

CHAPTER 6

QUANTIFYING LIQUIDITY RISK

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As far as pre-trade transparency goes, regulated and supervised exchanges offer the highest grade, allowing for fast and efficient price discovery. The only remaining element of uncertainty lies in the implicit transaction costs, which depend – at least for the most part – on the liquidity of the respective instrument the investor intends to trade. If the implicit transaction costs prove higher than the investor assumed, this might hurt the outcome of the trade. With the Xetra Liquidity Measure, Deutsche Börse enables investors trading on Xetra to assess the liquidity of a given instrument by quantifying the implicit trading costs of their respective transactions.

While explicit trading costs, such as trading fees, commissions and taxes, are transparent and therefore easily comparable throughout all trading venues, the implicit costs of a trade remain unknown until an order is executed. Since the implicit trading costs are by far the biggest cost factor of every transaction – they account for up to 80% of the overall costs of a trade – investors usually have to deal with a ‘dark horse’ when placing an order. Having this in mind, it is surprising how little effort has been made so far to quantify implicit trading costs by measuring the liquidity of a respective security. Granted, there are securities where the exact knowledge of the overall costs of a trade will not be of much help, for example, if single securities are so unique that there are simply no alternatives, or if a specific security can be traded at only one venue.

On the other hand, there are asset classes where the knowledge of the implicit transaction costs could be a crucial decision-making factor for every investor. Good examples for these are ETFs, which have been the most successful instruments on capital markets for more than 10 years now, with no indication that the popularity of these instruments will decline anytime in the near future. As a side effect of this success story, the asset class has developed a very unique characteristic which is gaining importance as more and more ETFs are issued: some of the most actively traded products focus on few popular benchmark stock indices as an underlying, such as the EURO STOXX 50, or the DAX.

On Xetra, no less than eight ETFs on the German benchmark equity index are tradable, many sharing similar product characteristics in terms of, for example, management fee, replication methodology and tracking error. Hence, investors have to choose between seemingly identical trading opportunities. In cases like this, one of the most successful ways to make the best possible trading decision is to compare the respective transaction costs of each ETF.

Liquidity as a decision-making criterion in ETF trading

Since 2000, when Deutsche Börse introduced its Exchange Traded Fund (ETF) segment and offered ETFs as the very first trading venue in Europe, Xetra has been the leading place for European ETF trading, both by the number of ETF listings and by on-exchange turnover. At the end of 2010, 761 ETFs were listed on Xetra, leading to a total of assets under management (AUM) of approximately €165bn. Today, Xetra holds a market share of 37% in European ETF trading.

Regarding pre-trade transparency, Deutsche Börse ensures optimum price information with the requirement to continuously calculate an indicative net asset value (iNAV) for every ETF tradable on Xetra. As the preferred European market for this asset class, Xetra offers superior liquidity in most ETFs, and unparalleled liquidity in blue chip ETFs. While 'superior' and 'unparalleled' most certainly might sound good to any investor, Deutsche Börse did not rest on its laurels as the European market leader but looked for a way to quantify liquidity risk respectively to the costs of market impact. The vision was to make implicit transaction costs 'visible'.

To obtain this goal, Deutsche Börse had to create a tool for liquidity measurement, facilitating investors to fine-tune their decision-making process by being able to compare even the slightest differences in transaction costs between very similar, if not identical, choices. The result of Deutsche Börse's efforts to provide an efficient tool for the objective assessment of the implicit trading costs is the Xetra Liquidity Measure – a single figure rating the liquidity of traded instruments on the basis of a uniform methodology. With the help of the Xetra Liquidity Measure, investors are able to compare securities by their transaction costs.

So, to get back on the earlier mentioned example of the variety of DAX ETFs, the Xetra Liquidity Measure shows significant differences in the liquidity of these ETFs. While all of them are highly liquid, the measure shows a range in liquidity from 3.41 basis points (bps) – for the *primus inter pares* – up to 13.88 bps for the least liquid DAX ETF. This means the implicit transaction costs are more than four times lower with the most liquid DAX ETF compared to least liquid DAX ETF on Xetra.

