European High-Yield Bond Markets: transparency, liquidity, efficiency

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Abstract

This is a first empirical investigation of the microstructure of the European high-yield bond market. We collected information about the structure and workings of the market by interviewing several buy- and sell-side participants. We also collected trades and quotes data for about 150 euro-denominated bonds and 50 sterling-denominated bonds. We find on average three trades a day for the typical bond in our sample, both for euro- and for sterling-denominated securities. Such activity is similar to the investment grade market. But average trading volume is lower, reflecting smaller trade sizes. The number of dealers is lower than in the investment grade market and the most active dealers have a larger market share. This could limit risk bearing, competition, and liquidity. Yet, effective percentage spreads are reasonably tight, with a 2005 average between 0.20% and 0.36% for euro-denominated bonds, and between 0.35 and 0.42% for sterling ones. The 2003 average spread is between 0.44 and 0.65% for Euros and 0.68 and 0.73% for Sterling. These figures compare favourably with those estimated by Edwards et al (2006) and Goldstein et al (2006) for high-yield and BBB bonds for the US market in 2003.

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I) Introduction

Innovative and young entrepreneurial ventures are key to productivity growth and job creation. And yet, for such firms, access to funds can be quite difficult. They have little internal cash or physical assets to pledge as collateral, and asymmetric information problems are severe. Even for mature firms, asymmetric information problems can arise, making it difficult to incentivize managers and fund projects. In these contexts, risky debt – i.e., debt with non-zero default risk – can be an efficient financial contract. It enables good firms to signal their type (Myers and Majluf (1984), DeMarzo and Duffie (2000) and Biais and Mariotti (2005)) and it helps providing strong incentives to managers (Innes (1990), Biais, Mariotti, Plantin & Rochet (2007)). For young, innovative firms, such financial contracts can be engineered by venture capitalists (Kaplan & Stromberg, 2004), while, for mature firms, they can be designed by private equity funds or in the context of leveraged buy-outs (see e.g., Asquith, Mullins, and Wolff, 1989).

Banks can provide risky debt financing by extending loans. Alternatively, risky debt financing can be raised on the bond market. As explained on investinginbonds.com, the investor education website of the Securities Industry and Financial Markets Association: "High-yield bonds are issued by organizations that do not qualify for "investment grade" ratings …[i] Credit rating agencies evaluate issuers and assign ratings based on their opinions of the issuer's ability to pay interest and principal as scheduled. Those issuers with a greater risk of default—not paying interest or principal in a timely manner—are rated below investment grade. These issuers must pay a higher interest rate to attract investors to buy their bonds and to compensate them for the risks associated with investing in organizations of lower credit quality." The high-yield bond market developed significantly in the US in the 1980s. In Europe, this market is more recent. Its growth since the late 1990s has been quite strong.

Relative to loans, bonds offer the additional advantage that they are securities, traded on secondary markets. Such trading can enhance their liquidity, which increases their attractiveness to investors and thus lowers the cost of funds for firms. In addition, prices set on the secondary market can convey useful information about the value of the firm and its default risk. Such information is valuable for investors, firm managers and regulators. Of course, for these advantages of bonds over loans to materialize, it is necessary that the bond market be liquid and informationally efficient. The purpose of this paper is to study to what extent this is the case in the European high-yield bond market.

To conduct this study, we interviewed several market participants from the buy-side and the sell-side, to learn the workings of the market (see the list of the institutions interviewed in the Appendix.) We also collected high-frequency trades and quotes data. The universe of bonds we consider corresponds to the Merrill Lynch High-yield Constrained Bond Index, which is viewed by the majority of buy- and sell-side participants as the benchmark in this market. Merrill Lynch provided us with daily closing bids for the bonds in this index. ICMA provided us with a complete record of transaction prices in 2003, 2004 and 2005. We thus obtained data for about 150 euro-denominated bonds and 50 sterling ones, corresponding to 242,763 transactions.

We find that the typical bond in our sample trades on average three times a day, both for euro- and for sterling-denominated securities. Such trading frequency is similar to what was found for the investment grade segment of the European corporate bond market (see Biais and Declerck, 2006) and greater than what was found in the US for BBB corporate bonds (see Goldstein et al, 2006). This suggests that the European high-yield market is quite active, at least in relative terms. Note however that while trading activity is on the rise for the euro-denominated bonds in our sample, it is declining for the sterling ones.

We also find the number of dealers active in the high-yield market to be lower than in the investment grade market. Correspondingly, the most active dealers have a rather large market share. This could limit risk bearing, competition, and liquidity. Yet, we find that effective percentage spreads are reasonably tight, with a 2005 average between 0.20% and 0.36% for euro-denominated bonds and between 0.35% and 0.45% for sterling ones.

The present paper is, to our knowledge, the first high-frequency study of the European high-yield bond market. It complements several recent analyses of the US market.

Edwards et al (2006) offer a comprehensive study of the microstructure of the corporate bond market in the US, based on tick by tick transactions data from TRACE. High-yield bonds represent 22% of the bonds in their sample, 25% of the trades, and 30% of the volume. Thus, in their data as in ours, high-yield bonds and investment grade bonds trade with similar frequency. They find that high-yield bonds are almost twice as costly to trade as investment grade bonds. We find a similar relation between the spreads on high-yield bonds and investment grade bonds in the European market. Given that high-yield bonds are riskier, this is consistent with the predictions of standard market microstructure models (see, e.g., Biais et al, 2005.)

Alexander, Edwards, and Ferri (2000) examine the trading volume of a sample of high-yield corporate bonds reported on Nasdaq's Fixed Income Pricing System (FIPS). They find that the `mandatory' FIPS issues trade fairly actively and that trading volume is larger for bonds with larger issue size or that have been recently issued. Hotchkiss and Ronen (2002) also, rely on FIPS data. They analyze hourly and daily high-yield bond transaction prices. They find that high-yield bond prices are quite informationally efficient, and that stock prices do not lead bond prices. These results go beyond the scope of the present study, which concentrates on bonds and does not cover equities.

In the next section we describe the market, its evolution and its workings. In Section III, we describe our dataset. In Section IV, the empirical results are presented. Section V offers some concluding comments and discusses some policy implications.

II) The European high-yield bond market

This section offers background descriptive facts about the workings of the European high-yield bond market. It is mainly based on several interviews with market participants (the list of firms interviewed is provided in the Appendix.)

II.1) The development of the high-yield bond market

The high-yield bond market started developing in the US in the 1970s. This market boomed during the 1980s, in conjunction with takeovers, mergers and LBOs. As reported by De Bondt and Marqués (2004), there was a first peak in the total amount of outstanding of high-yield bonds in 1989 (above 40 billion dollars). After some decline in the early 1990s, the US high-yield bond market started growing again in the late 1990s. It continued expanding in the first years of the 21st century, benefiting from low interest rates and limited default rates. De Bondt and Marqués (2004) report that the total amount outstanding of dollar-denominated high-yield bonds in 2001 was above 80 billion dollars.

In Europe the market developed later. It picked up only after 1999, and benefited from the European monetary unification and financial integration. It also benefited from relatively low rates of default and interest rates over the recent years. In addition, as noted by de Bondt and Marqués (2004) and Altman (1998), the Euro area includes a large number of small and medium sized firms which do not have access to the investment grade segment but could issue high-yield bonds. While the European bond market initially concerned only a small number of large and safe issuers, it is now much deeper and broader, and smaller and riskier firms have started issuing bonds. This contributed to the growth of the European high-yield market. De Bondt and Marqués (2004) report that in 2001 the total amount outstanding of euro-denominated high-yield debt was above 20 billion Euros. In 2005, European high-yield issuance amounted to 26 billion Euros (source Fitch Ratings). A survey ran by the Bond Market Association found that the composition of the investor base in the European high-yield bond market was the following: investment funds held 41%, hedge funds 27%, commercial banks 15%, insurance companies and pension funds 13%, and the rest of the bonds was held by other categories of investors, including private clients and retail. These numbers highlight the importance of institutional investors in the high-yield bond market, and also the role of hedge funds.

Another element which contributed to the development of the bond market in general, and the high-yield bond market in particular, is the growth of the credit derivatives market (see Biais & Declerck, 2005). Credit default swaps (CDS) are insurance contracts against default risk. The party buying insurance (or “protection”) pays the seller a fixed premium each period until either default occurs or the contract matures. If the issuer defaults, the seller of protection

must pay the buyer. The CDS contract defines the occurrence of default, referred to as a "credit event," which can include: bankruptcy, obligation acceleration, obligation default, failure to pay, repudiation or moratorium, and restructuring. The CDS market is often more liquid than the cash market, because liquidity is more concentrated and short-sales are easier. This is not quite the case yet in the European high-yield market, although the number of high-yield issuers with actively traded CDS continues to grow and the prevalence of larger jumbo LBOs should increase the potential universe of high-yield issuers. Trading in CDS contracts enables market makers to hedge and unload risk. This makes them more willing to take position and provide liquidity. CDS prices also convey useful information to market participants about default risk. To the extent that CDS enable to better spread and share risk, they can make the market more resilient to shocks and default events.

II.2) Pricing high-yield bonds

While government and investment grade bonds are most often negotiated in terms of yields, valuations in the high-yield bond market are expressed in terms of prices, similarly to the equity market. The most important variable for pricing high yield bonds is default risk. Market participants have teams of analysts. They carefully evaluate default risk and its evolution. For high-yield bonds, the term structure of the yield curve matters less than for investment grade bonds and Treasuries. Maturity plays less of a role in the high-yield market because, in practice, junk bonds are often short-lived: either the company underperforms and defaults on the bonds, or it performs well, in which case the bonds are often called (see the empirical analysis of Asquith et al., 1989.).

