



Market abuse and surveillance

Economic Impact Assessment EIA17

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Market abuse and surveillance

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1. Title of proposed measure

Proposal for a Regulation of the European Parliament and of the Council on Insider Dealing and Market Manipulation (market abuse), COM (2011) 651/3,

cited in this paper as *the Proposal* or *MAR*, with reference to

Proposal for a Directive of the European Parliament and of the Council on Criminal Sanctions for Insider Dealing and Market Manipulation, COM (2011), 654 final,

cited in this paper as the *Directive* or *DCS*

2. Objectives

MAR and DCS encompass objectives pertaining to insider trading and market manipulation. This report concentrates exclusively on the latter, given its focus on technological developments in market structure and practice. Nevertheless, the broad objectives of the two pieces are very similar in nature. There are several elements to the overall “objective” of the proposed legislation.

The primary aim is a relatively far-reaching Europeanization of capital markets law. This is to be accomplished through an extension of existing rules and uniformity with respect to individual jurisdictions and disparate market microstructures. The use of the terms, ‘uniform rules,’ ‘uniform framework,’ and ‘uniform conditions’ in the preamble to MAR suggests that the requirements relating to prohibitions and duties would be harmonized at the European level.² Both the MAR and DCS share common language, which should help to ensure that European Union law is incorporated into national criminal regimes. Extensive references to the Markets in Financial Instruments Regulation (MiFIR) also suggest that the various legal instruments currently under review will lead to new uniformity in European capital markets law.

Uniformity is meant to advance another objective, that of avoidance of regulatory arbitrage. Potential arbitrage is not limited to the crossing of national jurisdictions. The arbitrage of regulatory authority across differing trading venues within a single jurisdiction also has been considered. The MAR governs not only financial instruments on regulated markets (exchanges), but also includes instruments traded on multilateral trading facilities (MTFs) and organized trading facilities (OTFs). Uniformity, and possible regulatory arbitrage, also is implicitly considered by the breadth of financial instruments covered. Without delving into specifics, the MAR effectively applies to all financial instruments and markets, save for spot commodity markets.

One objective of the MAR is to bring European financial regulation into a new technological era of investment, trading, and market structure implementations. The expansion of rules and

² The author recognizes that ‘harmonization’ and its degrees can be a technical topic in and of itself. The intent is not to debate full versus partial harmonization here. For example, the DCS establishes minimum rules for sanctions, and is therefore a ‘minimum harmonization instrument.’ Full harmonization is not necessarily implied even by the fact that the MAR is a regulation, as opposed to a directive.

scope may be ascribed to the recognition of a drastic change in the European environment since 2007. Competition between different trading platforms and systems, as envisioned by the Markets in Financial Instruments Directive (MiFID), has certainly been realized.³ The design of electronic venues, and competitive pressures with respect to both incumbents and new entrants, have led to massive growth in new trading technologies such as high-frequency trading (HFT) as well as in the over-the-counter (OTC) markets.

An important aim of the European Commission is to create a deterrent sanctioning regime through uniform and stringent sanctions. The combination of the MAR and DCS is intended to do precisely that. Existing frameworks do not provide for criminal penalties for market manipulation, although some jurisdictions cover this area through national law. The MAR is limited to administrative sanctions, but criminal penalties are laid out in the DCS. Extension of applicability to alternative trading systems and platforms constitutes a key set of provisions in this regard. Intent to manipulate a market is covered, as well as a litany of specific actions.

At a very high level, the European Commission's objective is to make European financial markets attractive for cross-border issuers, investors, and traders. This statement includes countries from outside the European Union. A stronger, more unified, set of rules for markets has been chosen as the way forward in this respect.

3. Background

The objectives of the proposed measure are consistent with IOSCO's (2011) call for a review of how existing market manipulation rules and laws apply to computer generated orders. The report asks specifically whether activity traditionally deemed manipulative is still "appropriate" in today's market environment. A better term might be "relevant," as put forward in IOSCO's invitation for commentary from outside parties.⁴ The notion of relevance is underscored by examples pertaining largely to HFT activity, an area of concentration in the Proposal itself.

There is no single, accepted definition of HFT. It is argued below that such a definition is irrelevant for the regulation and surveillance relevant to market abuse. Nevertheless, definitional issues make it difficult to summarize empirical evidence on its effects on the markets. For the purpose of this background review, the characteristics relating to HFT set out in IOSCO (2011) are sufficient.⁵

- HFT involves the use of sophisticated technological tools for pursuing trading strategies ranging from market making to directional proprietary trading.
- It is highly quantitatively based, and may include elements in the investment chain, which go beyond high-speed execution.
- Little or no risk is carried 'overnight,' meaning a flat position at the end of the relevant trading day.

³ Directive 2004/39/EC.

⁴ IOSCO (2011), pages 40 and 42.

⁵ IOSCO (2011), p. 21, summarized here.

- Positions may be held for extremely short periods of time, down to fractions of a second.
- HFT is latency-sensitive, making such trading activity largely dependent on co-location with execution venues and direct market access.

The adoption of HFT across markets is highly variable, making it difficult to size the activity accurately. IOSCO estimates that 25 percent to 35 percent of trading activity in Europe reflects the characteristics noted above.⁶

Issues of identification of HFT make a sensible review of available literature even more problematic, as do relevant time periods for analysis. As an illustration, a paper by Hendershott, Jones, and Menkveld (2011) has been cited in this respect. The work depends on data circa-2003, a period during which such activity was low. It also pertains to ‘algorithmic trading.’ Although HFT activity is algorithmic in nature, it cannot be equated with algorithmic trading as the term is used today. Buy-side institutional investors commonly use algorithms to work orders into the market, as a productivity tool, and as a means to minimize frictional costs. Such activity does not correspond to the attributes above.

