São Paulo, 09 de agosto de 2013
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À
Comissão de Valores Mobiliários
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At.: Superintendente de Desenvolvimento de Mercado - SDM

Ref.: **Edital de Audiência Pública SDM nº 05/2013**

Prezados Senhores,

Servimo-nos da presente para apresentar nossa manifestação em face das questões colocadas no Edital de Audiência Pública SDM nº 05/2013, por meio do qual esta Comissão de Valores Mobiliários – CVM solicita a apresentação de manifestações sobre as opções regulatórias relacionadas à identificação, à mitigação, ao gerenciamento de riscos decorrentes da fragmentação de liquidez e de dados e à possível mudança na estrutura de autorregulação, tendo em vista a hipótese de concorrência entre plataformas de negociação.

A BM&FBOVESPA manifesta seu incondicional apoio à iniciativa da CVM de colocar em audiência pública adaptações à regulamentação em vigor sobre os mercados organizados de valores mobiliários que serão necessárias como preparação para a inauguração de uma nova etapa do mercado de capitais brasileiro, que terá início com a competição entre entidades administradoras desses mercados.

A concorrência entre mercados organizados de bolsa e entre mercados de balcão organizado será salutar para o desenvolvimento do mercado de capitais brasileiro, contribuindo para acentuar o processo de inovação e a melhoria dos serviços

prestados pelas entidades administradoras, em benefício do público investidor e das empresas que captam recursos por intermédio desses mercados.

Ao colocar em debate algumas das mais importantes adaptações regulatórias que se farão necessárias para pavimentar o caminho que conduzirá a uma salutar competição entre mercados organizados, a CVM exerce o papel que é esperado pelos participantes do mercado no sentido de definir bases sólidas para que esse processo se desenvolva de forma eficiente. Com efeito, cabe à CVM, na sua função de regular o mercado de capitais, estabelecer regras adequadas para que a competição entre mercados organizados possa se traduzir em incremento do bem-estar da sociedade, coibindo potenciais efeitos negativos experimentados em outras jurisdições.

A BM&FBOVESPA, como entidade autorreguladora do mercado de valores mobiliários, está inteiramente alinhada com os objetivos da CVM e comprometida em contribuir para que a competição entre mercados organizados se instale no Brasil de forma construtiva e apta a produzir os benefícios esperados para todos os participantes do mercado de capitais brasileiro, sem perder de vista o imperativo de se preservar sua integridade e higidez.

Nesse sentido, a BM&FBOVESPA reitera seu compromisso já externado publicamente de prestar serviços de pós-negociação para novas entidades administradoras de mercados organizados que venham a ser autorizadas pela CVM a se estabelecer no Brasil e que necessitem desse serviço, após a conclusão do projeto de integração de suas câmaras de compensação e liquidação.

A prestação de serviços de pós-negociação para novas entidades administradoras contribuirá para preservação dos interesses dos investidores e dos participantes do mercado, assegurando a qualidade e segurança proporcionadas pelas câmaras da BM&FBOVESPA. Não obstante, a prestação desses serviços deve observar, como pré-condição, o cumprimento dos requisitos necessários para a boa administração de risco inerente às atividades das câmaras de compensação e liquidação, em conformidade com as normas da CVM e do Banco Central do Brasil.

Por fim, apresentamos em anexo nossas considerações acerca das questões específicas colocadas no Edital de Audiência Pública em referência (Anexo I), bem como os relatórios elaborados, a pedido da BM&FBOVESPA, por Aité Group (Anexo II) e Rosenblatt (Anexo III), com análise bastante abrangente acerca dos tópicos de interesse e das abordagens adotadas nos EUA, Europa, Austrália e Canadá. Esperamos que referidos relatórios tragam subsídios úteis, que possam auxiliar a CVM na análise e decisão acerca das opções regulatórias que haverá de fazer, ressalvando que as informações e opiniões contidas nesses relatórios são de exclusiva responsabilidade das referidas empresas, e não coincidem ou expressam, necessariamente, com as opiniões da BM&FBOVESPA.

Sendo o que se nos apresenta para o momento, subscrevemo-nos.

Atenciosamente,

Edemir Pinto
Diretor Presidente

Edital de Audiência Pública SDM 05/2013

Objetivo: Convite para apresentação de manifestações sobre as opções regulatórias relacionadas à identificação, à mitigação, ao gerenciamento de riscos decorrentes da fragmentação de liquidez e de dados e à possível mudança na estrutura de autorregulação, tendo em vista a hipótese de concorrência entre plataformas de negociação.

Manifestação da BM&FBOVESPA às questões postas pela CVM

Parte I

Temas relacionados às entidades administradoras de mercados organizados: melhor execução no interesse dos clientes (*best execution*) e consolidação de dados de mercado

I.A. Melhor Execução no interesse dos clientes

(i) Quais seriam os fatores a serem levados em conta em uma regra de *best execution*, considerando a existência de diversas bolsas concorrentes? Por quê?

Com base na experiência internacional, verifica-se que há duas abordagens possíveis acerca dos fatores a serem considerados na implementação de uma regra de *best execution*: o adotado pela *Securities and Exchange Commission* – SEC e o adotado pela Comunidade Europeia por intermédio da Diretiva 2004/39/CE (*Markets in Financial Investment Directive* – MiFID).

O enfoque dado pela SEC nos EUA, com base na *Order Protection Rule*, consiste na exigência de que uma ordem deva ser sempre dirigida ao local de negociação que apresente a melhor oferta. Em termos práticos, essa regra privilegia o critério de preço sobre outros fatores a serem considerados na execução de uma ordem,

servindo como parâmetro a melhor oferta disponível (*top of the book protection*). Para dar curso a essa exigência, os ambientes de negociação (incluindo *alternative trading systems* e intermediários que realizam o processo de internalização de ordens) são conectados uns aos outros por meio de sistemas de roteamento de ordens, de forma a evitar que uma ordem seja executada a um preço pior que o melhor preço disponível em qualquer ambiente de negociação[1].

Na Europa, a abordagem contida na MiFID conferido ao dever de *best execution* um caráter mais flexível, permitindo que o intermediário, no seu relacionamento com o cliente, adote outros critérios além do preço, a saber: (a) as características do cliente, incluindo a sua classificação como cliente não profissional ou profissional; b) as características da ordem do cliente; (c) as características dos instrumentos financeiros objeto dessa ordem; d) as características dos ambientes de negociação para os quais a ordem pode ser dirigida[2].

Acreditamos que a opção já adotada pela CVM no art. 19 da Instrução CVM 505[3] – com clara inspiração na Diretiva 2006/73/CE, de 10/08/2006, que tratou da implementação da MiFID – se mostra plenamente satisfatória, descrevendo

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[1] Cf. SEC Release No. 34-51808 (Regulation NMS), disponível em www.sec.gov/rules/final/34-51808.pdf: "The duty of best execution requires broker-dealers to execute customers' trades at the most favorable terms reasonably available under the circumstances, i.e., at the best reasonably available price. The Commission has not viewed the duty of best execution as inconsistent with the automated routing of orders or requiring automated routing on an order-by-order basis to the market with the best quoted price at the time. Rather, the duty of best execution requires broker-dealers to periodically assess the quality of competing markets to assure that order flow is directed to the markets providing the most beneficial terms for their customer orders".

[2] Cf. Artigo 44 da Diretiva 2006/73/CE: "1. Os Estados-Membros assegurarão que, aquando da execução de ordens de clientes, as empresas de investimento tenham em conta os seguintes critérios para efeitos de determinação da importância relativa dos fatores enunciados no nº 1 do artigo 21º da Diretiva 2004/39/CE: a) As características do cliente, incluindo a sua classificação como cliente não profissional ou profissional; b) As características da ordem do cliente; c) As características dos instrumentos financeiros objeto dessa ordem; d) As características dos espaços ou das organizações de negociação para os quais a ordem pode ser dirigida".

[3] "Art. 19. O intermediário deve executar as ordens nas condições indicadas pelo cliente ou, na falta de indicação, nas melhores condições que o mercado permita. Parágrafo único. Para aferir as melhores condições para a execução de ordens, o intermediário deve levar em conta o preço, o custo, a rapidez, a probabilidade de execução e liquidação, o volume, a natureza e qualquer outra consideração relevante para execução da ordem".

adequadamente os fatores relevantes a serem levados em conta em uma regra de *best execution*. Com efeito, o citado dispositivo prevê os diversos fatores relacionados a serem considerados pelo intermediário no momento da execução de uma ordem, a saber: preço, o custo, a rapidez, a probabilidade de execução e liquidação, o volume, a natureza e qualquer outra consideração relevante para execução da ordem.

Deve-se enfatizar que, a despeito da regulação vigente nos EUA, onde prepondera o critério de preço, este deve ser considerado como apenas um dos fatores relevantes para se avaliar se a ordem do cliente foi executada da melhor maneira possível[4], na medida em que, a depender do perfil do investidor e de suas reais necessidades diante de determinada transação, outros critérios podem prevalecer sobre o melhor preço, tal como a probabilidade da execução (i.e., a maior certeza de que a oferta por ele realizada encontrará uma contraparte, o que depende diretamente da profundidade do mercado para onde a oferta é direcionada), e a certeza na liquidação (que depende da existência de uma *clearing* que ofereça serviço de contraparte central, em contraposição a uma *clearings* que apenas realiza a entrega contra pagamento (*Delivery versus Payment* – DVP), não garantindo o cumprimento da obrigação da contraparte).

Deve-se sublinhar igualmente que, em linha com o MiFID, a forma como a regra de *best execution* será aplicada deverá ser estabelecida na política de execução de ordens adotada pelo intermediário, de acordo com os diversos perfis de clientes. Vale notar que, para fins de cumprimento do dever em questão, será considerado que uma ordem foi executada nas condições mais favoráveis para o cliente sempre que esta houver sido executada de acordo com suas instruções[5], o que demonstra

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[4] Conforme ressaltado no relatório da Aité Group em anexo, "best price does not always constitute best execution, however. An investor may have a need to transact an order quickly—more rapidly than it can be absorbed in the prevailing market at or within the best displayed quotes. Filling the order in the prevailing market may "push" the stock's price and result in an execution price outside of the existing bid/ask spread. Still, this may constitute "best execution" in the view of the investor, as greater emphasis was placed on completion as opposed to price".

[5] Cf. Artigo 44 da Diretiva 2006/73/CE: Uma empresa de investimento satisfaz a obrigação prevista no nº 1 do artigo 21º da Diretiva 2004/39/CE, no sentido de tomar todas as medidas razoáveis para obter o melhor resultado possível para o cliente, na medida em que execute uma ordem ou um aspecto específico de uma ordem seguindo as instruções específicas do cliente relativamente à ordem ou ao respectivo aspecto específico.

que o *best execution* possui caráter suplementar ao que houver sido estabelecido entre o intermediário e seu cliente, conforme já prevê o art. 19 da Instrução CVM 505.

À luz dessas considerações, é forçoso concluir que, no atendimento do dever de executar as ordens de seus clientes nas melhores condições disponíveis, os intermediários devem levar em consideração as necessidades concretas de seus clientes em relação à forma como sua ordem deve ser executada e seu perfil de investimento.

(ii) Seria desejável o estabelecimento de critérios/parâmetros para a verificação do cumprimento da execução das ordens? Caso positivo, quais poderiam ser esses critérios/parâmetros? Por quê? Caso negativo, por que não seria apropriada a definição de critérios/parâmetros?

O estabelecimento de parâmetros para a verificação do cumprimento do dever de executar as ordens de clientes nas condições mais favoráveis é necessário para que o cumprimento desse dever possa ser aferido.

Os intermediários devem estar aptos a demonstrar que cumprem adequadamente com o dever de *best execution*, considerando, inclusive, que podem ser questionados por seus clientes em juízo, pela CVM ou pela BSM. Desse modo, consideramos recomendável que os intermediários adotem uma política de execução de ordens, onde façam constar os fatores a serem considerados no atendimento desse dever, de acordo com os perfis de seus clientes. Nesse sentido, o cumprimento do dever de *best execution* deve ser passível de verificação independente, devendo as políticas de *best execution* adotadas pelos intermediários estabelecer mecanismos que permitam a rastreabilidade de seu cumprimento.

Para esse fim, consideramos satisfatória a previsão já constante do art. 20 da Instrução CVM 505, de acordo com o qual o intermediário deve estabelecer regras, procedimentos e controles internos sobre a execução de ordens, de modo a permitir que os intermediários obtenham as melhores condições disponíveis no mercado para a execução das ordens de seus clientes, bem como assegurar que os clientes

sejam informados a respeito dos diferentes mercados em que os valores mobiliários objeto da ordem podem ser negociados[6].

Como requisito adicional em prol da transparência das regras de mercado, os intermediários devem deixar claro quais são as suas regras de *best execution* no RPA (Regra de Parâmetros de Atuação) – documento obrigatório de acordo com a CVM e que compõe o Programa de Qualificação Operacional da BM&FBOVESPA (PQO).

(iii) Seria oportuno a CVM adotar diferentes fatores de *best execution*, tendo em vista que diferentes perfis de investidores podem ter estratégias distintas de negociação? Por exemplo, investidores de varejo, institucionais, aqueles que operam por meio de acesso direto ao mercado (DMA) ou ainda os investidores de alta frequência (HFT)?

Tendo em vista comentários acima sobre a implementação da regra de *best execution*, somos da opinião de que a CVM deve facultar aos intermediários estabelecer uma política de execução de ordens que lhes permita dar cumprimento a essa regra de forma flexível, em conformidade com o perfil de cada cliente.

Nesse sentido, acreditamos que a CVM não deve adotar normas que estabeleçam regras mais detalhadas sobre os fatores a serem considerados na execução de ordens, sob pena de não permitir que os intermediários atinjam a própria finalidade da regra em comento, que é a execução de uma ordem no melhor interesse de seus clientes. As normas editadas pela CVM devem, a nosso ver, se restringir à definição dos princípios gerais que devem ser observados por todos os intermediários, como já feito nos artigos 19 e 20 da Instrução 505 citados nas respostas anteriores.

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[6] "Art. 20. O intermediário deve estabelecer regras, procedimentos e controles internos sobre a execução de ordens, de modo a: I – permitir que os intermediários obtenham as melhores condições disponíveis no mercado para a execução das ordens de seus clientes; II – possibilitar, a qualquer tempo, a vinculação entre a ordem transmitida, a respectiva oferta e o negócio realizado; e III – assegurar que os clientes sejam informados a respeito dos diferentes mercados em que os valores mobiliários objeto da ordem podem ser negociados".

(iv) Em caso afirmativo, indicar quais os fatores e os critérios mais apropriados para cada perfil de investidor ou tipo de ordem e as razões para tal?

Não aplicável, em virtude da resposta ao item (iii) acima.

(v) A adoção de um regime de *best execution*, em cenário de concorrência entre bolsas, implicaria em mudanças relevantes nos sistemas ou procedimentos dos intermediários?

Acreditamos que haverá adaptações relevantes a serem realizadas nos sistemas, processos e controles internos adotados pelos intermediários.

Merecem destaque as adaptações que serão necessárias nos sistemas de gerenciamento de ordens (OMS) e nos sistemas de gerenciamento de execução (EMS), utilizados pelos intermediários para gerenciamento do fluxo de ordens executadas em nome de seus clientes. Serão necessárias também adaptações nos processos de *back-office* (liquidação, gerenciamento de riscos, tarifação, etc.). Adicionalmente, os intermediários terão que utilizar um sistema de roteamento de ordens (*smart order routing*), como ferramenta para direcionar as ordens de seus clientes para o mercado que ofereça melhores condições de execução.

Para que os intermediários estejam aptos a demonstrar que executaram as ordens de seus clientes nas melhores condições possíveis, deverão implantar sistemas que permitam recuperar informações sobre as ordens executadas, a qualquer tempo, de forma estruturada, e assim comprovar o cumprimento de suas obrigações perante os órgãos de fiscalização (nomeadamente a própria CVM e a BSM), bem como perante o Poder Judiciário, diante de possíveis ações judiciais propostas por seus clientes. Para esse fim, será necessário que os intermediários adotem políticas de execução de ordens e controles internos robustos.

(vi) Quais seriam os desafios para os intermediários se conectarem aos diversos ambientes e realizarem o roteamento de ordens, por exemplo, em relação a custos e estrutura tecnológica? Nas respostas, é desejável a descrição das mudanças necessárias e, se possível, estimativas de custos.

De início, devemos salientar que a aplicação da regra de *best execution* não deve resultar na obrigação de os intermediários se tornarem pessoas autorizadas a operar em todos os mercados organizados eventualmente existentes, devendo tal decisão se subordinar a uma avaliação de cada intermediário em relação aos custos e benefícios envolvidos. De igual modo, deve ser preservado o direito das entidades administradoras de mercado de avaliar e eventualmente denegar pedidos de concessão de autorização de acesso para operar em seus mercados, conforme faculta o § 4º do art. 51 da Instrução CVM 461[7].

O intermediário que se conectar a um ou mais mercados organizados incorrerá em custos relevantes para estabelecer e gerenciar links de comunicação e infraestrutura tecnológica necessária para operar diretamente nesses ambientes, estimados abaixo. Os custos de conectividade para a indústria de intermediação podem chegar a R$ 70 milhões por ano, dado o atual número de participantes e custos de conexão, como demonstra a estimativa a seguir:

(i) Links de rede: um link de rede de 20 Mbps com contingência custa hoje R$20.000,00/mês, segundo as principais operadoras de telecomunicações em São Paulo. O custo adicional para as 85 corretoras conectadas ao segmento Bovespa totalizaria R$ 20,4 milhões por ano somente com esse item.