To discuss the relation between the performance of the firm and the value of high-yield bonds, it is useful to first consider a simple model. Denote the value of the firm by *V*. If this firm was purely equity financed, then the value of stocks would vary proportionally to *V*. Now consider the alternative case where the firm is financed by external debt, while the equity is owned by the entrepreneur manager. Denote the face value of the debt by *D*. If V is quite large relative to *D*, then default risk is low. This corresponds to investment grades bonds. In this case, the value of the bond is mainly determined by the term structure of interest rates. On the other hand, if *V* is not much above *D*, then default risk is large. In that case, the value of the bond is mainly determined by *V*, similarly to the value of the stock. Thus, as regards the relation between the value of the security and the performance of the issuing firm, high-yield

bonds are closer to stocks than are investment grade bonds. Biais, Mariotti, Plantin and Rochet (2007) offer a dynamic model of security design which confirms this simple discussion. Empirically, Hotchkiss and Ronen (2002) show that the dynamics of the prices of high-yield bonds and stocks are intertwined, and bonds are not simply lagging stocks. This is indeed a feature of the equilibrium dynamics of risky bonds and stocks in Biais, Mariotti, Plantin and Rochet (2007.)

II.3) The primary market for high-yield bonds

Issue size is much lower than for investment grade bonds. Typical issue sizes are around one or two hundred million euros. Because covenants are more important for high default risk bonds, they are better documented in the high-yield market than in the investment grade market.

The number of active investors, participating in high-yield bond issues has increased. New players have appeared, notably hedge funds. This contributed to an increase in activity, both in the primary and the secondary market.

Issuance volume has not grown as much as investor participation, however, because other segments of the debt market compete with the bond market. A significant fraction of corporate financing via risky debt is done through privately issued loans. “The Economist” recently reported that the European leveraged loan market was larger than the high-yield bond market. [ii] These loans are often repackaged and sold. But these assets are not as liquid as bonds, and many investors active in the bond market do not have access to the syndicated loan market.

Primary issues of high-yield bonds are sold by syndicates of investment banks, with a lead manager and co-managers. These banks often play a key role in the supply of liquidity in the secondary market. De Bondt and Marqués (2004) find that the bulk of euro-denominated high-yield bonds have US banks as issuers. For the period 1998 to 2001, they report that for 57% of the issues the bookrunner had been Goldman, or Merrill, Credit Suisse First Boston or Salomon.

In the issuance process, investors express indications of interest to the investment bank. After this book building stage the underwriter sets the price and decides on the allocation. As in the case of investment grade bonds or of equity, the investment banks have discretion about the allocation of the bonds, i.e., they are not bound by rules, unlike in auctions. They tend to allocate good deals and particularly oversubscribed issues to those investors which are good customers in the secondary market. This creates a winner's curse risk and poor allocation for the other investors. This can prevent an efficient confrontation of supply and demand and an efficient allocation of bonds to investors. Problems on the primary market have significant consequences since, because of limited liquidity on the secondary market, investors often try to buy the bonds when they are issued.

II.4) Segments of the European high-yield bond market

There is a lot of heterogeneity across bonds in the high-yield market. sterling-denominated issues are smaller and sparser than euro-denominated issues. De Bondt and Marqués (2004) report that, in 2001, 75% of the European high-yield new issues were denominated in Euros, 17% in Sterling, 8% in Dollars, and 5% in other currencies. sterling-denominated issues tend to be purchased by buy-and-hold UK funds, which rarely sell them back. A large fraction of the buy-side participants intervene mostly in the euro-denominated segment of the market (and then hedge currency risk if necessary.) But, hedge funds will invest in sterling-denominated bonds, and hedge the currency risk if necessary, if they see profit opportunities in such operations. In the euro-denominated high-yield bond market, practitioners differentiate three segments: the first tier includes 40 actively traded high-yield bonds. For these "benchmarks" liquidity is good and the number of active market makers is satisfactory. The second tier is composed of about 50 bonds for which there is some limited liquidity and a few active market makers. The third tier is composed of illiquid bonds.

As mentioned above, the valuation of high-yield bonds mostly reflects the perception of their default risk. Thus, high-yield bonds are much less substitutable than government bonds, or, to a lower extent, investment grade bonds. The buy-side participants we interviewed will typically hold portfolios of high-yield bonds composed of 20 to 120 bonds. They will tend to buy bonds which, given their own research, they estimate to be cheap, in particular in terms of the pricing of their default risk. The investors we interviewed told us that liquidity is not a

first order criterion in their bond selection process. They can sometimes accept to hold a rather illiquid bond, if they find it cheap enough.

II.5) Trading high-yield bonds

Most trades are negotiated on the phone. The Bloomberg quoting system is not widely used, but Bloomberg messaging is. Thus, in the morning and sometimes during the day, brokers send investors messages with indications of interests in certain bonds, which can include quotes and size. Investors can respond to these messages by contacting the dealers on the phone. Electronic trading platforms are not significantly used in the high-yield market.

Transaction sizes in the high-yield market are smaller than in the investment grade market, typically between 50,000 and 2 million Euros. Bid-ask spreads are wider than for investment grade. Some market participants expressed the view that market makers can be reluctant to take positions in this market, because of the risk involved. They would rather match buyers and sellers, and are actually often referred to as "brokers." Wider spreads and lower liquidity in the high-yield market are consistent with the predictions of market microstructure models, given that risk is higher and adverse selection problems potentially more severe (see e.g., Biais, Glosten and Spatt, 2005.) Economic theory predicts that such features of the market should increase spreads and reduce depth.

The number of active market makers in the high-yield market is lower than in the investment grade bond market. For the most liquid high-yield bonds, 10 to 15 market makers would regularly quote prices. For the typical, moderately traded, high-yield bond the number of active market makers might range between 1 and 3. For the less liquid high-yield bonds, it can be hard to find a counterparty. For many high-yield bonds, the relatively small number of active market makers can hinder competition. This could be reinforced by the fact that market makers are often reluctant to supply liquidity if they are not the only one approached.[iii] This reluctance arises because market makers are afraid that their competitors might opportunistically take advantage of them after the trade.

The banks which supply liquidity in the secondary market are often those which underwrote the issue in the primary market. Those banks acquired, at the time of the issue, information

about the company and about who bought the bonds. This information is very valuable for market making. Other banks which were not in the underwriting syndicate, and did not follow the bond after the issue, are in a more difficult position to supply liquidity in the secondary market.

The repo market in high-yield bond is not very developed yet. One of the obstacles is that most securities used as collateral in a repo transaction need to be investment grade to be eligible for ECB monetary operations. Yet, the growing importance of hedge funds in the high-yield market has contributed to the development of repo transactions. Repo trades can be engineered only if some investors holding the security are willing to lend it, for a price. Hedge funds are more likely to engage in such combinations than more traditional, purely buy-and-hold, investors.

II.6) Information about trades and prices

Information in this market tends to be less widely available than in other financial markets.[iv] In contrast with the investment grade market, market participants do not heavily rely on the Bloomberg quoting system. Some buy-side participants told us that market makers do not let them print quotes or transfer them to an Excel file.

Greater reluctance to give up information on trades, quotes or direction than for investment grade bonds could stem from the very nature of high-yield bonds. The value of these bonds can be quite volatile and the scope for information asymmetry is greater than for investment grade bonds. Hence, building up positions is risky for market makers. This makes them reluctant to disclose information about their inventory positions.

Some fund managers also mentioned that it can be difficult to value funds in the high-yield market. Some market participants mentioned that pricing services offered by investment banks are not always reliable. For example, some market participants told us that pricing services can be provided by an administrative department of the bank, not closely linked to the traders. In such cases, prices can be quite different from the quotes at which actual trades could take place.

III) Data

We obtained from Merrill Lynch a time series of daily closing bid quotes for the high-yield bonds in their index. We also obtained, from ICMA, a complete record of all trades in a sample of high-yield bonds in 2003, 2004 and 2005. [v] This dataset includes the identity and rating of the traded bond, and the transaction's price, time-stamp, size and direction (buyer- or seller-initiated.)

We discarded from the data all the trades that took place between 11:00 p.m and 6:00 a.m (1695 trades), as well as the trades with a transaction value above 20 millions (167 trades) and those for which the price change relative to the last trade was greater than 10% in absolute value (207 trades). This leaves us with a total of 242,763 trades.

To give a graphic illustration of our transactions data, Figure 1 plots the time series of transaction prices for one randomly chosen euro-denominated bond (Scandinavian Airlines) in January, February and March 2004.

As can be seen in Table 1, Panel A, for euro-denominated bonds, the quotes dataset included 191 bonds in 2003, 229 in 2004 and 226 in 2005, while the transactions dataset included 75 bonds in 2003, 123 in 2004 and 153 in 2005. The number of bonds for which we have both quotes and trades is 65 in 2003, 115 in 2004 and 153 in 2005. Thus, the size of the sample increases with time. Such greater availability of data correlates with the development of the market, where more bonds are issued and traded.

Panel B of Table 1 gives similar information for sterling-denominated bonds. In that sample, the number of bonds for which we have both quotes and trades is 45 in 2003, 50 in 2004 and 48 in 2005. These numbers are smaller than their counterparts for euro-denominated bonds, and in addition the size of the sample does not increase markedly with time. This reflects the smaller size and lower development of the Sterling market relative to the Euro market.

All the bonds in our sample are in the Merrill Lynch index, which includes the most actively traded high-yield bonds. Note however that, for euro-denominated bonds our sample size, although admittedly limited, is larger than the number of bonds which participants evaluate to be very active (which is around 50 in the euro-denominated segment of the market.) Thus, our sample includes a large fraction of the market, with a variety of different types of bonds.

Table 2 presents the industry structure of our sample. For euro-denominated bonds, the three most frequent industries are capital goods, consumer goods, and basic industry. For sterling-denominated bonds, the most frequent industries also include capital goods & consumer goods, along with media and utilities.

