

## Bond market transparency: To regulate or not to regulate...

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*The present Policy Brief attempts to contribute to the ongoing policy debate on MiFID art. 65.1, which tasks the Commission with conducting a study to report on whether the trade transparency requirements that currently apply to share trading ought to be extended to non-equity markets. It presents the pros and cons of introducing greater transparency into the marketplace, including a model on the possible impact of increasing transparency. This Policy Brief also highlights the insufficient level of data available to market participants and regulators on volumes and aggregate bond market activity, as well as the lack of appropriate information made available to retail investors, suggesting that dealers may have little time to come up with a solution, and that an industry code of conduct may be an appropriate avenue – and one preferable to legislative initiatives – for introducing more transparency uniformly (within each fixed income asset class) across the EU.*

### 1. Introduction

This paper aims to offer a nuanced view on a regulatory question that altogether too often becomes very sectarian very rapidly, pitting dealers in securities who are fighting to maintain the status quo against some regulators, who are pushing hard for change in the form of greater transparency in the bond market.

The debate on bond market transparency is a difficult one due to the complex interaction and possible trade-offs between the policy objectives of market liquidity, transparency, stability, efficiency and investor protection. All of these are valid policy objectives; the critical challenge becomes one of finding the appropriate mix.

Pre- and post-trade transparency may equally enhance or harm market liquidity and efficiency, depending on how they are applied, by whom, for what instruments, in which markets and at which latency. Likewise, transparency need not necessarily enhance investor protection, depending on how it is carried out and what the consequences of these measures are likely to be for various market actors, and since investor protection in fixed-income markets depends on many other (perhaps more important factors) than price transparency alone.

This all means there are many nuances to explore in the debate on bond market transparency, and that it is therefore important not to become trapped in an ideological mindset. Rather, one should put one's prejudices aside and seriously consider in an objective manner how to arrive at an *optimal* level of transparency.

This paper intends to provoke the entrenched camps on both sides of the debate to this effect.

### 2. Why regulate transparency?

The normative question of whether transparency ought to be regulated derives from the concern that the level, type

and distribution of information prevailing in bond markets might be sub-optimal from the point of view of meeting the policy objectives of market efficiency and retail investor protection. If transparency is found to be deficient, it means that both market efficiency and retail investor protection could suffer, raising the spectre of a twin set of market failures. At least, this has been the Financial Services Authority's rationale for looking into the possibility of further regulating secondary bond markets in the UK.<sup>1</sup>

On the one hand, opacity as regards essential trade information can damage the speed and quality at which new information is impounded into prices, causing the efficiency of the price formation mechanism to be compromised. Overall market efficiency will suffer as a result, since prices are that invisible hand that Adam Smith described to explain the miracle of efficient resource allocation; price formation (also known as price discovery) – generated by trading – is the mechanism by which market participants arrive at a consensus on the fundamental value of a security, enabling them to better determine how it fits in their portfolio of assets.

On the other hand, regulators are concerned that the lack of transparency prevailing in fixed-income markets can breed a culture where execution results for clients are not considered a priority by securities dealers. Trading activities in the B2C (business-to-consumer) space are

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<sup>1</sup> See FSA, *Trading Transparency in the UK Secondary Bond Markets*, FSA DP05/5, September 2005.

especially fraught with information asymmetries that are characteristic of principle-agent relationships: the client who submits an order is at the mercy of the broker who routes or fills it. Thus, transparency is a powerful instrument in better aligning the interests of the principle and the agent: it allows the client to verify the quality of execution his broker delivered. The pressure on brokers to obtain the most favourable execution result for their clients by routing their orders to the venue that will best satisfy the client's interest – rather than to the one that will yield the most kickbacks for the broker – is clearly a positive function of market transparency.

Faced with the possible market failures associated with opacity, e.g. inefficient price discovery and the failure of brokers to execute under conditions favourable to the client, the regulator's dilemma is to consider whether introducing greater transparency into markets can solve these actual or perceived deficiencies.

A first step is to consider in which cases statutory regulation is warranted. Broadly, there are two different approaches to this kind of assessment, the first of which we can call the *economic approach to regulation*. Proponents of this school will want to ask certain questions prior to introducing new regulations (e.g. is regulatory intervention warranted?), and prior to developing a regulatory strategy once a course of action has been decided (e.g. will the proposed regulations(s) be able to overcome the perceived market failure(s) in a way that minimises compliance costs and foregone external competitiveness?).

With respect to bond market transparency, the economic approach to regulation will encourage regulators to entertain questions such as: Is there a market failure? If so, can market-led initiatives or technological improvements substitute for new regulation? Will increased transparency improve overall market efficiency/liquidity? Will transparency improve investor protection (investor protection being one of the main policy objectives for which transparency is seen to be an effective policy instrument)? Will greater transparency lead to overall welfare gains for the economy (i.e. have a net positive, not a merely redistributive, effect)?

On the other hand, what might be called the *dirigiste approach to regulation* proceeds from the assumption that statutory regulation is preferable to self-regulation and that some degree of statutory regulation is better than none. As a result, like justice under the *code Napoléon*, the dirigiste approach to regulation assumes guilt until innocence is proved by the accused. The burden of proof lies on market participants to demonstrate that there is no market failure with regard to transparency when regulators suspect there must be one based on whatever circumstantial evidence they have collected or mere suspicions they may have. Regulators adhering to this school will concentrate their attention on questions such as: Are liquidity providers making excess profits? Is transparency a mechanism for redistributing some of these gains to investors? Is the balance of power in the principle-agent relation skewed

towards the service provider, and must regulation redress this asymmetry in favour of the consumer?

In my view, the key point to address is whether statutory measures aimed at enhancing transparency will generate *net* welfare improvements for the economy as a whole. If they do not, they will amount to a pure redistribution of rents from the dealer community to investors. Though dealers may be loathe to accept such an approach to regulation, there is nothing intrinsically wrong with it in principle. As public authorities, regulators can reserve the right to effect such redistribution of rents; yet if they choose to do so, they should not pretend to have an *economic* rationale for regulation – theirs would be a purely *political* decision. In addition, they would have to anticipate how private actors who provide liquidity would respond to such a move – and whether it would verifiably enhance market quality (although market quality is not likely to figure high on the priority list for such a regulator).

### 3. Arguments in favour of more transparency

A more cautious regulator will seek to balance the perceived benefits of introducing greater transparency with the costs that the economy is likely to incur as a whole from whatever approach he adopts. In terms of the benefits of market transparency, one can think of several reasons, discussed below, why more transparency in the bond market would be beneficial.

#### ***Achieving and verifying best execution***

Pre-trade transparency is an important component in achieving best execution, whereas post-trade transparency helps verify best execution. Though originally a concept designed for equity markets, the obligation for investment firms to assure best execution for their clients will apply equally to bond markets in the EU from 1 November 2007 under the Markets in Financial Instruments Directive (MiFID). To the extent post-trade transparency is an important element in verifying the quality of trade execution, it would not be very consistent if the European Commission did not mandate stricter and harmonised (post-trade) price transparency rules (or at least encourage the latter through an industry code of conduct) if it already imposes strict best execution requirements. The European Commission is mandated by the Council and the Parliament under MiFID (Art. 65.1) to decide a course of action on regulating bond market transparency by 31 October 2007. However, if the legislative option is at all pursued, it could well be many months before a uniform degree of transparency is imposed on European bond markets due to the slowness of the legislative machinery in Brussels. This will create an awkward situation whereby best execution requirements are harmonised across European bond markets where different levels of price transparency prevail in different member states, leading one to question the enforceability or practicability of

harmonised best execution rules. However, this discrepancy would only affect a minority of traded bonds (in volume terms): in government bond markets, about 70% of trading volume is carried out on the MTS system, which is a trading platform common to all sovereign issuers in the EU, and on which pre- and post-trade transparency requirements are virtually the same across the system; and in corporate bond markets, 70% of secondary market activity is carried out in London, and thus is regulated by a single authority, the FSA.

