



# Listing Market Outages: A continuity and price formation study

30<sup>th</sup> November 2009

## **Introduction**

As trading fragments to multiple trading venues in a post-MiFID landscape, there has been considerable discussion about whether price formation can take place on the new trading venues (Multilateral Trading Facilities or MTFs) or whether it is inextricably linked to the “primary” or “listing” market.

This paper seeks to discuss the impact on the market following technical outages at listing markets, using the recent outage at the London Stock Exchange (LSE) on 9<sup>th</sup> November 2009 as an example. It is not intended as a comprehensive study but rather focuses on a number of high-level metrics to determine the extent to which trading continued on alternative venues. The paper concludes with a brief discussion of the LSE outage on 26<sup>th</sup> November 2009.

As a point of comparison, it is helpful to bear in mind market reaction to a similar LSE outage on 8<sup>th</sup> September 2008, where the entire LSE trading system was down for much of the trading day. At that time, the MTF landscape was less well developed; BATS Europe and NEURO had not yet gone live, Turquoise was in the early stages of its launch and Chi-X had been live for a little over a year in LSE securities. Fourteen months later, the landscape has changed and these four MTFs collectively account for over 40% of order book trading in FTSE 100 securities (Chi-X ~25%, BATS Europe ~8%, Turquoise ~5%, NEURO ~2%).

During the LSE outage in 2008, trading virtually stopped on both Chi-X and Turquoise, leading market commentators to conclude that MTFs were unable to function without a reference price from the listing market. Some commentators have made similar claims about the most recent outage.<sup>1</sup>

## **Timeline**

At 15:04 on 9<sup>th</sup> November 2009, the LSE suffered a technical failure which affected one twelfth of all of its securities and which halted trading in the affected securities for the remainder of the trading day.

A summary of the key events is provided here:

- 15:04 – The affected securities stop updating quotes and trades on LSE market data feeds.
- 15:17 – LSE Notice: LSE sends an email notification of a technical issue impacting 1/12th of its securities (the list later transpires to be incorrect).
- 15:30 – LSE Notice: LSE sends an email notification correcting the list of affected securities.
- 16:09 – LSE Notice: LSE sends an email notification that trading will not be resumed in the affected securities.

A detailed timeline is available on the LSE website at

<http://www.londonstockexchange.com/global/incident/10november2009-incidentcommunicationsoverview.htm>

## **Affected securities**

One twelfth of LSE securities were affected; of these, the following eight are FTSE 100 constituents.

BATS Symbol Name	Company Name
AUI	AUTONOMY CORP ORD

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<sup>1</sup> See the 16 November 2009 Financial News article ‘Systems glitch triggers LSE trading boost’

BLTI	BILLITON ORD
BPI	BP ORD
IHGI	INTERCONT HOTEL ORD
LSEI	LOND STOCK EXCH ORD
RBI	RECKITT BNCSR GRP ORD
REXI	REXAM ORD
SVTI	SEVERN TRENT ORD

## ***Analysis***

BATS Europe tracks the market share of major trading venues in Europe and makes this data publicly available on its website at [http://www.batstrading.co.uk/market\\_data/market\\_share](http://www.batstrading.co.uk/market_data/market_share).

Using this data, BATS Europe analysed trading patterns in the FTSE 100 during the LSE outage on 9<sup>th</sup> November. The analysis considers trading volumes (by notional value) in two groups of securities.

- The eight FTSE 100 securities, which were unavailable for trading on the LSE from 15:04.
- The other 94<sup>2</sup> FTSE 100 constituents, which are used as a control group.

The analysis below pays particular attention to three specific time frames:

- the period from 14:30 (US open) to 15:04 (time of the LSE outage);
- the period from 15:04 (time of the LSE outage) to 16:09 (when the LSE announced that trading would not recommence trading in the affected securities that day and that no closing auction would be held); and
- the period from 16:09 (the time of the above referenced LSE announcement) to 16:30 (market close).

There is typically a shift in market share to the listing market in the last five minutes of the trading day in preparation for the closing auction. Therefore, this final period is further broken into two sub-periods: 16:09 to 16:25 and 16:25 to 16:30.

## ***Execution rates***

Chart 1 below shows the execution rates, in GBP/minute, of the eight affected FTSE 100 securities on the LSE and the aggregated rate on the four MTFs (BATS Europe, Chi-X, NEURO and Turquoise).

