lending market. Compared with the past, trading in corporate bonds has less to do with issuer credit risk (due to the alternative investment/hedging tool in the CDS market) and more to do with funding risk.

- 4) *Is liquidity still an “asset-specific” or an “issuer-specific” feature?* Liquidity may be considered as an asset feature for a well-identified corporate bond, for instance when a benchmark bond or index constituents have to be identified. By contrast, a CDS is a single instrument whose delivery option may refer to various obligations from the same issuer, not just to one particular corporate bond. The “novelty” is that there is a whole market for each individual issuer credit risk, with many instruments (not just the corporate bond) available which are differentiated by several types of risks (e.g. credit spread, default exposure, recovery rate). To the extent that a single-name credit derivative is increasingly efficient and liquid, the liquidity concept of the underlying

How does trading transparency fit into our model? Trading information has both a pre-trade and a post-trade dimension. Our focus is on the latter dimension, since the potential requirement to disclose the information on recently completed trades (real time) is the main concern of most bond market participants. Their concerns are summarised in the Appendix to this paper.

Let us look first at post-trade transparency and systemic liquidity. The crucial question we need to ask is can the observation of trading volumes and prices possibly increase the diversity of behaviour or reduce it? It would seem to us that in a world characterised by constraints (of foresight, liquidity and capital), the real-time observation of high turnover and falling prices in a bond that seldom trades is more likely to motivate a seller than a buyer. At the very least it raises the risk that a contrarian buyer may have to sell at a lower price unless he can afford to wait. Against this background, real-time post-trade transparency is unlikely to improve systemic liquidity. That is not to say that the opposite holds, i.e. that low post-trade transparency improves systemic liquidity, as it is likely that the information gap left by an absence of post-trade transparency would, in stressful times, be filled by speculative rumours.

<sup>38</sup> This is due to the strategies involving both CDS and corporate bonds (possibly financed in the repo market), which are targeted at exploiting mispricings. The increased activity in the CDS and credit repo market leads to a compression of bid/offer spreads, even if outright transactions on corporate bonds are not increased.

<sup>39</sup> This is also consistent with the fact that dealers’ desks are increasingly segmented by type of risks (interest rate risk, currency risk and credit risk) rather than by type of instruments, unless more complex structured credit products are involved.



What about search liquidity? Earlier we mentioned that search liquidity has two components, an estimate of search costs, and an uncertainty premium around that estimate. Observing trading turnover and patterns could be used to develop a clearer picture of the ability to find buyers or sellers at any one time. This picture could reduce uncertainty and information asymmetry, which should improve search liquidity marginally, though it is not clear that it would reduce the estimate of search costs as one would still not know where to look for a buyer if one wanted to sell or vice versa.

Pre-trade-transparency, by alerting buyers and sellers to the dealers or the multilateral trading facility, may have a bigger, if again, indirect impact on reducing search costs and improving price discovery. This search difficulty is mitigated when pre-trade transparency can be used to find dealers and through them learn about demand and supply, or more generally when it is known which market or multilateral trading facility attracts activity in the financial instruments to be traded.

In a similar way, transparency of holdings could support search liquidity. If a buyer of a rare bond were to know the current and past holders, the cost of finding a seller – search liquidity – would be lower. However, it is recognised that transparency of holdings could lead to a substantial reduction in systemic liquidity if the market begins to front run a sale by an investor, whose holding in a particular bond is badly underwater and hitting its risk limit. It is alleged that knowledge of LTCM's portfolio helped banks front run LTCM's attempt to get out of certain markets, therefore collapsing liquidity and prices (see also Brunnermeier 2005b). This is why the focus of the debate has been on pre- and post-trade transparency of flows and prices.

It should also be noted that search costs and uncertainty could be reduced by enhanced transparency in the CDS market. First, in the case of liquid CDS single names, transparency in the CDS market may make real-time post-

trade transparency for price discovery purposes in corporate bonds less important or even unnecessary. Second, it facilitates the monitoring of the CDS-bond basis and fosters its trading, which in turn increases search liquidity and price efficiency. Third, as an increasing number of market participants can trade credit derivatives without holding the bond, it may become less crucial, unless there is a high risk of default,<sup>40</sup> to know who owns the deliverable bonds referenced to highly traded single-name CDS.