(ii) Telas de negociação: as 85 corretoras do segmento Bovespa possuem aproximadamente 15 operadores cada. O custo médio de tela de negociação fornecida por empresa de tecnologia independente chega a R$1.000,00 por mês por operador, R$ 700,00 a mais do que a tela fornecida pela BM&FBOVESPA. O custo adicional da indústria com esse item chegaria a R$ 10,7 milhões por ano.

(iii) Sistema de *back-office*: a BM&FBOVESPA oferece um sistema de administração de *back-office* completo para as corretoras, o SINACOR. O valor médio pago pelas corretoras pelo SINACOR é de R$10.000,00/mês. Um software similar oferecido no mercado nacional – utilizado atualmente por diversos custodiantes – custa não menos do

[7] Instrução CVM 461, art. 51, §4º: "As entidades administradoras poderão estabelecer outros requisitos, inclusive de reputação ilibada, ou indicar outros impedimentos para admissão e permanência de pessoa autorizada a operar, a juízo de seu Conselho de Administração".

que R$50.000,00/mês. A substituição do SINACOR por um sistema que suporte múltiplas *clearings* acarretaria, em nossas estimativas, R$ 40,8 milhões de custos adicionais aos 85 intermediários do segmento Bovespa, por ano.

Além dos três itens listados acima, haveria ainda custos com sistemas de roteamento de ordens (*smart order routers*), com a agregação do *market data*, sistemas de *compliance* e auditoria de *best execution*, bem como adaptações em sistemas de acesso direto ao mercado (DMA), inclusive o de *home broker*.

Serão necessários hardwares adicionais para operacionalizar o fluxo de ordens e de liquidação decorrentes das operações em mais de um mercado organizado, bem como espaço físico adicional nas mesas de operações. Demais disso, os processos internos de execução de ordens deverão estar adaptados de forma a lidar com diferentes telas de negociação e diferentes códigos de negociação para os valores mobiliários listados nos diversos ambientes. Ainda não nos foi possível estimar esses custos.

Conforme mencionado na resposta à questão acima, serão necessárias adaptações aos sistemas de gerenciamento de ordens (OMS) e aos sistemas de gerenciamento de execução (EMS) para a correta implantação do processo de *best execution*, bem como nos processos de *back-office* (liquidação, gerenciamento de riscos, tarifação, etc.). O grau de complexidade dessa tarefa depende de diversos fatores, cabendo destacar o nível de compatibilidade entre as tecnologias utilizadas pelas entidades administradoras de mercados organizados.

Os relatórios elaborados por Aité Group (Anexo I) e por Resenblatt (Anexo II) apresentam estimativas de despesas com infraestrutura de TI para os intermediários em mercados fragmentados.

(vii) Seria apropriado estabelecer previsões para os administradores de mercado no sentido de estarem também sujeitos ao regime de *best execution*, nos moldes da *Order Protection Rule*? Quais seriam os desafios e benefícios dessa opção?

Acreditamos que os princípios de *best execution*, conforme o disposto no art. 19 da Instrução CVM 505, não são adequadamente atendidos por meio da abordagem adotada no mercado norte-americano com base na *Order Protection Rule*, da SEC. Consideramos que essa abordagem, de proteção do topo do livro de ofertas, é limitada, não capturando as reais necessidades dos investidores a serem atendidas pelos intermediários no momento da execução de uma ordem.

Dessa forma, seria ineficaz impor aos participantes do mercado custos relevantes com um sistema de roteamento de ordens a ser mantido pelas entidades administradoras de mercados organizados (que consistirá na aquisição e manutenção de infraestrutura de comunicação entre as diversas entidades, regras e parâmetros para o roteamento de ordens, sistema consolidador de ofertas, trilhas de auditoria para a verificação de *trade-throughs*, etc.), uma vez que esse modelo de roteamento não contribuirá para o objetivo de assegurar a melhor execução das ordens dos investidores[8].

Demais disso, a experiência do Canadá na implementação de um modelo de *best execution* baseado na obrigatoriedade de roteamento de ordens, nos moldes da *Order Protection Rule* norte-americana, resultou em custos elevados para os intermediários, especialmente se comparado ao modelo mais flexível, inspirado na MiFID, adotado na Austrália[9].

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[8] Na avaliação da Australian Securities & Investment Commission – ASIC, em relatório no qual conduz extensiva análise da estrutura do mercado Australiano, o modelo de roteamento entre bolsas "restricts the prices at which investors are able to trade, therefore representing a form of price control. It mandates that price is the most important criteria for all investors, which is not always the case. Some investors may be prepared to pay a premium to have a single fill or to execute quickly. Trade-through rules deny this choice, instead requiring that displayed orders be filled first". A ASIC firma, ainda, que "mandated linkages between markets required to operationalise a trade-through rule can be costly. Stoll (2001) argues that regulatory mechanisms designed to link execution venues potentially stifle competition and innovation by requiring that all markets conform to the linkage mechanisms. Further, such links may fail in the longer term because there is little incentive for individual venues to enhance the quality and efficiency of these linkages". In Report 215, disponível em http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/rep-215.pdf/$file/rep-215.pdf.

[9] De acordo com Rosenblatt, "it is reasonably clear that highly prescriptive best execution regimes, focused on mandating executions at the best displayed prices market-wide, tend to support venue proliferation, as well as higher (or at least less flexible) connectivity and data costs. Markets with such a regulatory structure – examples in the group of jurisdictions we studied are Canada and the United States – can also expect knock-on effects like greater structural complexity, including proliferation of exchange order types and off-exchange venues. Conversely, regimes that offer intermediaries significant latitude to

(viii) Fornecer quaisquer comentários adicionais sobre o regime de *best execution* e mecanismos de mitigação do risco de fragmentação de liquidez que julgar relevantes.

Para uma avaliação mais aprofundada acerca dos modelos de *best execution* adotados nos Estados Unidos, na Europa, no Canadá e na Austrália, recomendamos a leitura dos relatórios elaborados por Aité Group e Rosenblatt, em anexo.

I.B. Consolidação dos dados de pré-negociação e pós-negociação

Considerações Preliminares

Como base para as respostas, consideramos que a definição de "fita consolidada" é o resultado da consolidação das informações de mercado sobre o último preço das ofertas ou negócios realizados, informações de dados estatísticos dos instrumentos, como volume e número de ofertas ou negócios (*market data*).

Os dados refletidos na fita são gerados por vários "Market Centers", incluindo todas as bolsas de valores e o responsável pela geração da fita consolidada é denominado "consolidador".

A consolidação pode se dar com as informações das ofertas (consolidação dos dados pré-negociação), que é utilizado no processo de decisão acerca da execução de uma operação, ou a consolidação com as informações dos negócios realizados (consolidação de dados pós-negociação). As duas espécies de consolidação têm finalidades e propósitos distintos e podem ser geradas por diferentes consolidadores.

Dos benefícios da consolidação pré-negociação, podemos destacar que:

(i) facilita o acesso dos investidores sobre cotações disponíveis em vários mercados, conferindo maior transparência para o mercado como um todo,

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take into account factors other than best price, such as execution size, speed or fees, can result in lower costs or some market participants than they would bear in a strict order-protection environment. These effects can be seen, to varying degrees, in the experiences of Australia and the European Union" (pp. 5/6).

na medida em que possibilita uma melhor formação de preço, o funcionamento eficiente dos mercados;

(ii) possibilita o cumprimento das políticas de *best execution* por parte dos intermediários, bem como sua supervisão e evidenciação; e

(iii) possibilita que os operadores de mercado tenham controles adequados para evitar a entrada de ordens anômalas a seus mercados.

Dos benefícios da consolidação pós-negociação, podemos destacar que:

(i) é utilizado para fins de supervisão de mercado;

(ii) permite a marcação a mercado dos valores mobiliários negociados em múltiplos ambientes; e

(iii) possibilita que as companhias listadas monitorarem a atividade de negociação de suas ações.

(i) Qual seria a melhor forma de implementar a fita consolidada no Brasil? Um único ou diversos consolidadores? Por quê?

Acreditamos que a implementação de uma fita consolidada no Brasil seria mais adequada se fosse implementada por múltiplos consolidadores, assim como feito na Austrália, por decisão da ASIC. Diferentes consolidadores poderiam oferecer a fita consolidada de pré-negociação, pós-negociação ou ambas, sendo salutar para o mercado instituir um modelo que permita a concorrência entre empresas que se disponham a prestar esse serviço. A consolidação realizada por múltiplos consolidadores também evita que se tenha um único ponto de falha, na hipótese de inconsistências no processo de consolidação.

A indústria de provedores de serviços de dados existentes (*vendors*) seria candidata natural para prover o serviço de consolidação. A consolidação de dados pré e pós-negociação já é atividade realizada pelos *vendors* como parte de seu negócio, os quais já estariam, portanto, devidamente preparados para realizar essa tarefa na hipótese de fragmentação do mercado de valores mobiliários brasileiro.

(ii) No caso de uma única entidade funcionar como consolidador central, como essa entidade poderia ser estabelecida? No caso dos consolidadores serem os *vendors*, quais deveriam ser os requisitos mínimos para o seu reconhecimento pela CVM?

Conforme assinalado na resposta à pergunta anterior, entendemos que múltiplos consolidadores poderão participar do mercado, devendo a CVM estabelecer os requisitos mínimos para a prestação do serviço de consolidação. A entidade que prestar o serviço de consolidação de dados deve observar, no mínimo, os seguintes requisitos:

(i) possuir controles adequados para evitar a entrada de ordens anômalas na fita consolidada;
(ii) informar, em tempo real, as ofertas/negócios realizados com o mesmo grau de transparência existente atualmente (com indicação de corretora de compra e de venda);
(iii) assegurar que os dados são disponibilizados ao público de forma não discriminatória a um preço razoável;
(iv) ser capaz de disponibilizar para todos os seus clientes a consolidação dos dados padronizadas a partir do formato proprietário do *market data* fornecido pelas Bolsas;
(v) informar dados estatísticos, como preço máximo e mínimo do dia, bem como volume negociado para o instrumento em questão, inclusive dos negócios realizados em liquidação bilateral no mercado de balcão;
(vi) assegurar padrão mínimo de qualidade de dados (precisão e atualização);
(vii) possuir requisitos tecnológicos para a prestação do serviço (planos de continuidade, segurança e integridade de dados, etc.);
(viii) oferecer consolidação pré e pós-negociação para cada produto dos dados separadamente para aqueles usuários que só desejam adquirir componentes específicos (evitar "venda casada");
(ix) possuir recursos suficientes (incluindo recursos financeiros e técnicos) para o bom desempenho das suas funções; e
(x) possuir mecanismos de governança adequados, bem como sistemas e controles para gerenciar eventuais conflitos de interesse[10].

[10] Os conflitos de interesse inerentes à prestação do serviço de consolidação consistem, a nosso ver, na possibilidade de favorecimento de um ou mais participantes do mercado em detrimento dos demais, por meio do envio não sincronizado da fita consolidada.

Importante ressaltar que os consolidadores deverão ser auditados e supervisionados pela CVM, de modo a garantir o cumprimento dos requisitos para o seu funcionamento, a integridade do mercado e a boa prestação do serviço de consolidação de dados pré e pós-negociação.

Nesse sentido, sugerimos que a CVM avalie a extensão da competência, conforme definida nos limites da Lei nº 6.385/76, para regulamentar a atividade de consolidação de dados, bem como instituir normas visando à concessão de autorização ou reconhecimento dos consolidadores, bem como realizar a supervisão das entidades que prestarão esse serviço.

(iii) Haveria alguma questão de ordem operacional que deveria ser avaliada sob a perspectiva dos usuários e sob a perspectiva do(s) consolidador(es) reconhecido(s) pela CVM, considerando a desvinculação do serviço de fornecimento de informações consolidadas de outros serviços prestados?

Dada a relevância do processo de consolidação de dados para o funcionamento eficiente do mercado, é de extrema importância que essa atividade seja realizada por entidades devidamente capacitadas, em especial do ponto de vista tecnológico, e que haja mecanismos para prevenir falhas que comprometam a integridade das informações geradas com base no processo de consolidação. Desse modo, mostra-se relevante que essa atividade seja supervisionada pela CVM de forma atenta.

Devem ser adotados mecanismos de gerenciamento de conflito de interesse, de modo a: (i) coibir a "venda casada" de serviços de consolidação de informações com a venda de outros serviços prestados; e (ii) a utilização do serviço de consolidação pré ou pós-negociação para benefício próprio, em especial no caso de o prestador de serviço ser também um participante de mercado.

(iv) Quais seriam os custos relevantes para o(s) consolidador(es)? Favor apresentar estimativas.

O consolidador precisa investir em linhas de telecomunicações com os diferentes mercados, na aquisição e manutenção dos servidores necessários para processar o

market data dos mercados participantes, e manter equipes qualificadas para a adequada manutenção do sistema.

Deve-se esperar um investimento inicial relevante para a capacitação das entidades que prestarão esse serviço. Esses custos podem variar à medida que o volume de mensagens do mercado brasileiro crescer, seja por aumento de liquidez ou em razão da entrada de novos operadores de bolsa [11]. Deve-se levar também em consideração que o sinal de *market data* das bolsas sofre alterações com o tempo, e o consolidador precisará modificar seus sistemas para processar o sinal alterado.

(v) Administradores de mercado deveriam poder cobrar pelo fornecimento de dados sobre cotações e ordens executadas ao(s) consolidador(es)?

As cotações de valores mobiliários representam o resultado de todo o processo de negociação propiciado pelo sistema de negociação administrado por uma bolsa. Consistem, portanto, em um produto relevante da atividade de administração de um mercado organizado ao refletir as ofertas e negócios realizados em seu sistema de negociação, sendo que a qualidade das cotações geradas por uma bolsa está diretamente relacionada com sua aptidão para atrair investidores para realizar negócios em seu ambiente e para funcionar como um centro de liquidez eficiente.

As cotações funcionam não somente para orientar os intermediários e investidores no processo de negociação, mas também para a elaboração de índices e outros produtos sintéticos que reproduzem o comportamento do mercado administrado por uma bolsa. Nesse sentido, as cotações possuem um inegável valor econômico, que é determinado pela qualidade do mercado organizado de onde são originadas, podendo assim ser consideradas como um subproduto da atividade das bolsas, e

[11] De acordo com os números indicados no processo administrativo instaurado perante a SEC pela Nasdaq contra a *Consolidated Tape Association* (CTA), associação que supervisiona a *Securities Industry Automation Corporation* (SIAC), entidade responsável pela consolidação de dados no mercado norte-americano, para discutir a cobrança de um *fee* de entrada, os custos de desenvolvimento e manutenção incorridos pela SIAC para operar o CTA entre 2000 e 2004 estão em USD 6,9 milhões e USD 23,3 milhões para desenvolvimento e manutenção em produção, respectivamente (disponível em http://www.sec.gov/litigation/aljdec/2008/id358rgm.pdf).

que hoje representam parcela relevante de suas receitas, como podemos observar nos dados de 2012 de algumas bolsas localizadas em outros países (tabela abaixo).

Empresa	**Rubrica**	**% Receita**	**$ MM**
ICE	Market Data	10,8%	US$ 147
NYSE	Market Data	15%	US$ 349
Deustche	Market Data and Analytics	11,1%	EUR 215
CME	Market Data and information services	13,3%	US$ 387
CBOE	Market Data	4,8%	US$ 24

Desse modo, consideramos que às entidades administradoras de mercado de bolsa deve continuar sendo permitido cobrar pelo fornecimento de dados sobre cotações. Adicionalmente, dado o valor econômico intrínseco das cotações, as entidades administradoras devem preservar o direito de adotar as proteções contratuais usualmente utilizadas para restringir o uso de suas cotações por terceiros para finalidade diversa da que seja necessária para amparar as decisões de investimento nos valores mobiliários admitidos à negociação em seus sistemas.[12]

(vi) Administradores de mercado deveriam poder exercer o papel de consolidadores?

Considerando a resposta à questão (i) acima, no sentido de que os *vendors* estarão melhor vocacionados para prestar o serviço de consolidação de dados, entendemos desnecessário facultar às entidades administradoras de mercado o exercício da mesma atividade.

[12] O reconhecimento do valor econômico do Market data e a possiblidade das bolsas continuarem cobrando pelo seu fornecimento é reconhecida na Regulation NMS ("§ 242.601 Dissemination of transaction reports and last sale data with respect to transactions in NMS stocks. (…) (d) Charges. Nothing in this section shall preclude any national securities exchange or national securities association, separately or jointly, pursuant to the terms of an effective transaction reporting plan, from imposing reasonable, uniform charges (irrespective of geographic location) for distribution of transaction reports or last sale data").

(vii) Fornecer quaisquer comentários adicionais sobre fita consolidada e consolidadores que julgar relevantes.