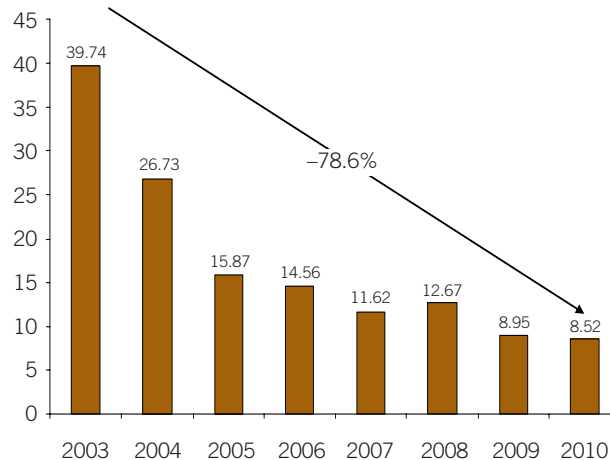
On a more general level, the Xetra Liquidity Measure shows that the average spread in the XTF segment is about 42 bps. The measure also shows that the liquidity across nearly all instruments of the XTF segment has increased significantly in the last 10 years, resulting in a decrease in implicit transaction costs of 79% until today, making blue chip ETFs the most liquid instruments traded on Xetra.

Calculating the Xetra Liquidity Measure: the definition of liquidity

Before explicating the concept of the Xetra Liquidity Measure, it seems expedient to define the term liquidity – beyond the usual capital market view of liquidity, describing the amount of bids and asks of a security. In 1984, Professor Richard Roll of the University of California, as well as

Exhibit 1

Average liquidity costs for 20 most liquid equity ETFs on Xetra



Source: Deutsche Börse Group

- Xetra Liquidity Measure (XLM) measures implicit transaction costs in basis points (1 bps = 0.01%) for a given order size (e.g., €100,000)
- Continuous increase in ETF liquidity since 2003 reduced implicit transaction costs by 78.6% to an average of 8.52 bps per ETF for 20 most liquid equity ETFs
- Blue-Chip-ETFs currently represent most liquid instrument group traded on Xetra, even surpassing the most actively traded DAX equities

New Yorker economists, Joel Hasbrouck and Robert A. Schwartz in 1988, substantiated in their scientific papers on market impact and execution costs that the term liquidity takes in four dimensions: market breadth, market depth, immediacy of execution and the market resiliency. To assess liquidity as precisely as possible, all four dimensions have to be taken into account.

There were previous efforts to assess liquidity; they mostly focussed on approximation factors such as transaction frequency or turnover, or, at best, both at the same time. At the time, economists tried to quantify liquidity by applying ratios like the number of transactions executed in a certain span of time, unit volume, transaction volume, or the relative transaction volume – reflecting the ratio of transaction volume to free float of the respective security. Without exception, all results were disappointing.

There are two reasons for the failure of these efforts: first of all, all approximation factors were oriented to the past; the results were not much more than mere statistics. And second, all ratios used in these models do reflect the activity but not necessarily the liquidity in a certain security. This way, there is a high probability these indicative figures could be significantly distorted. For instance, when using unit volume or transaction volume as ratios, a small number of very large transactions will produce misleading results. Another example: if the transaction frequency is used as ratio, a large number of very small transactions within the measured time span will bias the results, thus proving them unreliable.

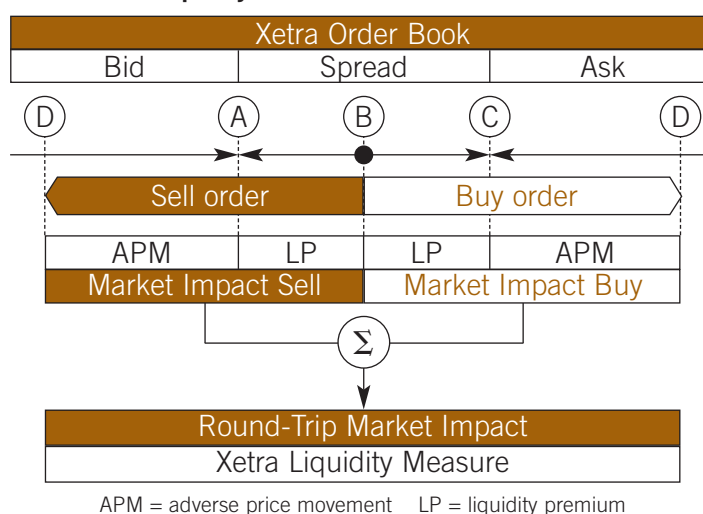
From this it follows that an objective and reliable figure to quantify liquidity must be derived from its direct benefit for investors, which is the minimisation of performance loss during a round trip due to market impact. After all, the less liquid a market for the respective ETF is, the stronger the market impact of an order will be – and vice versa, where the more liquid the respective market is, the less significant the market impact of placing an order will be, and the lower the implicit transaction costs for the investor.