Our first observation, therefore, is that while improving trading liquidity is an important goal, it is not necessarily well served by focusing on real-time post-trade transparency. It does not improve systemic liquidity, and at times could make it worse. It does reduce the uncertainty component of search liquidity, but only improves search liquidity by acting as a proxy for more detailed pre-trade transparency or some form of holdings transparency. That is not to say that post-trade transparency could not play an important role in the broader context of market efficiency and investor protection. Indeed, post-trade transparency may be helpful in measuring liquidity for portfolio valuation and collateral purposes, and for policing best execution rules. But in order to avoid potentially negative implications for systemic liquidity, it would have to be published with an appropriate delay. CDS transparency would also help search liquidity without harming systemic liquidity.

There is an interesting parallel here with post-trade transparency of foreign exchange intervention by central banks. Rightly or wrongly, the revealed preference during the last three major foreign exchange crises (EMS, 1992-1993, Mexico, 1994-1995, Asia, 1997-1998) is for central banks to reduce post-trade

<sup>40</sup> In this specific context, the availability of holding information may: (i) facilitate the search for defaulted bond of buyers of protection who have to physically deliver the bond after a credit event has been notified; (ii) ease the (physical) settlement process of CDS contracts in the event of an issuer default. Both aspects avoid triggering shock events which are negative for systemic liquidity.

transparency during an environment where they are worried about systemic issues, but to increase post-trade transparency during quiet times. Since these crises, central banks have moved towards greater transparency in reserve changes, but those that have increased the frequency of this transparency do not yet appear to have received much benefit in terms of increased investor confidence.<sup>41</sup>

One could think of a couple of adaptations to a rule on the transparency of holdings that improved search liquidity without damaging systemic liquidity. One solution is *delayed transparency of holdings*. By providing data on who held an asset with an appropriate delay and frequency, there is little risk of systemic liquidity worsening, as there is a good probability that holdings have changed. However, by providing information on the players who may be holding a bond, search liquidity would be improved. An alternative, which is not mutually exclusive, would be to disclose who currently holds what assets, but to provide no information on quantities above a minimal threshold. Furthermore, as hinted at above, *properly delayed post-trade transparency of aggregated prices and volumes*, for each financial instrument and by trading venue, may increase search liquidity without having an impact on systemic liquidity. While the identification of who has carried out the trade may affect systemic liquidity, disclosing where certain financial instruments are generally traded can help search liquidity without worsening systemic liquidity.

With adaptation we may be able to improve search liquidity without harming systemic liquidity, but neither pre- nor post-trade transparency is likely to improve systemic liquidity. It is likely that other forms of transparency and detail would be more valuable. The interaction between cash and derivative credit instruments makes it more difficult to monitor and understand homogeneous investor behaviour based on cash trading and holding information data only. However, assessing the amount of risk transferred through credit

derivative instruments raises methodological challenges, and is the subject of ongoing complex research. In this regard, more and better data on *net credit risk exposures and on concentration* – which tend to build up easily in highly leveraged and opaque markets such as the synthetic CDO market – could have considerable benefits in mitigating current shortcomings in liquidity risk management.<sup>42</sup> In fact, CRMPG II (2005) identified the occurrence of crowded trades and a concentration of large exposures as a major potential risk that makes it difficult to estimate accurately a liquidity stress.<sup>43</sup>

Our framework suggests that, to a large extent, transparency initiatives have so far been tangential to issues of “search liquidity” and deaf to issues of “systemic liquidity”, and on occasions even harmful. Yet systemic liquidity is probably the more pressing concern for central banks. Systemic liquidity is about homogeneity, concentration and behaviour, and bringing more transparency to these issues remains both vital and neglected.

## 6 CONCLUSION

The concept of trading liquidity in non-government bond markets remains elusive. The academic literature examining factors that drive trading liquidity in corporate bond markets is sparse. Much of the literature is based on experience of equity markets. As is argued in Chapter 2, the numerous structural differences between equities and bonds make it difficult to transfer findings from the equity to the bond market. It is also difficult to draw lessons from

<sup>41</sup> See Metcalfe (2003).