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<sup>2</sup> There are currently 102 FTSE 100 constituents, as two separate share classes of Royal Dutch Shell and Schroders are included.

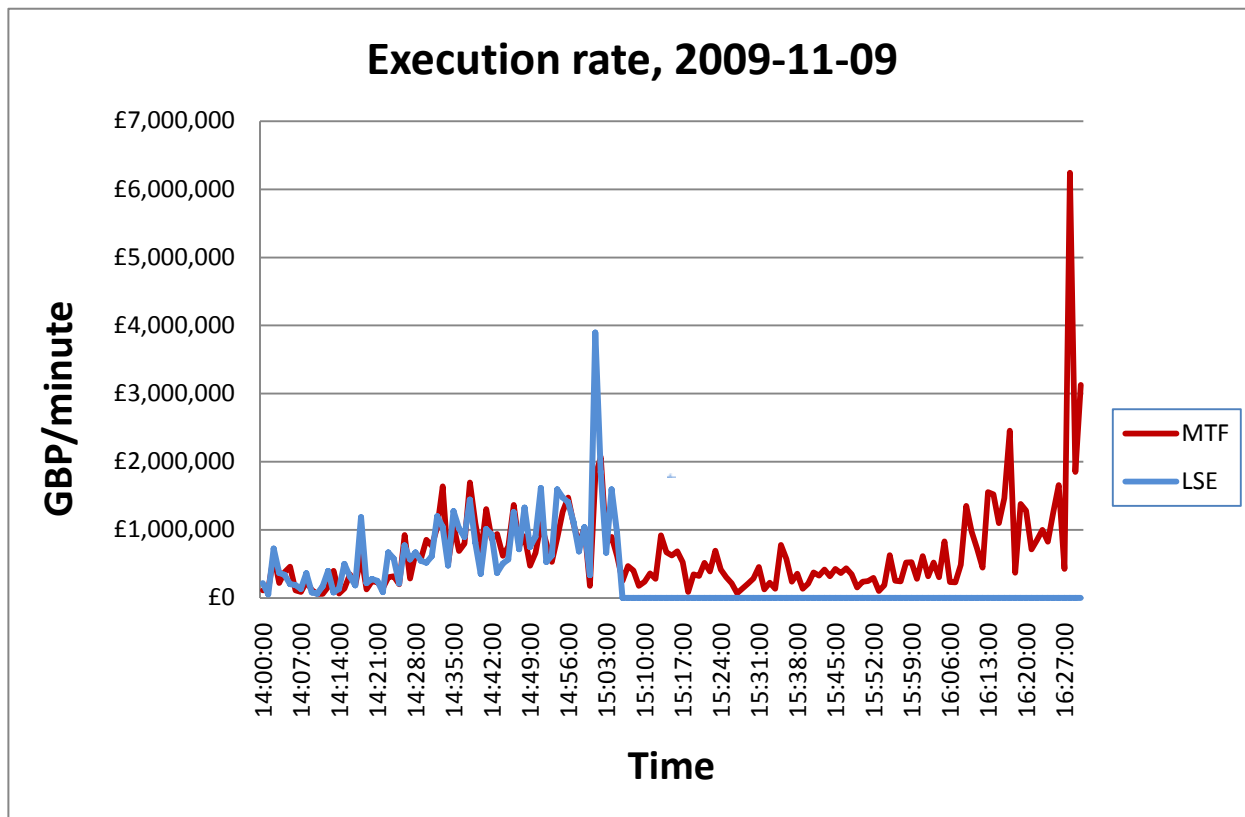


Chart 1: Execution rates, MTFs vs. LSE

As illustrated in the chart above, trading is slow until the US market opens at 14:30, at which time the execution rate increases to around £1,000,000/minute on the LSE and a similar rate on the MTFs. This is indicative of the LSE's circa. 50-55% market share during continuous trading in FTSE 100 securities. As highlighted in Chart 1, there is a brief spike in the execution rate on the LSE at around 15:03 followed by the LSE outage at 15:04.

Following the LSE outage, trading on the MTFs continues, albeit initially at a slower rate until 16:09 when it accelerates towards the close, peaking at over £6,000,000/minute at 16:28.