A good review of the HFT literature is provided by the European Securities and Markets Authority (ESMA, 2011), notwithstanding the caveats above.⁷ In short, the evidence with respect to market quality is mixed, but tends towards the conclusion that HFT has done no real harm to markets.⁸

In the context of market abuse, a review of the literature is simply disappointing. Although some empirical data are presented in the next section on risk assessment, available work on HFT relating to market abuse as defined in the Proposal is purely conjectural at best.

The conjectures have been influential at political and regulatory levels, however. Initiatives aimed at countering theoretical effects of HFT activity have been undertaken in the U.S., Europe, India, Australia, Canada, and Italy. Only Sweden has announced relative indifference to the practice, on the basis of a study carried out by Finansinspektionen, the Swedish markets authority. Even there, one finds mention of “considerable concern that the market will be subject to greater abuse.”⁹

⁶ IOSCO (2011), p. 22. The figure in the U.S. has been conjectured to be as high as 56 percent in 2010, based on survey evidence gathered by the Tabb Group; see “European Equity Trading 2010: Maneuvering in the Market,” Tabb Group Report, December 2010.

⁷ Detailed references to individual pieces of work may be found therein, p. 65, and are not reproduced here.

⁸ This theme is not further pursued here. The focus of this report is on market abuse regulation, as opposed to market structure regulation. The two are connected, but not hitherto directly through rule making. This might be considered a flaw in the regulatory process, but is too large a potential critique to be immediately useful in the context of this assessment. A reviewer has correctly pointed out that HFT profitability may be troublesome, for example, especially given negative financial externalities in the electronic market place. Economic incentives, especially in the relationship between HFT players and primary exchanges, may arguably be wrong; but market abuse regulation through centralized planning of economic incentives at the pan-European level is a lofty goal.

⁹ As reported in the Financial Times, February 21, 2011.

There are hundreds of papers relating to general market abuse and its fraternal twin, market manipulation. This body of work is largely off-point in terms of relevance to the Proposal, or evidence is simply lacking.¹⁰ Market manipulation is seen as possible, and may occur in a wide variety of markets and circumstances; this is of scant help. We know little about the frequency of occurrences, less about its effects, and virtually nothing with respect to how it responds to changes in market regulation, let alone changes in market structure.¹¹ Work on methodology pertaining to identification of abuse as well as particular types also is available; such research should be viewed as proposals, as opposed to evidence.¹² The link between surveillance and abuse is explored by Harris, Aitkens, and Ji (2011), but the empirical evidence is based on proxies and is both narrow and ambiguous.¹³

Reviews of the previous MAD regime concentrate on legal issues relating to insider dealing.¹⁴ There is occasional reference to the desirability of certain reforms pertaining to the Proposal's objectives with respect to market manipulation, including extensions to the MTF community.¹⁵ The European Commission, in its desire to strengthen supervisory and sanctioning regimes, certainly has taken into consideration the de Larosiere (2009) report and work by CESR (2008) on sanctions across member states.

Finally, there are a small number of studies pertaining to the Proposal itself, including the associated Directive with respect to criminal sanctions. This work is largely limited to the output of law firms, with commercial interests in regulatory law.¹⁶ The work is oriented at client education on the one hand, and details with respect to legal language on the other. Academic legal scholars have begun to produce output, which is a bit more general but very limited in quantity at this stage.¹⁷ All work pertaining to the Proposal itself is characterized by a broad-brush look at the MAR and associated Directive, comparisons to the previous MAD regime, and some specifics with respect to potential issues in specific legal language. With respect to market manipulation, in particular, there is nothing in that work not covered by the statement of objectives in this report.

¹⁰ Many works pertain to legal aspects of insider trading, for example, as well as to abuse that may arise due to purely concentration or competitive issues. See, for example, Di Noia and Gargantini (2009) or Siems (2008) for European perspectives.

¹¹ A survey covering these points is given by Putnins (2011).

¹² See, for example, Minenna (2005) or Nelemans (2008).

¹³ The overall conclusion is not surprising: real-time surveillance is said to reduce trade-based manipulation. On the other hand, closing auctions and circuit breakers are associated with increased manipulation, by the authors' measures.

¹⁴ Directive 2003/6/EC of the European Parliament and of the Council of 28 January 2003 on Insider Dealing and Market Manipulation (market abuse), as amended by Directive 2008/26/EC and Directive 2010/78/EU.

¹⁵ See, for example, Van Dyck (2010). Case study analysis is provided by Siems (2008).

¹⁶ Slaughter and May (2011, November and December) provide good examples. See also, Clifford Chance (2011) and Freshfields Bruckhaus Deringer (2011).

¹⁷ One such piece is Veil and Koch (2012), which is noteworthy in part for its own reference list, lacking citations to work other than working papers by European Commission staff.

4. Risk assessment

Many of the risks associated with the current market structure without the proposed measures are touched upon by the proposals themselves and have been widely debated. A brief summary of the issues follows the list of objectives above.

With respect to the uniformity imposed in part by the proposal of a Regulation, as opposed to a new Directive, problems relating to computerized market structure and practice have implications for every Member State. The risk is simply that purely national responses to market abuse may be circumvented or ineffectual in a cross-border context, and effective surveillance may prove impossible.