Table 3 presents the credit risk structure of our sample. For euro-denominated bonds, the most frequent ratings are B1, B2 and B3. Thus, the sample is tilted towards the more creditworthy part of the high-yield market. For sterling-denominated bonds, the most frequent ratings also include B1, B2 and B3, along with riskier categories, such as BB1, BB3 or even C.

To summarize we have quotes and trades data on more than one hundred euro-denominated bonds and about 50 sterling-denominated bonds for 2004 and 2005 (a little bit less for 2003.) These bonds, which are included in the Merrill Lynch high-yield index represent a significant fraction of the universe of investible high-yield bonds in Europe. The structures of the euro- and sterling-denominated samples are not exactly the same: the Euro sample has more bonds and is more tilted towards relatively creditworthy bonds, mostly from the consumer goods or capital goods industries; the Sterling sample is smaller, includes riskier bonds and includes media and utility bonds in addition to capital and consumer goods.

IV) Empirical results

IV.1) Trading activity

Number of trades per day

Figure 2 depicts the average number of traders per bond and per day in our sample. Panel A presents the results obtained for bonds denominated in Euros. On average, the typical euro-

denominated bond in our sample trades a little bit less frequently than three times a day. This is quite high. For investment grades euro-denominated bonds, Biais and Declerck (2006) found that the average number of trades per bond and per day was 3. This suggests that, for the high-yield bonds in our sample, the level of trading activity is similar to its counterpart in the investment grade segment of the market. Note also that this relatively high level of activity is observed across most of the ratings in our sample: from B1 to BB3.

Figure 2 Panel B presents the results for the sterling-denominated bonds in our sample. Again, the average number of trades per day for a typical bond in our sample is slightly lower than 3. This is quite large, especially when one bears in mind that the corresponding average for sterling-denominated investment grade bonds is around 2. Thus, the sterling-denominated high-yield bonds in our sample are rather actively traded. This is particularly true for the BB1 to BB3 bonds, which are the most frequent ratings in our sterling sample.

This rather positive note about the Sterling market should be taken with a grain of salt, however. Panels C and D of Figure 2 depict the evolution of the average number of trades per day for the two currencies. Trading activity is on the rise for the Euro. This is consistent with the view that the European high-yield bond market is developing. For Sterling, in contrast, activity seems to be steadily declining.

To summarize: the high-yield bonds in our sample are rather actively traded. This, in part reflects that our sample includes (among others) some of the most liquid bonds in the European high-yield market, but this also suggests that this market is rather active.

Trading volume per day

We also computed the average trading volume per day and per bond in our sample. For the euro-denominated sample the average daily volume per bond is € 1.4 million in 2003, € 1 million in 2004 and € 1.34 million in 2005. For the sterling-denominated sample the average daily volume per bond (converted in €) is €1.34 million in 2003, €0.99 million in 2004 and €1.26 million in 2005.

For investment grade bonds, Biais and Declerck (2006) find that, for euro-denominated bonds, the average trading volume per day and per bond is typically between €3.5 million

and 4.2 million, while, for sterling-denominated bonds, average daily trading volume is between €1 million and 1.5 million.

Thus, there are two differences between our sample of high-yield bonds and Biais and Declerck's (2006) sample of investment grade bonds: First, average daily trading volume is lower for high-yield bonds than for investment grade bonds. Second, for the high-yield bonds in our sample, trading volume is similar for euro and sterling bonds. The first difference was expected, since issue size and trade size are known to be lower in the high-yield bond market. The second result is more surprising. It suggests that, for the bonds in our sample, the Sterling market is as active as the Euro market. One should bear in mind however, that the size of our sterling bond sample is rather small (around 50 bonds.) These bonds may well be the most active in the market, and, for the other bonds, trading activity could be much lower.

IV.2) Competition between dealers

Liquidity supply in OTC bond markets is provided by dealers. Liquidity supply could potentially be reduced if the risk-bearing capacity of the dealers was limited, or if they were imperfectly competitive. Other things equal, the greater the number of dealers, the greater their collective risk bearing capacity and the stronger the competition between them, and consequently the greater the liquidity of the market. To shed light on this point, we computed the number of dealers active in the high-yield market, as well as their market share.

Figure 3 shows that there are on average about 15 market makers per euro-denominated bond, and slightly less for sterling-denominated bonds. For investment grade bonds, Biais and Declerck (2006) found that there were on average 25 dealers per euro-denominated bonds and 18 for sterling-denominated bonds. Thus, comparing the high-yield market to the investment grade market, one reaches a similar conclusion as in the case of trading volume: On the one hand, the number of active dealers is lower in the high-yield market than in the investment grade market. On the other hand, in our sample, there is no significant difference between the euro and the sterling segments of the high-yield market.

Figure 4 shows, for the average bond in our sample, the market share of the most active dealer. For euro-denominated bond, the market share of the most active dealer is about 40%. For sterling bonds it is slightly lower. For investment grade bonds, Biais and Declerck (2006)

found that the market share of the most active dealer was close to 20% for euro-denominated bonds and 25% for sterling-denominated bonds.

Figure 5 confirms this. It shows that the market share of the three most active dealers is above 65%, both for euro and sterling bonds. This is much higher than the market share of the three most active dealers in investment grade bonds, estimated by Biais and Declerck (2006) to be below 40% for euro-denominated bonds and a little above 50% for sterling bonds.

Thus, our findings indicate that the market for high-yield bonds is quite concentrated. A small number of dealers supply the bulk of the liquidity. This is likely to reduce the collective risk bearing capacity of the active dealers and also to limit competition. This could lead to relatively large spreads and market impact of trades.

Why is there such a small number of active dealers in this market?

- Possibly, this could stem from the relatively small size of the issues and the relatively small number of active investors. Thus, there is relatively little scope for trading and relatively few dealers are induced to enter this market.
- This may be reinforced by the significant costs of entry into this market. Dealers need to commit capital to bear risk. They also must invest in research and information collection. Both of these investments are likely to be larger for high-yield bonds than for investment grade bonds: Risk is larger for high-yield bonds, and consequently capital requirements are greater. High-yield bond values are more sensitive to information about the performance of the firm and the risk it runs, and information may be more difficult to collect, to the extent that firms issuing such bonds are smaller and less researched. Thus, dealers in high-yield bonds need to incur relatively large information acquisition costs.
- The relatively small number of active market makers in the secondary market may also be related to the concentration of the primary market. As mentioned above, De Bondt and Marques (2004) find that for the majority of high-yield bond issues, the lead underwriter came from a small group of four large investment banks.

- It may also be that the limited number of active dealers in the high-yield bond market reflects that this market is still young. One can hope that the market will continue to develop, and thus will attract more dealers, fostering risk bearing, competition and liquidity. Note however that, between 2003 and 2005, our data does not suggest there is such a trend.

IV.3) Spreads

Biais and Declerck (2006) analyze spreads in the European investment grade corporate bond market, using transactions prices as well as bid and ask quotes. Thus, to compute effective spreads, they study the (absolute value of the) difference between transactions prices and the previous mid-quote. We cannot use the same approach here, because we do not have ask quotes, so that we cannot directly compute midquotes. To cope with this lack of data, we take advantage of the fact that we know if trades were buyer initiated (and thus executed at an ask quote) or seller initiated (and thus executed at a bid quote). Using this information we use two approaches: In the first one, we rely on a proxy for the mid-quote, and, using this proxy, follow the same method as Biais and Declerck (2006). The second approach uses the same regression methodology as Goldstein et al (2006.)

IV.3 .1) Using a proxy for the mid-quote

For each week and each bond in our sample, we compute the average price of all transactions that took place at the ask quote, and the average price of all the transactions that took place at the bid. This gives us an average ask price and an average bid price. We then take the average of these two prices. We use this average as a proxy for the mid-quote. We then proceed as in Biais and Declerck (2006).

Table 4, shows the effective half-spread, obtained pooling trades of all sizes, for bonds with different ratings. For euro-denominated bonds, the average effective half-spread was 22 cents in 2003, 7 cents in 2004 and 10 cents in 2005. Thus, in 2005, for a bond with a mid-quote equal to €100, investors would buy the security at an average price of €100.10. Such spreads are larger than those observed in the investment grade segment of the market, where Biais and Declerck (2006) find an average effective half-spread of 5 cents. Yet, given that high-yield

bonds are rather risky instruments, percentage spreads of between 0.5% and 0.2% do not seem unreasonable.

Using TRACE data, Edwards, Harris and Piwowar (2006) estimate the difference between the effective half-spread on investment grade bonds and on high-yield bonds. For a trade size of $200,000, they find that, for B and BB bonds, the half-spread is 11.6 cents above its investment grade counterpart, while for bonds rated C and below, it is 25.8 cents above its investment grade counterpart. For a trade size of $1 million, Edwards et al (2006) find that, for B and BB bonds, the half-spread is 5.7 cents above its investment grade counterpart, while for bonds rated C and below, it is 8.3 cents above its investment grade counterpart. Thus, the difference between investment grade effective spreads and their high-yield counterparts is lower in our data than in the TRACE data.

For sterling-denominated bonds, the average effective half-spread was 34 cents in 2003, 24 cents in 2004 and 17 cents in 2005. This is larger than for euro-denominated bonds and also larger than the spreads found by Biais and Declerck (2005) for investment grade bonds.

Table 4 also shows that effective spreads tend to increase with credit risk (measured by ratings), although the relationship is not always monotonic. Also, Table 4 shows that, in 2004 and 2005, effective spreads were tighter for euro-denominated bonds than for sterling ones, except for BB1 in 2005.

Table 5 shows how the effective spread varies with transaction size. Spreads decline with transaction size, similarly to what was found by Biais and Declerck (2006) for the European investment grade market, and Edwards et al (2006) for the US corporate bond market.

