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ROLE OF EXCHANGES IN WELL-FUNCTIONING MARKETS

ASSET MANAGER PERSPECTIVE

Stock exchanges play a central role in facilitating the funding of firms and promoting investment and wealth creation. They provide two key services to economic growth and capital markets – policing of listing privileges and a price discovery process. Technological advances and regulatory changes have led to competitive forces that created faster and more fragmented markets. The new landscape has challenged exchanges to maintain their central role, and has forced asset managers to adapt in how they source liquidity in these markets.

Concurrent with these market structure developments, the mix of investors has evolved. Institutional investors, in particular, have become the dominant market participant, making fewer but much larger trading decisions. The classic model of many investors, few broker/dealers and even fewer trading venues is starting to invert.

In this note, we discuss key developments in the evolution of markets in relation to the central functions played by exchanges. Based on our investment and trading experiences, we highlight issues of concern, and provide a perspective on areas of interest to a large, long-term asset manager.

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The Asset Manager Perspective series articulates Norges Bank Investment Management's views and reflections on issues topical for the financial industry. They are not meant to be definitive, rather they are intended as timely contributions for the benefit of all market participants. The series is written by employees, and is informed by our investment research and our experience as a large, long-term asset manager.

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Introduction

Stock exchanges play a critical role in national economies, both developed and emerging. As a large long-term investor, Norges Bank Investment Management (NBIM) is an active participant in public markets and a beneficiary of the services that exchanges provide. We evaluate our investment and trading processes from a viewpoint of 'well-functioning markets'. We are interested in the long-term viability and vitality of financial markets, and we believe that exchanges should remain central to the development and evolution of markets.

Stock exchanges play a central role in facilitating the funding of firms and promoting investment and wealth creation. This role is well-understood. Perhaps more understated are the benefits they provide to the broader real economy. There is academic evidence, for example, that countries with deep and liquid exchanges experience a significant and persistent positive impact on economic performance[1].

Exchanges also play a major role in ensuring that the 'liquidity risk premium', which encourages private firms to go to public markets for funding, is both safeguarded and enhanced. We view this as a key value proposition offered by exchanges.

The evolving role of exchanges should be evaluated in the context of increased market structure complexity. This complexity is due partly to a technological arms race amongst market participants and trading venues, partly to unintended consequences arising from regulations. The competitive and highly fragmented landscape that has emerged has challenged exchanges to maintain their central role in the price discovery process, and has forced asset managers like ourselves to adapt in how we source liquidity in these markets.

The initial objective for exchanges was to serve as an organised meeting place for the benefit of their members. Since then, there have been significant developments in the evolution of exchanges; below are a few notable highlights that set the scene for more recent trends[2]:

- De-mutualisation away from a members-only structure: In Europe, Stockholm stock exchange was the first to do so in 1993.
- Switch from utility-like to for-profit commercial organisations.
- Erosion of local exchanges and consolidation amongst European exchanges.
- Increased competition amongst exchanges, focused around latency and order type differentiation.

1 See Rousseau P.L. and P. Wachtel (2000), "Equity markets and growth: Cross-country evidence on timing and outcomes, 1980-1995", Journal of Banking and Finance 24.

2 See detailed review on this topic in Steil, B., "Creating securities markets in developing countries: a new approach of automated trading", International Finance 2001, 4:2.

If there is a common driver to all these trends, it is that constraints – both technological and organisational – have become less binding over time. The early model of exchanges operating for the benefit of their members was subject to a number of constraints.

- The number of members that could reasonably participate in a centralised price discovery process was limited by the physical size of the trading pit. This encouraged the delegation of trading to dedicated brokers and exchange members, instead of investors self-trading.
- The number of messages that could be processed was limited by technology, making a specialist-based market more feasible than a central limit order book-based system.
- Bandwidth for information dissemination was limited, especially over a distance. This encouraged local exchange solutions.

As these constraints have become less binding, exchanges are in danger of losing their centrality in the market. New solutions, such as peer-to-peer venues and automated market making destinations, have the potential to further erode the exchanges' standing.