### ***Valuation and asset allocation***

Calculating net asset values (NAVs) has become increasingly important with the explosion of bond funds and ETFs. Yet without timely, consistent, accurate and widely accessible data on bond prices, it is difficult to arrive at the NAVs, which bond funds typically calculate on a mark-to-market basis. Greater post-trade transparency would facilitate the calculation of NAVs. It would also facilitate the valuation of illiquid instruments through better proxies, e.g. matrix pricing. In the pre-trade space, more transparency would enhance the efficiency of asset allocation, with important implications for asset management.

### ***Lowering transaction costs***

By enhancing the competition between market-makers, more transparency should unleash competitive forces and lead to lower transaction costs. Opacity in prices makes it easier for liquidity providers to retain pricing power over their clients because it increases search costs for investors. High transaction costs can frustrate the development of vibrant secondary market activity and thereby reduce market liquidity. It must be noted however that spreads are paper-thin (and sometimes even negative) in EU cash government bond markets and are reported to be lower than those in the US market for cash corporate bonds.

### ***Essential non-price information captured in bond prices***

In corporate debt markets, price movements are critical inputs in modelling default probabilities. Price transparency can therefore be an important element of retail investor protection, especially if ongoing disclosure by issuers is not as rigorous as in equity markets, and since credit ratings often respond with a considerable lag to critical corporate information that should trigger ratings changes. This lag is due both to the nature of the ratings business, whereby reputational risk is incurred every time an agency moves ahead of others with a rating downgrade – leading to a certain inertia in ratings changes – and to the way ratings rely heavily on historical data, making them backwards-looking. Default probabilities on the other hand are forward-looking and thus are more reliable and more up-to-date predictors of corporate defaults. The problems associated with the lack of price transparency in EU corporate bond markets have certainly been dampened by the rapid rise of the credit default swap (CDS) market, but

one cannot say it has been entirely resolved. Because the CDS market is more liquid and CDS prices are driving price discovery in the underlying cash market, modellers use prices on CDS contracts as references in the calculation of default probabilities. Nevertheless, there are sometimes situations where spreads widen in the CDS market and do so for no apparent reason that is linked to default probabilities, but rather arise due to market imperfections or the occasional market squeeze, for example, a shortage in the supply of deliverable underlying cash bonds. Improving price transparency in the cash bond market can help to increase the accuracy of calculated default probabilities by allowing one to gauge the quality of those derived from CDS prices against those derived from cash prices. Perhaps because the number of corporate defaults in the EU has been very low in recent years, insufficient attention has been drawn to the argument of improving price transparency to better capture the valuable non-price information that is implicit in the price of an asset. With a downturn in the credit cycle, this argument is sure to take on more weight.

### ***Data consolidation***

Since bond markets are characterised by a radical decentralisation compared to equity markets, efficient pricing would normally require that the various trading venues be inter-connected. Inter-connectedness is of course very difficult if not impossible to achieve in markets that are voice-brokered, as the bond market has traditionally been. However, because the percentage of trading volume that is conducted electronically is steadily rising in fixed-income markets, the potential for inter-connectedness increases. Technological advances such as electronic trading along with the development of multi-dealer-to-client (B2C) platforms have allowed for more transparency in a telephone-brokered market than in the past. A B2C platform, for example, can bring competing quotes of up to five market-makers simultaneously on a single screen, based on an inputted request-for-quote (by an institutional investor).<sup>2</sup> Ideally, in an integrated market, the same security will trade at the same price at the same point in time on multiple trading venues. In a decentralised trading environment, connecting the various trading spaces through data consolidation, such that the prices and volumes traded on some venues are visible on trading screens in other venues, will contribute materially to the quality of price discovery in the overall market. In the single market, similar transparency requirements would ideally be applied across all trading venues to facilitate data consolidation. While this is already the case for equity markets under MiFID (exchanges, internalisers and MTFs alike facing similar trade reporting rules), there is currently no such framework for bond markets. If trade information cannot be easily consolidated due to a lack of transparency or due to divergent transparency requirements across

<sup>2</sup> Retail investors cannot get access to B2C platforms, which are designed for wholesale market transactions.

different markets, overall price efficiency will suffer because search costs will be higher. High search costs damage the quality of price discovery by either discouraging investors from trading, or by reducing their willingness to search for better prices than those they are offered by their regular broker(s). If bond transparency requirements were harmonised across the EU, it would be far easier to consolidate bond data, leading to a more efficient bond market and to the development of more and higher-quality indices.

### ***Levelling the playing field***

Large institutional investors can probably obtain all the transparency they want out of dealers due to their value to dealers as important and regular clients, who probably generate fees for dealers in other areas beyond trading. However, smaller players cannot exercise this kind of leverage over dealers. Unless standard transparency rules are applied across the market, large players have an important information advantage. Smaller buy-side firms and retail investors suffer from the current lack of optimal transparency in the market, while large buy-side firms and dealers benefit from opacity at the expense of the former group, who can trade profitably on their information advantages. An industry code of conduct, or mandated transparency requirements (designed in close consultation with the industry) could help to close the information gap between various classes of market participants, contributing to market confidence.

### ***Index construction***

Indices can only be as good as their inputs. Good indices rely on high-quality and consistent price data. The TRACE reporting system provides just that in the US corporate bond market, presenting post-trade data in a consistent format that allows data consolidation and thereby affords a view of overall market activity. In the European corporate bond market, the iBoxx index covering liquid investment grade credits is a good start to more transparency, since it consolidates prices from the 11 investment banks who market-make in iBoxx-eligible bonds and publishes them in real time. These real-time quotes, along with the daily closing prices freely available on the International Index Company website, are already a significant step in the right direction. iTraxx does the same for the credit derivatives market. MTS indices and (recently-launched) index futures provide a similar function in the European government bond market, enhancing the quality of price discovery. Nevertheless, prices on Bloombergs and other terminals that rely on iBoxx feeds are occasionally several basis points off mark, undermining the quality of market data. Greater transparency of bond prices and volumes will also improve the accuracy of index-tracking. If greater transparency brings more traders with active trading strategies to the market, it will increase the regularity of trading. By leading to more continuous pricing rather than price movements characterised by sometimes significant discrete jumps as in the past, a smoother stream of orders

will also have positive knock-on effects on the quality of bond indices.

### ***Improving liquidity***

The more homogeneous the liquidity needs of the trading community, the more likely it is that liquidity will freeze over in the markets, since market movements will largely be uni-directional. Fixed income markets have traditionally been dominated by institutional investors who pursue buy-and-hold strategies for asset-liability matching purposes. While retail investors are also largely buy-and-hold investors, their liquidity needs fluctuate more regularly than those of institutional investors, so greater retail investor participation in the bond market should lead to more regular trading. Other players with heterogeneous trading strategies are also likely to come into the market as transparency increases, such as hedge funds which thrive on arbitrage plays on default, event, interest rate, inflation and liquidity risk. The presence of these groups of heterogeneous traders should lessen the volatility in price movements. Greater pre-trade transparency in particular is also likely to improve liquidity by tapping into unfulfilled liquidity demand (potential orders that are not executed because bond investors are unaware of existing trading opportunities).

### ***Enhancing disclosure of financial risks***

There is a marked tendency today to move towards fair-value accounting, witnessed by the requirement for all listed firms in the EU since January 2005 to present their accounts in IFRS, which is based on fair value, rather than historical cost, accounting. At the same time, due to concerns about systemic risk in the economy and a preference for pre-emptive action to stave off financial crises, regulators are pushing for more disclosure of financial risk on a more regular basis for credit institutions and insurance firms alike. More recourse to, and more accurate, mark-to-market accounting can contribute to systemic stability by highlighting weak points in the financial system as they emerge. Greater transparency in bond markets can contribute to systemic stability: price transparency helps market-makers and credit institutions value their inventory and helps institutional investors and hedge funds to more accurately and regularly value their portfolio holdings. More transparency in bond and credit derivatives holdings can contribute to financial stability by helping financial market supervisors trace the path of risk as it cascades through the financial system.<sup>3</sup>

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<sup>3</sup> For a more detailed exposition of the latter argument, see Laganá, Peřina, von Köppen-Mertes and Persaud, *Implications for Liquidity from Innovation and Transparency in the European Corporate Bond Market*, ECB Occasional Paper Series No. 50, European Central Bank, Frankfurt, August 2006.