IV.3 .2) Indicator variable regression

Method:

Following the same methodology as Goldstein et al (2006), we estimate effective spreads by regressing the difference between the transaction price for a customer (P_t) and the previous

bid price (B_{t-1}) on a dummy variable (X_t) that equals one for customer buys and zero for customer sells, i.e., trades at the bid:

$$P_t - B_{t-1} = \alpha + \beta X_t + e_t, \qquad (1)$$

where e_t is an error term.

Consider a simple model of transaction prices where the fundamental value of the bond is v_t such that:

$$v_t = v_{t-1} + z_t,$$

the bid-ask spread is denoted by s, spread the ask price is:

$$A_t = v_t + s/2,$$

and the bid price is:

$$B_t = v_t - s/2.$$

Then, when the time t trade is at the bid, equation (1) yields:

$$P_t - B_{t-1} = B_t - B_{t-1} = z_t = \alpha + e_t.$$

Taking expectations, we have: $\alpha = E(z_t)$. When the time t trade is at the ask, equation (1) yields:

$$P_t - B_{t-1} = A_t - B_{t-1} = s + z_t = \alpha + \beta + e_t.$$

Taking expectations, we have: $\beta = s$. Thus, the slope coefficient of the indicator variable regression is an estimate of the spread.

To proxy for B_{t-1}, we use the previous day bid obtained from the Merrill Lynch Constrained High-yield Bond Index. This is similar to Goldstein et al (2006), who use the bid quote reported by Reuters for the end of day prior to the transaction. The regression is estimated across trades, pooling all bonds. We estimated first a simple regression (for which the results are reported in Table 6). Then we estimated a richer specification, in which we controlled for several variables, such as the maturity of the bond or the trading volume during the 30 trading days prior to the trade. The results were not significantly altered.

Results for all trade sizes:

As can be seen the first panel of Table 6, for euro-denominated bonds, the estimated effective spread was 65 cents in 2003, 36 cents in 2004 and again 36 cents in 2005. This is somewhat higher than the spreads estimated obtained with the previous method (using a proxy of the

mid-quote): 44 cents in 2003, 14 cents in 2004 and 20 cents in 2005. Note however that the order of magnitudes are comparable, as well as the variation through time. For sterling-denominated bonds, the average effective spread was 73 cents in 2003, 52 cents in 2004 and 42 cents in 2005. Again, this is somewhat higher than, but comparable to, the spreads estimated obtained with the previous method (using a proxy of the mid-quote): 68 cents in 2003, 48 cents in 2004 and 34 cents in 2005.
Thus, similarly to the result obtained with a proxy for the mid-quote, the indicator variable regression results imply that spreads are tighter for euro-denominated bonds than for sterling ones.

The difference between the estimates obtained with the indicator variable regression approach and the proxy for the mid-quote suggest the latter maybe slightly biased. But the small size of the difference (especially for the sterling case) suggests the bias should not be very large. The intuition why there could be a bias is the following: suppose that, on a given day, the ask and the bid are constant and there are 5 trades, 4 at the bid and 1 at the ask. Since the majority of the trades is at the bid, our proxy for the mid-quote will be below the actual mid-quote, and closer to the bid. This will lead us to underestimate the spread for the trades at the bid, and overestimate it for the trades at the ask. Since there are more trades at the bid than at the ask, the former effect will be larger than the latter. Hence the spread will be underestimated.

It is interesting to compare our estimates to those obtained by Goldstein et al (2006), for the US market, using TRACE data from 2003. Note that the bonds studied by Goldstein et al (2006) are rated BBB, i.e., they are a priori less risky than the high-yield bonds we analyze. Note further that, while the European market is not post-trade transparent, the US market is, for disseminated bonds. For all these reasons, one could expect that the spread estimates obtained by Goldstein et al (2006) would be tighter than their counterparts for our European high-yield market data. Yet, their indicator variable regression estimate of the spread is 1.70% overall. They also estimate that post-trade TRACE transparency reduces spreads by 0.25%. This leads to an estimated spread of 1.45% for transparent BBB bonds in 2003, which is much higher than the spread estimate we obtain. This difference could stem from our focusing on the 110 most liquid high-yield bonds in the European market. The comparison between the TRACE results and ours, however, suggests that, at least for these 110 bonds, the European high-yield bond market was reasonably liquid.

Results for different trade sizes:

In Table 7, we report the results obtained for different trade sizes. Similarly to what we found with the previous method, spreads decrease with transaction size. Again, this is consistent with the results obtained in previous literature (see, e.g., Biais and Declerck (2006), Goldstein et al. (2006) and Edwards et al. (2006).)

V) Conclusion

V.1) Summary of the results

This paper is a first empirical investigation of the microstructure of the European high-yield bond market. To collect information about the workings of the market, we interviewed several participants from the buy-side and the sell-side. We also collected tick by tick trades and quotes data for about 150 euro-denominated bonds and 50 sterling-denominated bonds. These bonds are included in the Merrill Lynch High-yield Constrained Bond Index, which the majority of market participants consider as quite significant and consistent.

For the bonds in our sample, the European high-yield bond market is relatively active. There is on average around three trades a day for the typical bond in our sample, both for euro and for sterling-denominated securities. This is similar to the level of trading activity in the investment grade segment of the market. But average trading volume is lower in the high-yield market than in the investment grade market, reflecting smaller trade sizes.

We estimate effective spreads in this market using two methods: One relies on a proxy of the mid-quote, the other replicates the indicator variable regression approach of Goldstein et al (2006.) The two methods do not yield exactly the same results, but the orders of magnitude are the same, and lead to the same rankings. For the euro-denominated high-yield bonds in our sample, the first method estimates the effective spread to be equal to 44 cents, and the second yields an estimate of 65 cents for 2003. The estimates are 36 cents and 20 cents for 2005. For the sterling-denominated high-yield bonds, in 2003, the estimated effective spread is 73 cents according to the first method, and 68 cents according to the second one. For 2005, the estimates are 42 and 34 cents.

As in the investment grade market, spreads are larger for sterling-denominated bonds than for euro-denominated bonds. This is likely to reflect that the investor base is larger for euro-denominated bonds.

Naturally, since high-yield bonds are riskier than investment grade bonds, these spreads are larger than those observed for bonds with ratings between AAA and BBB (which were estimated by Biais and Declerck (2006) to average 10 cents for euro-denominated bonds.) Yet, the difference between high-yield and investment grades effective spreads in Europe does not seem unreasonable. For example, it is lower than that found by Edwards, Harris and Piwowar (2006) for the US.

We also found that the number of dealers active in the high-yield market is lower than in the investment grade market. Correspondingly, the most active dealers in this market, have a rather large market share (above 65%.) This could limit risk bearing capacity and curb competition, potentially resulting in reduced liquidity.

V.2) Views on transparency and regulation

As in the investment grade market, imposing pre-trade transparency seems impractical. In a telephone based OTC market, pre-trade transparency is simply not possible to engineer. Regarding post-trade transparency views vary a lot across market participants.

The larger buy-side participants are satisfied with the current level of information and transparency. The smaller ones are critical of the current opacity of the market. The median buy-side participants tend to be positive about some limited regulation, aiming at improving post-trade transparency, under two conditions: i) First drastic changes should be avoided and post-trade transparency should be limited: for example the reporting of transaction prices would be anonymous and delayed and large trades would be exempted from it. ii) Second, regulatory changes should be conducted in collaboration with market participants.[vi]

There is also some variation among the views of sell-side participants. Some are neutral about the consequences of some post-trade transparency. But the majority of the sell-side participants think that enhancing transparency would actually reduce market liquidity. It would reduce the willingness of market makers to supply liquidity by taking positions. This

particularly applies to large positions. Suppose the bid ask spread is 98 to 99, and the market maker is approached by a customer desiring to sell a very large amount, say 20 millions. Then the market maker could potentially buy the bonds at a very low price, say 97, and then sell them back progressively. But this would be very difficult if the transaction price of 97 was publicly posted. Such a low price would signal a large sale. Of course, this problem would be avoided if large trades were exempted from public reporting.

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Appendix: List of firms interviewed

BNP Paribas
Cognis Capital
Crédit Suisse
Intermediate Capital Group
Insight Investment
JP Morgan Securities
Merrill Lynch Europe
Morley Fund Management
M&G Securities
Pall Mall Partners
Royal Bank of Scotland
Standard Life Investments
UBS Investment Bank

Figure 1: Transaction prices. Scandinavian Airlines. January, February & March 2004.