At the same time, exchanges continue to provide two services that are central to well-functioning markets – the policing of listing privileges, and the provision of price discovery. Next, we review these key services and highlight some challenges facing exchanges to re-assert their dominance.

Listing privileges and safeguarding the liquidity risk premium

Providing listing privileges and ensuring the high quality of companies which go public is a key role of exchanges. Numerous benefits to the shareholders and employees arise through listing. There are also wider benefits to the economy, allowing companies to grow and provide job creation. Listing requirements improve a company's operations and corporate governance standards by opening up to the public, including analyst research and media scrutiny.

However, despite an increase in trading volumes in US and Europe, the number of new listings are flat to down in many large cap markets[3]. For example, there has been a drop of around 20% in the number of listings in the US when comparing 2014 with 2003. In Europe, the drop is even larger over this ten-year period, with almost 30% fewer listings on Euronext and Deutsche Börse. Moreover, there has been a shift in the listings mix, with a significantly greater number of ETN listings in 2014 than in 2003. This implies that the number of companies listed on these markets has dropped by an even larger margin.

3 *Source: World Federation of Exchanges, www.world-exchanges.org/statistics.*

There are a number of macroeconomic reasons for this development, but the reduced number of listings raises a number of questions for exchanges in Europe and the Americas:

- Have they managed to maintain an attractive public listing/liquidity premium, or has venture capital and private equity won the race? Are IPOs for cashing out or for raising capital?
- Are rules set by regulators and exchanges becoming too stringent for smaller firms? Should they receive some incentives (e.g., tax deferrals) to encourage more players to go public?
- Should we re-visit the older model of reviving local exchanges where smaller firms were able to attract attention from local investors and face less stringent liquidity and trading-related constraints that perhaps are imposed by larger exchanges? Such a structure can be complementary rather than competitive where small firms can 'graduate' to the larger, more global exchanges as they grow in size.

There is supporting evidence for the arguments above:

- Based on data from OECD (2010) there is a significant fraction of equity that remains unlisted – from around 40% in the UK to more than 80% in Southern and Eastern Europe, including major markets such as Spain and Italy.
- There has been a drop in number of exchanges in the US and Europe, while there has been a rise in Asia[4]. In North America, for example, there were over 60 exchanges in the 1930s, while there was only half that number in recent years.
- Buybacks and cash M&A have contributed to the removal of free float from equity markets (e.g., approximately 4.5% has been taken out annually from US markets in recent years[5]).

Efficient price discovery

The other major function of modern exchanges is to ensure a transparent and efficient price discovery process through their central limit order books and trade reporting systems. Technology investments in recent years have provided a robust platform for this responsibility, enabling an 'open for business' model for trading. The market's ability to continue operating during periods of extreme volatility – such as during the credit crisis in 2008, and to recover speedily from glitches – such as the Flash Crash in 2010 or the Knight Capital malfunction in 2012, are testament to the resilience of modern market structure. Exchanges have tended to take a pragmatic approach in response to such episodes, for example the limit-up/limit-down mechanism

4 *See Jorgensen B.J., K.A. Kavajecz, and S.N. Swisher (2013), "The historical dynamics of financial Exchanges",* http://scottswisher.net/JKS_Exchanges.pdf

5 *Source: Bloomberg, BofAML Quantitative research (2015).*

in the US. These measures have done much to make markets more resilient, in our view.

Exchanges are ultimately a key arbiter of prices in capital markets, acting in the interest of all investors – retail and institutional alike. In a sense, they provide a utility-like service to all participants in the economy, perhaps analogous with airports and motorway infrastructure. Unlike physical infrastructure, however, they have experienced a technological speed race almost unprecedented in any other industry.

While there has been consolidation and a drop in the number of exchanges in developed markets, we have not seen a concentration in liquidity. The opposite is true – the increasing number of off-exchange trading venues has led to fragmentation in liquidity and greater complexity in order routing processes. There are a number of reasons for the emergence of these trading venues, driven by regulatory developments aimed at fostering competition, and demand from investors seeking to minimise market impact when trading in size. There has been significant growth in alternative trading systems (ATS). In the US, for example, there are currently 11 equity exchanges and over 60 Alternative Trading platforms. Many large exchanges now have their own off-exchange trading platforms and dark books, responding to this investor demand.