Regulatory arbitrage is facilitated by lack of cross-border uniformity of rules. The possibilities for same are further enhanced if the regulations do not touch all financial instruments, given the close relationship between them; a clear example is cash equity trading and equity derivatives. The feasibility of arbitrage is further enhanced if alternative trading venues are not brought under a uniform umbrella.

Enforcement is meaningless without uniform and strongly deterrent sanctions. Administrative sanctions within a fragmented regulatory regime are easily seen to be merely a cost of doing business. The probability of detection is already low in such an environment.

There is something more original to say with respect to computerized trading activity and potential risks in the absence of the MAR. It has been noted that the risks associated with HFT, relating to market manipulation in particular, are largely conjectural, as far as published literature is concerned. Nevertheless, there is reason to believe that such risks are real, and a few examples may help make that point.¹⁸

Manipulation of the bid-ask spread is one avenue for market abuse. Figure 1 contains data on a high-frequency trading strategy running in over 80 stocks, on four exchanges. The stock here is FAS, and the snapshot is from January 20, 2012, depicted in two second intervals.

¹⁸ All figures in this section have been supplied by Nanex, the developer of a streaming whole market datafeed for the U.S. The author thanks Eric Scott Hunsader, CEO of Nanex for the creation of, and permission to use these figures. Additional information is available on the company website, www.nanex.net.

Figure 1

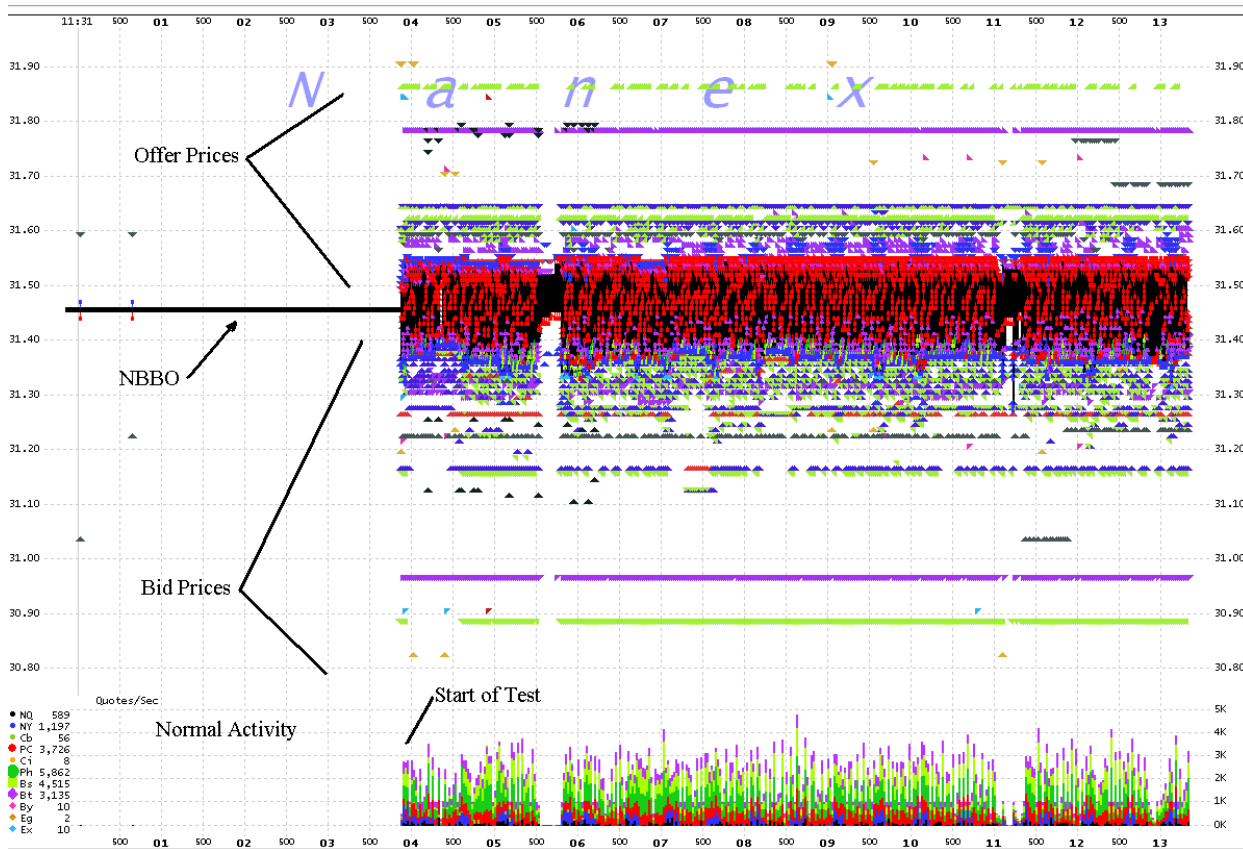


The strategy turns on at 9:45, off at 9:58, and back on again at 10:02. This is clearly visible at the bottom of the figure, which illustrates the intensity of quote activity for the exchanges involved. The national best bid and offer (NBBO) is graphed in black. A market is said to be *locked*, when the bid is equal to the offer; the yellow lines indicate a locked market. A market is said to be *crossed* when the bid is greater than the best offering price; the red lines signal crossed quotes.

While this automated strategy is running, Nanex estimates that the quote rate increases by 10-fold. The occurrence of a locked or crossed market also goes up significantly. The result is a confluence of market fragmentation and high-frequency computerized trading activity.