Execution rates vary throughout the trading day. For example, European trading typically peaks at the US open, towards the European close and after significant news events, such as economic announcements. In order to ascertain whether the above patterns were representative of a normal trading day on the MTFs, notwithstanding the LSE outage, we considered in parallel the FTSE 100 control group.

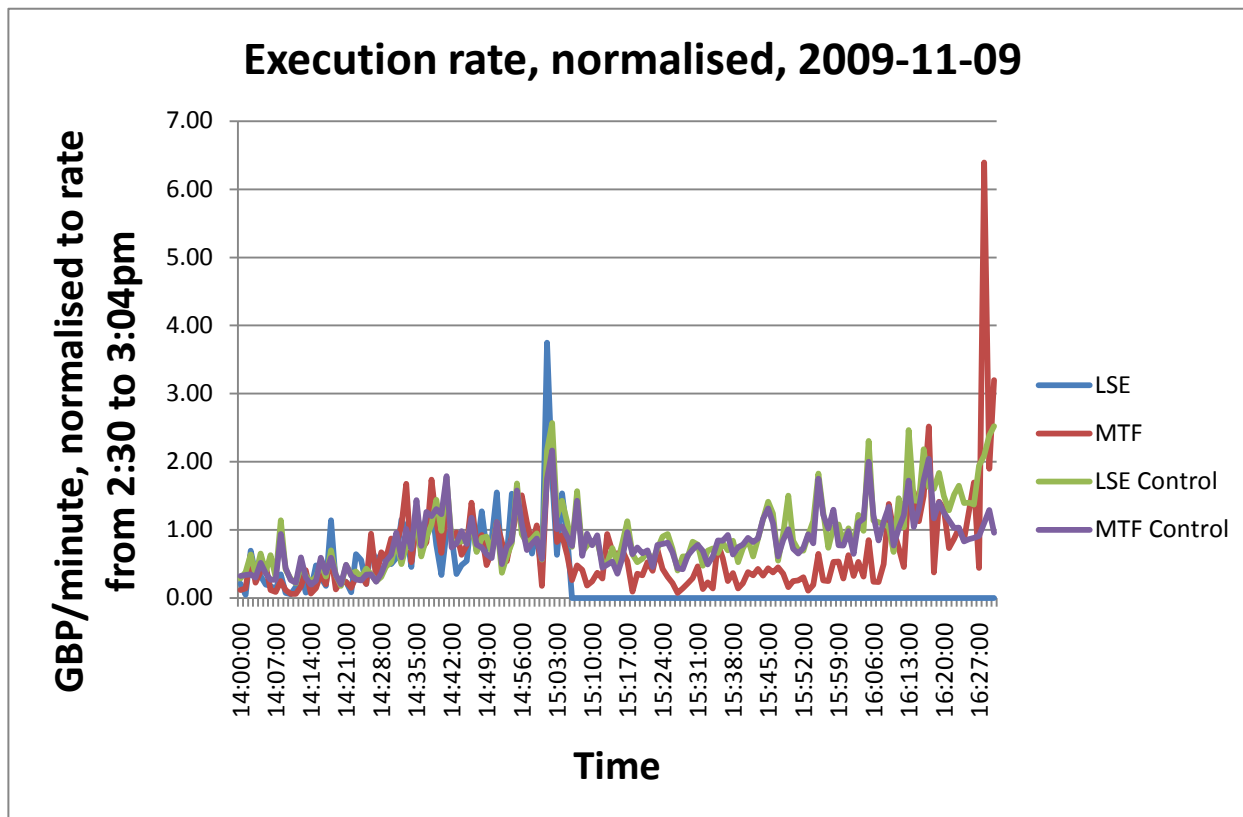


Chart 2: Execution rate, normalised

Chart 2 above shows the execution rates of the two security groups (i.e. affected securities and control securities), normalised to the average rate for each group from 14:30 to 15:04. The Chart illustrates that execution rates on the MTFs initially slowed more on the securities in the affected group than on the control group, but then accelerated into the close. Table 1 below shows this data in tabular form for the four periods of interest.