#### 4. Arguments against more transparency

In preparing this paper, it so happens that I have found more arguments in support of transparency than against it, but this is not to suggest that pros necessarily outweigh the cons in terms of total economic impact.

##### ***Could damage liquidity***

Unlike equity markets, where liquidity is brought to the market by orders from investors – the exchange merely providing a service of facilitating the matching of orders in a consolidated limit order book – liquidity in the bond market depends critically on the willingness of market-makers to risk their capital in proprietary trading to buy and sell blocks of bonds from their clients as a service to them. This activity is not without a certain risk: bonds tend to be illiquid, and the market is quite concentrated. As a result, if greater pre-trade transparency is imposed through regulation, traders could exploit the service market-makers provide to their clients by hitting or lifting bids or offers posted on a continuous basis in opportunistic fashion, especially if greater transparency is combined with market-making obligations (as under MiFID for equities dealt by systematic internalisers or for EU government bonds traded on MTS platforms). In these cases, the profits of opportunistic traders would come at the expense of the market-maker and of the overall market, since it will discourage a dealer from providing liquidity, a public good.

If introduced in a haphazard fashion, mandated post-trade transparency could increase the costs to dealers of providing liquidity, since real-time disclosure on large blocks of illiquid securities can lead other market participants to anticipate the need to rebalance or hedge inventory by taking exploitative positions in the swap market that will increase the costs of hedging to the dealer or by increasing the market impact of dealer trades by anticipating a dealer's need to offload some inventory and front-running the inventory reshuffling in the cash market.

The regulatory debate on bond market transparency has largely focused on the need to provide greater protection to retail investors. The law of unintended consequences always portends caution on the part of the regulator who seeks to alter existing market structures. Paradoxically, retail investors could even be worse off if market-makers withdraw their capital from liquidity providing activities if the costs/risks of providing this service are too great; the same can be said if greater transparency would erode the profitability of market-making to such an extent that dealers no longer find it a worthwhile activity for certain types of credits.

The annex presents a very simple model of the market for liquidity. The model describes how introducing transparency could potentially reduce the supply of liquidity while widening spreads. It also measures the welfare impact of such a policy move, demonstrating that the economy can be worse off as result.

While there clearly are merits to this argument of exercising regulatory caution to preserve market liquidity, one must not either succumb to a knee-jerk reaction against transparency nor defend the status quo at all costs. The model in Annex I also shows that depending on the consequences of greater transparency on market participants' behaviour, there are also cases where introducing greater transparency can lead to net welfare benefits for the economy.

##### ***Other instruments better suited for retail investor protection<sup>4</sup>***

Although one of the pillars of retail investor protection in any marketplace is transparency, it is important to highlight that regulatory attention ought not to focus solely on transparency, as a number of more important variables can impact on the level of investor protection in the bond market.

Fixed-income investments are associated with a wide array of risks, which retail investors may either not understand or remain completely oblivious to. Bonds are often presented as relatively simple financial instruments compared to equities. They typically offer annual or semi-annual coupon payments that represent interest on the principal one has loaned to the issuer until maturity, whereupon the principal is recovered. However, to present bonds so simply is to mislead investors as to the true nature of risks they are undertaking when purchasing a bond. Not only does an investor face the risk of not recovering his invested principal, known as default risk, the value of his investment can also be negatively affected by interest rate risk, inflation risk, event risk and liquidity risk. These risks are largely unknown to the average retail investor.<sup>5</sup>

This is not to say that transparency is not an important component of investor protection. Transparency ought to be improved. But besides mere transparency, there is an array of flanking measures that should be considered in earnest by regulators if retail investor protection is their primary concern in the regulation of bond markets. These include: suitability of instruments ('know your client' principle); addressing conflicts of interest in, and ensuring principled distribution (e.g. in remuneration schemes), thereby reducing the risk of mis-selling; improving bond documentation; protecting invested principal against default and event risk; educating investors to the particularities of fixed income investments; and

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<sup>4</sup> For a more complete exposition of auxiliary measures/instruments that are more relevant for investor protection in fixed income markets, see J-P Casey and K. Lannoo, *Europe's Hidden Capital Markets*, CEPS Paperback, Centre for European Policy Studies, Brussels, October 2005, chapter 4.

<sup>5</sup> See Casey & Lannoo, *ibid.* They cite a NASD study that reveals that over 60% of US investors do not know what interest rate risk is.

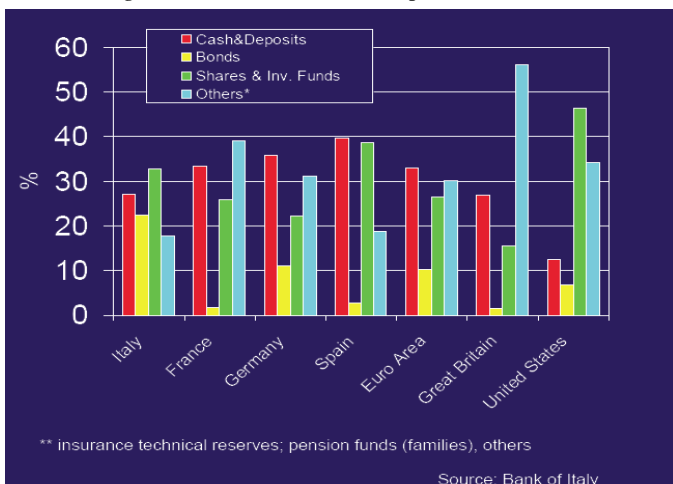
encouraging indirect investments through diversified funds for risky products.

An interesting related question is how is it that retail investors are allowed by regulators to buy individual credits but are often not allowed to buy e.g. a diversified fund. It shows there is an odd bias in the regulatory framework that makes little sense from an economic or indeed consumer-welfare viewpoint. This dilemma is primarily relevant to countries, such as Italy, Denmark and Spain, where bond markets are populated by a large retail presence. In the European bond market as a whole, retail-investor participation only accounts for a miniscule percentage of trading activity in volume terms. Yet this fact is not a good argument in itself for not regulating: peoples' savings are at risk, and these investments, though small in macroeconomic terms, can be large in terms of the invested wealth of a retail investor. The question is rather one of how to preserve the integrity and efficiency of the wholesale market while adopting a regulatory scheme that contributes to more retail investor protection.

### No clear evidence of a market failure

One of the principal arguments that has been touted by market participants against introducing greater transparency in the bond market is the lack of evidence of a market failure significant enough to warrant regulatory intervention. This argument has found some backing, not least from the FSA, which found no compelling case of market failure in UK secondary bond markets. Because London accounts for up to 70% of secondary market activity in European corporate bonds, the FSA's analysis ought to be treated with considerable weight. Others regulators, however, are not likely to be satisfied with this approach. The Italian market regulator, Consob, has consistently been pushing for greater transparency, owing to the large presence of retail investors in the Italian bond market and the losses they suffered in the recent past (Parmalat, Argentina) – nearly 30% of the Italian bond market is held by retail investors, a total that is often a multiple of the same figure for other EU countries and the United States (See Figure 1).

Figure 1. International comparison (2004)



## 5. Lessons from TRACE

We have all heard many times from industry representatives that the TRACE experience ought not to be the starting point for European regulators for the following reasons: there is greater pre-trade transparency in Europe than in the US; spreads are lower in Europe; the structure of the two markets is not directly comparable and the two markets operate quite differently; the conclusions of academic studies on the effects of TRACE which show enhanced liquidity in the US corporate bond market are not convincing because NASD does not want to share TRACE data with any independent researchers and the models used have their limitations. Rather than to bore the reader with the merits of these arguments, which can be judged for themselves, I intend to focus on some of the positive aspects of TRACE that are less frequently mentioned, but which are nonetheless important and relevant for the European corporate bond market.