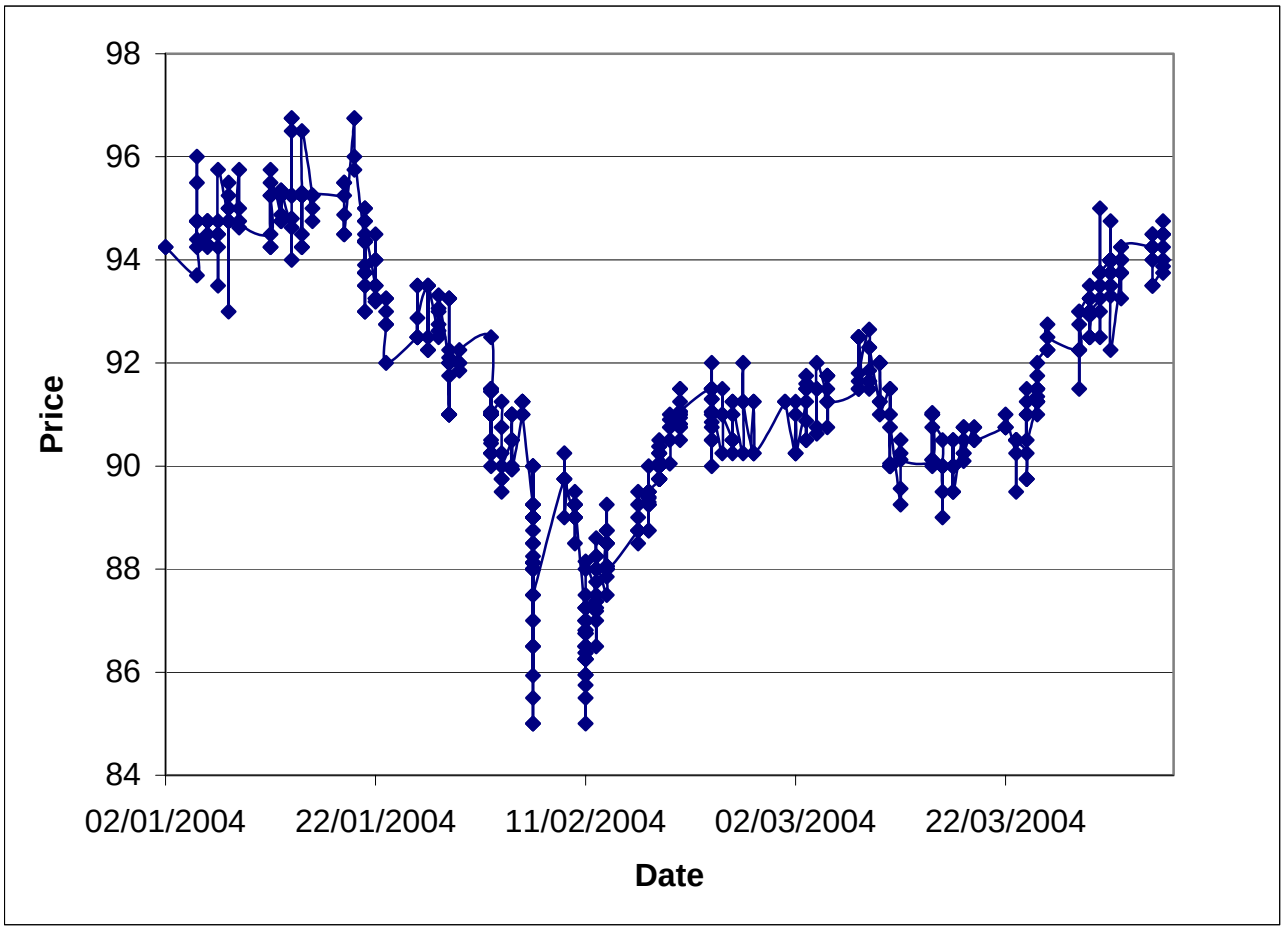
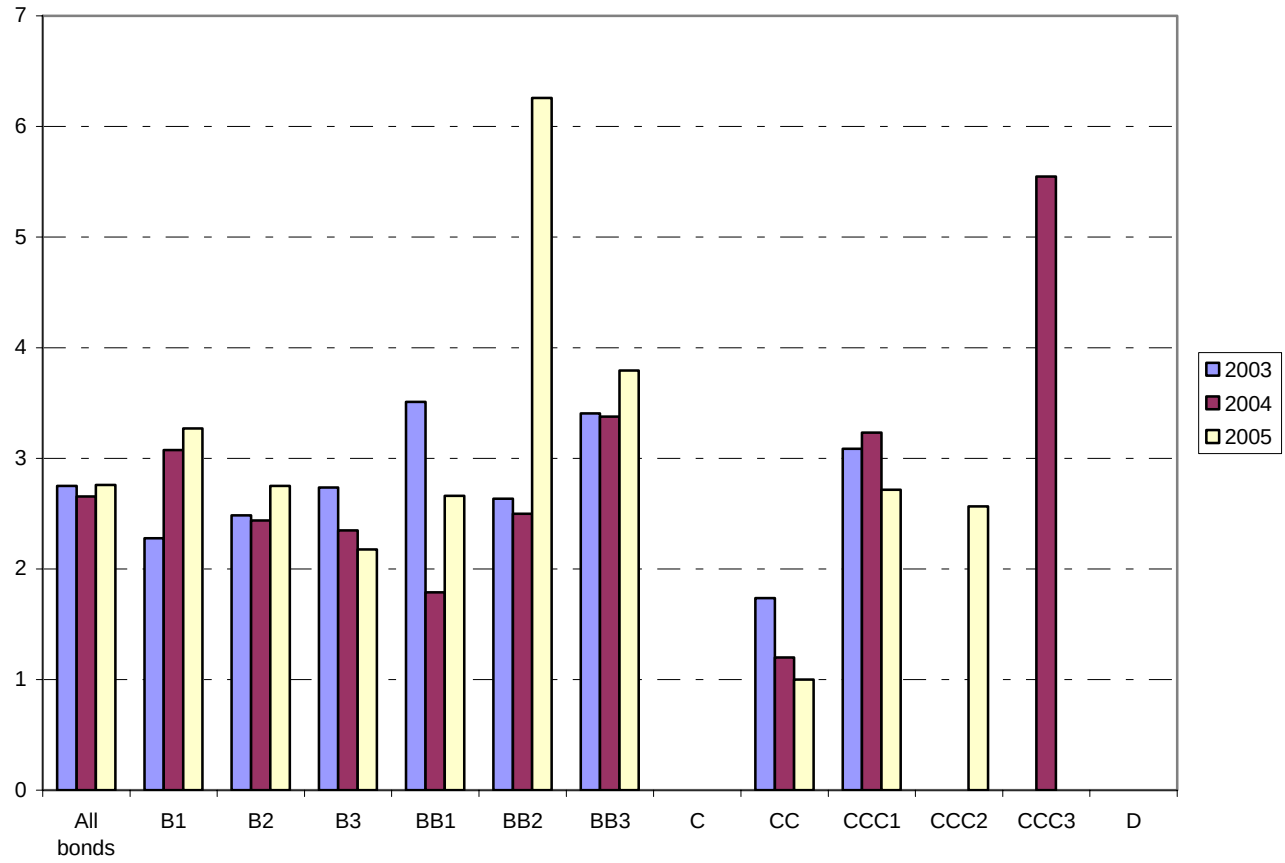
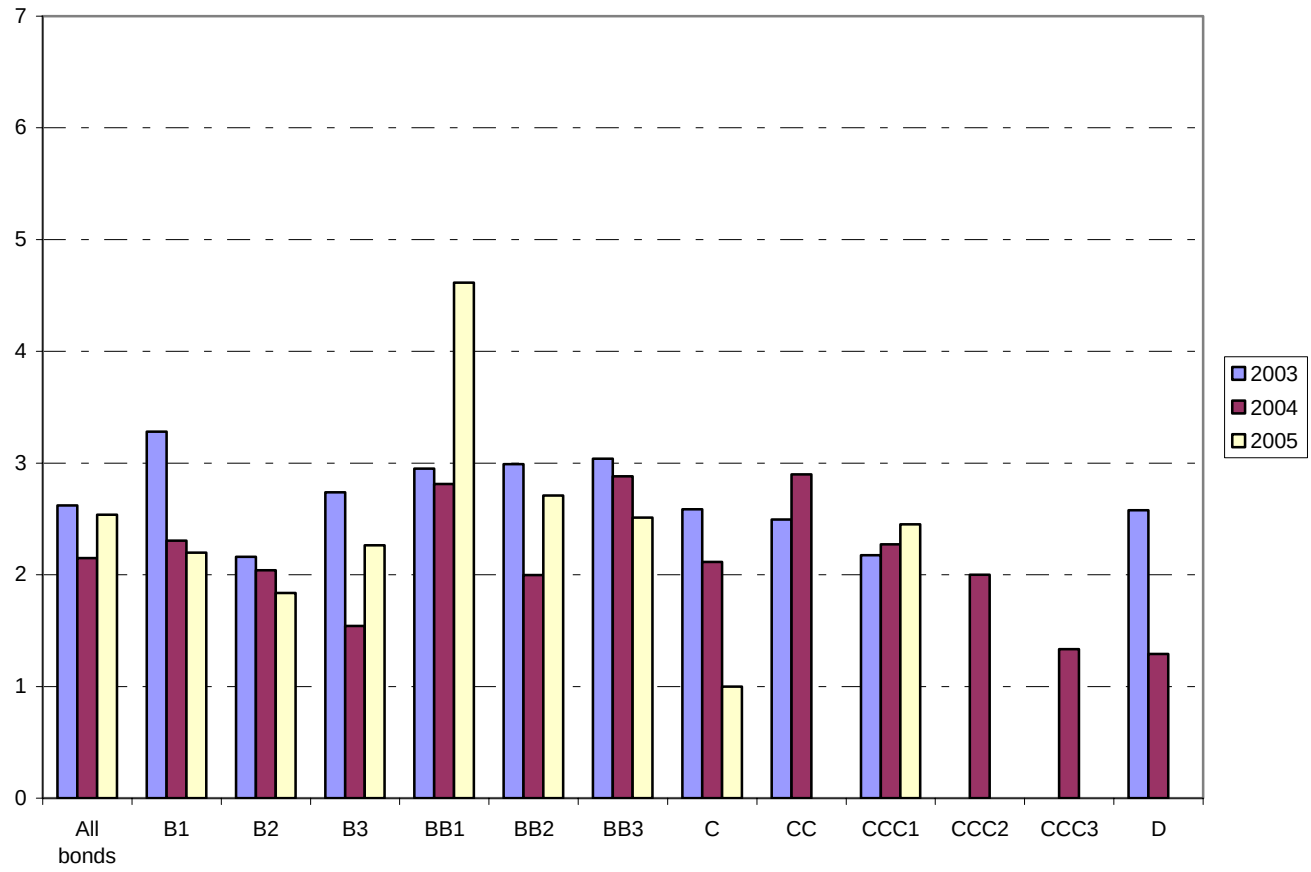


Figure 2, Panel A: Average number of trades per day, €



For each bond, and for each year, we computed the average number of trades per day. We then computed the average of this number across bonds. The figure shows this average for each of the three years in our sample.