<sup>42</sup> Leading indicators of distress have been developed only for currency markets (see IMF 2002) and for some liquid equity and treasury markets (see Tarashev 2003), where data are more easily available.

<sup>43</sup> See also IMF (2006) and Joint Forum (2005). Finally, Fitch (2005d) highlights that “existing standards of financial disclosure do not provide enough of an insight into firm level positions and exposures, particularly with reference to how credit derivatives and credit structured products are used to either mitigate, diversify or take on additional risks”.

the US experience with enhanced trading transparency in corporate bond markets due to the fundamental structural differences between the US and EU bond markets.

In this paper we do not claim to have brought trading liquidity in non-government bond markets out of the shadows and into the sunlight, but the framework and concepts discussed here may help to bring greater definition. Our simple analytical framework for trading liquidity should be applicable also to European corporate bonds that trade relatively seldom. It distinguishes between two types of liquidity, search and systemic liquidity, which may act against each other, depending on market conditions. During “quiet” times, the liquidity premium is driven by “search” costs, i.e. the cost in time, information asymmetries, and capital, funding, inventory and research costs required for a trader to locate a willing buyer for an asset that he has purchased. In distressed market conditions, the driver of the liquidity premium is the homogeneity of investors. If investors are homogeneous in their behaviour, the trading liquidity disappears down a black hole. This framework makes it possible to examine the search or systemic avenues along which any development, be it financial innovation or improved transparency, will have an impact on liquidity.

The possibility to trade separately credit risk via credit derivatives is likely to reduce search costs by improving the ability of dealers to manage and hedge credit risks, also in large sizes. Credit derivatives also have the potential to affect positively systemic liquidity, since they lessen the urgency or the need to liquidate a bond subject to an adverse market. Moreover, they may provide additional liquidity during periods of market distress, since credit derivative desks could be better positioned to increase their credit risk exposure than cash investors. Finally, the creation of new composite products that transfer credit risk in portfolio form have allowed for the dispersion of credit risk across a broadened investor base, with the potential for increasing diversity in behaviour. Overall, it

is too early to draw any conclusions about whether financial innovations such as credit risk derivatives have increased market resilience. To the extent that they enhance hedging capabilities, keep trading strategies varied and make the investor base broader and more diversified, also in distressed market conditions, credit derivatives may have a positive impact on systemic liquidity.

However, there has not been a downturn of the credit cycle yet, hence it has not been possible to test this sufficiently, also because credit derivatives provide a greater capacity for investors to crowd into trades than in the cash market where such congestion would be more visible. Crowding and behaviour homogeneity will reduce systemic liquidity. Moreover, because these instruments have, to some extent, been shifted from the hands of credit experts to those who lack this expertise, these instruments may have indirectly led to a rise in the use of common sell “triggers” in valuations and correlations, which lead to a crowd trying to exit a particular exposure or exposures at the same time.

Our framework tells us that the focus of concern should shift from instruments and turnover to behaviour and to considering how best to encourage liquidity increasing behaviour rather than liquidity reducing behaviour. A useful analogy might be that we have introduced a new product: “insurance” that appears to be used by people not looking for insurance. It is not the instrument which creates liquidity concerns but the way market participants may be using them.

The conceptual framework also allows us to shed some light on the ongoing debate into what is the optimal degree of trading transparency in secondary bond markets. We believe that, from the perspective of promoting liquidity, the focus on post-trade transparency may be wrong. Post-trade transparency only supports search liquidity by acting as a proxy for detailed pre-trade transparency and some form of holdings transparency, while it may

harm systemic liquidity if it is disclosed real time. The observation of high trading volumes and rapidly changing prices may reduce the diversity of investor behaviour in stressed market conditions. Focusing on encouraging more detailed pre-trade transparency and forms of transparency of bond holdings may prove more useful in terms of improving search liquidity. And if transparency of holdings was delayed, or neutral to quantity, it may not negatively affect systemic liquidity.

We do not see how pre- or post-trade transparency can improve systemic liquidity. But other forms of transparency may. The most promising avenue could be an enhanced availability of data on net exposures or concentration of positions. This type of information could indeed help market participants and competent authorities to properly value, manage and price the increasing risks of homogeneous behaviour, which possibly causes crowded trades, makes the market more vulnerable to shocks and thereby threatens systemic liquidity.