Though the bond market is characterised by decentralisation, it is little short of inexcusable that neither regulators nor market participants, whether institutional or retail, are unable to obtain aggregated information on bond market activity in a given day in the European bond market or volume data on individual credits. Although asset allocation is typically driven by price considerations, the information captured in traded volumes, with breakdowns by type of securities, is undoubtedly of economic value and could improve market efficiency if available to all. It is impossible to do so without a common reporting engine akin to TRACE, or at least without inter-linked reporting systems whose post-trade inputs can be consolidated.

Table 1. Trading activity in the US corporate bond market, 3 November 2006

	All issues	Investment-grade	High-yield	Convertibles
<b>Total issues traded</b>	4,470	2,909	1,302	259
<b>Advances</b>	1,516	857	540	119
<b>Declines</b>	2,553	1,789	637	127
<b>Unchanged</b>	135	44	83	8
<b>52 week high</b>	200	100	90	10
<b>52 week low</b>	50	36	11	3
<b>Dollar volume</b>	15,115	9,313	4,135	1,666

Source: NASD website (<http://www.nasd.com>).

Table 1 shows activity in the US corporate bond market on 3 November 2006.

The TRACE engine allows one to verify on a daily basis the total number of corporate bonds traded in the US market, with a breakdown into three sub-categories: investment grade, high-yield and convertible. It also documents the number of bonds that gained in price over

the previous market closing as well as those whose price declined or remained unchanged. It provides 52-week high/lows. And the total dollar volume of trades is recorded. By any measure, this aggregated market information is a valuable resource for all market participants, dealers, asset managers, retail investors and regulators alike. While TRAX offers a similar service for Eurobonds and for bonds traded in the City of London, the service is neither comprehensive nor aggregated. Currently, the TRAX engine only enables one to obtain end-of-day data on individual securities, but volumes are often excluded. ICMA members only can get data on weekly or monthly volumes, but not daily data. One must also consider that these volumes only represent those of bond trades that are reported to TRAX, so even if ICMA would publish daily data on volumes, it would not represent an aggregate picture of bond market activity.

TRACE also enables market participants to collect information on traded volumes on individual bonds, which is a useful proxy to gauge the liquidity of these bonds. Table 2 shows the outputs that are possible to produce with TRACE data. One can compare the dispersion in liquidity among US corporate bonds by issuer, coupon, maturity and rating. In 2005, the most liquid corporate bond, a GM 8<sup>3/8</sup> 2033, registered nearly 60,000 trades in 2005, or twice as much as the 5<sup>th</sup> most-liquid corporate bond in the US market (another GM bond). The most liquid bond was three times more liquid than the 10<sup>th</sup> most liquid bond, which suggests that liquidity in the bond market is concentrated in a few issues and that it quickly trails off subsequently.

Table 2. Top 50 publicly traded investment grade issues by number of trades executed in 2005 (excluding convertible bonds)

Rank	SYMBOL	ISSUER NAME	COUPON	MATURITY	RATING	TRADES
1	C.GMV	CITIGROUP INC.	3.500	2/1/08	AA	11,197
2	MWD.QP	MORGAN STANLEY	4.750	4/1/14	A	10,507
3	WMT.HN	WAL-MART STORES, INC.	4.550	5/1/13	AA	10,129
4	GE.ADF	GENERAL ELECTRIC COMPANY	5.000	2/1/13	AAA	9,645
5	GS.UG	GOLDMAN SACHS GROUP, INC. (THE)	5.125	1/15/15	AA	9,190
6	GS.PX	GOLDMAN SACHS GROUP, INC. (THE)	4.125	1/15/08	AA	8,388
7	GE.WB	GENERAL ELECTRIC CAPITAL CORPORATION	5.875	2/15/12	AAA	8,229
8	GE.AGS	GENERAL ELECTRIC CAPITAL CORPORATION	3.500	5/1/08	AAA	8,122
9	WFC.GBX	WELLS FARGO & COMPANY	4.200	1/15/10	AA	7,846
10	GE.AAA	GENERAL ELECTRIC CAPITAL CORPORATION	5.000	6/15/07	AAA	7,758

Top 50 publicly traded high-yield issues by number of trades executed in 2005 (excluding convertible bonds)

Rank	SYMBOL	ISSUER NAME	COUPON	MATURITY	RATING	TRADES
1	GM.HB	GENERAL MOTORS CORPORATION	8.375	7/15/33	B	58,131
2	GM.GM	GENERAL MOTORS CORPORATION	7.200	1/15/11	B	37,920
3	GMA.GY	GENERAL MOTORS ACCEPTANCE CORPORATION	7.750	1/19/10	BB	31,249
4	GM.HC	GENERAL MOTORS CORPORATION	8.250	7/15/23	B	30,496
5	GMA.HF	GENERAL MOTORS ACCEPTANCE CORPORATION	8.000	11/1/31	BB	29,890
6	GMA.HD	GENERAL MOTORS ACCEPTANCE CORPORATION	6.125	9/15/06	BB	23,324
7	GM.HA	GENERAL MOTORS CORPORATION	7.125	7/15/13	B	22,179
8	GMA.HE	GENERAL MOTORS ACCEPTANCE CORPORATION	6.875	9/15/11	BB	21,330
9	F.GY	FORD MOTOR COMPANY	7.450	7/16/31	BB	21,079
10	F.IF	FORD MOTOR CREDIT COMPANY	7.375	10/28/09	BB	20,964

Source: NASD, 2005, TRACE Fact Book ([http://www.nasd.com/web/groups/reg\\_systems/documents/regulatory\\_systems/nasdw\\_017618.pdf](http://www.nasd.com/web/groups/reg_systems/documents/regulatory_systems/nasdw_017618.pdf)).

Overall, I believe TRACE to provide three essential *absolute* benefits to the U.S. corporate bond market that must be considered seriously by European bond market SROs and regulators. (I refer to absolute benefits, because it is not sure that the *net* benefits, once one discounts the liquidity that *may* have evaporated from the market as a result of TRACE, is taken into consideration). These benefits are namely:

- As described above, TRACE gives all market participants and regulators useful information on aggregate activity in the bond market and volume data on individual credits
- Enabling retail and institutional investors to verify the quality of execution no later than 15 minutes after a

trade.<sup>6</sup> This possibility puts pressure on brokers to ensure that they are consistently making efforts to place their clients' needs over any professional arrangements or proprietary trading activities.

<sup>6</sup> Some will argue that the notion of best execution is a pure theoretical construct that can only apply in perfect markets where there are no frictions, all information is available to all market participants, etc. The concept is difficult enough to apply to equity markets where trading typically is concentrated on a handful of trading venues, but in fixed income markets, it is a matter of great controversy over how exactly best execution can be applied and enforced. The vigorous debate surrounding the FSA's suggested benchmarking approach attests to this.

- By making post-trade information available to all, TRACE levels the playing field between various categories of market participants as regards access to information. Without a system like TRACE, large dealers, large institutional investors and active hedge funds have a clear advantage over smaller players because they will have a much better idea of what constitutes a good price for a given credit, which are the most liquid securities and where to find them – and they can trade on this informational edge to their advantage.

## 6. What incentives for the buy-side to promote greater transparency?

This paper is not aimed at quantifying inefficiencies in the European bond market that could be tantamount to market failure(s). But clearly, insufficient information is available, especially for retail investors, in the European bond market. In addition, without a single trade reporting system, or at a minimum, data reconciliation between various trade reporting systems that would allow post-trade data to be consolidated, it is impossible to obtain an aggregate picture of the European bond market, including information on the total credits and volumes traded, with various breakdowns thereof. The bulk of information about bond holdings, pricing and traded volumes is probably visible to large banks in their dealing activities, as well as to their large and active clients. The unavailability or rather the inexistence of data on aggregate activity in the European bond market smells of a market failure. Will the market rise to the challenge of correcting it without regulatory intervention?