Figure 2, Panel B: Average number of trades per day, £



For each bond, and for each year, we computed the average number of trades per day. We then computed the average of this number across bonds. The figure shows this average for each of the three years in our sample.

Figure 2, Panel C: Evolution of trading activity for euro-denominated bonds

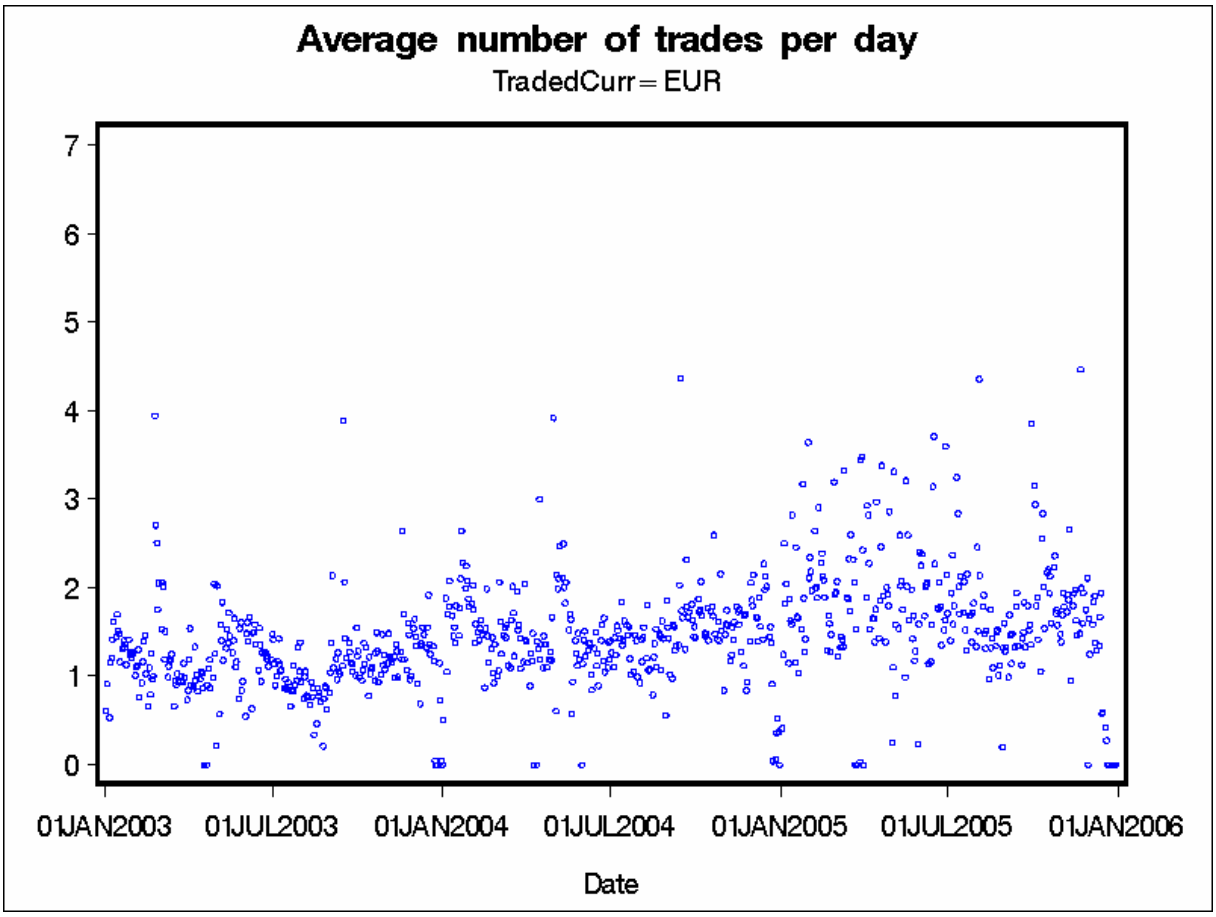


Figure 2, Panel D: Evolution of trading activity for sterling-denominated bonds.

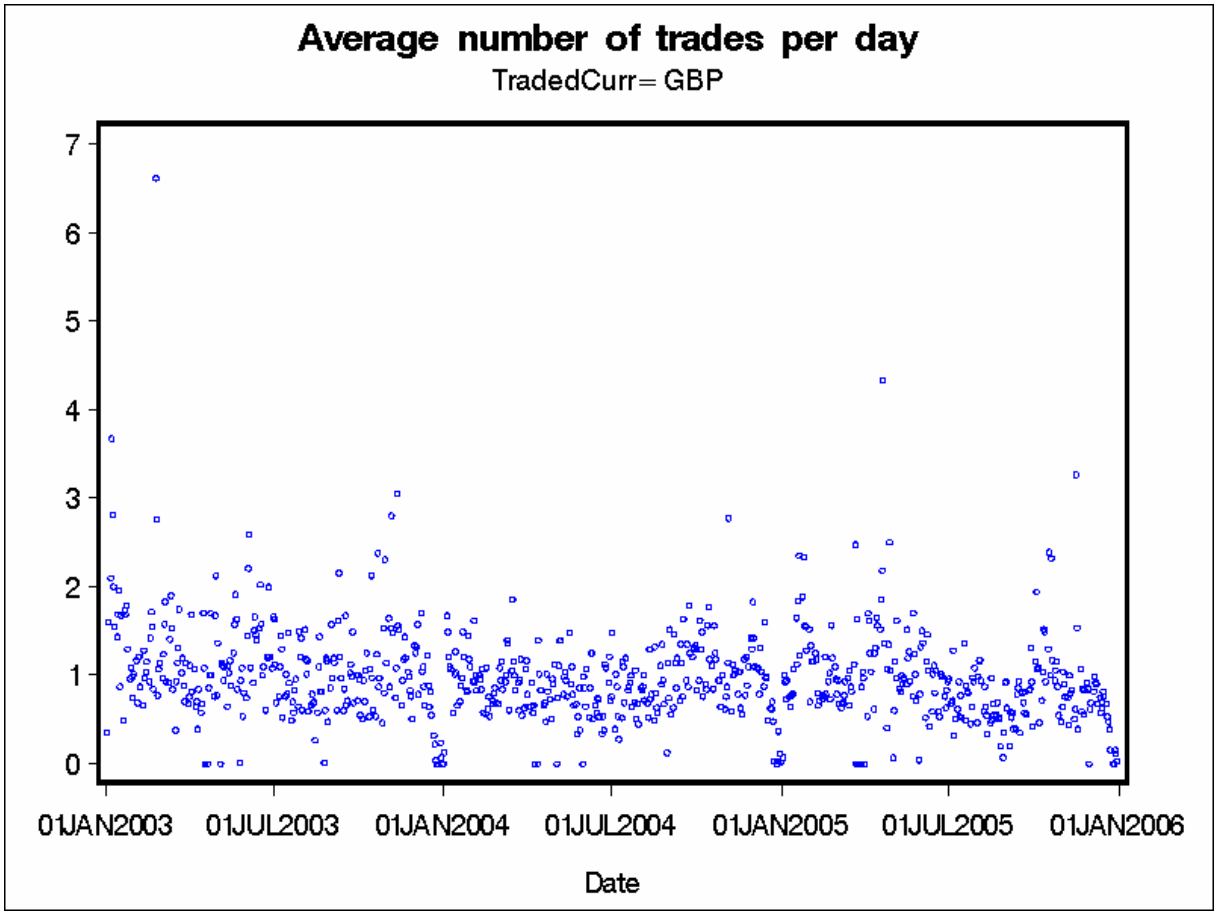
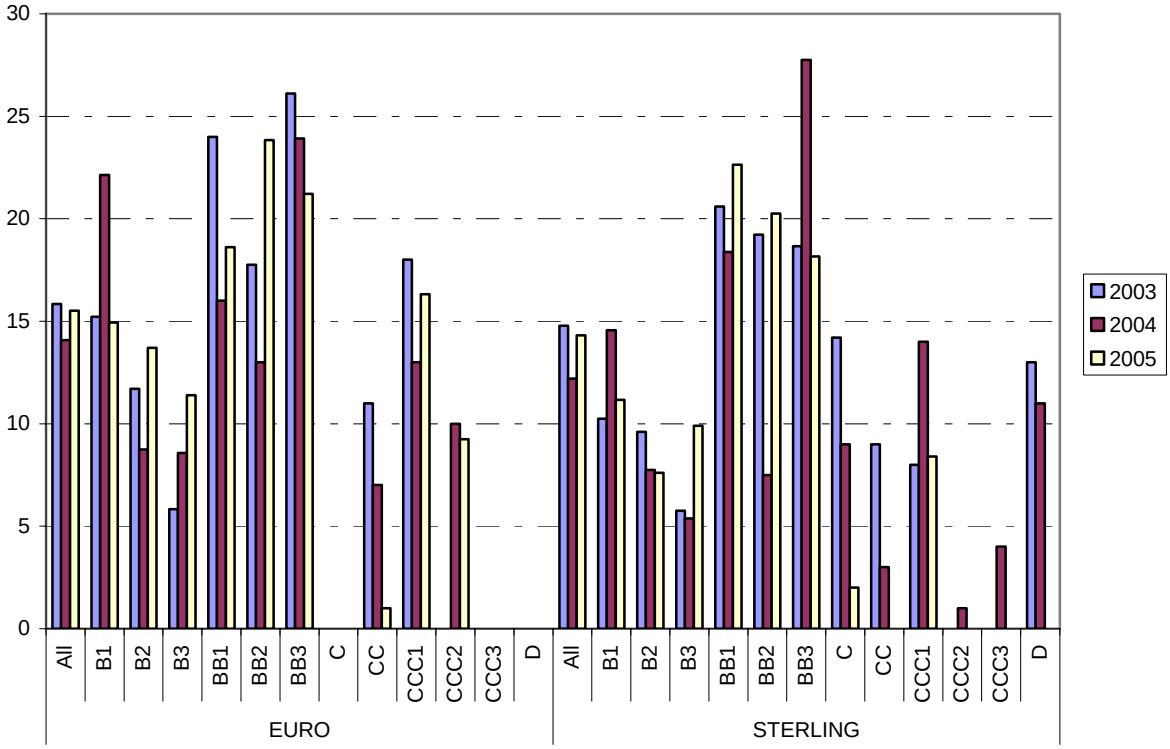
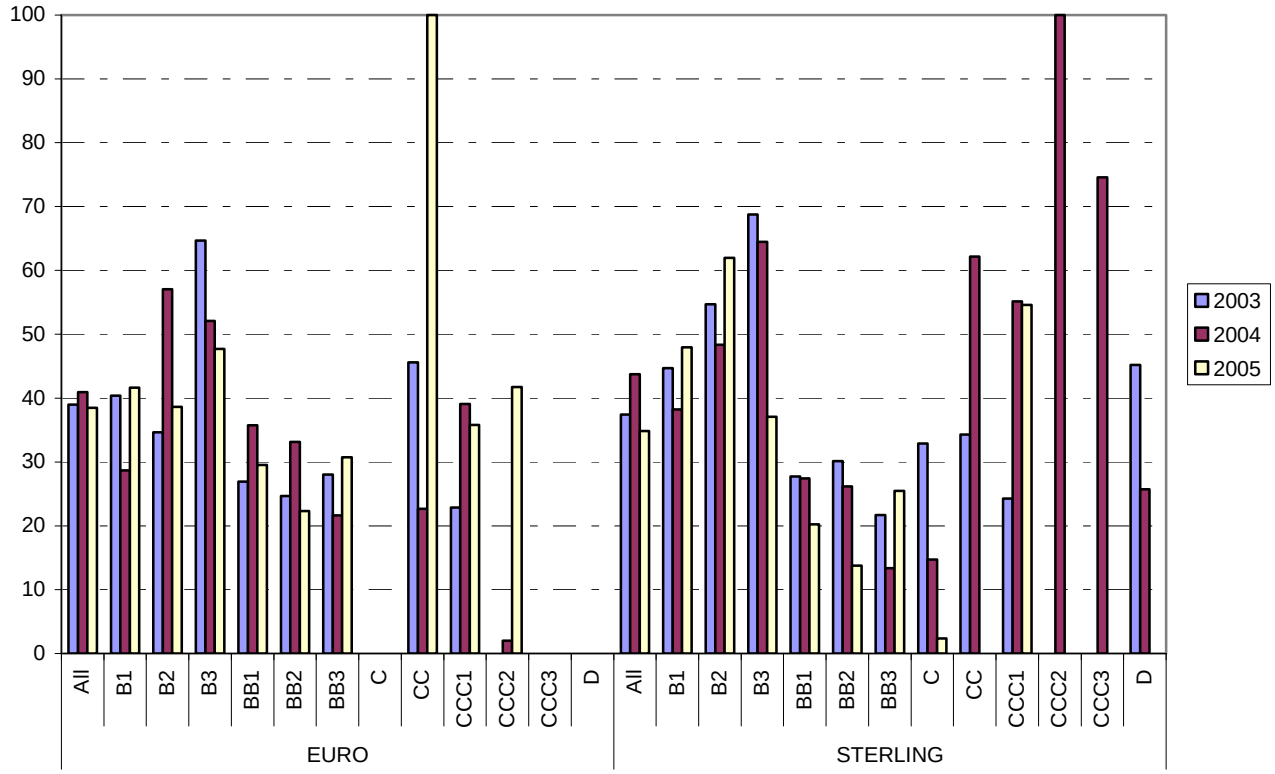