Acreditamos que uma fita consolidada de pré e pós-negociação e dados referenciais agrega valor ao mercado como um todo. Devemos ressalvar, entretanto, que o modelo de *best execution* que sustentamos ser o mais adequado é o que confere maior flexibilidade na definição dos fatores que serão ponderados pelo intermediário na execução de ordens, de acordo com as reais necessidades e o perfil de seus clientes. Desse modo, entendemos que a relevância da fita consolidada deve ser relativizada, na medida em que o melhor preço é apenas um dos fatores a serem considerados no processo de execução de ordens.

Considerando que o processo de consolidação de dados envolve necessariamente a captura dos dados originados dos mercados organizados, em seu formato nativo (*market data* nativo), sua conversão para um formato padrão e posterior disseminação, é inevitável que haja alguma latência na divulgação da fita consolidada, em comparação com o *market data* nativo divulgado pelos *vendors*, ou diretamente pelas próprias entidades administradoras de mercados organizados.

Os investidores de alta frequência, que fazem uso de estratégias de negociação de baixa latência através de robôs e proximidade geográfica (*colocation*), não utilizam um roteamento de ordens para identificar o melhor preço, mas fazem uso da arbitragem entre preços de diferentes mercados. Desse modo, para esse tipo de investidor é mais comum utilizar o *market data* nativo dos mercados em que atuam, não se valendo de uma fita consolidada. Em adição, esses investidores enviam ofertas que constantemente alteram o preço no topo do livro, causando o efeito de *flickering quotes* entre os mercados, ou seja: do momento em que o investidor recebe a fita consolidada, até o recebimento da oferta, esse preço pode não mais estar disponível.

Os fatores acima relacionados devem impactar nas políticas de *best execution* a serem adotadas pelos intermediários, na medida em que afetam a certeza quanto à execução de ordens.

Parte II

Temas relacionados à estrutura da autorregulação das entidades administradoras de mercados organizados

(i) Quais seriam os aspectos positivos ou negativos da estrutura atual de autorregulação, em existindo diversas bolsas concorrentes?

Pontos Positivos

A atividade de autorregulação tem por finalidade assegurar a higidez e o funcionamento eficiente dos mercados organizados, destinando-se a coibir práticas não equitativas ou fraudulentas que afetam negativamente sua credibilidade e minam a confiança do investidor. A adequada supervisão dos mercados organizados de modo a assegurar seu funcionamento eficiente é um de seus atributos essenciais, constituindo-se como elemento fundamental para sua subsistência.

Conforme reconhecido pela IOSCO, a autorregulação é um instrumento eficaz de supervisão de uma atividade complexa, dinâmica e sujeita a constantes mudanças, constituindo-se como um elemento valioso para que os órgãos reguladores do mercado de capitais possam atingir seus objetivos, em especial no que se refere à preservação de práticas saudáveis de negociação em mercados organizados[13].

Por ser submetida a regime jurídico privado, a autorregulação apresenta maior flexibilidade e agilidade para tratar questões estruturais, como, por exemplo, suprir necessidades de contratação e aprimoramento tecnológico, necessários para o aperfeiçoamento da supervisão e fiscalização dos participantes do mercado.

[13] *In* "Report of the SRO Consultative Committee", p. 1, disponível em http://www.iosco.org/library/pubdocs/pdf /IOSCOPD110.pdf.

A estrutura atual da atividade de autorregulação, assim como definida na Instrução CVM nº 461[14], tem apresentado benefícios palpáveis, que podem ser atribuídos em grande medida à adequada estrutura de governança instituída pela CVM para conferir atribuições claras ao Conselho de Supervisão, ao Diretor e ao Departamento de Autorregulação.

Acreditamos que o modelo de autorregulação instituído pela Instrução CVM 461 permite um tratamento adequado dos conflitos de interesse inerentes ao exercício dessa atividade[15], criando condições propícias para o desenvolvimento eficiente da função de autorregulação, caracterizada por sua maior agilidade e expertise na avaliação das questões relativas ao funcionamento dos mercados organizados.

Cumpre destacar, do modelo vigente, a independência assegurada ao Conselho de Supervisão e ao Diretor de Autorregulação, sem prejuízo de seus deveres de prestação de contas ao Conselho de Administração da entidade administradora, formada por uma maioria de membros independentes. Trata-se de modelo de regulação inspirado nas recomendações da IOSCO a respeito de como lidar com os conflitos de interesse em bolsas, especialmente em virtude do processo de desmutualização[16], que vem comprovando sua eficácia desde a edição da Instrução CVM 461.

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[14] Nos termos do art. 36 da Instrução CVM 461, a autorregulação consiste na supervisão das operações cursadas nos mercados organizados de valores mobiliários, das pessoas autorizadas a neles operar, bem como das atividades de organização e acompanhamento de mercado desenvolvidas pela própria entidade administradora.

[15] Conforme descrito no Edital de Audiência Pública da proposta de normativo que resultou na Instrução CVM nº 461/07, a CVM buscou "construir uma estrutura orgânica que preservasse as funções de auto-regulação e fiscalização das pressões do cotidiano das Entidades Administradoras, provenham elas dos próprios sócios, no caso das estruturas mutualizadas, ou, no caso das estruturas desmutualizadas, dos interesses comerciais de curto prazo dos acionistas e administradores. A norma procura deixar esta idéia clara listando as atribuições inseridas na competência de cada órgão e explicitando que as atividades de auto-regulação competem exclusivamente aos órgãos de auto-regulação, vedada a atribuição de funções de fiscalização e de supervisão ao Conselho de Administração e ao Diretor-Geral, exceto nas hipóteses a seguir descritas (§2º, art. 19)".

[16] Cf. Relatório do Comitê Técnico da IOSCO: "*Regulatory Issues arising from exchange Evolution*", disponível em http://www.cnmv.es/publicaciones/IOSCOPD225.pdf.

Especificamente no caso da BM&FBOVESPA Supervisão de Mercados – BSM, criada em agosto de 2007, a adequação do modelo em vigor permitiu o pleno desenvolvimento de suas atividades, fruto de investimentos da ordem de R$ 140 milhões, aproximadamente. Desde sua constituição, a BSM realizou 896 auditorias em participantes e 1.162 auditorias em Agentes Autônomos de Investimentos; emitiu 463 relatórios de supervisão de mercado; instaurou 146 Processos Sancionadores, tendo celebrado 76 termos de compromisso e enviado 1.342 cartas de recomendação e de censura aos participantes dos mercados administrados pela BM&FBOVESPA.

Apoiados nos histórico de desempenho da BSM e na percepção geral acerca do funcionamento hígido dos mercados administrados pela BM&FBOVESPA que acreditamos existir, somos da opinião de que o modelo atual de autorregulação, exercida por um Departamento de Autorregulação vinculado à entidade administradora, tem se provado como instrumento eficiente para garantir a integridade do mercado.

Pontos Negativos

Na hipótese de existir mais de uma bolsa, o atual modelo de autorregulação – de acordo com o qual cada entidade administradora de mercados organizados deverá constituir seu próprio Departamento de Autorregulação – poderá dar ensejo a potenciais conflitos na interpretação e aplicação das diferentes regras de mercado, podendo os Departamentos de Autorregulação de cada entidade administradora adotar diferentes níveis de tolerância com irregularidades de uma mesma natureza, gerando assim um processo de arbitragem regulatória.

As diferentes abordagens que os Departamentos de Autorregulação podem adotar diante de fatos similares pode gerar ineficiência no processo de *compliance* das pessoas autorizadas a operar, elevando assim os custos de observância para os intermediários.

A existência de diversos mercados organizados pode resultar no surgimento de "pontos cegos" para os Departamentos de Autorregulação, que não possuirão uma visão completa da atividade dos participantes do mercado em todos os ambientes de negociação, ensejando o risco de manipulação e de outras práticas ilícitas serem

conduzidas por meio de múltiplos mercados. Nesse contexto, certas funções que podem ser exercidas pelo Departamento de Autorregulação quando há somente um único mercado organizado poderão ter de ser exercidas pelo órgão regulador diretamente no contexto de um mercado fragmentado.

(ii) Considerando a hipótese de diversas bolsas concorrentes, a estrutura atual de autorregulação seria adequada?
(iii) Caso a resposta seja afirmativa: apresente razões, considerando as preocupações mencionadas anteriormente. Considerando a hipótese de várias bolsas, a constituição de múltiplos departamentos de autorregulação afetaria as suas atividades? Como?

À luz das considerações acima, entendemos que o modelo de autorregulação instituído pela Instrução CVM 461 tem se mostrado eficiente para preservar a integridade e credibilidade dos mercados organizados, em virtude da existência de incentivos econômicos e reputacionais da entidade administradora em manter uma estrutura adequada para realizar a tarefa de supervisão de seus mercados, bem como daqueles que neles atuam (emissores de valores mobiliários, intermediários e demais pessoas autorizadas a operar). Esses incentivos se traduzem na necessidade de se preservar a integridade do mercado como pré-condição da atividade empresarial desenvolvida pelas bolsas, sem o qual essa atividade não se mostra viável.

Caberá à CVM sopesar os aspectos positivos do atual modelo em comparação com potenciais aspectos negativos acima descritos ao decidir sobre a pertinência de se alterar o modelo de autorregulação vigente.

Tendo em consideração, porém, a importância de zelar pelo bom funcionamento de seus mercados, a BM&FBOVESPA manterá, em qualquer hipótese, estrutura própria com o objetivo de analisar as operações cursadas nos seus mercados, com a finalidade de se assegurar de sua higidez e integridade, em benefício dos investidores que neles atuam[17].

[17] Conforme destacado no relatório da Aité Group na análise da estrutura do mercado europeu, "most European exchanges, even without an official SRO status, continue to provide limited supervisory functions related to their markets. For example, exchanges will share the role of market surveillance to

(iv) Considerando o ambiente de múltiplos mercados, quais seriam os pontos mais relevantes que necessitariam de atuação integrada entre os autorreguladores, bem como entre os departamentos de autorregulação?

De modo a evitar que se instaure um processo de arbitragem regulatória que conduza a práticas que possam colocar em risco o bom funcionamento do mercado, entendemos que será necessário que a CVM acompanhe com atenção e incentive uma harmonização das regras de mercado, tais como (i) regras sobre procedimentos especiais de bolsa (e.g., leilão, *circuit breakers*, etc.); (ii) regras sobre suspensão de negociação de valores mobiliários; (iii) critérios de definição de preços de ajuste de contratos futuros, dentre outros aspectos nucleares do funcionamento dos mercados organizados.

(v) Como a autorregulação de cada entidade do mercado poderia se organizar conjuntamente, de forma a continuar exercendo o papel de auxiliar da CVM na supervisão do mercado como um todo?

As entidades de autorregulação poderão estabelecer mecanismos de coordenação para a harmonização da regulamentação e supervisão de mercados com a coordenação da CVM, possibilitando o intercâmbio de informações e a coordenação de esforços em auditorias periódicas. Referidas entidades poderão estabelecer convênios para cooperação mútua, estabelecendo, dentre outras medidas, o compromisso de harmonizar seus planos de trabalho anuais, tanto no que se refere à definição de seu conteúdo como em relação a sua forma de execução. Referidos convênios devem contemplar igualmente o compromisso dos Departamentos de Autorregulação no sentido de buscar uma padronização de suas interpretações sobre regras de mercado, para evitar arbitragem regulatória e aumento de custo de observância para os participantes ligados a mais de uma bolsa.

A CVM deverá necessariamente supervisionar a execução dos compromissos firmados em tais convênios, assegurando a efetiva cooperação entre os departamentos de autorregulação.

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identify potential trade abuse but will typically defer to the regulator to take the lead role in the actual investigation" (p. 60).

(vi) Caso a resposta seja negativa, qual seria a estrutura mais adequada? Fundamente a resposta. No caso de indicar a centralização de algumas atividades hoje sob um único autorregulador, que salvaguardas precisariam ser consideradas? A estrutura proposta implicaria custos adicionais para a sua atividade? A organização da estrutura proposta implicaria em que tipos custos de implantação e manutenção? Como eles deveriam e poderiam ser financiados?

Não aplicável, em virtude da resposta à questão anterior.

(vii) Fornecer quaisquer comentários adicionais sobre estrutura de autorregulação que julgar relevantes.

Não possuímos comentários adicionais.

Aitë PARTNER. ADVISOR. CATALYST.

Market Fragmentation and Its Impact: a Historical Analysis of Market Structure Evolution in the United States, Europe, Australia, and Canada

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Market Fragmentation and Its Impact, commissioned by BM&F Bovespa and produced by Aite Group, examines the effects of market fragmentation on four specific financial centers: the United States, Europe, Australia, and Canada. The study takes a historical perspective of market fragmentation and evaluates how each market navigated through structural transformation, implemented specific market practices, and addressed certain regulatory issues during the last few years in attempts to ensure investor confidence and market transparency.

Highlights of the study include the following:

- While market fragmentation has occurred across many different markets to date, the overall impact of fragmentation on each market has varied depending on existing market size, regulation, infrastructure, post-trade environment, and the legacy of pre-fragmentation market structure.
- Market fragmentation has certainly led to a decline in explicit transaction costs and has encouraged market innovation, but it has also generated negative unintended consequences that have seriously threatened market stability and investor confidence.
- In the **U.S. equities market**, where market structure changes unfolded during a period of over 10 years, market fragmentation was accommodated by several key market infrastructure components that were already in place: a centralized clearing and settlement function, market competition amongst exchanges, and a well-defined business and technology process involving the concept of consolidated tape. This experience was unique amongst markets.
- Despite the fact that MiFID was implemented in 2007, market fragmentation in **Europe** is still not as evolved or stabilized as we have been able to observe in other markets, such as in Canada. Besides basic differences in size and simplicity, we can identify some other characteristics that have not been conducive to the success of the fragmented European market's path to maturity:
    - Regulatory changes are still ongoing at the pan-European level. No finality is imminent, and any potential compromise is difficult to predict.
    - Lack of consolidated tape and fragmentation in clearing and settlement has discouraged interest from new entrants, thus dampening the prospects for further market fragmentation.
    - While the market is clearly fragmented at the pan-European level, when analyzing individual major markets within Europe, it is clear that each incumbent exchange still has a strong presence in defending its domestic market. The only real competitor is BATS Chi-X, making most individual markets look like a duopoly.
- The **Australian market** is the most recent financial center to experience the process of market fragmentation. Australian market size and liquidity are small (but not tiny)

relative to the other markets included in this study, a characteristic which prompts debates regarding the fortuitousness of introducing a competitive structure considering the additional cost burden of multi-market surveillance, which is ultimately passed on to market participants. After regulatory expenditures upwards of A$42 million, the new Australian market structure has resulted in market share of 12% to 17% for Chi-X Australia. Members of Australia's sizeable institutional community are better positioned to absorb the additional regulatory and connectivity costs associated with fragmentation than are the country's smaller domestic participants.

- The **Canadian market structure** transition that occurred over the last five years, at an arguably accelerated pace, was driven by leading Canadian banks desiring to pressure the incumbent market center to moderate its prices, as well as improve technology and customer service. After recent round of consolidation, today's Canadian market looks like a duopoly represented by the TMX Group (and all of its different execution venues including Alpha Trading) and Chi-X.

The study also analyzes key implications of market fragmentation for four specific areas within each market:

- Best execution
- Connectivity and routing
- Consolidated tape
- Self-regulation and rule-making

BEST EXECUTION

The definition of best execution globally is broad, and leaves many aspects to interpretation. While price is always an important variable to consider, it is never the only factor. Other key components (besides price) that should be considered as part of a best execution analysis in the context of market fragmentation include:

- Speed of execution
- Fill rates of specific venues (i.e., likelihood of execution)
- Liquidity profile of symbol
- Size of transaction and average volume of given symbol
- Specific instructions from qualified clients
- Prevailing market conditions during period of execution
- Details on order routing decisions

While identifying violations of best execution principles might be challenging for the regulator, the burden of capturing the requisite data, and storing such data, to prove best execution clearly resides with the broker-dealer community for all of the markets analyzed. Additionally, as markets fragment, post-trade reporting requirements must be heightened to allow specific information surrounding routing decisions to be clearly formulated, thus providing a better environment for best execution in a fragmented environment.

Furthermore, delineation of best execution policies according to end-customer segment (retail vs. institutional) can be an important component of best execution theory, as investors' needs and requirements will understandably differ according to categorization. Typically, the burden of best execution for retail investors will be more restrictive, following the general theory that retail investors are less informed, on average, in comparison to institutional investors, and thus require greater regulatory protection.

Not surprisingly, complying with best execution obligations is often the leading driver for investment in IT infrastructure. Developments in connectivity, trading systems, compliance engines and routing has become an integral part of ensuring best execution – a reality that is applicable from the broker-dealer community to the exchanges. Rapid development in the adoption of execution algorithms and smart order routing technology can be viewed as a reasonable response to the challenge of mitigating operational risk in a fragmented marketplace.

CONNECTIVITY AND ROUTING

If best execution should be viewed as specific written policy and procedure, connectivity and routing represents the necessary plumbing and logic to fulfill the promise of best execution. Currently, there are ample providers of both connectivity and routing services, and these will continue to lower the price of entry into a fragmented marketplace assuming that these global vendors are able to move into new fragmented markets without artificial competitive barriers in the form of hidden taxation or unfair protection of local competitors.