This fragmentation and increased competition have led to some worrying developments for exchanges, broker-dealers and investors alike.

- Intensified competition amongst exchanges and ATSs poses the threat of a regulatory race to the bottom. For-profit exchanges are now challenged to maintain their regulatory and corporate governance duties in this competitive landscape[6].

- There is a risk of speed race to zero: investments both by exchanges – to cope with ever-increasing message flow, and by broker-dealers and market-makers/HFTs – to keep up in the speed race, have the potential to impose negative externalities on all market participants[7]. These externalities have the result of transferring an increasing portion of the profits from intermediation to entities outside the financial sector. For example, we are following the current speed race amongst microwave data-link providers with interest and believe that they are able to earn increasingly super-normal profits, to the detriment of all financial market participants. We support efforts to remove complexity that leads to this form of overinvestment.

6 For more in-depth analysis on this topic, see Christiansen H. and A. Koldertsova (2008), "The role of stock exchanges in corporate governance", OECD.

7 See Stiglitz J.E. (2014), "Tapping the brakes: are less active markets safer and better for the economy?" presented at the Federal Reserve Bank of Atlanta 2014 Financial Markets Conference.

Sourcing liquidity – an asset manager's perspective[8]

When we look at how asset managers source liquidity, we find that exchanges have been relegated to the status of 'one venue amongst many'. This reflects the evolution of exchanges over the last 20 years which has solved specific problems and introduced healthy competition in the market place. We certainly would not want to go back to the equity markets of the mid-'90s.

Over the same period, the investor mix has evolved significantly. This development has not received the level of attention it should warrant. The next frontier in market structure development, in our view, is the adaptation to the needs of the current investor mix. Institutional investors, in particular, have become the dominant market participant as households increasingly delegate their wealth management to professional investors. Examples include the growing AUM of defined contribution retirement products such as 401ks, as well as the explosive growth in ETFs and related products. For our large cap US universe, 13F filings show that more than 80% of the free float outstanding is held by institutions on average as of March 2015. This compares to just 50% in the year 2000[9].

The regulatory model behind the current market structure in both the US and Europe was designed with the assumption of many small and heterogeneous participants interacting – the so-called 'retail investors'. In reality, the retail volume that remains has been successfully segregated by broker-dealers, and no longer directly participates in the price discovery process on exchanges. Instead, the overwhelming majority of orders coming to exchanges now are from significantly fewer, but much larger institutions, as well as the liquidity intermediaries that interact with them.

Institutions make fewer, but larger trading decisions than a heterogeneous set of retail investors holding the same number of shares. This means that the likelihood of two matching natural orders appearing at the same time is lower than in a world of many small investors. For example, Apple (AAPL), part of our US equity benchmark, was held by more than 3000 institutional investors and managers in March 2015, and has significant direct retail ownership. At any given point in time, it is likely that there are natural orders on both sides of the market. National Interstate Corp (NATL), also in our US equity benchmark, is held by approximately 100 institutional investors, in contrast. The likelihood of matching natural orders is much lower.

A Central Limit Order Book, which is pre-supposing the existence of continuous two-way liquidity supply and demand, may no longer be the optimal mechanism for price discovery in such an environment. We believe the emergence of today's fragmented market reflects this sub-optimality. Block-crossing venues, the increasing attractiveness of end-of-day auctions, and changes in the intraday volume distribution are all an expression of the need, and

8 *See also NBIM Asset Management Perspective (2015), "Sourcing liquidity in fragmented markets",* http://www.nbim.no/en/transparency/asset-manager-perspectives/2015/sourcing-liquidity-in-fragmented-markets/.

9 *Source: Factset, NBIM calculations.*

the willingness, of institutions to give up continuously clearing markets in favour of 'on-demand', but more sizeable liquidity events.

Fortunately, equity markets are a long way off from the type of ownership concentration seen in many corporate bond markets. However, we believe that equity markets may be able to learn something by monitoring developments in fixed income markets, rather than the other way round, which has been the approach over the last few years.