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## APPENDIX

The ECB currently hosts a series of seminars where financial market participants present their views and share their market knowledge and expertise in a relatively informal environment with interested experts from various ECB business areas. The primary objective has been twofold: a) to gain a better understanding of how credit markets function and of the different roles various market participants play in the market; and b) to perform a first fact-finding exercise in order to understand market participants' concerns as regards the possible extension of transparency requirements to debt instruments. This annex aims to provide an initial summary of the evidence collected so far during the seminars at the ECB.

## HOW MARKET PARTICIPANTS DEFINE LIQUIDITY

The general view of most of the participants was that a well-functioning market is a market in which buyers and sellers can:

- make well-informed investment and risk management decisions;
- transact business at reasonable cost;
- have confidence in the prices they receive;
- have certainty about the settlement and their entitlement to the property of the acquired asset;
- value portfolios reasonably and accurately.

Liquidity in the traditional sense is *defined* as the ability to execute transactions at short notice, at low cost and with little impact on price. It depends to a great extent on the microstructure of the particular market and generalisations about liquidity are often not possible.<sup>44</sup> It was also argued that liquidity is important to attract investors and borrowers, to allow proper asset and liability management and to promote market resilience to crises. A

rather common view was that it is restrictive to relate liquidity only to turnover and narrow bid-ask spreads, and to expect that liquidity is stable and symmetrical for sales and purchases. In the opinion of many participants, an important determinant of liquidity was the diversity in the investor base. A rather exhaustive list of factors affecting bond market liquidity was provided.<sup>45</sup> Some participants argued that what is important is not just the level of liquidity but also its variability under normal and especially stress conditions. There was another dimension to the definition of liquidity when it was said to be important to distinguish between the ability or commitment to provide two-way prices (usually very difficult in corporate bonds) and the relatively easier to provide “bid-side liquidity” (i.e. the ability of the dealer to show a binding price at which he is willing to buy a bond from the bond holder) that most institutional investors are interested in, because it gives them the opportunity to liquidate their bond position without delay.

## HOW MARKET PARTICIPANTS MEASURE LIQUIDITY

Concerning the measurability of liquidity, market participants generally confirmed that it is very difficult to measure corporate bond liquidity risk, not least because of the unavailability of trading data. No straightforward measure seems to exist at present. However, there are some indicators which may provide some information that allow important changes in liquidity conditions to be observed. When relevant data are available, the so-called default swap basis or CDS-bond basis, namely the difference between the CDS spread and the cash bond spread, is under constant examination by market participants, mainly for trading purposes. Although in theory there is a risk-free

44 An ideally functioning market would be characterised by maximal and stable liquidity. In such a market, prices would not be driven by shifts in liquidity and would entirely reflect fundamentals.

45 Namely multiplicity of issues, size of issue, capital required to support liquidity, central bank eligibility, repo market, time since issuance, credit rating, ability to hedge interest rate risk, ability to hedge credit risk, diversity and type of investors, Business to Business (B2B) and B2Customer trading platforms,

arbitrage opportunity between the two spreads, which should lead to a basis of zero, there are a number of reasons why such a spread exists. Some factors are described as fundamental because they relate to the precise specification of a CDS contract that makes it different from a cash bond. Others are described as market factors because they refer to the nature of the market in which cash and CDS (which is an unfunded instrument) are traded.<sup>46</sup> The CDS-bond basis expresses the degree of dislocation between the cash and CDS markets. Increasing empirical evidence and some anecdotal evidence by market participants suggests that a significant proportion of the basis and its changes may be explained in terms of liquidity factors and supply/demand imbalances.

Under normal conditions, if credit spreads narrow, bid-offer spreads normally shrink (both for cash and derivatives) but, more importantly, the cost of funding is cheaper. In such a scenario the basis tends to increase up to a certain potential cap, when market players will find it more convenient to sell the bond and sell protection (arbitrage opportunity). Such “positive basis trades” increase price efficiency and reduce mispricing. However, it is constrained by the difficulty of borrowing and shorting corporate bonds. An increasingly efficient reverse repo/securities lending market in corporate bonds may mitigate such constraints and further close mispricings.