Cost associated with connectivity is completely dependent on level of fragmentation within the specific marketplace as well as the strategic needs of broker-dealers to connect to every venue available. In the U.S. market, which is clearly the most fragmented market in the world, even for the largest brokers, it is pretty rare for them to connect to every single venue, simply because the costs of connecting with certain markets (i.e., those with minimal trading activity) would outweigh any benefits of actually maintaining that particular connection. As a result, a handful of small-broker-licensed routing services function as the order router for small market centers.

Overall, in the U.S. market, Tier-1 brokers typically spend well over US$1 million annually on connectivity, while Tier-2 brokers are burdened with approximately US$700,000. Tier-3 firms currently stand at around US$250,000. For a market like Brazil and Australia where significant market fragmentation is not expected due to its relative market size and trading activity, broker-dealer spending on connectivity is probably on the lower end of the spectrum at US$250,000.

SOR platforms play a pivotal role in fragmented markets, enabling both brokers and market centers to make sub-millisecond order routing decisions based on preset parameters, typically aligned with best execution obligation. Similar to other technology components, cost for SOR can

also vary widely, depending on the total number of routable venues (also on access to dark pools), ability to handle order types, latency levels, and complexity of data input and analysis.

On the higher end of the spectrum, SOR can cost approximately US$600,000 annually; on the lower end, it can go for a relatively affordable US$150,000. Average cost currently stands at US$300,000.

CONSOLIDATED MARKET DATA

Other than in the U.S. market and, to a lesser degree, the Canadian market, the provision of consolidated data has been wrongfully overlooked and can be viewed as one of the reasons for increased costs for operating in markets such as Europe. Lack of consolidated market data also adds unnecessary complication to compliance with best execution.

As market structures transform, it is vital for the marketplace to support a regulator-approved, single source information processor for consolidated market data to facilitate consistency and ensure validity of the data itself. This is precisely the approach the U.S. market took decades ago to guard against the fragmented side effect of fragmented market data. Competition amongst third-party vendors for dissemination of consolidated tape from the single source processor certainly occurs, which makes access to consolidated data more affordable. As a result, markets facing potential fragmentation should consider the following when dealing with potential for consolidated data:

- Single information processor should be designated by the regulator to ensure data validation and quality, following the lead of U.S. and Canadian markets
- Some form of data revenue sharing should be seriously considered for data contributors similar to the U.S. market
- Third-party vendors can actively participate in distributing data, with the potential for competing on the merits of speed, value added data, and also quality

SELF-REGULATION AND RULE-MAKING

The U.S. securities market is the most prominent marketplace for self-regulation and rule-making (i.e., the SRO model). There are many perceived benefits of the SRO model, including leveraging industry experts to self regulate, leading to fewer government-initiated directives and enabling government agencies with limited budgets to efficiently deal with complex market structure. However, given the numerous regulatory changes and ongoing upheaval related to fragmentation within the U.S. equities market during the last five years, one could also argue that the SRO model may not be the best industry benchmark for capital markets regulatory structure.

Indeed, while the U.S. market has fully embraced the SRO model, the rest of the world decidedly has not. Regulators in most non-U.S. markets have cited potential conflicts of interest for exchanges operating as an SRO. In those markets, exchanges remain active in terms of identifying potential compliance failures, but the investigation of and the ultimate disciplinary

action resulting from illegal activities resides firmly in the hands of the government regulators. The following factors also commonly appear in argument against the SRO model:

- Potential for regulatory arbitrage
- Incentives for loosening regulations
- Inherent conflict with members
- Potential growing conflict between SRO regulatory function and market operations
- Conflict with issuers
- Multiple SRO duplication
- Difficulty in harmonizing market surveillance

As markets morph from single- to multi-market structures and regulators are forced to adopt additional responsibilities in order to regulate different market centers, the overall cost of monitoring market activities will inevitably increase. A recent example from the Australian market is an appropriate one to examine, as the Australian regulator, Australian Securities and Investments Commission (ASIC), in expectation of marketplace competition, took over responsibility for supervision of real-time trading on domestic licensed markets in August 2010:

- Since August of 2010, ASIC's additional costs incurred as a result of the new regulatory functions necessitated by market fragmentation have exceeded A$42 million, which have been somewhat evenly split between the cost of implementing the policy to promote market competition and the transfer of supervision
- A significant portion of these expenditures were either directly or indirectly related to market surveillance needs
    - Costs directly related to the market surveillance function (including real-time surveillance) drove the largest portion of spending
    - Technology infrastructure represented the second largest expenditure, which includes continuing upgrades to ASIC's Integrated Market Surveillance System (IMSS), which was originally purchased from NASDAQ SMARTS in 2010

INTRODUCTION

The global capital markets have experienced a metamorphosis during the last 15 years. The advent of the Internet and adoption of other innovative technologies have facilitated an unprecedented level of transparency in exchange-traded markets and substantially lowered barriers to market entry. Along the way, electronic trading has become a competitive requirement for most major financial centers, and automation within the marketplace has created high levels of efficiency while eliminating many jobs that will likely never be recreated.

One of the most fascinating changes over the last decade has been the transformation of the exchange competitive landscape, often beginning with the process of demutualization, which essentially altered the composition of many exchanges at a molecular level. As these venues transformed themselves from member-owned (i.e., broker-dealers) industry utilities to profit-maximizing entities, they also found themselves increasingly coming into conflict with their former members.

Across geographies, market consolidation has become a persistent trend over the years, as large exchanges have scrambled to further expand regional presence and broaden support for different asset classes. Causation of this widespread consolidation movement can be attributed to a number of factors, but one has certainly been increased competition among trading venues in domestic markets, referred to as market fragmentation.

The wave of market fragmentation can be traced back to the late 1990's in the U.S. equities market, with NASDAQ as perhaps the most famous example. The initial impact of the emergence of little-known brokers dubbed electronic communication networks (ECNs), driven by regulatory changes in the United States, seemed—at best—fairly innocuous at the time. With names like Island, Strike, and BRUT, the seemingly inconsequential new market entrants faced the arduous task of convincing established Wall Street veterans to take them seriously.

Nevertheless, the launch of the ECNs ultimately signaled end of the old way of trading, triggering what has amounted to a complete transformation of market microstructure, not only in the U.S. market but in other major financial centers around the globe as well. In the U.S. market, the market share of incumbent exchanges disintegrated from over 90% of the market to less than 25% in the most extreme cases. While increased competition has conclusively led to a dramatic decline in explicit execution costs, it has also generated some unsavory and unintended consequences. In some cases, these inadvertent repercussions have elicited fundamental questions regarding the fairness and stability of the capital markets.

This study presents a historical evaluation of the market fragmentation that has occurred in four major markets: the United States, Europe, Australia, and Canada. The following sections will detail the overall market structure changes observed in each market and illuminate some of the key market impacts that have shaped the current market reality.

MARKET STRUCTURE EVOLUTION IN THE U.S.

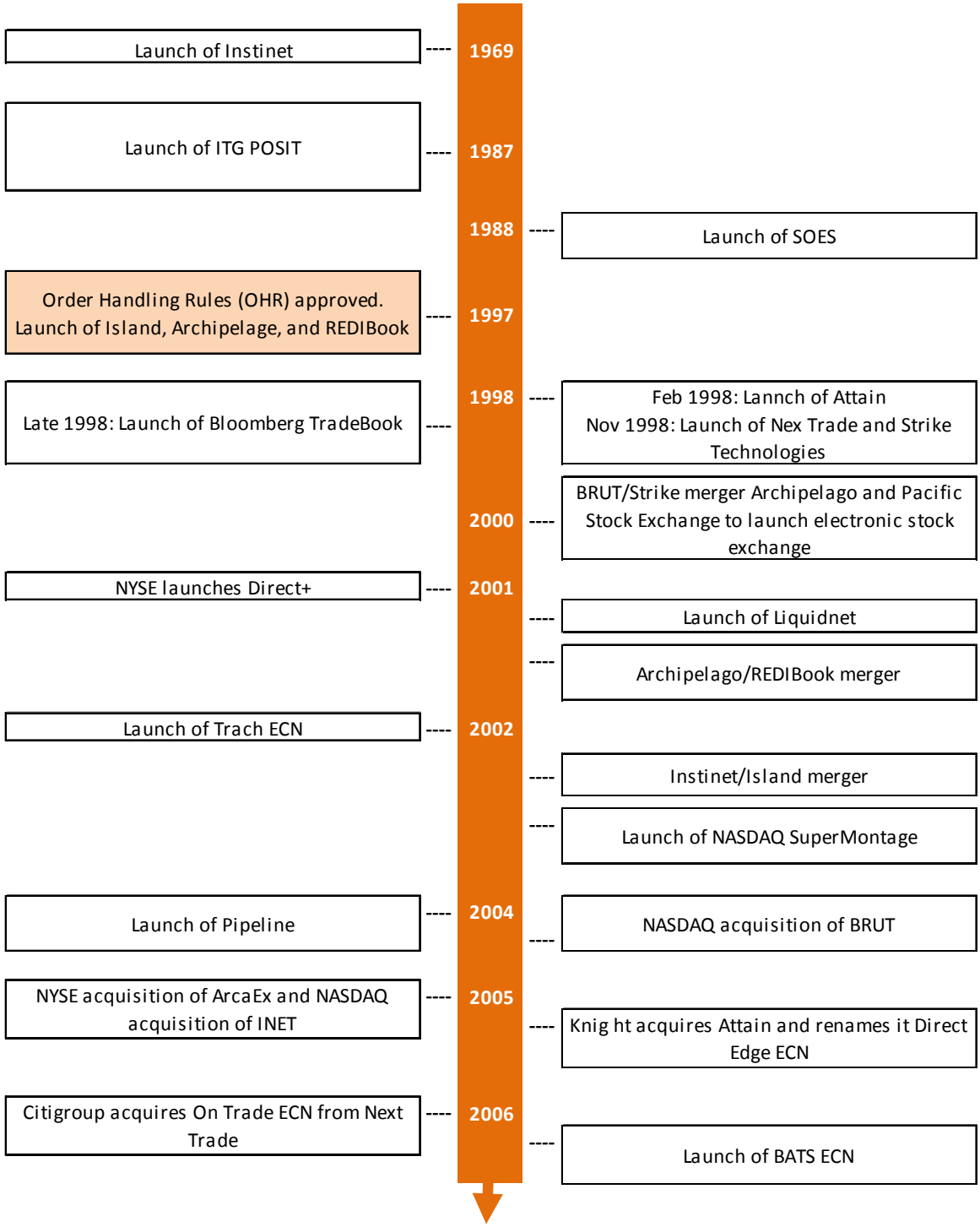
The U.S. equities market structure has undergone radical changes during the last 15 years. In the aftermath of the Order Handling Rules of 1997, competition has increased substantially and has led to the creation of various independent execution venues, including ECNs, alternative trading systems (ATSs), and dark pools. Initially, market fragmentation was limited to NASDAQ, as various viable execution venues materialized and proceeded to seriously threaten NASDAQ for execution revenue (Figure 1).

By 2002, however, a wave of consolidation was triggered by the merger of Archipelago and REDIBook, which was then owned by Goldman Sachs. Subsequently, the most significant ECN merger occurred when Instinet acquired Island (becoming INET), its chief competitor in the ECN market. NASDAQ embarked on a spending spree soon after the Instinet merger, determined to recapture its lost market share by acquiring BRUT. This consolidation trend peaked in 2005, during which the NYSE acquired ArcaEx and NASDAQ teamed up with INET, thereby creating a de facto duopoly in the U.S. equities market.

Just when the market was adapting to the concept of a more centralized marketplace, another wave of fragmentation swept the marketplace in the aftermath of Regulation NMS (typically referred to as Reg NMS), echoing 1997 events. Beginning in 2001, a number of ATSs appeared on the market landscape, endeavoring to meet the growing needs for block trading in the marketplace. Additionally, many large dealers, fearful of total dominance by the NYSE and NASDAQ, formed partnerships with buy-side firms in order to either support existing execution venues or to create new execution venues. Large bulge bracket firms also jumped into the fray more directly by launching or developing internal crossing engines, designed to take advantage of the massive order flow passing through broker trading desks.

By Q3 2006, the short wave of consolidation ended, and the U.S. equities market began to resemble the post-1997 state of the market, when market fragmentation appeared to gain momentum. This time, however, both the NYSE-listed and NASDAQ-listed securities were feeling the effects.

Figure 1: Key U.S. Market Events, Pre-Implementation of Regulation NMS



Source: Aite Group

MAJOR REGULATORY EVENTS IN THE U.S.

To many observers, the idea of a national market system in the U.S. market may appear to be something new rising out of the implementation of Regulation NMS in 2005. In fact, the concept is ingrained in the Securities Exchange Act of 1934 and has been behind much activity of the U.S. Securities and Exchange Commission (SEC) since 1975. In that year, the U.S. Congress amended the Securities Exchange Act to establish a framework for creating a national market system for equity securities. The framework was predicated upon the concept of market transparency (by way of quote and execution information), market center linkage, fairness, and efficiency. These underpinnings, Congress believed, would foster the development of a healthy, vibrant capital market—an essential foundation of a strong national economic structure. To facilitate the development of the national market structure, Congress expanded the powers of SEC.

The SEC focused on market structure development by encouraging the widespread use of evolving technology. Mandated to "facilitate" rather than "direct" the formation of a national market, the SEC relied on market participants to put forward collective plans on how to best implement a workable structure. Going was slow as agendas clashed in spite of SEC requests to act for the "greater good." Some 20 years later in the mid-1990s, the technological underpinnings of the market finally in place, the SEC took aggressive direct regulatory action designed to balance inherent inequities and remedy inefficiencies.

ORDER HANDLING RULES OF 1997

Our analysis begins with the SEC regulatory decisions of 1997, which sought to rein in widespread corruption and illegal order handling by NASADQ market-makers. The Order Handling Rules (OHR) of 1997 sought to create a more orderly market in which all market participants would have access to greater market transparency and improved execution rates. The OHR consists of two rules:

- **Limit Order Handling Rule (Rule 11Ac1-4):** This rule mandated that market-makers receiving limit orders inside their spread must handle these orders in one of three ways (the first two options effectively resulted in market-makers narrowing their spreads or reducing their profits):
    - Incorporate the price into their quote in NASDAQ quote montage
    - Execute the limit order immediately
    - Send the limit order to another market participant (other market-makers or ECNs) that will display the order
- **Quote Display Rule (Rule 11Ac1-1):** This rule banned market-makers from posting one quote in the NASDAQ quote montage and a different quote for the same stock in an alternative trading network. Under the same rule, however, dual quoting became permissible if the alternative trading network had a direct link to NASDAQ and had the capability to post its best bid and offer on the NASDAQ quote montage.

Collectively, these rules had a profound impact on both market structure and over-the-counter (OTC) securities trading. The Limit Order Handling Rule put client quotes on the same footing as market-maker quotes, while the Quote Display Rule in effect "sanctioned" ECNs as part of the

national market structure. And as a result, these two tenets of the OHR ensured that ECNs would thrive in the NASDAQ market. ECNs became the main outlet for unwanted limit orders from market-makers. Large buy-side firms became attracted to ECNs because of their ability to execute orders anonymously and to minimize market impact. For all market participants, the rapid, automatic matching capability of the ECNs substantially lowered transaction fees, which directly translated into substantial cost savings.

REGULATION ALTERNATIVE TRADING SYSTEM OF 1999

ECNs were proprietary systems beyond the scope of regulatory oversight at the time the OHR were implemented. The near-immediate proliferation of ECNs following the effective date of the OHR alerted the SEC to the growing number of execution venues not subject to regulation. To remedy the regulatory framework and better reflect the needs of the evolving market, the SEC implemented the Regulation Alternative Trading System (ATS) in 1999.

Regulation ATS set forth the definition of an alternative trading system and specified various operating requirements. Key elements include:

- **Registration as a Broker-Dealer (Rule 301b-1):** All ATSs were required to register as broker-dealers.
- **The "5% Rule" (Rule 301b-3):** ATSs registering as broker-dealers, displaying quotes to subscribers, and trading in excess of 5% of the average daily volume (ADV) of a national market stock in four of the preceding six months were required to submit quotes to a national securities exchange or the National Association of Securities Dealers (NASD, the current FINRA) for distribution to market data vendors (i.e., wide public dissemination). Broker-dealers with access to the exchange or NASDAQ had to be able to transact against those quotes.
- **The "Fair Access" Rule (Rule 301b-5):** ATSs registering as broker-dealers, displaying quotes to subscribers, and trading in excess of 5% of the ADV of a national market stock in four of the preceding six months were required to establish written standards that did not unreasonably prohibit access to the ATS.

Interestingly, the unstated alternative to broker-dealer registration under Rule 301b-1 was to apply to the SEC for exchange status. Of the nine ECNs in existence at the time of Regulation ATS implementation, three filed for exchange status. The benefits of exchange status over broker-dealer registration were twofold: As a self-regulatory organization (SRO), market centers had a broader ability to control some aspects of their trading operations; furthermore, as exchanges, these market centers would be able to join the Intermarket Trading System (ITS), which would provide them access to greater listed securities business. (At the time of Regulation ATS implementation, approximately two-thirds of listed securities volume was subject to stringent exchange rules that significantly restricted off-exchange trading, thereby providing exchanges with a distinct advantage in this business.)

A second interesting point, only ATSs that displayed quotes were subject to Rule 301b-5, the Fair Access Rule. Anonymous matching systems and crossing networks, which did not display quotes,

were specifically exempted from the fair access requirement if that venue executed in excess of 5% ADV as specified in the regulation.