When invoking the US experience with TRACE, and when comparing US corporate bond markets with their European counterparts, it is often noted that the EU corporate bond markets are more competitive, spreads are lower and pre-trade transparency is higher. While this may well be the case, EU regulators cannot simply justify their inaction on the aforementioned market failure by saying that EU corporate bond markets compare favourably with those in the United States. European regulators are accountable to the European investor public and to users of EU financial markets irrespective of the regulatory situation in a comparable market in overseas jurisdictions, including the US.

EU corporate bond markets may indeed be broadly efficient, but that does not mean there are not little market failures to correct here and there (such as the lack of data on volumes on individual credits or on aggregate market activity), either through regulatory intervention or by means of market-led initiatives that benefit from a bit of prodding from regulators.

As part of any cost-benefit exercise that would accompany any proposed legislation, it is important to assess who benefits from the status quo and who gains from a change in market regulation to understand the dynamic of how vested interests colour the policy debate. Let us consider

who benefits from the current relatively opaque European (corporate) bond market. Clearly, it is the leading dealers and large buy-side investors. One might think that if large institutional investors want more transparency, dealers would give it to them, so there is no need for regulators to interfere in the workings of the wholesale market. But large buy-side firms may want to preserve opacity in the markets, since they get good information anyway and they are big enough to obtain favourable prices from their dealers. Therefore, one should not expect the larger buy-side firms to be clamouring for more transparency. Smaller institutions on the other hand may be dissatisfied with the current level of transparency in the market but may be reluctant to push for more, since they cannot exercise the same leverage over dealers in terms of the value of their business to dealers.

Although the current level of opacity in the market does not benefit smaller buy-side firms and retail investors, it is unlikely that they will agitate for more transparency. It is not that buy-side firms would not necessarily prefer greater transparency in the market. Rather, one must consider their positions in light of the important business relations they maintain with dealers for other services – relationships these smaller buy-side firms might not be willing to jeopardise if dealers would come to see them as troublemakers on the transparency question.

For example, just as the Gang of 26 negotiations quickly broke down when features of certain debt issues that were blacklisted (because of their failure to satisfy the minimum documentation standards the Gang of 26 had jointly agreed to enforce) made these same issues very attractive to the institutional investors who constituted the Gang, so also buy-side firms that may voice dissatisfaction with the current level of transparency in the bond market may decide to suppress their dissent to get in on attractive issues.<sup>7</sup> Examples of this kind of behaviour have emerged in EU securitisation markets, where some investors were privately very dissatisfied with the level of ongoing disclosure by issuers, but were publicly mute on the point in order to not compromise their ranking in the pecking order of key issues allocated by dealers in a market that is typically oversubscribed.

To further this argument of why the incentive structure for various stakeholders in the bond market transparency debate might lead some pro-transparency parties to remain mute, pension funds and insurers want to match long-term liabilities with assets, hence their great demand to buy and hold long-horizon, highly-rated corporate securities. There is currently a serious shortage of long-dated debt securities to satisfy the demand for asset-liability matching by pension funds and life insurance companies who face increasing longevity risk and unmatched liabilities: KPMG

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<sup>7</sup> See “Improving Market Standards in the Sterling and Euro Fixed-Income Credit Markets”, October 2003 (to obtain an abridged version, go to <http://www.abi.org.uk/Display/File/364/newbondpaper.pdf>).

estimates a shortfall of up to £200 billion between the demand for and supply of long-dated corporate bonds, leading to a squeeze at the long end of the maturity curve.<sup>8</sup> Given this shortage, paying a higher price on the one-off purchase of a security could be a small penalty to pay to get in to a hot new issue. This is especially true given the buy-and-hold nature of bond holdings in institutional investor portfolios: over time, the one-time (higher) transaction cost resulting from less competition among dealers because there is less price transparency will not come across as very important in economic terms, given the benefits of obtaining the debt issues that are vital for proper liability-driven investments. All this to say that the clamor for more bond market transparency from institutional investors would likely be greater if their position on the question could be developed independently of all other considerations that derive from the business relations they maintain with their dealers.

## 7. What kind of transparency is warranted?

Who will argue that more information is worse than less? That more information made available to market participants will damage market quality? Hardly anybody. Markets thrive on information. The quality of a marketplace in any sector of the economy depends critically on the intangible assets and preconditions for a successful market economy that are publicly-disseminated information and contract law. The critical question therefore is not so much *whether* more transparency is needed, but rather *how* should it be introduced, by whom and under what conditions.

The all-encompassing notion of transparency as applied to bond markets can mean a variety of things. It could mean price transparency – and even price transparency can be broken down into its pre-trade and post-trade components, each of which can be calibrated to the  $n^{\text{th}}$  degree in their implementation by regulators. It could mean more data on volumes in addition to mere price transparency – without information on the quantity of bonds traded, prices are not as informative as they ought to be: comparing the price on a block trade of 5,000 bonds to the price of trading an individual security makes little economic sense. It could include the direction of trade (i.e. whether the trade was a ‘buy’ or a ‘sell’). It could mean a certain delay in the dissemination of post-trade information to other market participants. This delay can also be calibrated to the  $n^{\text{th}}$  degree, depending on the relevant market or instrument. It could mean different ways to publish the disseminated post-trade information: ought it to be consolidated? Should trades over a given size be given abstract representations so as to protect liquidity providers from opportunistic behaviour that moves the market against them as they

attempt to hedge or unwind the positions they have built up in dealing with their clients?<sup>9</sup>

Clearly, there is no right or wrong answer. Different forms of transparency can be implemented and considered appropriate for different instruments, which highlights the importance of regulatory flexibility as opposed to an established blueprint. The European Commission seems to have appreciated this nuance in its ongoing review.<sup>10</sup>

## 8. Will market-led initiatives improve transparency?

The key question then is whether market-led initiatives will be sufficient to satisfy the needs of retail investors, smaller buy-side firms and regulators. Markets need to be given a chance. But this chance has to be couched in terms of a limited window of opportunity after which regulators will be forced to act, either through an industry code of conduct (preferable) or through legislation.

Encouragingly, we have recently seen some positive developments in market-driven initiatives to enhance transparency: the dealer community, whether pushed by greater competition or pulled by technological improvements, has moved towards providing greater transparency to the marketplace than was available to investors in the past. Initiatives include ICMA’s TRAX and TRAX2, MTS indices, the Iboxx/iTraxx indices and the development of B2C multi-dealer-to-customer platforms, which have greatly increased the degree of both pre-and post-trade transparency in the bond market (although to a lesser extent for the latter). In addition, a consortium of 11 investment banks set up LiquidityHub, an initiative aimed at consolidating liquidity and market data for electronic trading in the fixed-income market and due to be operational in 2007.

Are these initiatives enough? I would argue not. Retail investors still lack good information access to the bond market; and all market participants along with regulators lack volume data and an aggregated view of the European

<sup>9</sup> This will especially be important if the dissemination delays for illiquid securities are for very short periods of time.

<sup>10</sup> “...[T]he provision does not require consideration only of two options: full MiFID-style transparency for each instrument class or nothing. We believe the ‘extension’ referred to includes the possibility of adapting that regime to the characteristics of a particular instrument market, the nature of the instrument market concerned and the characteristics of the investors who typically use that market. Therefore, one possible outcome would be to have more than one transparency regime (for example, more than one set of post-trade publication deferrals for large transactions) for different instrument classes.” European Commission, Call for Evidence: Pre- and post-trade transparency provisions of the Markets in Financial Instruments Directive (MiFID) in relation to transactions in classes of financial instruments other than shares, 12 June 2006 ([http://ec.europa.eu/internal\\_market/securities/docs/isd/call\\_for\\_evidence\\_en.pdf](http://ec.europa.eu/internal_market/securities/docs/isd/call_for_evidence_en.pdf))

<sup>8</sup> Barry Riley, “Not only bonds but also backstops”, *Financial Times*, 6 November 2006.

bond market, both government and corporate, on a daily, weekly or other latency – a considerable shortfall. In addition, no consolidated tape exists post-trade to verify whether best execution has effectively been delivered.