Figure 2 illustrates what appears to be testing of HFT strategies during regular trading hours. The instrument is IMPV, and the snapshot is from January 10, 2012.

Figure 2



The bottom of the figure contains normal activity in terms of quotes per second, followed by a blast of quotes from five exchanges. The test activity is so elevated as to suggest that a normal market exhibits virtually no quoting activity; this is simply a matter of scale, however.

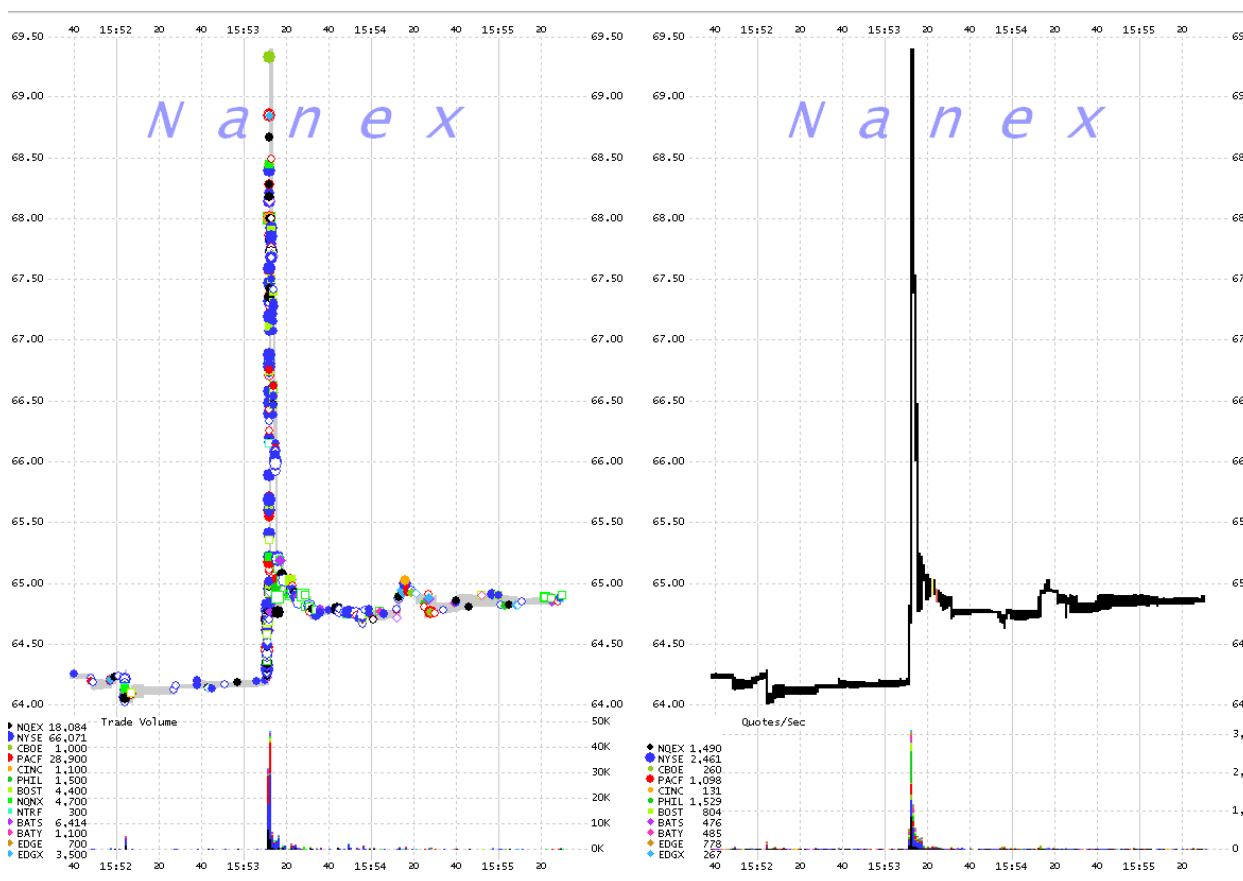
The black area characterizes the best bid and offer. During the periods outside the test, the spread is stable at roughly two cents. In the presence of the high frequency quoting activity, the spread widens to as much as 25 cents and is clearly unstable.

Although not shown here, after 43 seconds, the HFT algorithm pauses few times. During each pause, spreads shrink and stabilize, gyrating again once the quotes recommence. One might question whether such behavior is clearly price manipulation. On the other hand, the possibilities are clear from a trading perspective.¹⁹

¹⁹ The example begs several questions, such as, who gained and who lost. The technical definition of a spread also is debatable at such frequencies. The point here is simply that manipulation is possible through HFT activity.

Figure 3 is more interesting with respect to potential price manipulation. The snapshot is from December 14, 2011, for a single stock, WAB, listed on the New York Stock Exchange. The price of shares rose eight percent in roughly one second, reverting to its previous level three seconds later. The left side of the chart shows trades and trade volume; the right illustrates the NBBO quote in black. As in the previous charts, the bottom contains the frequency of quoting activity over the time frame.

Figure 3



Over and above the short-run pricing disparity, several items stand out. The move coincides precisely with the heavy increase in high-frequency quote activity. Despite the magnitude of the move and its suddenness, the market was never locked or crossed. This is all the more surprising, because the quote and transaction traffic emanated from no less than eleven market venues. The behavior of any single venue does not stand out, and the signal of crossed quotes was never observed. There were no news events during the day. No trades were cancelled by any of the exchanges, despite the nature of the price movement.