The integration of liquidity and transaction costs into a single figure

Deutsche Börse's Xetra Liquidity Measure condenses the market impact information into one single figure by summarising the market impact on both the bid side and the ask side of the Xetra order book. As a consequence, the market impact information is used as a measure of the costs of the immediate demand for liquidity by investors placing an order.

Exhibit 2

Basic concept of the Xetra Liquidity Measure



APM = adverse price movement LP = liquidity premium

Source: Deutsche Börse AG

In Deutsche Börse's concept of the Xetra Liquidity Measure as highlighted in Exhibit 2, the market impact breaks down into the sum of the liquidity premium (LP) and the adverse price movement (APM). The LP equals half of the bid/ask spread and reflects the market breadth, therefore representing the minimum cost of liquidity consumption. As the example in Exhibit 2 also portrays, the LP is measured from the difference between the middle of the bid-ask spread (midpoint B) and the current best ask limit (point C) for a buy order (B to C). In case of a sell order, the difference from the middle of the bid-ask spread (midpoint B) and the current best bid limit (point A) has to be measured. In both cases the midpoint serves as the benchmark for the theoretical market value of the respective ETF in this model. Since the LP represents only one dimension of liquidity, it is of limited use for the assessment of trading costs for larger orders, or, more exactly, when the order volume in demand exceeds the quoted volume at the best ask or bid limit.

In order to cover this aspect, market depth has to be included, in case an order has to be executed against several limits on the other side of the order book. With growing numbers of executions necessary to fulfil the respective order, the average execution price for the order will gradually change for the worse. As a consequence, the implicit transaction costs of this order will increase additionally by the difference between the respective best bid or ask quote and the resulting average execution price (C to D in case of a buy order or A to D for a sell order). These costs are reflected by the earlier mentioned adverse price movement. Equally important, the more time between opening and closing of a position will elapse, the more adverse developments are likely to occur – and the more implicit transaction costs could increase. This liquidity cost factor is reflected by the third liquidity dimension, the time.

Basically, there is a redistribution of market impact costs from the liquidity provider to the investor demanding liquidity, and the Xetra Liquidity Measure describes the performance loss due to liquidity costs caused by the liquidity-demanding investor by opening and closing a position.

Altogether, the market impact reflects three dimensions of liquidity. The fourth dimension covers the market resiliency, measuring how fast liquidity reverts to 'normal' levels after an adverse liquidity shock. The market resiliency can be estimated on the basis of the change in market impact measuring results over time. This time dimension is not only of particular importance for investors contemplating to split up a large order – it is important for the overall liquidity of a market.

Since July 2002, Deutsche Börse has been calculating the Xetra Liquidity Measure based on all information in the order book for all ETFs traded continuously in Xetra. Hence, the measure provides by far a more comprehensive analysis of liquidity-demanding costs than the bid/ask spread. All Xetra Liquidity Measure data are based on hypothetical order sizes and are calculated every minute during trading hours.

Benefitting multiple applications investors

The liquidity assessment provided by the Xetra Liquidity Measure enhances the transparency in order execution in two respects. On the one hand, the measure provides valuable and reliable indications for the assessment of the current liquidity in relation to the average historical liquidity prior to order execution, and therefore for the timing of the order placement. On the other hand, the measure allows for an objective post-execution view of the order execution quality and the broker service by distinguishing simple versus complex transactions. The Xetra Liquidity Measure not only facilitates investors to compare ETFs regarding their respective liquidity, but the measure also allows for liquidity ratings over the course of time.

On a more general level, the Xetra Liquidity Measure offers an additional advantage to all investors trading on Xetra, since Deutsche Börse uses the measure internally to determine the trading parameters on Xetra as well as in the assessment of possibilities to improve market structure and overall market quality.

A new level of pre-trade transparency

With the Xetra Liquidity Measure, investors trading on Xetra are able to integrate implicit trading costs into their decision-making process to the same grade they benefit from the transparency of the open order book. The full knowledge of both the price and the transaction costs of a security allow investors on Xetra to make better trading decisions and give the term 'pre-trade transparency' a new meaning. IndexUniverse, a leading authority on ETFs, indexes and index funds, published an analysis of the liquidity of European ETFs in September 2010, concluding that the Xetra Liquidity Measure is the best publicly available measure for the costs of market impact, since it is the only proven and reliable method to assess liquidity to date.

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