Are market-led efforts to overcome these deficiencies credible? The problem with a market-led initiative regarding post-trade transparency, in my view, is whether one will ever materialise – its development is rendered more difficult by the classic collective action problem: unless all dealers implement post-trade transparency together and in the same way, nobody will do it. No dealer has the incentive to move ahead with the introduction of greater transparency with respect to his dealing if not all others move with him. Otherwise, he exposes himself to risks from which the others will benefit. In addition, unless all join in on the industry-led initiative, whatever consolidation is arrived at will not be representative of the whole market. The first-mover disadvantage that characterises collective action problems makes it somewhat unlikely that market-led solutions to introducing greater transparency can work *unless* SROs take a strong lead and impose such measures equally on all their members. Their potential role in pushing their members towards an effective industry-led solution in this important debate cannot be underestimated.

It is evident that dealers have a commercial incentive to prefer less, rather than more, transparency, since it will enhance competition and probably squeeze margins as a result – as well as costing dealers resources in terms of inputting the data (the large share of bonds are voice-brokered as opposed to electronically traded). But nobody ever said the data have to be made available to all market participants for free! Revenues from the sale of data would allow dealers to recoup at least in part the ‘losses’ generated by higher post-trade transparency and possibly to profit from it if they move towards consolidating liquidity and data in a cost-effective manner through more joint efforts such as LiquidityHub.

Here, I would like to raise what I call the paradox of market information: the market information is proprietary, and the dealer feels it belongs to him for commercial purposes. But information is not generated in a vacuum. In my view, therefore, a ‘market-maker’ is less of a liquidity ‘provider’ than a liquidity ‘facilitator’: market liquidity is also brought about by the counterparty who makes a RFQ – it takes two to tango! Without a demand for liquidity, the

supplier of liquidity would earn no revenues and generate no profits from liquidity provision. In addition, trade information is a public good in a market economy. Information on bond prices, volumes and yields has value that goes far beyond that created in the bilateral deal struck between counterparties: this information is used to price other assets (estimate discount rates), to mark portfolios to market and to assess inflationary expectations. So to the extent that dealers operate within a given market structure and rely on it to derive profits from dealing, they have a responsibility to sustain and enhance the efficiency of that structure. Also, to the extent ‘proprietary’ information can be a public good, dealers should make it available to the wider marketplace, but obviously should be allowed to charge for it.

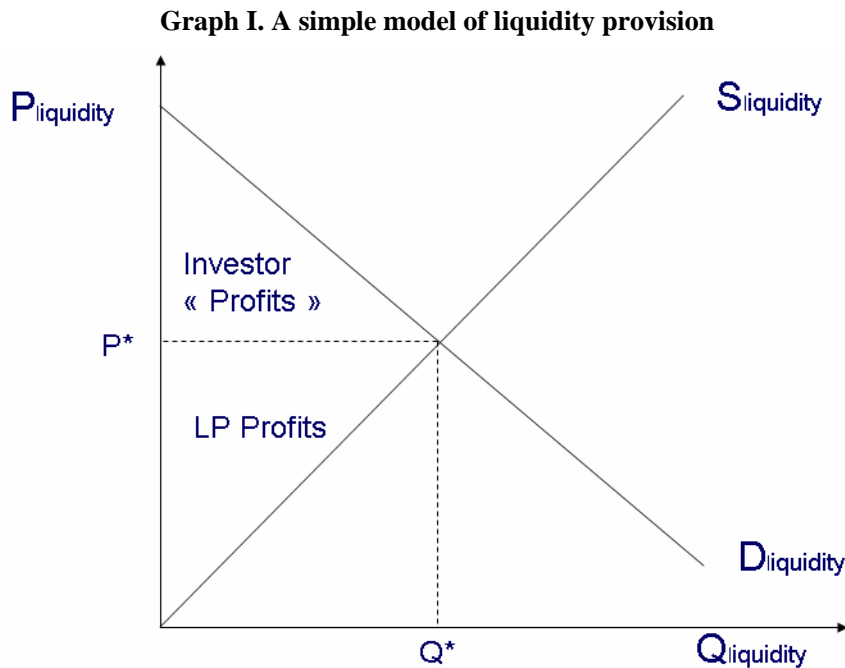
Will dealers overcome the existing coordination failure in markets? Will they ensure consistent pricing across a wide range of assets? Will they consolidate data to allow a pan-European view on debt markets?

Regulators should give dealers and bond market SROs a chance to develop market-led solutions to the unsatisfactory level of post-trade transparency in particular that prevails in the European bond market today. Alternatively, an industry code of conduct or mandated set of transparency requirements (designed in close consultation with the industry) could help to bring more information to the marketplace on volumes on individual credits – a good proxy for liquidity – and on aggregate bond market activity. In addition, more information that is relevant for retail investors in particular ought to be made available by dealers, not least because doing so could preclude the need for mandated transparency requirements on wholesale market operations – requirements that are designed with the retail investor in mind and thus are ill-suited to wholesale transactions. Finally, increasing the level of available market information can serve to close the information gap between various classes of market participants, thereby contributing to market confidence.

The legislative option currently hangs as a sword of Damocles over dealers’ heads that could drop at any time. Because of their flexibility and their proximity to the business, market-led solutions are preferable to legislative alternatives. But they have to be credible, and time is running short. That means the ball is in the dealers’ court. Now the key question is: Are they up to the challenge?