Are we looking at price manipulation? Possibly. The timing of the move suggests another avenue through which price may have been manipulated. The spike in price occurs at 15:53:11, just before the market close. There are trades marked after the close, to be executed at the day's volume weighted average price (VWAP). If the spike had not occurred, Nanex computes a VWAP which is about 50 cents lower than what was actually marked. Regardless

of any singular pricing during this short interval, the activity clearly moved a price, which is accepted by the industry as valid for a variety of trades and benchmarks.²⁰

The evidence is not definitive, but it is certainly suggestive of practices, which might reasonably be construed as price manipulation. It also is notable that, contrary to most other examples used in published work, the incidents portrayed here have nothing to do with the U.S. Flash Crash of May, 2010. Despite the data-based nature of the examples, however, their anecdotal nature should be taken into account when weighing the available evidence for policy purposes.

In evaluating the risks inherent in computerized trading, in the absence of the provisions of MAR, high-frequency activity is not the only piece of the puzzle. It is the confluence of fragmentation, the participation of venues which are not registered as exchanges, the electronic nature of those venues, and HFT activity. Some aspects of this set of risks are addressed in the next section.

4.1.Options

There are two options with respect to regulatory implementation considered in this section. The first is an extension of the concept of market abuse nascent within the MAR and DCS. The second pertains to surveillance. The two are distinct, in that the surveillance issues discussed apply to MAR with or without the extension of definitions discussed below.

After detailing a list of perceived problems in the European marketplace, the authors of MAR write, *In light of these problems, this initiative aims to increase market integrity and investor protection, while ensuring a single rule book and level playing field and increasing the attractiveness of securities markets for capital raising.*²¹ Market integrity and attractiveness involves more than the absence of price manipulation. The existence of electronic markets and computerized trading, regardless of the definition of the latter, introduces factors contributing to market abuse beyond the definition of price manipulation.

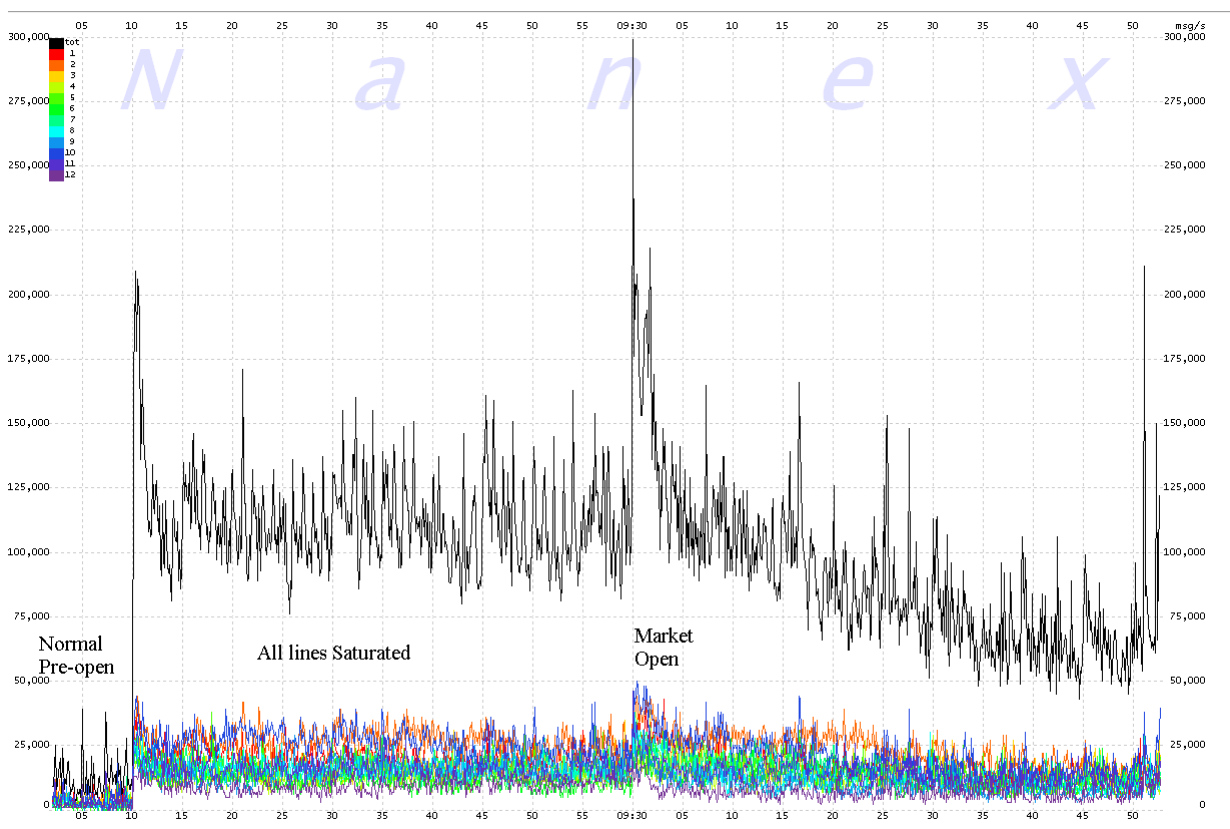
Another example illustrates the point. Figure 4 contains data on so-called quote stuffing behaviour. The charts show message traffic for each of the lines carrying quotes, as well as for the total in the U.S. consolidated quote system.²² The figure is calibrated in 100 millisecond increments.