REGULATION NATIONAL MARKET SYSTEM (REG NMS) 0F 2005

Regulation NMS, first proposed in February 2004, took another weird turn when the SEC released a radically revamped version around Christmas 2005. Instead of retelling the story of the different versions, this section will focus on the content of the final proposal.

The SEC has traditionally walked a fine line between pushing for an integrated national market system and encouraging competition. The SEC is certainly not an insulated regulatory agency devoid of outside influences. On the contrary, the SEC is a political animal, highly influenced by external forces. Arguably a very conservative regulatory agency, the SEC, more often than not, errs on the side of minimum regulatory intrusion. As a result, despite its long desire for a more consolidated national market, it has thus far erred on the side of using competitive forces to push the national market system forward.

At least that was the case until early 2004, when the SEC came out with its proposed Regulation NMS, designed to create a more integrated market system. The SEC's main argument for Reg NMS can be summed up by the following considerations:

- **Protection of individual investors**: One unifying theme of the SEC has been its focus on protecting the interests of individual investors. This type of thinking went to the heart of the most controversial area of Reg NMS: the Trade-Through Rule (aka Order Protection Rule). This rule, in essence, took a very narrow view of what best possible execution should be by focusing on best price. While this may be beneficial for the individual investors in general, some of the largest institutional investors argued otherwise.
- **Recognition of available technology and the need to change ITS**: The viability of the outdated ITS, which began operations in 1979, had been the subject of debate for over a decade. Finally, the SEC decided that given the availability of cost-effective connectivity solutions provided by third-party technology providers, it was no longer necessary to operate an artificial national market system based on outdated IT infrastructure.
- **Leveling the playing field in terms of regulation**: With the existence of multitudes of execution venues, the SEC opted to create an overarching national regulation that can dictate the way the entire national market system will behave instead of singling out specific stock exchanges.

In the end, the SEC wanted a set of rules that can be applied uniformly across all U.S. equities market centers to improve market transparency and to guarantee fair access for individual investors. The core of Reg NMS is composed of four key rules:

- **Trade-Through Rule (Rule 611):** The basic idea of the Trade-Through Rule (aka Order Protection Rule) was to protect limit orders of investors by forbidding a particular market center from trading through another market with a better price and executing the order at an inferior price. The Trade-Through Rule within the ITS plan

had existed for many years, although only within the exchange-listed stocks and with little enforcement. Under the new Trade-Through Rule, order protection extended to NASDAQ stocks as well as to block trading and small orders (i.e., so-called "100 share order"). In addition, faced with the reality of floor and electronic markets, the Trade-Through Rule would only protect automated quotes. There were built-in exceptions to the Trade-Through Rule, including intermarket sweep (enabling firms to simultaneously sweep multiple market centers at different price levels) and flickering quotes. The rule also required all market centers to develop and enforce policies and procedures to deter trade-throughs. Perhaps the most controversial part of the Trade-Through Rule was the two alternative versions the SEC proposed:

- **Top of book (TOB):** This first alternative (i.e., "Market BBO Alternative") would only protect the best bids and offers (BBOs), leaving the market requirement quite similar to the one that currently exists under the ITS plan.
- **Depth of book (DOB):** This second alternative (i.e., "Voluntary Depth Alternative") would protect the entire depth of book beyond the BBOs but only require market centers to display DOB on a voluntary basis. This was the virtual central limit order book (CLOB) alternative that caught most market participants off guard when it was introduced.

- **Access Rule (Rule 610):** This rule tackled a number of issues surrounding access to Reg NMS stock quotes. First, the Access Rule addressed the hotly debated ECN access fees by mandating that any market center can charge an access fee capped at US$0.003 per share. Second, the rule encouraged ITS/UTP members to use private links to connect to other members, thereby implicitly signaling the eventual phase-out of ITS. Third, the rule required market centers to develop and establish procedures to prevent locked or cross markets. Finally, the rule lowered the threshold of fair access as stipulated in Regulation ATS from 20% to 5% of the ADV of a given stock.

- **Market Data Rules and Plans (Rules 601 and 603):** These rules addressed market data availability issues and the need to link market data revenue and usefulness of data. First, these rules would enable market centers and their members to independently distribute market data, with or without fees, while still mandating market centers to report their best quotes and trades to their designated securities information processors (SIPs). Second, a new formula would be used to allocate market data revenue, taking into account the value of quotes and trades into the consolidated data stream. Finally, the rule proposed a new definition of "consolidated display" to only include data on national BBO (NBBO) and consolidated last sale information.

- **Sub-Penny Rule (Rule 612):** Considered to be the least controversial aspect of Reg NMS, this rule prohibited market participants from displaying and accepting quotes of NMS stocks in sub-penny increments, with an exception for those stocks priced below US$1.00 per share.

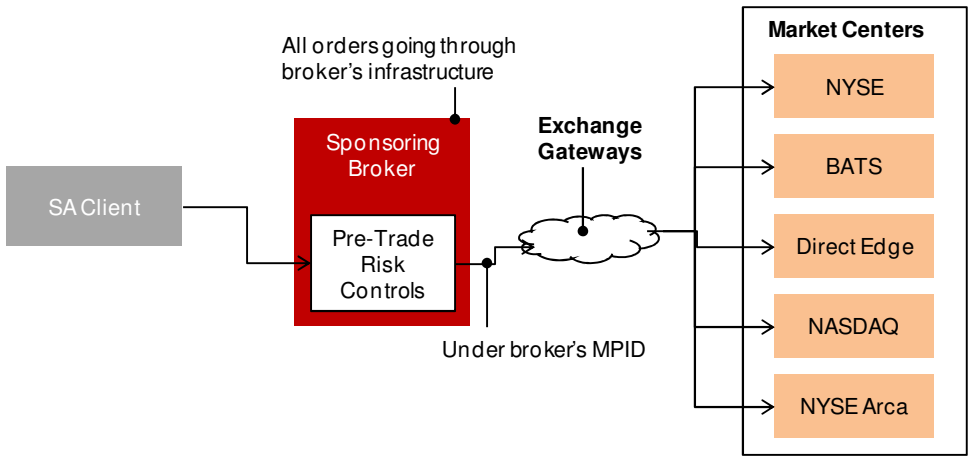
Combined, these four rules made up Reg NMS, which the SEC hoped would create a true national market system in which key rules could be applied uniformly across market centers and to ultimately protect the rights of individual investors.

MARKET ACCESS RULES (15C3-5)

One of the byproducts of market fragmentation has been the inability for a single market to keep track of levels of risk taken by individual firms in the overall marketplace. Prior to the credit crisis of 2008/2009, this was not a discernible issue, but the failures of Lehman and Bear Stearns highlighted the dangers of counterparty risk. On top of this, the continued growth of high frequency trading (HFT) and the perceived lack of regulatory oversight over their trading activities shed light on a type of market access activity called sponsored access.

The origin of sponsored access can be traced back to the practice of direct market access (DMA), in which a broker who is a member of an exchange provides its market participant identification (MPID) and exchange connectivity infrastructure to a customer interested in sending orders directly to the exchange. In this way, the broker has full control over the customer flow, including pre- and post-trade compliance and reporting. The DMA customer, in turn, gains direct access to major market centers (Figure 2).

Figure 2: Direct Market Access Work Flow



Source: Aite Group

While DMA can theoretically be considered part of a wider definition of sponsored access, for the purpose of this study, sponsored access is defined as a non-member entity (i.e., a sponsored participant) gaining direct access to market centers by using the MPID of a member broker-dealer (i.e., a sponsoring broker), leveraging access infrastructure not owned by the sponsoring broker.

There are potentially three types of sponsored participants in a sponsored access arrangement (Table A):

- Broker-dealer that is a member of market centers
- Non-member, registered broker-dealer
- Non-broker-dealer organization

Table A: Types of Sponsored Access in the U.S.

Type of Participant	Motivations for Participation
Member broker-dealer	- Lower execution costs by piggybacking off a member broker-dealer's volume discounts - Higher rebates
Non-member broker-dealer	- Lower execution costs by piggybacking off a member broker-dealer's volume discounts - Gain direct access to market - New revenue source for attracting customers looking for direct market access - Higher rebates - Anonymity
Non-broker-dealer entity	- Lower execution costs by piggybacking off a member broker-dealer's volume discounts - Gain direct access to market - Anonymity - Subject to less regulation and costs

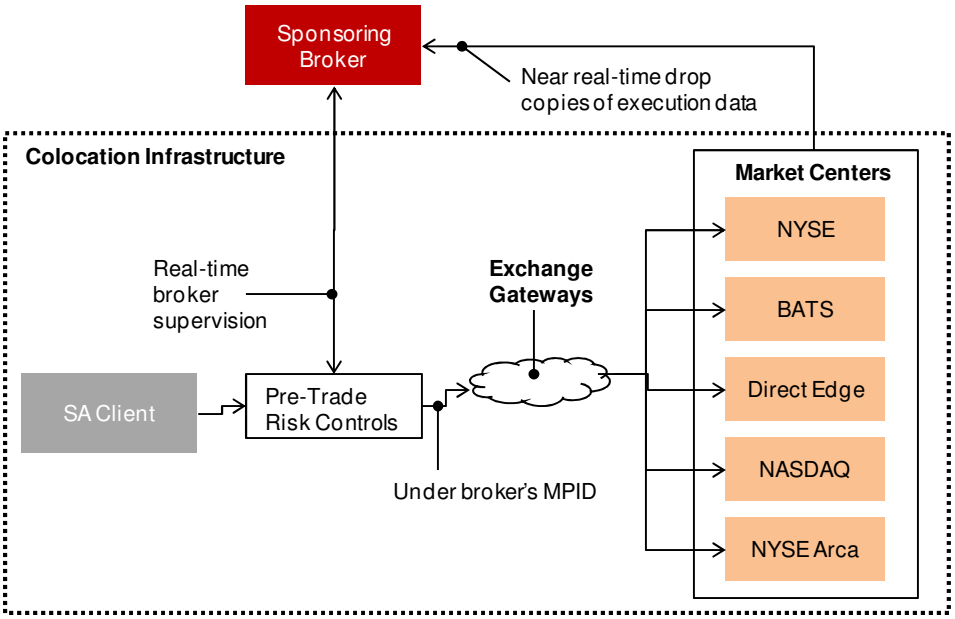
Source: Aite Group

Firms opt to go through a sponsored access arrangement for many different reasons. While reduction in latency is one of the factors, other, more basic reasons include additional revenue opportunities and hitting volume discounts.

Sponsored access models prevalent in the U.S. cash equities market can be divided into two specific types based on whether real-time risk checks exist at an account level:

- **Filtered sponsored access**: More conventional and widely accepted by bulge bracket firms and third-party vendors, this model allows the sponsored participant to gain direct access to market centers via a dedicated port provided by the sponsoring broker. Risk controls and connectivity are typically provided by the sponsoring broker's recommended third-party vendors or service bureaus. The sponsoring broker can set up and monitor pre-trade risk parameters, and, if necessary, remotely modify and/or shut down trading activities (Figure 3).

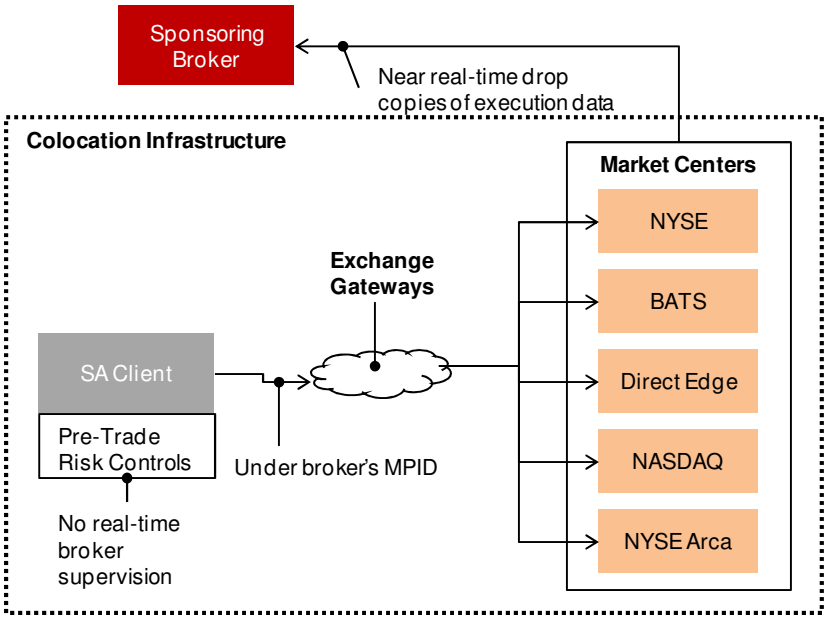
Figure 3: Filtered Sponsored Access Work Flow



Source: Aite Group

- **Unfiltered sponsored access (aka "naked" access):** Under this sponsored model, the sponsored participant gains direct access to market centers via a dedicated port provided by the sponsoring broker but lacks real-time pre-trade risk monitoring by the sponsoring broker. Instead, the sponsoring broker receives post-trade drop copies of each transaction, which may or may not be received in near-real-time and may or may not be used for any type of position risk management (Figure 4).

Figure 4: Unfiltered Sponsored Access Work Flow



Source: Aite Group

The term "filter" in this instance does not imply actually filtering orders for single-order quantity or price; it refers to the sponsoring broker's capability to provide real-time risk checks at an account level. In this scenario, real-time risk checks do not obtrusively filter but instead unobtrusively monitor the flow. Intervention is triggered only when a position limit has been breached.

Several key characteristics help define today's sponsored access business:

- Technology infrastructure that supports sponsored access is not provided by the sponsoring broker because its current systems are centralized. A robust colocation infrastructure is required in order to support today's HFT needs.
- Colocation increasingly plays a vital role in overall sponsored access relationships and is especially attractive for market centers looking to gain additional order flow and revenue sources.
- Conceptually, a tri-party relationship exists between the market center, sponsoring broker, and sponsored participant, all through contractual agreements.
- The ultimate legal, financial, and reputational risk of managing a sponsored access arrangement lies with the sponsoring broker.

Each sponsoring broker must perform due diligence on prospective customers looking for sponsored access; however, there is no standard, industry-accepted checklist for sponsoring brokers. Three potential types of pre-trade risks are involved in sponsored access, outlined in Table B and below:

Table B: Type of Pre-Trade Risk Checks in the U.S.

Type	By Exchange Port	Order Across Venues	By Sponsored Account	Ability of Sponsor to Stop Participant Order Flow
Market Center	Single	No	No	No
Third Party/Broker	Across ports	Yes	Yes	Yes
Fund Risk Checks	Across ports	Yes	Yes	No

Source: Aite Group

- Market center-provided, port-level, pre-trade risk controls that check for order-level restrictions vary depending on the venue and feature different latency levels. The main weakness of this approach is its being completely siloed into one particular venue. As such, it lacks the ability to check across venues and by account.
- Lack of sponsoring broker-provided, pre-trade risk controls does not automatically mean that sponsored participants lack their own sophisticated pre-trade risk filters. In fact, some of the sponsored participants are sophisticated proprietary trading firms with broker-dealer licenses. Despite this, the sponsoring broker does not ultimately have the ability to control the sponsored participant's order flow in real-time.
- The third-party with broker supported pre-trade risk model tries to bridge the strengths of the first two pre-trade risk approaches, enabling checks across venues and by account. It also provides the flexibility to monitor and change the sponsored participant's order flow in real-time if necessary.

Sponsored access has many benefits to be gained by the parties involved:

- For HFT traders with robust risk management capabilities, it enables dramatically faster access to market centers.
- Benefiting from volume aggregations services from the likes of Wedbush, Penson, Fortis, and Newedge, small to midsize brokers can now compete on a level playing field with larger brokers. This allows them to hit the maximum volume tiers and capture attractive pricing points across EDGX, NASDAQ, and NYSE Arca.
- From an additional-revenue perspective, revenue-sharing arrangements between sponsoring brokers and sponsored participants that are also registered brokers can be beneficial for both parties involved.
- Exchanges benefit from additional liquidity into their venues to boost volume and revenue. In addition, market centers operating their own data centers can expect additional revenue from value-added services such as colocation.

Sponsored access, on the other hand, has specific risks and challenges for participating parties as well as for the market overall.

- Supporting non-filtered sponsored access can lead to sponsored participants taking unacceptable levels of risk, which can cause both great financial burden and reputational damage to the sponsoring broker.
- In order to support non-filtered sponsored access, sponsoring brokers must develop strong risk management and due diligence teams capable of handling sponsored participants' credit and operational risk.
- Broker-to-broker sponsored access can lead to a situation in which the sponsoring broker loses track of the activities of the sponsored broker's customer.
- Providing filtered sponsored access often leads to a higher pricing point for sponsored participants, resulting in favorable competitive conditions for those brokers offering unfiltered sponsored access.
- While the potential is slim, there is a chance that a rogue sponsored participant can increase overall systemic risk.

Following the May 6, 2010 market anomaly known as the "flash crash," the U.S. SEC faced inordinate pressure to regulate out the possibility of another event of this type. It took a substantial amount of time to research and identify the appropriate cause of the flash crash, but the SEC determined at the outset that mandatory pre-trade risk checks seemed a safe bet for reducing risk across the market. Based upon this assumption, Rule 15c3-5—the "Market Access Rule"—was finalized and went into effect on July 14, 2011, essentially banning unfiltered sponsored market access.