In *stressed* market conditions, when the source of stress is the cost of funding, the basis can become more negative (or cheaper). This is because investors/banks whose funding costs increase will prefer to sell protection rather than buy the bond. The possibility of funding the position on repo, at cheaper funding costs, is important as it provides a floor to the basis and accordingly to price dislocations between the cash and derivatives markets. This is particularly the case when firms face constraints when using their own balance sheets or increased costs related to uncollateralised borrowing. In fact, the so-called “negative basis trade” implies buying the bond and buying CDS protection for

the same reference entity. The possibility of executing such a trade, cheaply financed on repo, attracts other “natural” buyers in a market of forced sellers, thereby increasing liquidity and reducing the price impact in the market. When the source of stress is related to idiosyncratic issuer credit risk, the basis can become more positive, reflecting attempts by investors/banks to buy protection in the more liquid CDS market instead of selling the more illiquid bonds.

The CDS-bond basis is the result of a trading activity which is nowadays very frequent, although there are no longer as many arbitrage opportunities as there were recently. Lower funding costs and more liquid single-name CDS markets allow relatively sophisticated unconstrained investors to better exploit arbitrage opportunities between the cash and the derivative markets, thereby promoting price efficiency and liquidity.

## FUNCTIONING/STRUCTURE/ORGANISATION OF CREDIT MARKETS

The bond markets have, over time, developed certain structures and standards that serve them well in fulfilling their role of allocating resources between investors and borrowers. Certain specific observations and recent innovations worth mentioning are summarised below.

One recent trend, especially significant in the European markets with their highly competitive environment, is the *growing importance of electronic trading platforms* (ETPs), which now take a lion’s share in trading the more liquid bond sectors (especially government bonds) in both the dealer-to-dealer and dealer-to-client spaces. Via a concentration of buyers and sellers in one place, which makes ETPs similar to exchanges, ETPs can significantly improve secondary market liquidity; however the trading taking place on the ETP should still be considered mainly OTC and not exchange-based, as it involves bilateral trading and

<sup>46</sup> See also McAdie (2001).

clearing and settlement relationships. ETPs may be either inter-dealer (B2B) platforms or dealer-to-client (B2C) platforms (including both multiple- and single-dealer systems).

Inter-dealer platforms tend to focus on homogeneous financial instruments with high trading frequency and volumes, generally with limited issuer credit risk (e.g. government bonds, supranationals, Pfandbriefe, etc.) and low information risk. Their contribution to market functioning is mainly in terms of efficient trading and post-trading services. Dealer-to-customer platforms allow trading in both government and corporate bonds, yet they currently seem better placed to provide markets in corporate or other less frequently traded bonds. Moreover, most investment firms have their own single dealer platforms, which they generally use to offer their inventory. One of the rather remarkable developments, benefiting mainly investors, is the integration of the trading platforms and information delivery and financial analysis services which has taken place over the past few years.

The *structural differences between the bond and equity markets*, and also between the US and European markets, have been highlighted by several participants, as they have a direct impact on how the markets function.

Unlike equities, with their centralised trading on exchanges, bonds have traditionally traded bilaterally in the over-the-counter (OTC) market. The reasons behind this fundamental difference in market structure are rather obvious: while there is usually just one single equity issue by a particular corporate issuer to which fungible tranches can be added over time, the same issuer may have at any moment in time up to several hundred bond issues outstanding with different features (e.g. maturity, coupon rate, currency etc.). The lack of homogeneity makes bilateral negotiation necessary as details need to be agreed between buyer and seller before a transaction can be concluded. The concentration of equity trades in an exchange was also deemed necessary for enhancing

liquidity, as well as other reasons, including investor protection. As bond holders have traditionally been large institutional investors who are more likely to be able to look after their interests, the issue of investor protection was not so pressing in the bond markets.