²⁰ VWAP pricing can be used as a way for asset managers to limit the effect of volatility on the prices they receive. Crossing systems employing VWAP pricing are offered by brokers such as Morgan Stanley, Instinet, and ITG, in Asia, Europe, and the U.S.

²¹ Section 1, last paragraph.

²² Each line carries quotes for a certain range of stock symbols.

Figure 4



On April 26, 2010, message rates reached capacity at 9:29:10. Between 250 and 500 updates per stock per second were broadcast, and stocks were apparently chosen in such a way as to fill each of the lines to capacity, simultaneously. To do so involves a finely timed algorithm and a precise count of quotes on multiple exchanges; in other words, this is not a random event. There is no price manipulation, per se. On the other hand, other legitimate quotes incur queuing delays and do not reach the market in a timely fashion. Such behavior is clearly disruptive to the market, and it is tempting to classify it as market abuse on an intuitive and pragmatic basis.

A story may now illustrate the nature of the option proposed. In a piece of popular fiction, the President of the United States asks an intelligence agent for a plan to eradicate the cocaine trade.²³ Due to the classification of the drug as simply 'dangerous,' classic enforcement methods are inadequate, because enforcement is restricted within the confines of the criminal justice system. The solution is to reclassify cocaine as a terrorist threat. This simple action permits a much wider range of enforcement options, as might be applied to chemical weapons. In the spirit of much fiction, the idea succeeds.

The practical version of this tale in financial markets is a reclassification of what constitutes market abuse in a computerized environment. The idea is not new. It is illustrated in a new amendment of the U.S. Commodity Exchange Act.²⁴ Certain disruptive activities, not previously

²³ Fredrick Forsyth, *The Cobra*, Bantam Books, 2010

²⁴ Section 747, amending Section 4c(a) of the Commodity Exchange Act (7 U.S.C. 6c(a))

classifiable as market or price manipulation, are specifically labeled as ‘unlawful,’ and subject to penalties. These include, for example, bids or offers with the intent to cancel the order prior to execution. As of the end of February of this year, the NYSE and NYSE/ARCA filed proposed rule changes, adopting text from the Financial Industry Regulatory Authority, prohibiting the publication of manipulative or deceptive quotations or transactions.²⁵

A full delineation of the breadth and details of such a reclassification is beyond the scope of this report. A beginning is made in the MAR, in which market manipulation is redefined beyond price manipulation, and which outlines activities specifically relating to algorithmic trading, broadly defined. ESMA’s work provides another excellent starting point, identifying computerized trading practices which reasonably fall into a definition of market abuse.²⁶

A more general reclassification removes the need for precisely defining terms such as *high frequency trading* and *algorithmic trading*. The suggestion pertains to behavior, regardless of the class of market participant. It is behavior that contributes to market integrity and investor protection, not the technology or precise nature of trading strategies. In any case, the technology and strategy choices change continuously, while behavior leading to a stable market is easier to classify and is more stable in and of itself. The goal is simple: identify bad behavior, write regulation to cover it, and enforce the law.

Enforcement requires surveillance, and options towards this end have been considered by U.S. authorities in some detail. On May 26, 2010, the Securities and Exchange Commission (SEC) proposed to require all self-regulatory organizations (SROs) to adopt a plan for the development, implementation and maintenance of a consolidated audit trail.²⁷ Leaving details pertinent only to the repurposing of existing U.S. reporting infrastructure aside, the plan covers the same basic objectives as MAR, and since 2007, differences between European and U.S. market structure have become minimal from the perspective of computerized trading activity.

The consolidated audit trail (CAT) resides in a central repository, owned and operated by the SROs. The repository collects and retains a time-sequenced record of information on all orders, including bids and offers that may not have culminated in transactions. Origination, routing, receipt, modification and cancellations of orders are to be tracked. Timing is to be calibrated in milliseconds. The “material terms” of an order for reporting purposes include

- Symbol
- Security type
- Price

²⁵ NYSE filing, Release No. 34-65954, file no. SR-NYSE-2011-61; NYSE/ARCA filing, Release No. 34-65955, file no. SR-NYSE/ARCA-2011-90.

²⁶ ESMA (2011), pp. 26-27. These include ‘pinging,’ ‘quote stuffing,’ ‘momentum ignition,’ and ‘spoofing.’ Beneath all this jargon is real, identifiable, trading activity, all of which may be argued to be disruptive to markets in such a way as to constitute market abuse.

²⁷ Securities and Exchange Commission, Release No. 34-62174; File No. S7-11-10, Consolidated Audit Trail, May 2010.

- Size (both displayed and undisplayed)
- Side
- Order type
- Short sale information (e.g., short or short exempt), and a locate indicator
- Time in force
- Whether the account has a prior position in the security
- Any special handling instructions

There is additional information requested, but the list above essentially permits reconstruction of trading activity. Order books are typically reconstructed for historical analysis using such information.²⁸

As originally put forward, the SEC proposal does not cover all instruments included in MAR, although the SEC indicates its desire to ultimately expand the repository to essentially do so. The first proposal also contained a real-time reporting and surveillance component; this has subsequently been dropped in favor of end of day reporting.

The proposed rule requires regulatory authorities to incorporate CAT data into existing surveillance systems, and to amend the latter as necessary to accommodate this granularity of information. Rule changes must be filed to ensure that all SRO members comply with the plan as well.

CAT would, in the end, revolutionize securities surveillance and enforcement. Elimination of reporting delays, increased granularity of data, and the implicit close linkage of information from fragmented sources all contribute to the success of enforcement in a market place characterized by electronic venues and associated computerized trading.