## Annex

## A Welfare Analysis of Bond Market Transparency

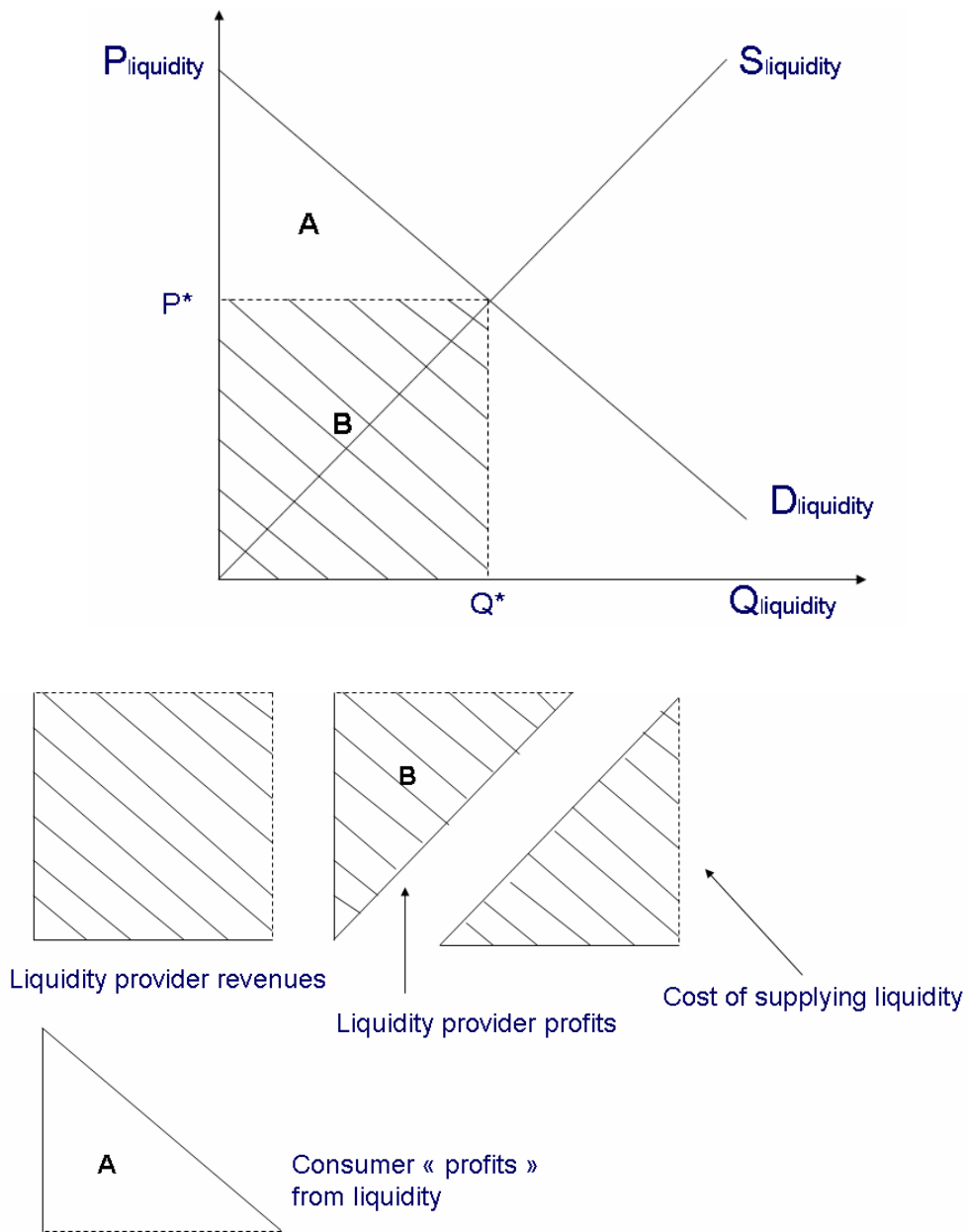


Graph 1 shows the base case scenario. The supply schedule is upward-sloping, because the higher the price of liquidity, the more liquidity a market maker is prepared to supply to the market. The demand schedule is downward-sloping because the lower the price of liquidity, the more the demand for liquidity is likely to increase. Where the supply and demand schedules intersect, the market is said to clear, or to be in equilibrium, because the quantity of liquidity supplied by market makers is equal to the quantity of liquidity demanded by investors. The supply curve represents the costs to the market maker of supplying liquidity. A market maker will not supply a quantity of liquidity that lies below the supply curve, since he would be making a loss on all the units of liquidity supplied that lie below the supply curve. However, a market maker is happy to provide liquidity if the price consumers are prepared to pay exceeds the cost of supplying that liquidity.

When the market is in equilibrium, the total quantity of liquidity supplied to the market is the quantity where demand = supply, or  $Q^*$ . The market-clearing price of liquidity is  $P^*$ .

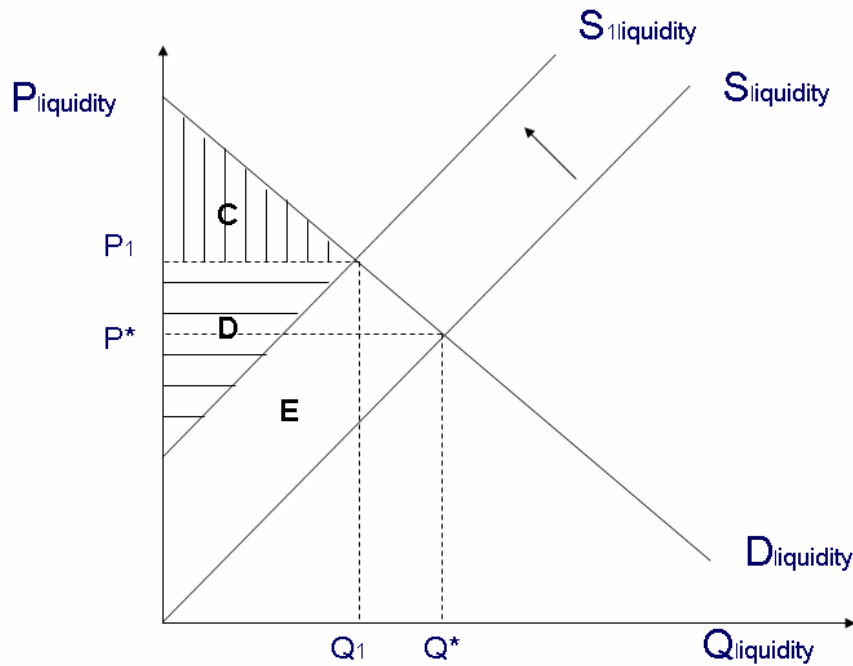
Because for all units of liquidity up to  $Q^*$  investors are prepared to pay more than the market maker charges for these units of liquidity, investors are said to “profit”, since they derive an economic benefit from obtaining a service at a price that lies below that which they are prepared to pay (the reservation price they are prepared to pay for each unit of liquidity is given by their demand schedule). Therefore, whatever lies below the demand schedule and above the equilibrium price  $P^*$  can be called consumer “profits”. Since the cost to the market maker of supplying all units of liquidity up to  $Q^*$  is lower than the price investors are willing to pay to satisfy their demand for liquidity up to  $Q^*$ , the market-maker earns less profit on all units of liquidity supplied up to  $Q^*$ .

Graph II. Base Case Scenario



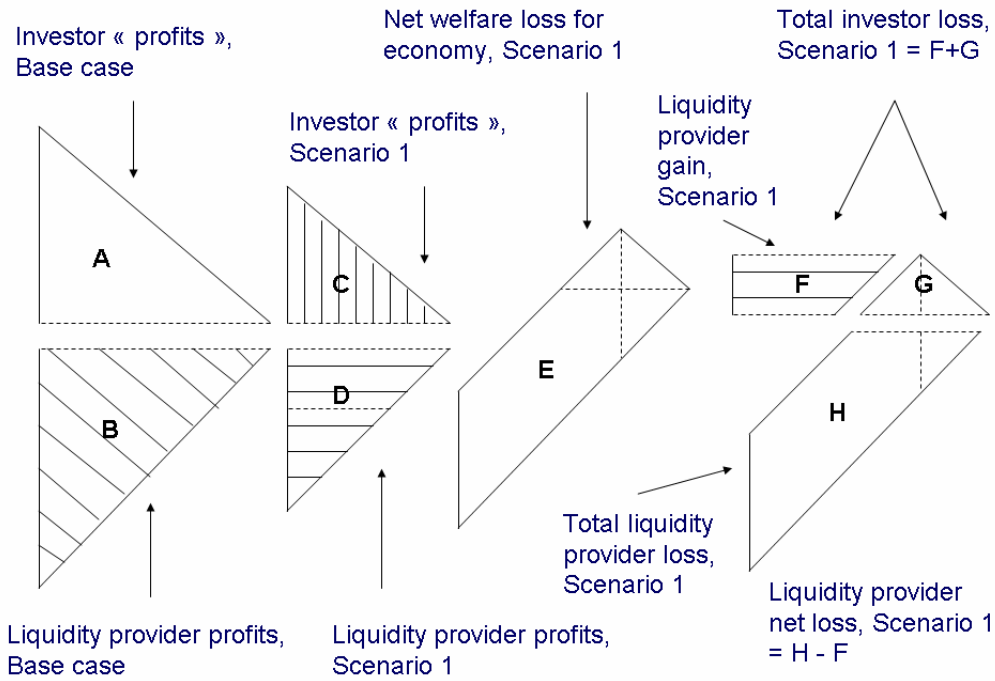
We now make a welfare analysis of the base case scenario to establish the respective welfare positions of market-makers and investors in the base case. This will enable us to verify who benefits and who loses when more transparency is introduced into the marketplace (subject to certain assumptions). In the base case scenario, if the market clears, the market maker makes revenues of  $P^* \times Q^*$ . This is because at price  $P^*$ , he is willing to provide  $Q^*$  units of liquidity. And price  $\times$  quantity supplied = revenues. Remembering that what lies under the supply curve represents the cost to the liquidity provider of providing  $Q^*$  units of liquidity and what lies above the supply curve up until price  $P^*$  represents the profits to the market maker of providing  $Q^*$  units of liquidity, we see that the upper triangle composing square **B** represents profits and the lower triangle composing square **B** represents costs. Investor “profits” of consuming  $Q^*$  units of liquidity are given by the area that lies under the demand schedule and above the equilibrium Price  $P^*$ . This area is given by the triangle **A**. As we can see, in this example, the welfare positions of the market maker and of the investor are identical. (The areas of triangles **A** and **B** representing investor and market-maker “profits” are identical, so the benefits market makers and investors derive from providing liquidity and consuming liquidity, respectively, are identical).