*Differences between the US and European bond markets* were mentioned several times during the presentations, and they are particularly important for the functioning of the corporate bond markets. In European markets the dealers usually act as principals to the transaction, buying the bonds in their own name. There are usually more dealers competing for a trade simultaneously and the prices shown to the investors are often executable, meaning that the dealer may end up with a bond position on his books he has to finance and hedge for some time before a buyer can be found. While in the United States this model prevails as well, anecdotal evidence suggests that the practice of dealers acting on an agency basis (where they work out a sell order which is often exclusive for a client and when a buyer is found the transaction is completed without the dealers committing their own capital) is more widespread than in Europe, especially in less liquid segments of the market.

While these differences have a direct bearing on the market-making ability and appetite of dealers, they also affect the *level of transparency* in the two markets. Transparency was significantly improved with the more widespread use of ETPs, especially in the European markets. The ETPs play a key role in creating the potential for a high degree of transparency across the whole trading process. Participants in trading platforms are generally able to view and compare quotes, which may be executable for approved customers of the dealers, or indicative. This *pre-trade transparency* facilitates both competitive pricing and investors' ability to execute at the best available price among those offered by dealers on a multi-dealer platform. Pre-trade prices are usually made available to non-platform participants via distribution networks, but on an indicative basis

only and often at a cost. Well-established pre-trade price transparency exists as provided by commercial data providers or for approved customers of the dealers on dealer-to-customer trading platforms. This is particularly true with respect to European government and high-grade bonds, although in the lower credit quality (i.e. less liquid) markets it may still be somewhat limited.<sup>47</sup> There is, however, little pre-trade price visibility for the retail investor.

In terms of *post-trade transparency*, ETPs generally provide reference and closing prices, together with audit trail information to prove best execution to customers, regulators and other relevant parties. In addition, some statistics on individual and market performance are provided to both clients and dealers by most trading platforms. Generally, limited information that is only aggregated by market sector is available on traded volumes. Dealers, which are often the major stakeholders of ETPs, are normally reluctant to allow ETPs to make this information available to other market participants. Post-trade prices of approximately 11,000 corporate bonds (estimated at 70% to 80% of the total) are also reported by more than 40 market-makers to various European regulators via ICMA's TRAX system and published on a next day basis. Individual volume averages are published once a month, helping to gauge liquidity (daily volumes are not available for the time being). In general, industry associations (e.g. BMA 2005) confirm that a great deal of post-trade price (but not necessarily volume) transparency exists in European government and high-grade corporate bond markets for institutional investors. A certain level of post-trade price information is also accessible to the retail sector. However, this information is available on a more delayed and not very user-friendly basis for a more limited number of bonds and at a cost (although several platforms do make post-trade prices available free of charge on their websites on a delayed basis).

Concerning *bond holding transparency*, there may be various reasons for investors to disclose

their holdings (dealers would usually opt to refrain from disclosing their positions). The marketing incentives, where funds disclose publicly their holdings to attract investors, can be catered for by commercially available services. For example, several major financial services providers currently offer consolidated information on a number of funds' bond holdings, together with additional analytical tools. Regulatory requirements exist, too, for disclosing portfolio holdings. For instance, US registered mutual funds, insurance company funds and public pensions funds are mandated to report individual bond holdings' information at a semi-annual, quarterly and annual frequency respectively and normally within 60 days of the reporting date. In Europe, Registered Mutual Funds, Sicavs, Publicums Fonds, Unit Trusts & OEICs are requested to report on a semi-annual basis, typically with a 60-day delay.

Sometimes, thanks to specific agreements with investors or with some national industry representatives, services may be enhanced or doors opened to financial innovations which were not anticipated when the regulatory transparency requirements for holdings were mandated. For example, holding information may be collected with a higher frequency (monthly) and a shorter delay (30 days) but not necessarily publicly disseminated. The service provider is able to construct specific holding-based indices, which differ from the composition of the traditional bond indices, and offers to investors various complementary information which is available via ad-hoc asset managers' surveys.

In other cases, specific arrangements between the parties may grant dealers privileged access to investors' portfolios. Anecdotal evidence suggests that this is more frequently the case for insurance companies or pension funds which hold relatively less liquid bonds. In return dealers offer daily valuation services or identify ad-hoc trading opportunities.

<sup>47</sup> It was argued in this context that the limited availability of price indications may not necessarily be a result of a market failure but rather a mere expression of the fact that for illiquid instruments prices are simply not easy to obtain.