CONSOLIDATED AUDIT TRAIL (CATS)

Passed by the SEC in July 2012, CATS requires exchanges (SROs) and the Financial Industry Regulatory Authority (FINRA) to establish a market-wide consolidated audit trail that must collect and accurately identify every order, cancellation, modification, and trade execution for all exchange-listed equities and equity options across all U.S. markets. In addition, all exchanges, members of exchanges (broker-dealers), and customers of those broker-dealers will be assigned unique cross-market identifiers that will be associated with every order. CATS is in its very early stages of implementation, especially from compliance infrastructure and reporting perspective.

SPREAD OF MARKET FRAGMENTATION IN THE U.S.

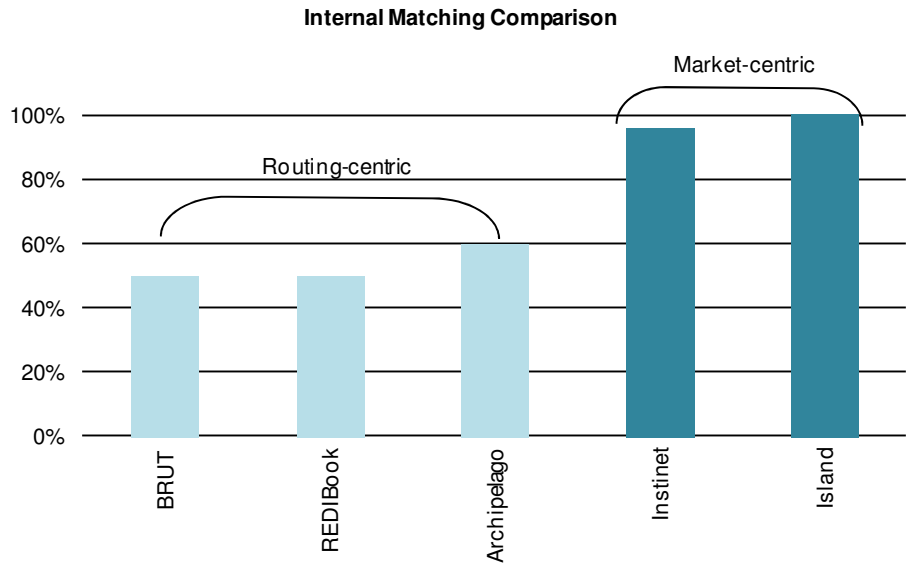
With the basic regulations enabling competition based on electronic trading in place, the U.S. equities market has experienced massive levels of fragmentation over the last 15 years, more pronounced than any other financial center globally, with over 40 execution venues that consist of regulated exchanges, ECNs, lit ATSs, and dark pools. The fragmentation of the market can be viewed in two separate stages.

MARKET FRAGMENTATION, PHASE I: 1997 TO 2005

One of the most important events of the last decade in the U.S. equities market has been the introduction and evolution of ECNs. Prior to the OHR of 1997, the only ECN-like platform with notable liquidity was Instinet. Instinet began its operations in 1969, nearly three decades before the creation of the first NASDAQ ECNs.

As a category, ECNs are a fully electronic subset of ATSs that automatically and anonymously match orders based on price-time priority. ECNs function as an execution venue similar to exchanges, but from a regulatory perspective, they are broker-dealers. Unlike other agency broker-dealers, ECNs were allowed to post their BBO on the NASDAQ quote montage. In this way, ECNs were able to participate in NASDAQ and compete head-to-head against other market participants for order flow. (The term "ECN" only applied to those private networks that were recognized as such under the SEC's ECN Display Alternative Rule.) At the height of their existence, ECNs exhibited two very distinct business models (Figure 5):

Figure 5: Market-Centric vs. Routing-Centric ECNs



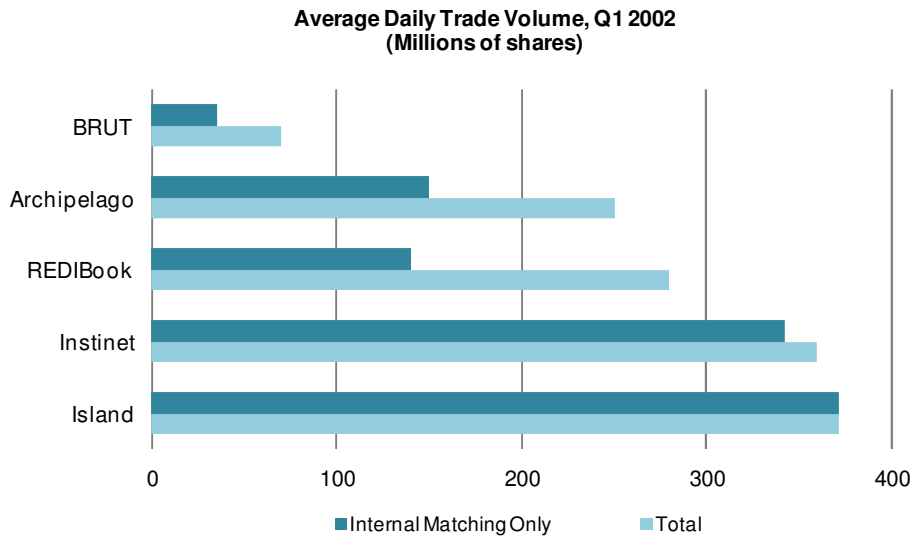
Source: ECNs

- **Market-centric**: Initially, only Instinet and Island truly represented this model, under which most orders that entered their trading systems were matched internally and were rarely routed out of their platforms to other execution venues. In general, those using Instinet and Island were more concerned about speed of execution than with execution price.
- **Routing-centric**: The remaining ECNs followed the best-execution-centric model dictated by the reality of a lack of internal liquidity. These ECNs (e.g., Archipelago, REDIBook, BRUT, etc.) would look to match orders internally first and then, using smart order routing (SOR) technologies, would route the unmatched orders to

various execution venues with the best price. Not surprisingly, the best price often took precedence over speed of execution under this model.

In Q1 2002, only Instinet and Island could claim to be true execution venues with high levels of internal liquidity. Other ECNs used a hybrid model of order execution and order routing. Some focused more on order routing than others —again driven by the reality of a lack of internal liquidity (Figure 6).

Figure 6: ADV of Leading ECNs and Internal Matching Rates

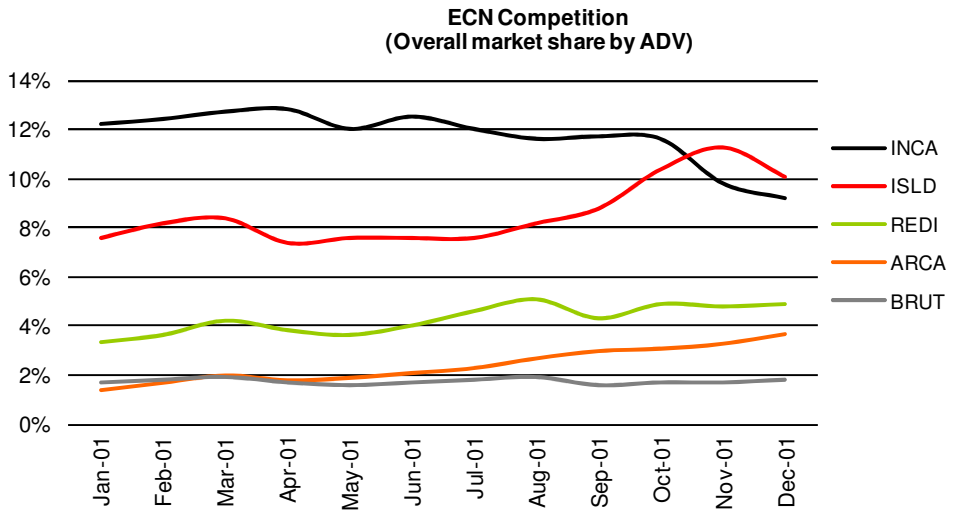


Source: ECNs

In the end, the one true value proposition of an ECN was its ability to match orders internally, based on a high level of liquidity. Although order routing was a value-added service, it increasingly become marginalized as the popularity of direct market access providers (i.e., aggregators), such as Lava Trading, continued to increase.

In terms of direct ECN-to-ECN competition, the initial spotlight was on Island and Instinet. Over the years of competition, Instinet continued to rely on order flow from its traditional client base of institutional traders and market-makers. Island, on the other hand, focused on the underserved but rapidly growing client segments of hedge funds, proprietary trading desks, program trading desks, and retail flow. Instinet did not succumb to the commission compression that was impacting all of the other ECNs until it started losing market share to Island in 2001. Finally, by the end of 2001, Island became the largest ECN on NASDAQ (Figure 7). In order to remain competitive, Instinet in June 2002 did the only thing it could: acquire Island for more than US$500 million in cash.

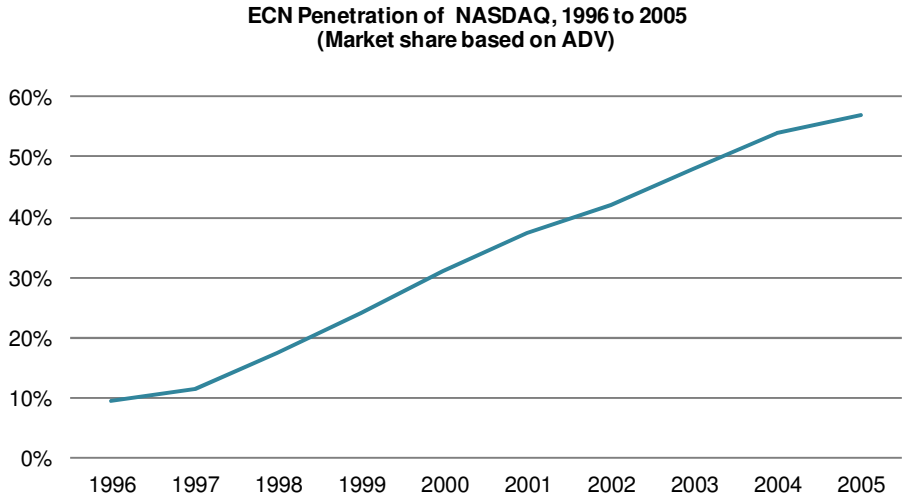
Figure 7: ECN Competition



Source: ECNs

Overall, ECNs made tremendous progress in penetrating NASDAQ and accounted for approximately 57% of the market share within NASDAQ by the end of 2005 (Figure 8). NASDAQ was then at a crossroads, and something drastic had to be done for it to retain its leadership position in the U.S. equities execution market. In the end, NASDAQ had to resort to an aggressive acquisition program.

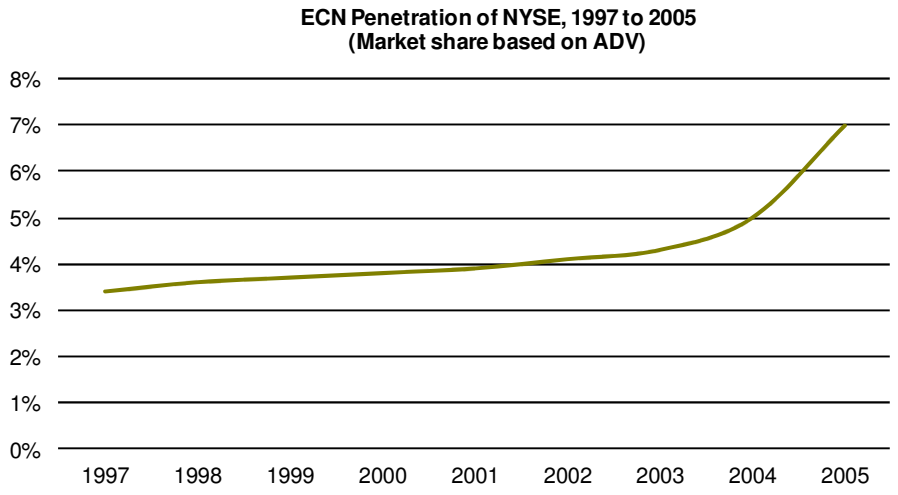
Figure 8: Market Share of ECNs on NASDAQ



Source: ECNs, NASDAQ

On the other hand, ECN penetration of the listed market had been disappointing at best. The most notable exception had been the trading of exchange-traded funds (ETFs), which originally started at the American Stock Exchange (AMEX). Overall, however, ECNs' foray into the listed market failed to produce any significant gains. Examining the NYSE market alone, ECNs accounted for approximately 5% of the NYSE trade share volume at the end of 2004. By the end of 2005, however, much progress had been made by the combination of INET, BRUT (with its free DOT program), Bloomberg TradeBook, and ArcaEx to gain a foothold into the NYSE. The fact that the competition had been opened up as a result of impending Reg NMS in the electronic trading market also played an important role in making some of the ECNs viable alternatives to trading NYSE stocks. By the end of 2005, the ECN market share of the NYSE reached 7% (Figure 9).

Figure 9: Market Share of ECNs in NYSE



Source: ECNs, NYSE

Overall, NYSE had been experiencing losses in market share in NYSE-listed trading since 2000, when its market share stood at well above 80%. By January 2006, that market share had plummeted to 71.7%. Competitive pressures continued to increase, not only from ECNs but also from other exchanges (most notably NASDAQ) and ATSs that specialized in block trading. Regulatory pressure from Reg NMS and customer demand also mounted, forcing the NYSE to initiate a hybrid market strategy. At the same time, the NYSE looked to take a bold step toward the electronic market by quietly seeking out a potential partner.

BRIEF PERIOD OF MARKET CONSOLIDATION: 2006

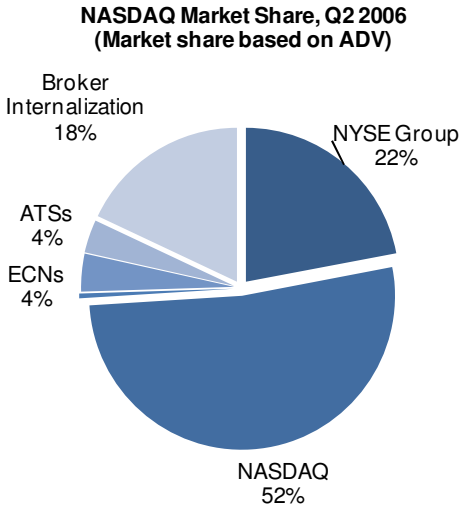
NASDAQ began the process of reclaiming its market share in the NASDAQ market in 2004, when it acquired BRUT. Subsequently, in early 2005, months of rumors ended in two blockbuster mergers. The NYSE was the first to break the somewhat shocking news that it had joined forces with ArcaEx. That news was followed by the confirmation that NASDAQ had acquired INET (which market players had assumed for months). The end result of all these acquisitions and

mergers was that all of the large ECNs disappeared in a matter of months, leaving the ECN market littered with smaller players. Perhaps more importantly, in only a matter of months, years of market fragmentation appeared to be coming to an end as the NYSE and NASDAQ forcefully moved back to the top of the execution market and created a de facto duopoly.

The future of the remaining ECNs looked quite bleak, and the future of the largely manual regional exchanges looked even worse—they would need to somehow come up with a new plan not only to compete against the re-outfitted NYSE and NASDAQ but to compete in a post-Reg NMS market structure in which electronic trading would dominate the marketplace. Without much capital or internal liquidity, it appeared that most of the regional exchanges would simply be crushed by the competition.

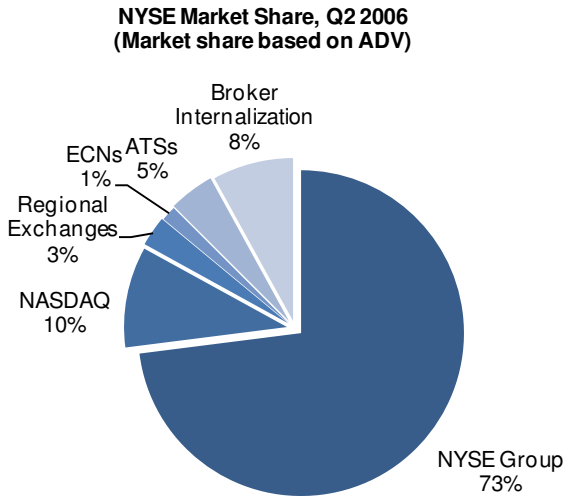
With the acquisition of INET by NASDAQ and the combination of ArcaEx and the NYSE, the competitive landscape of NASDAQ changed completely in matter of months. The reign of ECNs in NASDAQ market abruptly ended as the largest of the ECNs were essentially acquired by NASDAQ, and the new NASDAQ consolidated its market share to hold approximately 52% of the market share in trading volume at the end of Q2 2006 (Figure 10). The mega-mergers of NYSE/ArcaEx and NASDAQ/INET briefly changed the competitive landscape of trading in NYSE-listed securities as well (Figure 11).