The analogue of CAT for Europe is the only viable option for the enforcement of MAR. The option carries heavy financial costs, however, and to this we now turn.

5. Costs, risks, and benefits

The benefits of implementing MAR and DCS are inherent in the statement of objectives, and covered to a large extent by the impact assessment of the European Commission.²⁹ In summary, these are:

- ensure that regulation keeps up with market developments;

²⁸ See, for example, Coppejans, Domowitz, and Madhavan (2005) and references therein.

²⁹ See Commission Staff Working Paper, Executive Summary of the Impact Assessment, accompanying the MAR and DCS, SEC (2011) 1218 final.

- enhance the effectiveness of the market abuse regime by ensuring greater clarity and legal certainty;
- establish a level playing field and a high level of investor protection and market integrity for a wide range of financial instruments, irrespective of the trading venue on which activity takes place;
- ensure that cross-instrument manipulative activity is within scope;
- give regulators appropriate powers to identify market abuse;
- offer effective and deterrent sanctions within the market abuse framework;
- create a single 'rule book' for the European Union; and,
- in principle, ensure effective enforcement of market abuse rules.

The last item is covered by the previous remarks on surveillance. It is not explicitly dealt with in the context of MAR itself. The MAR/DCS package simply guarantees that, if abuse is suspected, then competent authorities may inspect telephone records and enter private premises based on certain safeguards.

The primary benefit to the option of reclassifying market abuse is to further ensure a fair and orderly market. The option addresses aspects of computerized trading, which are detrimental to the working of markets, but not covered by current definitions of market manipulation. It also eliminates the necessity of precisely defining the nature of participant activities in the normal course of business.

The benefit of the surveillance framework laid out by the U.S. CAT is quite simple: proper enforcement of MAR is not possible without it.

The greatest risk inherent in MAR lies in the long delays written into the Proposal with respect to implementation. Given the nature of the Regulation, certain delegated acts and the writing of technical standards are foreseen. The risks laid out in this report are real, today, not tomorrow. Investor confidence is seriously impaired by crises, which can be directly related to market structure and practice. This point has been made by many commentators in analyses of the Flash Crash of May, 2010, in the U.S.³⁰

Risks with respect to diminished liquidity are minimal, at worst. Any such effects would be dwarfed by initiatives such as a financial transaction tax, for example.

The author does not have information upon which to base an estimate for the dollar cost of MAR/DCS implementation. Those costs are necessarily 'sunk' in expected value terms, because such a revision to the MAD regime is mandatory given market developments. The cost of extending MAR to include the reclassification of market abuse to cover existing use cases also is similarly difficult to estimate.

³⁰ In fact, there was a flash crash of similar duration and magnitude in 1962. Reports following the incident cited a two-year hiatus in terms of retail investing activity in the equity market as a result.

Surveillance costs in a computerized trading environment have been calculated, however, in the U.S. context, at least for markets and participants regulated by the SEC. Be prepared for sticker shock: the aggregate cost has been put at approximately \$4 billion in one-time costs, with aggregate annual costs estimated to be roughly \$2 billion.³¹ The aggregate is not necessarily meaningful in the European context, but examples of how the steps break down by SRO and participant are instructive. All estimates are from the SEC, without further attribution.

5.1. Creation and filing of a surveillance plan

The one-time effort to develop and file the plan is 840 work hours per SRO, plus \$20,000 in external legal costs.³² Once the initial plan is in place, 192 hours per SRO would be required annually to keep up the plan.

5.2. Creation of the report under the proposed surveillance model

The estimate is 420 hours per SRO to create the reporting structure, including internal legal, compliance, business operations, and information technology staff time. Another \$10,000 in outsourced legal fees is noted, as well.

5.3. Data collection and reporting

There is a one-time burden per SRO for development and implementation of systems needed to capture required information and transmit it to a central repository. This is estimated at 2,200 hours per SRO, plus some outsourcing fees. In addition, the SEC expects a \$4,542,940 bill per SRO for hardware and software costs. The average maintenance burden per entity, on an annual basis, is thought to be in the range of 5,000 hours of labor plus \$1.25 million for computer systems maintenance.

5.4. The central repository

Creation of the central repository entails receipt, consolidation and retention of the reported order and execution information. Every SRO sponsoring the plan will incur 17,500 hours for development and implementation. In addition, \$4 million is attributed to systems development in terms of software and hardware. Upkeep, including reviews for maintenance of compliance obligations, totals another \$6.7 million per year, per sponsor.

5.5. Member firms

There will be costs incurred by registered broker-dealers. The one-time burden is estimated at 6,530 hours per member, plus \$1.5 million for hardware and software to implement reporting systems. Annual maintenance comes to 3,050 hours and another \$756,000 for the maintenance of systems connectivity, new hardware, and the like.

Although these estimates may appear high to some, they strike others as low. In the context of MAR, all estimates above err on the low side. The reporting structure contemplated by the SEC is not as broad as that which would be required by the multi-asset character of MAR.³³

³¹ Securities and Exchange Commission, Release No. 34-62174; File No. S7-11-10, Consolidated Audit Trail, May 2010

³² Legal costs are estimated at \$400 per hour. The SEC computes dollar figures for the work effort for the aggregate, but not for the individual SROs and members. That computation uses hourly rates for various skill sets ranging from \$193/hour for software programming to \$305/hour for in-house legal counsel.