Furthermore, one market expert proposed his concept of transparency: a market may be considered transparent if there is full disclosure of information to regulators, who have a duty to disseminate information to market participants on where concentrations lie and where they are developing. Market disclosure of flows and positions should be full and complete, but delivered within different time horizons based on whether information can be abused by short-term traders. The speed with which information is disseminated is fairly crucial and may be problematic for certain market participants. For instance, arbitrageurs make markets more liquid, but they could not operate if their positions were made public instantly. The trade-off between liquidity and transparency is particularly relevant when investors focus on the short term.

Overall, there was consensus that many commercially-driven steps towards achieving pre-trade transparency have been taken in Europe. Regarding post-trade transparency, the industry is not ruling out considering market-driven initiatives to improve post-trade transparency, historical prices and volumes, before regulatory requirements impose more costs and ultimately disincentives to commit risk capital. However, if the objective is to have a complete database on EU trading activities, an EU regulatory intervention mandating relevant private entities to collect this information will probably be necessary. For the subsequent consolidation and dissemination, there was a consensus that (existing) market-led initiatives should be the driving forces.

#### CONCERNS WITH REGULATORY CHANGES AND PROPOSALS

The implementation of the Markets in Financial Instruments Directive (MiFID) will be a major milestone in terms of the functioning of the EU financial markets and the overall regulatory framework on investment services. The debate among market participants and regulators about the possible extension of transparency requirements to transactions in classes of

financial instruments other than shares<sup>48</sup> is gaining increasing attention by the whole financial markets community. This part of the Appendix attempts to collate market participants' concerns that may become relevant should more regulatory-driven transparency be mandated, as is sometimes suggested in the debates surrounding the implementation of the MiFID. The focus is therefore on the analysis of the potential impact of these measures on the functioning of the European corporate bond market from the viewpoint of market participants. Other regulatory considerations, such as investor protection and market integrity, are not considered.

Regarding *pre-trade transparency* information, investment firms with large euro-denominated corporate bond books object to the need for further pre-trade transparency and seem satisfied with the current level. It was also added that pre-trade transparency is commercially driven and that post-trade transparency would be of limited value to institutions with access to pre-trade transparency.

Moreover, smaller dealers noted that a more transparent environment (price, volumes and holdings) favours brokers (trades done on an agent basis) more than traders (trades done on a principal basis). However, large, leading dealers who commit a lot of capital with large trading books may be more competitive in a less transparent environment.

Another view considered the position of large investors, which can probably demand as much pre-trade transparency from their dealers as they need, and hence do not need any more.<sup>49</sup> In

48 The MiFID currently provides for the application of transparency rules to equity markets only. The European Commission has stated that rules on the transparency of transactions are needed to ensure the effective integration of Member States' financial markets, to promote the efficiency of the overall price formation process for financial instruments, and to assist the effective operation of "best execution" obligations. The European Commission has been mandated to submit a review on an extension of transparency rules to non-equity markets to the European Parliament by the end of October 2007.

49 This position was also confirmed by the intervention of the representative of the Association of British Insurers during a panel discussion at the ICMA Annual General Meeting held on 2 June 2005.



fact, large investors obtain higher price transparency than smaller investors and might therefore consider that this comparative advantage could be eroded if price transparency were legislated. It was also added that large issuers may not always support transparent and liquid bond markets. It is not always necessarily the case that the greater the transparency and liquidity of bonds, the lower the cost of capital.<sup>50</sup> Nevertheless, in terms of overall market benefits, the views were in favour of more transparency, which should not be pursued with regulations – a relatively heavy-handed and static instrument with which to handle dynamic and carefully-balanced markets. Another interesting recommendation was that the establishment of a transparency and liquidity rating system should be explored, if necessary sponsored by the public sector with a view to subsequent privatisation. It would imply some qualitative differentiation (with a rating or score) among assets with different levels of liquidity or which are subject to different transparency requirements. It would provide issuers with a strong incentive to improve the liquidity and price transparency of their issues.