Figure 3: Number of market makers with at least one trade



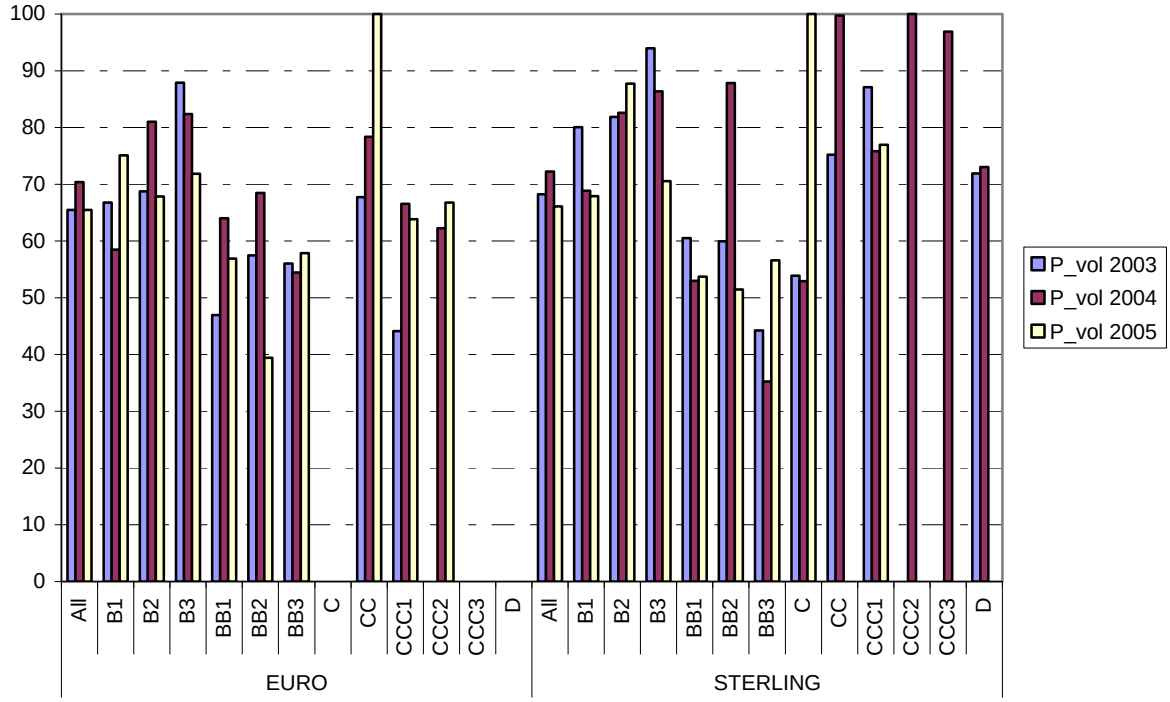
For each bond, and for each year, we computed the number of market makers with at least one trade during that year. We then computed the average of this number across bonds. The figure shows this average for each of the three years in our sample.

Figure 4: Market share (%) of the most active dealer



For each bond, we computed the market share of the most active dealer. We then computed the average of this market share across bonds. The figure reports this average market share in percentage, i.e., 40 means that on average the most active dealer was involved in 40% of the trades.

Figure 5: Market share (%) of 3 most active dealers



For each bond, we computed the market share of the three most active dealers. We then computed the average of this market share across bonds. The figure reports this average market share in percentage, i.e., 70 means that on average the trades of the 3 most active dealers represented 70% of the total number of trades.

Table 1 :

Panel A: Euro-denominated bond sample

	Number of € denominated bonds with		
	Quotes data	**Trades data**	**Quotes and Trades data**
2003	191	75	65
2004	229	123	115
2005	226	153	153

Panel B: Sterling-denominated bond sample

	Number of £ denominated bonds with		
	Quotes data	**Trades data**	**Quotes and Trades data**
2003	50	55	45
2004	53	62	50
2005	55	55	48

Table 2: Structure of sample by industry

Panel A: Euro-denominated bonds

To highlight them, the three largest figures in each column are in boldface.

	2003		2004		2005	
Banking		0%		0%	2	1%
Basic Industry	8	11%	18	**15%**	22	**14%**
Brokerage		0%		0%	2	1%
Capital Goods	11	**15%**	26	**21%**	30	**20%**
Consumer Cyclical	9	**12%**	15	**12%**	23	**15%**
Consumer Non-Cyclical	10	**13%**	12	**10%**	14	9%
Energy	4	5%	6	5%	5	3%
Insurance		0%		0%		0%
Media	3	4%	10	8%	16	10%
Real Estate		0%		0%		0%
Services Cyclical	6	8%	9	7%	14	9%
Services Non-Cyclical	3	4%	4	3%	5	3%
Technology & Electronics	5	7%	8	7%	8	5%
Telecommunications	4	5%	5	4%	10	7%
Utility	2	3%	2	2%	2	1%

Panel B: Sterling-denominated bonds

To highlight them, the three largest figures in each column are in boldface

	2003		2004		2005	
Banking		0%		0%		0%
Basic Industry	2	4%	2	3%	4	7%
Brokerage		0%		0%		0%
Capital Goods	6	**11%**	9	**15%**	6	**11%**
Consumer Cyclical	4	7%	4	6%	8	**15%**
Consumer Non-Cyclical	5	9%	6	10%	5	9%
Energy		0%		0%		0%
Insurance	1	2%	1	2%		0%
Media	7	**13%**	7	**11%**	4	7%
Real Estate	2	4%	2	3%	2	4%
Services Cyclical	5	9%	6	10%	6	**11%**
Services Non-Cyclical	1	2%	2	3%	2	4%
Technology & Electronics	1	2%	1	2%	1	2%
Telecommunications	2	4%	3	5%	5	9%
Utility	9	**16%**	7	**11%**	5	9%

Table 3: Structure of sample by rating

Panel A: Euro-denominated bonds

To highlight them, the three largest figures in each line are in boldface.