6. Future

A crystal ball made of murky quartz is all that is available to anyone these days. It is easy to speculate on the implications of, say, the convergence of mobile computing and mobile communications, and the combination's coming effects on the market place. In the financial markets, the harsh light of history suggests that technology, in and of itself, will have evolutionary, not revolutionary, effects over the next ten years.

Consider first the market microstructure of electronic trading venues. With the exception of dark pool design, dating from 1987, there has been no fundamental change to the structure of an electronic marketplace since the Toronto CATS system debuted in 1977. Electronic markets remain automated continuous limit order books; in other words, the structure of the *market logic* has been static for 35 years. Diffusion of the structure across market centers resulted in differences in behavior, as floor auctions were replaced.³⁴ This diffusion process has lasted for over 30 years since Toronto first unveiled its system; one might argue that it still continues. New order types were added, but the basic design remains. Regulation, not technology, bears responsibility for fostering competition in the market for transaction services and its associated fragmentation. Technology merely patched the resulting structure together. "More and faster" does not mean "newer." The latter, from the perspective of market abuse regulation, requires innovation which occasions changes in behavior.

Similar comments may be made concerning HFT. It is generally conceded that the vast majority of strategies employed by HFT participants are quite old: market-making, arbitrage, and directional trading. High-speed arbitrage of, say, rebate pricing, relates to innovation in a trading venue's business model, not to technology as an enabler. The fast diffusion of HFT as a practice was aided and abetted by another piece of business model innovation---the diversification of exchange services in a drive for profitable activities beyond simple transaction processing. Business models and behavior change slowly, relative to technology.

The exception to these statements concerns surveillance. The means by which behavior is implemented powerfully impacts surveillance and its cousin, enforcement. The May, 2010 Flash Crash in the U.S. was not a wake-up call with respect to speed and intensity; both were highlighted in the very similar flash crash of 1962.³⁵ It was, however, a forcible reminder that surveillance data and techniques were sorely lacking. Months passed before the relevant regulatory agencies were able to compile data for a single day. Leaving such surveillance to individual market centers was clearly not sufficient in a fragmented environment. The technology committee of one agency was revived after a five year hiatus. Behavior mimicked that observed in 1962, but surveillance even for a simple post-mortem was caught short by technological developments in market structure.

Surveillance, and the human capital skills required to identify manipulative behavior in a computerized world, will require continuous overhaul over the next ten years. In essence, governments and regulators must exploit the same technologies employed in trading, in order

³³ See also Vroonhof and Boog (2011). Estimates provided for market center operators are most germane here. Costs for market participants, saving issuers and banks, are not considered.

³⁴ See, Domowitz and Steil (1999) and Domowitz (1993, 1995).

³⁵ Many have forgotten this important incident. See, *The Flash Crash Is History*, *Advanced Trading*. June 22, 2010.

to maintain a credible enforcement policy. In this context, the example of mobile communications becomes interesting again, apart from casual speculation. Discussions of telephone record access in the MAR/DCS package already are antiquated.

7. Summary

The MAR/DCS package is a necessary step, as Europe moves to bring financial regulation into a new technological era of investment, trading, and market structure implementations. Uniformity across financial instruments, execution venues, and national jurisdictions, combined with a deterrent sanctioning regime, advances the broad objective of making the European financial markets attractive for cross-border issuers, investors, and traders. The costs associated with the package as written are low, while the expected benefits are high.³⁶

The greatest risk in the MAR lies in the long delays written into the Proposal, even without a surveillance component. Certain delegated acts and the writing of technical standards are foreseen. The market risks identified by the proposal itself, and elaborated upon in this document, are real today, not tomorrow. Recent events remind us that investor confidence may be seriously impaired by crises which can be directly related to market structure and practice.

Two distinct options are considered here. The first involves a broadening of the definition of market abuse to cover computerized trading behavior, which is not satisfactorily handled by previous market manipulation statutes. In essence, certain disruptive activities are specifically labeled as ‘unlawful,’ following the example set in non-European jurisdictions. The option furthers the goals of MAR in that it increases market integrity and investor protection, while still ensuring a single rule book and a level playing field for investors. The reclassification removes the necessity of precisely defining terms such as ‘high frequency trading,’ since it pertains to behavior regardless of the class of participant. It is behavior that contributes to market integrity, not the technology or precise nature of trading strategies. The goal behind this suggestion is quite simple: identify bad behavior, write regulation to cover it, and enforce the law.

Enforcement is the motivation behind the second option. In fact, surveillance is not an option, but a necessity, since enforcement requires it. Surveillance options have received serious scrutiny in the U.S. equities market, in particular; these options provide a blueprint for the path forward. A consolidated audit trail is proposed, residing in a central repository, and operated by registered entities. Origination, routing, receipt, modification, and cancellations of orders are to be tracked. Material terms of an order are identified for this purpose, which are sufficient to reconstruct trading activity in a security. The author views this as the only feasible option for the enforcement of MAR.

Surveillance, and the human capital skills required to identify manipulative behavior, require continuous revision during the next ten years. Such a surveillance system would be revolutionary, and revolutions often come at a high financial cost. The various steps of such a surveillance program are analyzed here, with cost estimates from regulatory findings in the U.S. It will be expensive. On the other hand, governments and regulators alike must exploit the same technologies employed in trading, in order to maintain a credible enforcement policy.

³⁶ A reviewer correctly notes that “impact assessment” often means the cost for the private sector to adapt to a proposed piece of legislation. Such a review is contained in European Commission (2011), which is quite extensive. It is limited here to the monetary effects of surveillance on market participants.

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