As the debate on the possible changes to the price transparency regime has been going on for some time, market participants seem to be increasingly resigned to the fact that some form of post-trade transparency regulation will come in, and mostly as a result of the existence of TRACE in the United States. Market participants wish to be able to engage in an open debate with EU regulators to ensure that such a regulation, if any, is shaped in a way that takes account of the unique structure of the bond market, its diversity and innovative nature, as well as of the important differences between the state of the EU and US bond markets. The recent formation of the Global Capital Markets Board, comprising TBMA, ICMA and ISDA, should help to ensure that the industry speaks with one voice on this and other issues.

The experience with TRACE in the United States suggests that liquidity does not

necessarily dry up when post-trade transparency is enhanced. Along similar lines, the three recent academic publications based on TRACE data present the benefits of transparency in terms of a substantial reduction in transaction costs, particularly for retail trades but to some extent also for institutional investors. The availability of this information is also promoting a number of other structural developments and financial innovations for the US corporate bond market.<sup>51</sup> The evidence obtained from these studies is, however, often questioned because it is feared that the results, while showing correlation between the introduction of TRACE and a narrowing of bid-ask spreads (used as a measure for transaction costs), may not necessarily confirm causality. According to market participants, these studies, while using control groups to try to isolate the impact of transparency from other factors, do not take into account the parallel credit rally, the improvements in commercially driven pre-trade transparency or the positive contributions of the CDS market to the price discovery mechanism. Moreover, it is also mentioned that the historical TRACE data underlying the findings of the studies have not been made publicly available for independent review.<sup>52</sup> Against this background, when considering policies affecting a dealership market, the challenge is to take fully into account the trade-off of transparency with both liquidity and efficiency, in particular in the less liquid securities. With regard to the high yield sector, a survey commissioned by TBMA showed a number of concerns from the buy-side. Two-thirds of investors (and three-quarters of the most active investors, with below

50 In many cases, structured transactions, often privately placed and therefore highly illiquid, achieve a lower cost of borrowing for issuers. At the same time, it was acknowledged that large issuers would not be able to cover all their funding needs without the benchmark transactions.

51 Examples of these developments are: a) the launch of “active” corporate bond indices whose prices are weighted by effective TRACE volumes; b) the set-up of tools for the analysis of historical trading patterns; and c) the reported reduction and transparency of commissions charged by investment funds, etc.

52 In June 2006, the NASD published a “Notice to Members” requesting comments on its intention to provide public access to historic TRACE data that have not been publicly available in the past.

investment-grade trading volumes over USD1 billion) did not believe increased transparency to be beneficial to their ability to manage their portfolio, mainly due to the fear of close to real-time information dissemination. It is nevertheless increasingly recognised that more transparency can promote market culture, investor confidence and the ability of market participants to analyse and monitor the pattern of trading activity and make more informed investment/trading choices.

The greatest concern is now over a possible “big bang” scenario which mirrors exactly the MiFID equity transparency regime and targets primarily retail investor needs. In the United States, the implementation has been gradually piloted over the years by the self-regulatory organisation NASD, with the substantial involvement of the financial industry via the BMA. The TRACE system offers some level of disclosure “protections” for large trades and for non-investment grade bonds. At the same time, when considering the two alternatives of a) partial size information published in real time and b) full-size information published with an appropriate delay, the US approach favours the first option, whereas large EU dealers seem to prefer the second, normally with a one-day delay. This could possibly be attributed to the fact that in the United States there is much less pre-trade transparency than in the European Union and therefore real-time post-trade transparency provides comparable benefits to pre-trade transparency. According to US regulators, real-time dissemination is mainly a system cost issue and is not so much related to dealers’ hedging concerns, which would call for an additional degree of caution in the more fragmented European markets. Indeed, large dealers in particular fear that if post-trade transparency is too close to real-time dissemination, this will be costly from a system viewpoint, and particularly problematic for trading activity in relatively illiquid bonds.

Regarding post-trade transparency, in principle the market is much more open than in the past. However, the debate on the EU optimal

transparency regime and the way to pursue it has just begun and should take into account EU structural differences versus those in the United States, bond specificities versus equities, and the structural developments in the credit derivatives market. The major opposition appears to come from consolidated market leaders, who fear that the “big bang transparency” will change market microstructure and challenge their positions.



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