	B1	B2	B3	BB1	BB2	BB3	CC	CCC1	CCC3	CCC2	C	D
2003	**28%**	**15%**	**18%**	14%	6%	14%	2%	3%	0%	0%	0%	0%
2004	**20%**	**17%**	**26%**	6%	4%	10%	1%	15%	1%	0%	0%	0%
2005	11%	**18%**	**24%**	8%	4%	**16%**	1%	**16%**	0%	3%	0%	0%

Panel B: Sterling-denominated bonds

To highlight them, the three largest figures in each column are in boldface.

	B1	B2	B3	BB1	BB2	BB3	CC	CCC1	CCC3	CCC2	C	D
2003	9%	11%	9%	**22%**	**20%**	7%	4%	4%	0%	0%	**11%**	2%
2004	**18%**	**16%**	**16%**	**16%**	4%	8%	4%	10%	2%	2%	2%	2%
2005	**13%**	10%	**21%**	**23%**	8%	**13%**	0%	10%	0%	0%	2%	0%

Table 4: Effective half-spread, for all trade sizes, estimated using a proxy for the mid-quote.

	Panel A : Euro-denominated bonds					
	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
All	0,2236%	*0,00230*	0,0675%	*0,00377*	0,1021%	*0,00252*
B1	0,2570%	*0,00209*	0,1306%	*0,00158*	0,0631%	*0,00245*
B2	0,2256%	*0,00072*	0,0352%	*0,00510*	0,1083%	*0,00232*
B3	0,1099%	*0,00274*	0,0749%	*0,00480*	0,1061%	*0,00238*
BB1	0,1597%	*0,00105*	0,0829%	*0,00371*	0,2405%	*0,00469*
BB2	0,3111%	*0,00189*	0,0890%	*0,00040*	0,1218%	*0,00056*
BB3	0,2395%	*0,00287*	0,1146%	*0,00073*	0,1043%	*0,00069*
CC	0,1195%	-	0,3245%	-	-	-
CCC1	0,4071%	*0,00062*	0,2105%	*0,00308*	0,0384%	*0,00305*
CCC2	-	-	-	-	0,1972%	*0,00085*
CCC3	-	-	0,0358%	-	-	-
	Panel B : Sterling-denominated bonds					
	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
All	0,3390%	*0,00354*	0,2381%	*0,00420*	0,1754%	*0,00161*
B1	0,4858%	*0,00152*	0,4344%	*0,00850*	0,1588%	*0,00081*
B2	0,2104%	*0,00029*	0,0568%	*0,00204*	0,1765%	*0,00214*
B3	0,0036%	*0,00605*	0,2817%	*0,00247*	0,1919%	*0,00127*
BB1	0,2970%	*0,00108*	0,1885%	*0,00122*	0,1396%	*0,00154*
BB2	0,2898%	*0,00128*	0,1640%	*0,00068*	0,1742%	*0,00043*
BB3	0,0505%	*0,00290*	0,2546%	*0,00165*	0,2107%	*0,00130*
C	1,0087%	*0,00376*	0,6490%	-	-	-
CC	0,6203%	*0,00871*	0,5828%	*0,00824*	-	-
CCC1	0,4487%	*0,00014*	0,3026%	*0,00112*	0,2867%	*0,00346*
D	0,5433%	-	0,6589%	-	-	-

Table 5: Effective half-spread, by transaction size, estimated using a proxy for the mid-quote.

Panel A: Euro-denominated bonds

	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
[0 - 10,000]	0,6628%	*0,01582*	0,1512%	*0,00551*	0,3123%	*0,00592*
]10,000 - 25,000]	0,3040%	*0,00568*	0,2237%	*0,00445*	0,2118%	*0,00598*
]25,000 - 50,000]	0,3089%	*0,00381*	0,2033%	*0,00696*	0,2355%	*0,00657*
]50,000 - 100,000]	0,2608%	*0,00368*	0,1361%	*0,00626*	0,0973%	*0,00334*
]100,000 - 200,000]	0,2932%	*0,00283*	0,0604%	*0,00405*	0,0898%	*0,00353*
]200,000 - 500,000]	0,1951%	*0,00347*	0,0009%	*0,00413*	0,0772%	*0,00284*
]500,000 - 1,000,000]	0,1261%	*0,00386*	0,0381%	*0,00372*	0,0991%	*0,00278*
]1,000,000 -]	0,1941%	*0,00384*	0,0265%	*0,00369*	0,0529%	*0,00274*

Panel B: Euro-denominated bonds

	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
[0 - 10,000]	0,4418%	*0,00889*	0,2830%	*0,00341*	0,2157%	*0,00323*
]10,000 - 25,000]	0,4365%	*0,00729*	0,5415%	*0,00759*	0,1861%	*0,00282*
]25,000 - 50,000]	0,4048%	*0,00634*	0,3090%	*0,00515*	0,2474%	*0,00482*
]50,000 - 100,000]	0,3757%	*0,00495*	0,2167%	*0,00524*	0,2142%	*0,00272*
]100,000 - 200,000]	0,3117%	*0,00401*	0,2375%	*0,00242*	0,1836%	*0,00186*
]200,000 - 500,000]	0,3221%	*0,00391*	0,2065%	*0,00243*	0,1649%	*0,00254*
]500,000 - 1,000,000]	0,3387%	*0,00462*	0,1774%	*0,00450*	0,1994%	*0,00251*
]1,000,000 -]	0,3240%	*0,00349*	0,2230%	*0,00269*	0,1392%	*0,00142*

Table 6: Effective half-spread, for all trade sizes, estimated using the indicator variable regression approach.

	Panel A : Euro-denominated bonds					
	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
Intercept	0.39837 %	(0.01045 %)	0.18640 %	(0.00534 %)	0.26508 %	(0.00663 %)
Slope (spread)	0.65247 %	(0.01393 %)	0.36372 %	(0.00756 %)	0.36196 %	(0.00918 %)
	Panel B : Sterling-denominated bonds					
	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
Intercept	0.92888 %	(0.03000 %)	0.35004 %	(0.02113 %)	0.37607 %	(0.02235 %)
Slope (spread)	0.73221 %	(0.04097 %)	0.51654 %	(0.02822 %)	0.41875 %	(0.03065 %)

Table 7: Effective half-spread, by transaction size, estimated using the indicator variable regression approach.

	Panel A : Euro-denominated bonds					
	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
[0 - 10,000]	0,72369 %	0,02767 %	0,34976 %	0,02127 %	0,35322 %	0,03711 %
]10,000 - 25,000]	0,78694 %	0,03164 %	0,37007 %	0,01836 %	0,37782 %	0,03099 %
]25,000 - 50,000]	0,88911 %	0,03589 %	0,36245 %	0,01762 %	0,39940 %	0,02537 %
]50,000 - 100,000]	0,03826 %	0,03826 %	0,35314 %	0,01853 %	0,36651 %	0,02166 %
]100,000 – 200,000]	0,66791 %	0,04389 %	0,38669 %	0,02231 %	0,32617 %	0,02877 %
]200,000 – 500,000]	0,58696 %	0,03711 %	0,40188 %	0,02040 %	0,34584 %	0,02208 %
]500,000 - 1,000,000]	0,40755 %	0,04949 %	0,38646 %	0,02703 %	0,36507 %	0,02511 %
]1,000,000 -]	0,35877 %	0,05636 %	0,25718 %	0,02628 %	0,35928 %	0,02387 %
	Panel B : Sterling-denominated bonds					
	2003		2004		2005	
	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*	Half spread estimate	*Std. dev.*
[0 - 10,000]	1,16602 %	0,20095 %	1,06160 %	0,24830 %	0,67979 %	0,08036 %
]10,000 - 25,000]	1,45621 %	0,16590 %	0,87105 %	0,08590 %	0,56597 %	0,11317 %
]25,000 - 50,000]	0,74332 %	0,12343 %	0,73906 %	0,08021 %	0,64608 %	0,09696 %
]50,000 - 100,000]	0,85598 %	0,10985 %	0,51262 %	0,06813 %	0,49520 %	0,08872 %
]100,000 - 200,000]	0,77342 %	0,10575 %	0,60992 %	0,06239 %	0,39308 %	0,09281 %
]200,000 - 500,000]	0,77213 %	0,08708 %	0,47380 %	0,07609 %	0,40275 %	0,06752 %
]500,000 - 1,000,000]	0,53380 %	0,10479 %	0,34458 %	0,05595 %	0,28510 %	0,08742 %
]1,000,000 -]	0,53753 %	0,09851 %	0,35618 %	0,06910 %	0,23775 %	0,07364 %

Notes

[i] That is, bonds with credit rating strictly below BBB.

[ii] Special report: "The credit markets", The Economist, September 23-29, 2007, page 71.

[iii] When contacted by a customer, market makers will often ask: "Did you contact somebody else ?" If the answer is yes they will often be reluctant to supply liquidity.

[iv] One of the fund managers we interviewed said: "This market is very similar to the after-hours market for stocks in London before the Big Bang, in which telephone trades would be arranged in the dark."

[v] All the London based members of ICMA (i.e., the huge majority of the dealers in the European Corporate Bond market) and all members of the Council of Reporting Dealers, irrespective of their location, have to report their trades within 30 minutes to this self regulatory organisation, through a system known as TRAX. TRAX captures most of the professional business in Continental Europe and the UK. Retail trading conducted between European banks and small clients is usually not reported to TRAX. TRAX makes its information available to national regulators, such as the FSA in London or the AMF in Paris, which can use it for monitoring and surveillance.

[vi] Several market participants complained about rumours in the market, whereby for example someone would claim that a given bond had been sold at a very low price. Post-trade transparency would help to avoid that. Some market participants also noted that post-trade transparency would facilitate the valuation of funds.