	Affected securities						Control securities	
	LSE	MTF			Total		LSE	MTF
	actual GBP/minute	actual GBP/minute	expected GBP/minute	actual/ expected	expected GBP/minute	actual/ expected	actual GBP/minute	actual GBP/minute
14:30-15:04	1,038,925	977,032					7,271,320	5,605,899
15:04-16:08	-	371,787	824,374	0.5	1,741,318	0.2	6,392,925	4,729,996
16:08-16:25	-	1,134,453	1,203,179	0.9	2,792,228	0.4	10,932,304	6,903,459
16:25-16:30	-	2,662,408	1,006,074	2.6	3,253,002	0.8	15,006,489	5,772,533

Table1: Execution rates

Table 1 sets out the average execution rates of the 'Affected securities' and the 'Control securities' during the four periods of interest. The execution rate of the control securities slow slightly on all platforms after the initial burst of activity following the US open. On the LSE, the execution rate then accelerates rapidly towards the end of the day, whereas the execution rate on the MTFs is more consistent through to the close.

By comparing the execution rates of the control securities in each period to their execution rate in the baseline period (14:30-15:04), Table 1 sets out the *expected* execution rates of the affected securities on both the LSE and the MTFs had trading been able to continue on the LSE. Initially, the execution rate on the MTFs slowed to approximately 50% of the expected rate. Once the LSE announced that trading would not be resumed in the affected securities, activity on the MTFs increased, ending the day at 2.6 times of the rate that would have normally been expected. In the final five minutes of the day, the MTFs traded almost as much as would be expected from the MTFs and the LSE combined.

## **Conclusion**

Following the LSE outage at 15:04, the LSE initially informed market participants that trading would resume in the affected stocks. During this period, trading continued on the MTFs but at a reduced rate. Following the LSE announcement that trading would not resume, activity rapidly picked up on the MTFs, including to levels approaching that which would have otherwise been expected from the LSE and the MTFs combined.

While outside the scope of this paper, BATS Europe also analysed the quality of its own order book for the affected securities during this period. On most of the affected securities, inside spread and depth on the BATS Europe order book remained unchanged and, in some cases, improved following the LSE outage.

The analysis in this paper highlights the difference between market reaction to listing market outages as alternative trading venues have become more established and trusted as price formation venues in their own right. Specifically, on the 9<sup>th</sup> November, the MTFs had sufficient liquidity to provide price formation in the absence of the listing market and enable trading participants to execute the level of business that would have otherwise been executed on the LSE and MTFs combined. This is in marked contrast to the experience during the LSE outage in September 2008.

While not included in this paper, a similar reaction by market participants was witnessed during the Euronext outage in the trading of ING Groep N.V. on 27<sup>th</sup> October 2009. That is, trading continued on the MTFs at a reduced rate until Euronext announced that trading would not resume, at which point trading rapidly increased to market close.

The analysis would suggest that:

- Alternative trading venues provide good price formation and liquidity, even in the event of listing market outage.
- However, as seen in the analysis above, it is imperative that all market centres provide timely and accurate information about issues in order that trading participants can assess the impact and adjust their trading decisions as necessary.

## **Update – 26<sup>th</sup> November LSE Outage**

Shortly after this paper was completed, the LSE suffered another outage, on 26<sup>th</sup> November 2009. In this case, the LSE's matching engines stayed up, but there was a connectivity failure affecting many of its customers from approximately 10:30 until 14:00. Commentators have noted that liquidity did not migrate to MTFs in any meaningful way during this outage<sup>3</sup>. Similarly, our own analysis confirmed that market participants reacted in a different manner on 26<sup>th</sup> November compared with 9<sup>th</sup> November.

A key difference between the 9<sup>th</sup> November and 26<sup>th</sup> November LSE outages is the action taken by the LSE following the outage. On 26<sup>th</sup> November, rather than close the market pending resolution of the issues, the LSE placed its system into 'Auction Mode'. Auctions are used by many market centres, including the LSE, to re-initiate trading after a period of inactivity. For example, where the market was closed overnight or a stock was suspended from trading for volatility or regulatory reasons. Auctions typically last of the order of 5-10 minutes and produce market data, indicating to market

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<sup>3</sup> <http://fragmentation.fidessa.com/2009/11/27/should-i-stay-or-should-i-go-%E2%80%93-27-november-2009/>

participants, amongst other things, buying and selling interest and expected opening prices. Many order routing systems are programmed to direct order flow to these auctions, in the expectation of liquidity as the market opens.