Figure 10: NASDAQ Market Share After Consolidation



Source: Exchanges, ECNs, ATSs, brokers, Aite Group

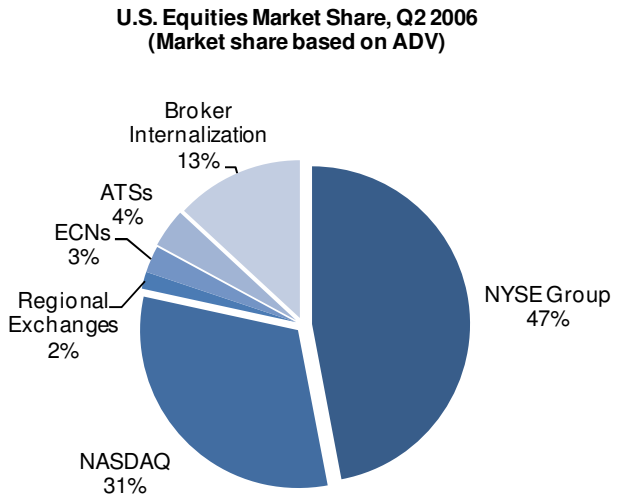
Figure 11: NYSE Market Share After Consolidation



Source: Exchanges, ECNs, ATSs, brokers, Aite Group

While quite brief, market consolidation led to the creation of two of the largest pools of liquidity in the form of NASDAQ and the NYSE Group. In Q2 2006, the NYSE Group and NASDAQ collectively accounted for 78% of the entire U.S. equities market (Figure 12). At this point in time, more than 20 other execution venues were battling for the remaining 22% of the U.S. equities market share.

Figure 12: U.S. Equities Market Share Pre-Reg NMS



Source: Exchanges, ECNs, ATSs, brokers, Aite Group

MARKET FRAGMENTATION, PHASE II: 2006 AND BEYOND

After market consolidation effectively created a duopoly of NYSE and NASDAQ, the rest of the market looked completely overmatched. The implementation of Reg NMS, however, and growing broker concerns over the increased market clout of NYSE and NASDAQ quickly ignited the next phase of market fragmentation. One thing that NASDAQ and NYSE did not expect was active involvement of broker-dealers in exacerbating the fragmented nature of the U.S. equities market. Leading broker-dealers achieved this in two ways:

- **Investing in various venues**: With the passage of Reg NMS and the resurgence of both the NYSE and NASDAQ, the future prospects of regional exchanges and ECNs looked bleak. Nevertheless, regional exchanges and two particular ECNS (i.e., BATS and Direct Edge) sprang back to life driven by investments from leading sell-side firms and, in some cases, buy-side firms and prop shops. From the investing firm's perspective, these deals were low-risk investments with high upside potential that simply could not be passed up. Upsides included:
    - **Having a say in market development**: Investments into these entities certainly provided a voice for these participants in the future of the U.S. market structure development.
    - **Taking a warning shot at the NYSE and NASDAQ**: These deals sent a clear message to the NYSE and NASDAQ that there were plenty of alternative execution venues that could be utilized in the hope of curbing any price hikes that the NYSE and NASDAQ may have considered in the post-Reg NMS market structure.

- **Making a potentially safe investment**: In the end, these were fairly safe investments (i.e., cheap investments) with huge upside potential for the participants considering valuations in the public exchange space.
- **Diversifying instruments**: New entrants into the equities market, such as the International Securities Exchange (ISE) and Chicago Board Options Exchange (CBOE), were looking to leverage their dominance in the options market to branch out into the equities market, just as the NYSE sought to move into the options market through ArcaEX.

Table C: Investments in Major Venues

Venues	Main Players	Details
Philadelphia Stock Exchange (PHLX)	PHLX, Merrill Lynch, Citadel, Citigroup, Credit Suisse, Morgan Stanley, and UBS	Investment into PHLX by the various dealers and Citadel; in the end, the new investors can end up owning 89.4% of PHLX common stock
Boston Stock Exchange (BSE)	Boston Stock Exchange, Citigroup, Credit Suisse, Fidelity, Lehman, Atos Euronext Market Solutions, and Lava Trading	Formation of a new electronic stock exchange, BeX (Boston Equities Exchange)
International Securities Exchange (ISE)	ISE, Bear Stearns, Citadel Derivatives Group, Deutsche Bank, Interactive Brokers Group LLC, JP Morgan, Knight Capital, and Sun Trading	Launch of anonymous matching service called MidPoint Match (MPM) in Q3 2006, followed by a fully displayed market in Q4 2006
Chicago Stock Exchange (CHX)	CHX, Bank of America, Bear Stearns, E-Trade, Goldman Sachs	Total investment of US$20 million for a minority equity stake in CHX
Chicago Board Options Exchange (CBOE)	CBOE, Interactive Brokers, LaBranche, Susquehanna International Group, VDM Specialists	Launch of new equities exchange, CBOE Stock Exchange (CBSX), in early 2007 with backing from large specialist firms
BATS	GETCO, Wedbush, Citi, Credit Suisse, Lime Brokerage, Lehman Brothers, Morgan Stanley, Merrill Lynch	Acquiring buy-in from major liquidity providers
Direct Edge	Knight Capital, Citadel, Goldman Sachs	Knight purchased Attain ECN and turned it into Direct Edge, then attracted investments from Citadel and Goldman Sachs

Source: PHLX, BSE, CHX, ISE, CBOE

- **Aggressively launching broker-owned dark pools:** Prior to implementation of Reg NMS, most dark pool activities were based on block trading, with the likes of Liquidnet and ITG's POSIT. Starting in 2005 and 2006, however, real competition

began. While some of the broker-owned dark pools had launched prior to that (e.g., Credit Suisse's Crossfinder launch in 2004), the rest of the broker-dealer community recognized potential opportunity to reduce their trading costs and while at the same time providing yet another execution tool in the form of these crossing platforms.

The growth of dark pools over the 10 years has been one of many changes that the U.S. equities market has experienced, leading to a complete transformation of the institutional trading environment. No one could have predicted that the U.S. equities market would go from having two major market centers not so long ago to more than 50 venues today. Most of these new venues have been dark pools, whether owned by an individual broker-dealer or operated by a consortium or an exchange.

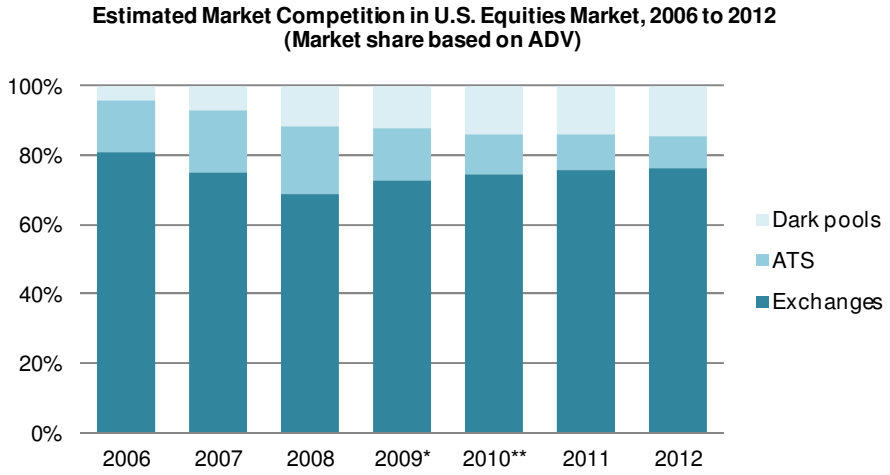
Dark pools can be defined as execution venues that do not to provide public quotes. The core value of a dark pool is its ability to provide access to liquidity while minimizing market impact. In recent years, however, this rather restrictive definition of a dark pool has been challenged as an increasing number of dark-pool users appear to be willing to live with a certain level of market impact in return for higher fill rates. Some dark pools have also opted to link up with other dark pools in the hope of increasing the chances for client orders to get a significant portion of their orders done in the non-displayed market before being routed out to the displayed side.

The proliferation of dark pools has undoubtedly made the life of an average buy-side trader extremely difficult, as those traders must still make real-time decisions in terms of where the order should be routed to get the best possible execution. In today's microsecond-execution environment, market fragmentation certainly adds another layer of complexity to the buy-side.

Due to their "dark" nature, non-displayed pools are misunderstood by some and downright distrusted by others. Given the increasing use of outbound and inbound indications of interest (IOIs) within some dark pools, it is not currently clear whether the traditional definition of a dark pool still applies to a majority of the venues. One thing is certain, however: The overall market concern over the share of dark pools has grown, and regulatory intervention appears inevitable.

On the lit market, both BATS and Direct Edge have grown tremendously since their entry into the market, typically occupying about 10% of the overall U.S. equities market share each. Eventually, both BATS and Direct Edge became exchanges themselves, creating four large exchanges in the U.S. equities market by 2010 (Figure 13).

Figure 13: Market Fragmentation in the U.S. Equities Market

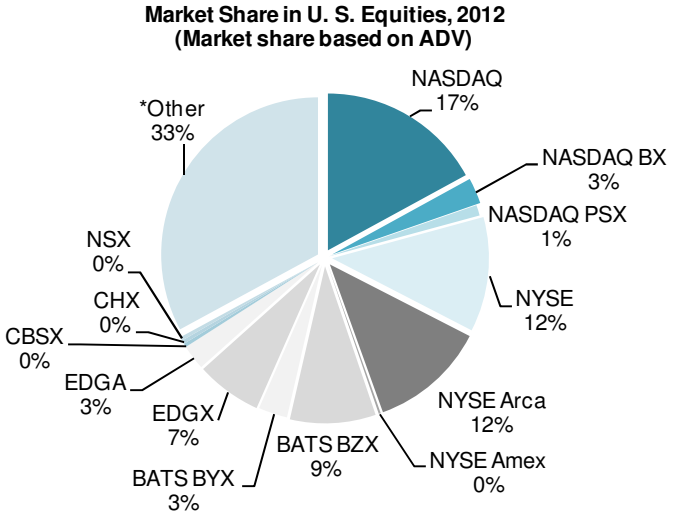


**Includes BATS as an exchange*
***Includes Direct Edge as an exchange*

Source: Aite Group

Another key trend within the U.S. exchange marketplace over the last few years has been exchanges operating more than one exchange license to test out new pricing schemes or launch new order types and products. In fact, all top four U.S. exchanges currently operate more than one exchange, making the U.S. market look even more fragmented (Figure 14). Market fragmentation has become the norm in the U.S. equities market, and all market participants have spent the last 15 years adjusting to this market reality.

Figure 14: Market Share Reality in 2012 in the U.S. Equities Market



**Other includes ATSs, broker internalization, and dark pools*

Source: Exchanges, ATSs, brokers, Aite Group

KEY IMPLICATIONS OF MARKET FRAGMENTATION IN THE U.S.

This section will focus on implications of market fragmentation for four specific areas:

- Best execution
- Connectivity and routing
- Consolidated tape
- Self-regulation and rule-making

U.S. BEST EXECUTION

Similar to other markets, "best execution" is a term that lacks precise definition in the U.S. market. Some confusion has been caused by the Order Protection Rule of Reg NMS, Rule 611, which appears to single out best price as the sole determinant for best execution in the U.S. market.

It is very important to note that the Order Protection Rule refers only to the overall routing obligation of integrated market centers and does not equate to any concrete best execution obligation. Another thing to keep in mind is that Rule 611 was specifically adopted to address the issues caused by the Trade-Through Rule that has existed in the U.S. equities market since the last 1990s, which leveraged antiquated market linkage ITS. The major issue with this was that the linkages of various market centers that were both slow (e.g., floor-based NYSE) and fast (e.g., NASDAQ), and as a result, trade-throughs were often ignored and left the market linkages largely ineffective. Rule 611 was an attempt to fix this while applying it only to fast markets (i.e., electronic markets) with a specific time frame of one second to make routing decision to the venue with the best price at a given time.

With that clarification out of the way, it is not surprising that one broker's view of best execution in relation to a trading decision may differ significantly from that of another. To generalize, best execution involves an unspecified combination of price, speed, and execution parameters. Still, it is quite true that best execution has been associated with price. Using a security's NBBO as a point of reference, a trader or investor receiving an execution at or inside the spread was considered to have received a quality execution. Execution outside the NBBO was subject to question.

Best price does not always constitute best execution, however. An investor may have a need to transact an order quickly—more rapidly than it can be absorbed in the prevailing market at or within the best displayed quotes. Filling the order in the prevailing market may "push" the stock's price and result in an execution price outside of the existing bid/ask spread. Still, this may constitute "best execution" in the view of the investor, as greater emphasis was placed on completion as opposed to price.

Under the FINRA Rules 5310, the definition of best execution requirements are as follows:

> Rule 5310(a) requires a member firm, in any transaction for or with a customer or a customer of another broker/dealer, to use "reasonable diligence" to ascertain the

best market for security and to buy and sell in such market so that the resultant price to the customer is as favorable as possible under prevailing market conditions.

The rule also specifies five factors that the firm must consider to be found to have used reasonable diligence:

- Character of the market for the security
- Size and type of transaction
- Number of markets checked
- Accessibility of quotation
- Terms of conditions of order as communicated to the firm

Each broker-dealer has documented its best execution policies and procedures. With the above factors in mind, most broker-dealers will focus on potential for price improvement, speed of execution, and likelihood of trade execution as major components when trying to make trading decisions on behalf of clients.

Maintaining best execution obligation in a single market environment requires much effort on the part of broker-dealers in terms of data capture, store, and analysis to ensure compliance. This obligation can become quite complex when working in a fragmented marketplace. One of the major implications on the regulatory compliance resulting from market fragmentation in the U.S. market has been reporting obligations by both market centers to shed light on order routing and execution practices:

- **Rule 11Ac 1-5**: Requires market centers to publicly disclose, on a monthly basis, basic information related to their handling and execution of orders. Sample info includes the following:
  - Execution of market orders relative to public quotes
  - Price improvement data on limit orders compared to public quotes
  - Quoted and effective spreads
  - Speed of execution
  - Fill rates
- **Rule 11Ac 1-6**: Requires broker-dealers to publicly disclose, on a quarterly basis, information regarding their routing decisions. Sample info includes the following:
  - Identity of market centers to which the orders were routed
  - Disclosure of relationship with market centers, including internalization or payment for order flow arrangements
  - On customer request, disclosure of where a customer's individual order was routed to for execution

In the end, while market fragmentation itself has not significantly altered the actual definition of best execution, extra regulatory burden has been imposed on market centers and broker-dealers alike to ensure that their best execution obligations are being followed and met. As a result, there is a clear cost impact on regulatory compliance that requires market centers and broker-dealers to capture, store, extract, and analyze data. Cost implications will be discussed in a separate section at the end of this study.

The most dramatic change to best execution as a result of market fragmentation is the direct impact that it has had on the need for increased connectivity, routing, and complicated market data needs. This will be discussed in proceeding sections.

U.S. CONNECTIVITY AND ROUTING

Unlike other markets, the U.S. market has always been fragmented, if we stretch the definition of "fragmentation" to purely mean the existence of multiple execution venues within a domestic marketplace, without taking into account market share distribution among the individual venues. That is, if a given market is home to more than one market center, yet one venue commands 99% of trading, one could reasonably argue that the market is not truly fragmented from a practical perspective. Prior to 1997, the fragmented nature of the U.S. equities market closely mirrored this scenario—a handful of regional exchanges supported trading of listed stocks, but the NYSE dominated the marketplace with over 90% of the market share in listed securities trading, while NASDAQ represented the OTC market.

In order to accommodate this type of fragmentation and foster a more integrated marketplace, in 1978 the SEC directed several exchanges to submit a joint plan to develop a system that would facilitate communication and order routing within the exchange community. The plan was approved, and ITS was launched within the year.

ITS was designed to be an automated means of linking exchanges, thus enabling electronic communication and routing orders to the destination with the best pricing. In 1979, the SEC began exploring alternatives to the existing exchange rules restricting off-exchange trading of listed securities. Concluding that the rules were overly prohibitive, the SEC authorized third-market trading for listed securities that had traded on-exchange after a particular date in 1979.

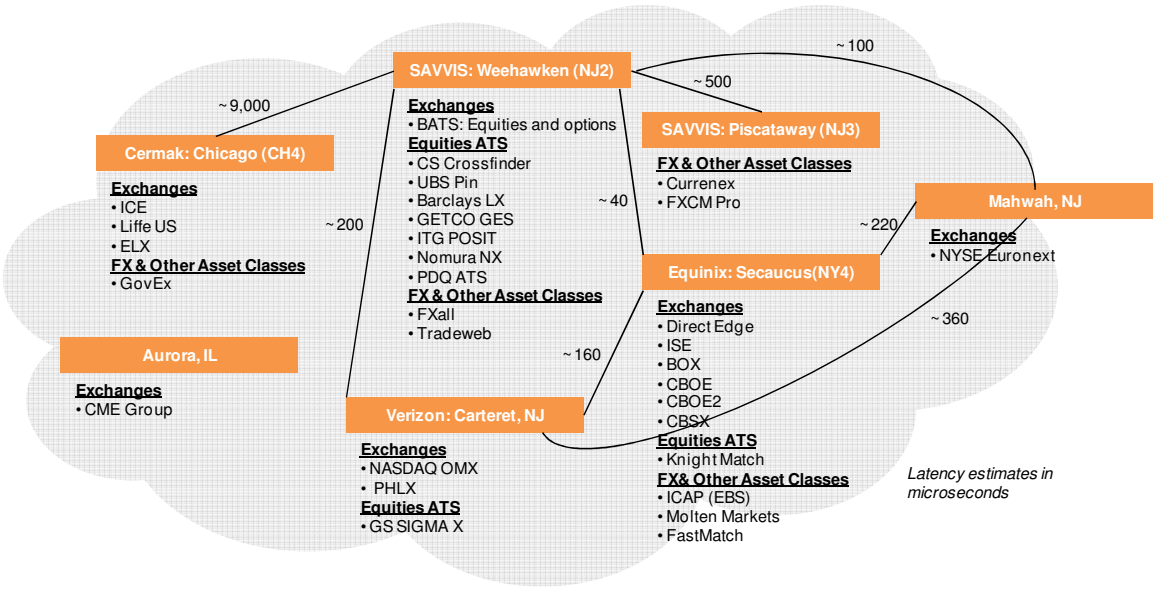
In 1980, the SEC requested those SROs that were members of ITS to present a plan for linkage to the NASD's Computer-Assisted Execution System. When no satisfactory plan was reached voluntarily, the SEC mandated a linkage be implemented. In 1983, ITS and CAES were linked, marking the first-ever automated link between the listed and OTC stock communities.