Conclusion

We view exchanges as critical to well-functioning markets, both in their function as listing venues, and as the final arbiter of the price discovery process. However, if they are to re-assert their central role, they must adapt and innovate to enhance their attractiveness to institutional investors who have supplanted the many small retail investors that exchanges were originally designed to serve. After all, institutional investors are ultimately responsible for managing the pensions and investments on behalf of individual savers. In conclusion, we highlight a few key points from an asset manager perspective.

We view the current latency race as ultimately a dead-end. Modern markets required the speed-up that computer technology and automation provided to exchanges, since it enabled increased competition and lower trade execution costs. However, we are now reaching a point where further latency reduction is both extremely costly and potentially counter-productive. Low-latency communication through microwave links is fast approaching physical limits. The race to zero is almost over. Latency reduction is a winner-takes-all game. This means that the profits to the winner – an HFT that leases bandwidth first, say – will be extracted by the microwave link provider, and thus leave the financial sector. We are not sure that this is in the interest of the financial sector or of investors. While we understand the economic rationale for exchanges in attracting this type of flow, we believe that it will ultimately be self-defeating if the rent extraction by non-financial service providers becomes excessive, pushing investors to seek out alternative ways of trading.

Exchanges need to be willing to adapt to changing market conditions. In recent years, we have seen a number of positive developments. Exchange revenues have been shifting from variable cost pricing (per-trade fees) towards fixed cost pricing (particularly through data feeds, but also port fees and other connectivity related fees). The recent trend of exchanges purchasing index businesses is another example of this. In the US, Nasdaq's recent experiments with maker/taker pricing structures goes in the same direction by de-emphasising the variable revenue stream (which incentivises exchanges to seek more trading volume from short-term market participants). We support these developments, and believe they allow exchanges to focus on the key services they provide to investors and the economy.

Institutions like us are patient. We are looking for liquidity at a fair price for large size orders. We have a long-term interest in having a market structure with two-way liquidity that works for a heterogeneous set of other market participants as well. We therefore welcome initiatives taken by exchanges to

increase availability of liquidity in size. Supporting the development of batch auctions and experimenting with size vs. time priority models are all initiatives in the right direction, in our view.

We think that market participants are responding to these challenges. Based on our experience with market impact costs from algorithmic trading, we have started to shift to more block executions, a reflection of increased willingness to take on opportunity cost in exchange for lower market impact cost. Market-wide, we see that block crossing networks and dark volume continues to increase as percentage of trading volumes. Similarly, there is increasingly more reliance on closing auctions. Both NYSE and LSE have announced the introduction of mid-day batch auctions. We are supportive of initiatives that slow down the clock, reduce complexity and allow for larger buy-side to buy-side matches to take place. There are a few initiatives currently underway – Plato in Europe and Luminex in US. We are in favour of and would encourage exchanges to participate in block trading venues.

Lastly, exchanges fulfil an important role through their listings business. We are concerned at the fall in the number of listings in the US and Europe in recent years. Exchanges need to ensure that the liquidity risk premium that is available from listings is maintained, versus the increasing amounts of capital available through venture capital and private equity. We do not believe economies benefit when going public simply means cashing in, rather than raising capital. We encourage exchanges to develop new solutions in this area, be they in the form of new listing classes, or potentially even a return to local exchanges.

The centrality of exchanges to well-functioning markets is not under threat, in our view. In their blueprint for European capital markets, the Federation of European Securities Exchanges (FESE) have elegantly put forward their priorities by emphasising that their "vision is that of a capital market which exists for issuers and investors above all"[10]. To fulfil their mission, exchanges need to continue to evolve and respond to changes in market structure and investor needs. We view the automation and latency reduction phase of exchange development as coming to a close. The next phase is developing solutions that are appropriate for today's institutional investor mix. This means trading in the immediacy of a continuous auction process for the possibility of liquidity concentration through, for example, intraday auctions.

10 Federation of European Securities Exchanges (FESE), "A blueprint for European capital markets: How to unleash markets' potential to finance dynamic and sustainable growth" (2014).