Placing the entire LSE market into an auction mode, even though the re-opening of the market was not imminent, had a quite different effect than simply closing the market. Throughout the outage, the LSE generated quotes on their market data feeds which were not indicative of any real liquidity (see Chart 3 below). However, these quotes were read by trading systems as valid liquidity, along with the flag suggesting there was a valid auction happening. This operation of a 'false' auction had the effect of preventing or complicating the orderly transfer of trading to alternative trading venues. In addition, it is questionable whether the market was orderly on the LSE given publication of data which did not represent legitimate trading interest or available liquidity.

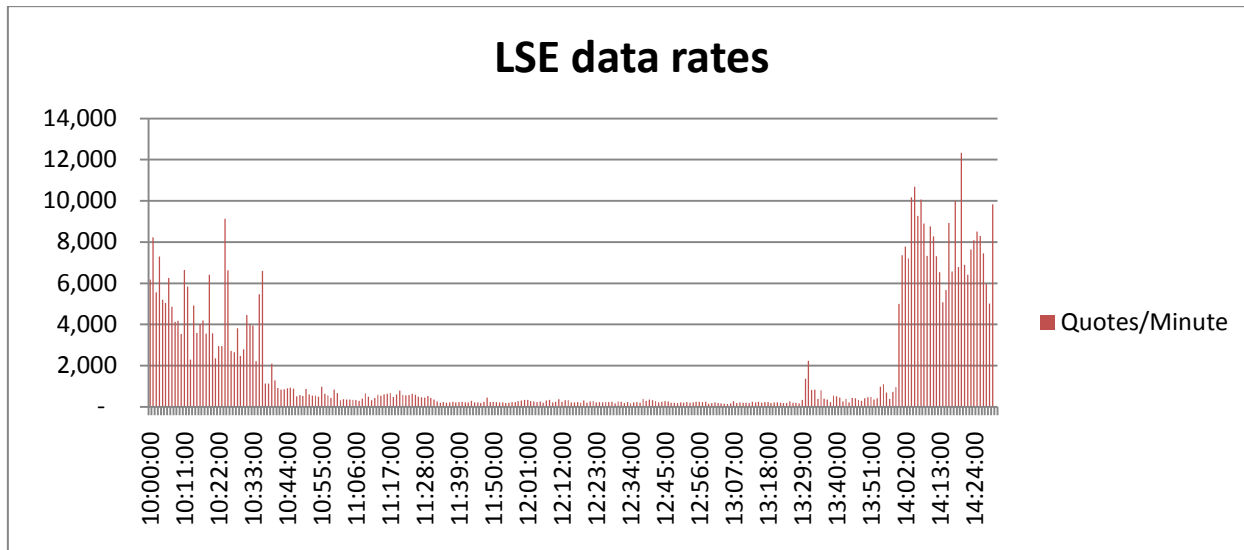


Chart 3: Message counts from the LSE before, during and after the 26<sup>th</sup> of November outage.

We believe there is a need for a clear protocol for market outages to ensure consistency so that market participants can plan for such scenarios and that trading will remain orderly.

- Market centres experiencing difficulty should provide concise, accurate and timely information to market participants (including competing market centres).
- When a market is unable to trade, it should close its market and clear all order books (thus giving participants certainty about their position and therefore giving them a choice to trade elsewhere).
- During an outage, market centres should refrain from distributing data which suggests there is liquidity at that market.
- Once a resolution is reached, market centres should signal a clear re-opening time to market participants. The re-opening may (depending on market practice) be preceded by an auction, but this auction should represent live liquidity and should be brief (we suggest no more than 10 minutes).

Furthermore, market participants should program their systems to be able to ignore invalid market data from any market centre which it deems as down, so that they have the ability to trade on any other available venue.

The market's reaction during the Euronext outage on the 27<sup>th</sup> of October and the LSE outage on the 9<sup>th</sup> of November clearly demonstrated that MTFs have sufficient liquidity to provide price formation and active trading independent of the listing exchange. This has the potential to strengthen the systemic stability of the market such that there is no single point of failure. It is important that outages at any market centre or trading venue are managed in a way that

encourages the orderly continuation of trading. As a further safeguard, market participants should also be prepared to route around market centres experiencing problems where the market centre is unable or unwilling to accurately disseminate their trading status and activity.