Graph III. Scenario 1



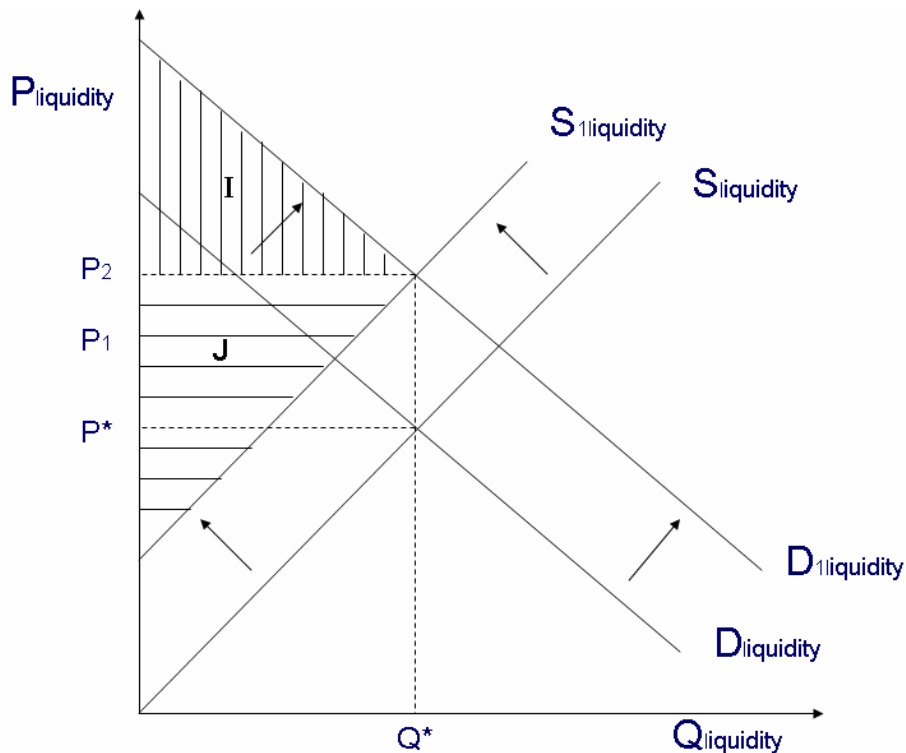
Graph III shows a departure from the base case scenario. Now, greater transparency has been introduced into bond markets through statutory measures. The increased transparency is assumed to increase the costs of market makers' supplying liquidity. This is due to the greater market impact of inventory reshuffling and hedging as dealer positions are more visible through their trading activities, and the subsequent increased risk they face in their liquidity supplying functions raises the cost of supplying liquidity. If the cost of supplying liquidity increases for all quantities of liquidity supplied, as some observers say increased transparency will do, then the new measures will shift the supply curve upwards and to the left. Why? Because for every quantity of liquidity supplied, market makers will increase the price of liquidity to cover the increased cost of supplying that liquidity.

Let us analyse the welfare effects of the increase in transparency, which we call Scenario 1. Triangles **A** and **B** represent the investor and liquidity provider profits, respectively, under the base case scenario. Triangles **C** and **D** represent the investor and liquidity provider profits, respectively, under Scenario 1. Because the statutory transparency measures introduced under Scenario 1 have increased the cost of providing liquidity for the market makers, the supply schedule has shifted upwards and to the left, representing both an increase in the price of liquidity (spread) and a smaller quantity of liquidity provided. Clearly, such a scenario leads to negative welfare implications for the economy relative to the base case. The net welfare loss to the economy is shown by the trapezoid **E**. The total losses to the market maker from the higher costs of supplying liquidity (profit effect) and of supplying less liquidity than in equilibrium (revenue effect) are given by the trapezoid **H**. However, **H** does not represent the net losses to the market maker. Because transparency has increased the price of liquidity (i.e., caused spreads to widen), the liquidity provider captures revenues that he previously was not able to capture because the base case price of liquidity  $P^*$  is lower than the price of liquidity  $P^1$  that prevails in the new equilibrium when more transparency is introduced into the market. As a result, the liquidity provider also makes some revenue gains in Scenario 1, but these gains do not compensate for the total losses, meaning that the liquidity provider makes a *net loss* in Scenario 1 relative to the base case: he is worse off by a margin of  $H - F$ , a sum equivalent to the difference in area between triangles **B** and **D**, which represent liquidity provider profits under the two scenarios.



Like liquidity providers, investors are also worse off (under the stated assumptions) as a result of the introduction of regulatory measures increasing transparency. This is immediately obvious from comparing the area of triangles **A** and **C**. The total loss of “profit” for investors is **F + G**, which is equivalent to the difference in area between triangles **A** and **C**. While the triangle **G** is a net loss to the economy, the trapezoid **F** represents a net transfer of wealth from investors to the liquidity provider, owing to the higher price market makers charge for providing liquidity.

**Graph IV. Scenario 2**



Scenario 2 is presented in Graph 4. This scenario assumes that while transparency will increase the costs to market makers of providing liquidity and subsequently lead them to widen spreads (price of liquidity) and reduce the supply of liquidity, it will also bring more investors to the market (see the arguments in Section III of this paper as to why this could be the case). More transparency could contribute to market confidence by making existing investors/institutions more willing to invest in and

actively trade bonds, it can bring new types of traders to the market, and convert potential liquidity (willingness to trade) into real liquidity by bringing additional investors/traders to the market. All of this can lead to a shift in the demand schedule upwards and to the right from  $D_{\text{liquidity}}$  to  $D^1_{\text{liquidity}}$ , which reflects the increase in demand for liquidity at every quantity of liquidity supplied. Because there is more demand for liquidity for every unit of liquidity supplied by the market maker, bond investors are prepared to pay slightly more to obtain the finite units of liquidity that are available in the market at any given time.

Interestingly, if the increase in market transparency leads the demand schedule to expand by an equivalent amount as the supply schedule, we observe that the net effect of introducing transparency is neutral from a welfare perspective. Consumer profits in Scenario 2, given by triangle **I**, are identical to those in the Base Case, given by triangle **A**. Likewise, liquidity provider profits in Scenario 2, given by triangle **J**, are identical to those in the Base Case, given by triangle **C**. As one can see, the equilibrium quantity of liquidity supplied to the market,  $Q^*$ , is identical to the initial quantity of liquidity supplied under the base case. The only difference between the Base Case and Scenario 2 is that the equilibrium price of liquidity is higher. The reason investors are not worse off in terms of welfare is that under Scenario 2, the increase in transparency has increased the demand for liquidity, making investors more willing to pay a higher price to obtain it.

Finally and importantly, one can deduce from this exercise, especially from Scenario 2, that if the positive demand effect of an increase in market transparency is greater than the negative supply effect, the equilibrium quantity of liquidity supplied to the market by dealers will actually be *greater* than it was in the base case scenario, prior to more transparency being introduced into the marketplace, meaning that the economy as a whole can derive a *net welfare gain* from a more transparent bond market.

Graph V highlights how a positive demand effect from the introduction of greater transparency outstripping the negative supply effect leads to net welfare gains for the economy. The analysis of Scenario 3 is identical to that of Scenario 2, so all one has to do is to compare the respective sizes of the investor and producer profit triangles with those of the base case. Clearly, investor profits under Scenario 3, given by the triangle **K** (which includes the small triangle **L** – see geometric diagram below Graph V), are greater than those in Scenario 2, given by triangle **I** and triangle **A** for the base case (the latter two are identical, as explained above). Similarly, producer profits under Scenario 3, given by the sum of triangles **B + M + N** (see geometric diagram below Graph V), exceeds that under Scenario 2 (where the supply effect = the demand effect) and therefore that under the base case, where welfare effects are identical to Scenario 2. Because the sum of liquidity provider and investor profits under Scenario 3 exceeds the sum of liquidity provider and investor profits under the base case scenario, the economy as a whole has gained from the introduction of more transparency in the bond market.

Graph V. Scenario 3