The ITS framework ultimately failed to mature with the market structure changes that started occurring in late 1990s, with the introduction of ECNs and the true fragmentation of the market that presented not only fragmentation in terms of number of execution venues but also fragmentation of actual liquidity. With the launch of Reg NMS, the regulatory mandated ITS disappeared and was consequently replaced by private networks and connectivity services.

For trading firms, market fragmentation has led to the practical IT issues of figuring out which venues to connect with to optimize trading capabilities. For execution venues, the difficulty has been to determine which data center is the most appropriate location for their matching engines

to attract liquidity. Figure 15 provides basic snapshot of the U.S. market in terms of potential connectivity issues that trading firms face. While this looks quite convoluted, the reality is much worse for those firms with interest in trading in European and Asian markets.

Figure 15: Fragmentation in Data Centers and Connectivity: Chicago and NYC Metro



Source: Data centers, Aite Group

The need for robust and reliable connectivity and routing capabilities is closely tied to best execution obligations for both broker-dealers and market centers; however, it is certainly not the case that a major broker-dealer needs to directly connect to each venue. While there are four major venues in the U.S. equities market, a number of venues represent less than 1% market share each. Most brokers (even global brokers) do not view direct connection to these venues as vital to meeting their best execution obligations. Instead, they typically rely on a broker that specializes in order routing to reach those smaller venues. While major brokers still may rely on their own in-house networks to facilitate connections to various venues, the availability of third-party network providers, such as Savvis, BT, and more, has made it easier for firms to efficiently participate in the fragmented marketplace.

The need for connectivity business has also extended to the buy-side as low-touch, self-service execution tools such as DMA and algorithmic trading proliferate among the buy-side traders. Most large OMS/EMS vendors operate their own networks, connecting all major brokers and venues for buy-side firms. Typically, the brokers would pay for individual connections on behalf of buy-side firms. For certain vendors, the trading network business has become quite lucrative.

As mentioned earlier, the concept of order routing has been deeply rooted within the U.S. market structure, especially since the launch of first-generation ECNS. ECNs such as Archipelago and BRUT created their own private connections to other ECNs and exchanges to handle customer order flow. As a result, by the time intense fragmentation occurred following implementation of Reg NMS, various third-party services and broker-driven order routing

services were available for all interested parties. The concept of smart ordering routing itself can be traced back to Archipelago ECN during the late 1990s. As markets have become severely fragmented, with different pricing schemes, order types, latency levels, etc., most vendors and brokers have implemented SOR engines to ensure that appropriate trading decisions are being made. All order routing engines are programmable to fit the specific routing logic that might be required of by the client users.

Closely tied to costs associated with increased connectivity and order routing is colocation. Currently in the U.S. market, four largest exchanges host their matching engines in four different data centers:

- NYSE Euronext: Mahwah, New Jersey at NYSE-owned data center
- NASDAQ OMX: Carteret, New Jersey at Verizon-owned data center
- BATS: Weehawken, New Jersey at Savvis-owned data center
- Direct Edge: Secaucus, New Jersey at Equinix-owned data center

In the end, connectivity, telco, and routing fees are dependent on the decision of the broker-dealer to connect with the various matching engines in dispersed data centers.

U.S. CONSOLIDATED MARKET DATA

In other financial centers going through market fragmentation, one of the key issues that need to be addressed has been how to consolidate market data across the different competing venues. In the case of United States, however, market data consolidation has not been a major issue at all; in1976, the SEC recognized early on that a unified national market structure was dependent in part on timely, widely distributed market data. To this end, the SEC instructed the exchanges to devise plans to report and distribute last-trade and current quote information across the SEC-registered market centers that traded in those securities.

The Consolidated Tape System (CTS), which disseminates last sale reports for all reporting market transacting NYSE, AMEX, and a variety of regional listings, was fully implemented in 1976. The Consolidated Quote System (CQS), reflecting available quotes in securities across exchanges, was launched in 1978. The Consolidated Tape Association (CTA) oversees the dissemination of real-time trade (CTS) and quote (CQS) information in NYSE (Tape A) and NYSE Arca, NYSE MKT (formerly AMEX), and other regional exchange (Tape B) listed securities. As a result, all SEC-registered exchanges and execution venues that trade Network A or Network B securities send their trades and quotes to a central consolidator, where CQS data streams are produced and distributed worldwide. Currently, NYSE is the administrator of Network A and NYSE MKT is the administrator of Network B.

On the NASDAQ-listed securities side, UTP SIP Plan represents the CTA equivalent, governing the collection, processing, and distribution of all NASDAQ-listed securities data. The UTP SIP data feed represents Tape C, which is the single source of consolidated market data for NASDAQ-listed securities. The UTP Trade Data Feed (UTDF) provides continuous last sale information, and the UTP Quote Data Feed (UQDF) provides continuous quotations from all venues trading NASDAQ-listed securities.

In terms of costs, while there have always been and will always be complaints from data users associated with overall cost of consolidated data feeds, it would not be accurate to argue that the cost of data has increased as a result of market fragmentation. As a result of Reg NMS's Market Data Rules, all venues and brokers have been given the right to provide their own market data and distribute it to the market for a fee or for free while continuing to meet their market data obligations of providing data back to both CTA and UTP plans for market-wide consolidated tape, before using the data for their own commercial efforts. While we have seen an increase in market data products from exchanges as a result of the implementation of the rule, it has not translated into a major revenue source for broker-dealers.

The proliferation of market centers and their ability to package their own proprietary data products has led to issues related to speed of data dissemination for regulators. One of the concerns of regulators in terms of the availability of consolidated data has been the potential latency difference between when consolidated data is available to the general public compared to certain market data products that might have a much lower latency. The fear is that this latency difference could provide information advantage for those firms relying on low latency data feeds to make trading decisions. On September 2012, the SEC charged the NYSE with improperly sending market data via two of its proprietary data fee products before sending data to the consolidated feeds. This had been going on since 2008. Ultimately, NYSE was penalized for failure to monitor the latency level of its proprietary data feeds in relation to the data transmission to the consolidated data feeds. This resulted in NYSE paying US$5 million in penalty.

U.S. SELF-REGULATION AND RULE-MAKING

Self-regulation has been a vital element of the U.S. regulatory regime since the market crash of 1929. SROs are responsible for developing, implementing, and monitoring standards and procedures for their members to conduct business. The current U.S. regulatory landscape is driven by multiple SROs, most of which are also exchanges. One major exception to this is FINRA, which is the largest independent regulator for all securities firms doing business in the United States. FINRA was created in2007, through the consolidation of NASD and the member regulation, enforcement, and arbitration operations of NYSE.

All SROs have four major sources for funding for their operations:

- Regulatory fees paid by members
- Transaction fees paid by those firms that use SRO facilities for executing, reporting, and clearing transactions
- Listing fees by corporate issuers
- Market data feeds paid by including all users of data, including broker-dealers, institutional and retail investors, third-party data vendors, and more

Perceived key benefits of self-regulation and rule-making are the following:

- Enabling an organization quite familiar with the inner workings of the industry to ensure that detailed operations and issues are understood

- Enjoying peer group supervision, leading to fewer intrusive, government-initiated directives
- Allows a government agency (i.e., SEC) to leverage its limited budget to effectively regulate a very complex market structure

Over the years, the continuing fragmentation of the U.S. equities market has placed the SRO framework under increasing strain. Another potential issue has been the demutualization of exchanges and their transformation into for-profit organizations, which may lead to conflict of interest in relation to the members that they regulate. Some of the challenges that that SRO structure experiences under market fragmentation include the following:

- **Regulatory arbitrage**: Lack of uniformity in terms of regulatory rigor may lead traders to send flow into a SRO with less-than-stringent regulatory rules.
- **Incentives for loosening regulations**: Exchanges faced with intensive competition and falling market share might be tempted to lower their regulatory barriers to attract additional business.
- **Selective client targeting**: Again, fighting for market share, exchanges might be driven to develop favorable settings for specific client types that can help them grow their market share.
- **Inherent conflict with members**: Today, broker-dealers are increasingly competing against exchanges for trading volume, and SROs' responsibilities over the member firms (i.e., broker-dealers) and their financial and operational affairs can be perceived as inherent conflict of interest.
- **Potential growing conflict between SRO regulatory function and market operations**: As exchanges continue to fight for dwindling trading volume, the market operations side of the business might be tempted to pressure the SRO side to minimize enforcement and increase market participation.
- **Conflict with issuers**: Driven by the need to get additional revenue via listings businesses, SROs might lessen regulatory requirements for listings or overlook struggling listed issuers for making de-listing decisions.
- **Multiple SRO duplication**: Without specific rules to eliminate duplicated responsibilities and hence duplicated regulatory burden, having multiple SROs can put significant compliance burden on those members with multiple SRO memberships.
- **Market surveillance**: It is tough enough to perform market surveillance and monitoring in a single market framework—when there are multiple venues involved, the changes for errors increase exponentially. The real issue is that even if a particular SRO is doing a perfectly good job with a specific member, the fragmentation issue makes it next to impossible to have a full view of the overall activities of that particular member. In the U.S. market, certain rules have been

harmonized so that, for instance, if a member is part of more than one SRO, the firm is only obligated to comply with one SRO per SEC regulation.

In the end, the reliance on the SRO regulatory infrastructure will not change in the U.S. equities market, as the overall market structure has changed so much and has become so complex that only the actual market practitioners truly understand the intricacies behind the overall market operations. Instead, the SEC will continue to focus on harmonizing different rules across SROs and look to eliminate duplication of compliance burdens that could add cost to members.

MARKET STRUCTURE EVOLUTION IN EUROPE

Since the explosive growth of alternative execution venues in the United States, many European exchanges been bracing for similar competition during the last decade. Ill-fated attempts by foreign invaders, such as NASDAQ Europe, and homegrown European failures, such as Jiway, are some examples we can point to when speculating upon the competitive resiliency of existing exchanges in the vast European market.

To be fair, traders in Europe have always had to grapple with fragmentation. Prior to the Markets in Financial Instruments Directive (MiFID), there were a multitude of domestically dominant regional exchanges, which usually operated with their own unique post-trade requirements and processes. As a result, while individual financial centers within Europe functioned quite efficiently, market participant attempts to engage in efficient and frictionless trading across Europea were often prohibitively difficult and costly. Thus, MiFID, introduced by the European Commission in 2007, attempted to create a framework for accessible and efficient trading across a pan-European market, allowing Europe to compete with the U.S. market and other global financial centers.

Not unlike developments seen in the adolescent stages of U.S. fragmentation, MiFID also yielded unintended consequences, many of which are being addressed in the current MiFID review. Nevertheless, one of MiFID's primary goals—the creation of competition at the execution level—has been achieved. Since late 2007, we have seen multiple alternative execution venues emerge, including multilateral trading facilities (MTFs) and dark pools.

Despite the structural achievement of emergence, some of those venues have not survived in their original form or even at all. Several reasons exist for their demise, but one fundamental problem that has impacted the entire European equity market has been a downturn in market liquidity. Many of the execution venues were born 2007 and 2008, when equity volume was at its peak; their business models and likelihood of success, therefore, were predicated upon pre-financial-crisis liquidity levels, a materially different picture from today's European volume. Consequently, European venues have found themselves vying for increasingly elusive trading volume and struggling to survive in a condensed marketplace.

MAJOR REGULATORY EVENTS IN EUROPE

Since 1993, European Union member countries operated under the Investment Services Directive (ISD), which required all orders to be sent to regulated exchanges for execution. In November 2007, everything changed in the European market landscape when the European Commission adopted MiFID, enabling firms—for the first time—to bypass any existing concentration rules, thus allowing alternative trading venues to compete with existing exchanges. An ambitious piece of regulation, MiFID was designed, at the highest level, to accomplish the following goals:

- Provide pan-European harmonization in order to promote investor protection and the leveling of competition across borders
- Improve market transparency

- Create an environment for greater market competition and trade execution
- Create a pan-European mandate to uphold best execution

The arrival of MiFID was praised by some, feared by others, and misunderstood by nearly all. Some believed that MiFID would completely revolutionize every aspect of the European markets, while others expected MiFID to have very little impact. The reality rests somewhere in the middle of these two extremes. More precisely, MiFID has had little effect on some aspects of the European market (pan-European clearing and interoperability are still distant goals), yet has imposed a drastic effect on other areas (alternative trading venues).

Some of the most important elements of MiFID include the following:

- **Best execution burden**: Firms are required to formulate, maintain, and demonstrate their best execution policies and practices on behalf of their clients. They are also required to maintain a five-year history of customers' trades, own quotes and trade execution data, statistics on execution venues used to complete execution, etc. The ability to capture, store, and analyze accurate and timely trade and customer-related data are crucial elements of successful regulatory compliance—and a pivotal element of MiFID, which put additional pressure on the data management infrastructure of European market participants.
- **Bypassing concentration rules**: In certain European countries, under ISD, all orders were required to be sent to regulated exchanges for execution. MiFID enabled firms to bypass any existing concentration rules within specific domestic markets, which led to increased competition among the market execution venues. Related to this, off-exchange-executed trade information (i.e., internalized trades, upstairs trading, ATSs, etc.) can be reported to other venues that are outside of the traditional exchanges. Other venues can include MTFs, market data consolidators, and more.
- **Mandate for firm public quotes and transparency requirements:** In the interest of enhancing pre-trade price discovery, MiFID mandated that those firms that are active internalizers publish firm public quotes. Also known as systematic internalizers (SIs), these firms were required to publish their quotes and trade execution data concerning those securities traded on regulated markets on a regular and continuous basis to meet pre- and post-trade disclosure mandates.

MiFID also defined three explicit categories of trading venues:

- **Regulated market (RM):** Regulated markets represent traditional stock exchanges, such as the London Stock Exchange (LSE), NYSE Euronext, and Deutsche Boerse. The regulated markets have seen a persistent trend of consolidation rather than fragmentation as they have attempted to diversify and globalize their operations in recent years in order to remain relevant and profitable throughout challenging market conditions.
- **Multilateral trading facility (MTF):** An MTF can be operated by an exchange or investment firm, and it has characteristics that closely resemble the ECNs of the U.S.

equities market. MTFs are fully electronic, anonymous execution platforms that emphasize speed, liquidity, and low execution prices.

- **Systematic internalizer (SI):** This category represents those investment firms (i.e., broker-dealers) that engage in significant internalization activities to meet the execution needs of clients that are outside of regulated markets and MTFs (i.e., market-making). The aim of the SI provision was to combat with increased pre-trade transparency the market fragmentation that ensued from the abolishment of the concentration rule.

MIFID AND ITS UNINTENDED CONSEQUENCES

It was clear soon after its implementation that MiFID had resulted in some unintended consequences that were having a detrimental impact on the European marketplace. As mentioned above, MiFID had a variety of goals, with the key theme of creating a single, harmonized European marketplace. The aim of competition at the execution level was to reduce the cost of trading for market participants and to nurture innovation and creativity in trading technology and trading processes.

Another goal of MiFID was to harmonize pre- and post-trade transparency requirements for equities across the European markets. Post-trade transparency requirements were set up for RMs, MTFs, and investment firms transacting in shares outside of a RM or MTF. Investment firms were given a number of possibilities for obliging with their post-trade disclosure, including:

- Reporting to any RM or MTF that trades the instrument in question
- Reporting to any third-party reporting entity
- Reporting to their own website or other proprietary arrangements

In the end, MiFID completely overhauled the trading landscape in Europe; unfortunately, alongside its good intentions came some unanticipated consequences. The majority of market participants, if not all, believe these unintended consequences have negatively impacted the European trading landscape. This has frustrated many market participants, and most believe it has reduced liquidity in the European markets. Further frustration has been caused by the fact that it has been six years since these unintended consequences appeared and market participants are still waiting for a solution. Some of the high-profile unintended consequences include the following:

- **Fragmented data**: Coupled with competing trade reporting venues, increased market fragmentation has created a disparate, fragmented market data reality in the post-MiFID world. With no single venue responsible for trade reporting in a market, there was no one to check the accuracy of data. As a result, during the first few months of MiFID, some trades were being reported at up to three different venues because many firms adopted the attitude that over-reporting was better than under-reporting. This fragmented-data issue has created a negative scenario around fragmented liquidity, and the lack of a consolidated tape makes a fragmented liquidity landscape difficult to navigate, leading to some frustrated European market participants.

- **Confusion over OTC trade reporting:** The rise of dark pools and alternative trading venues post-MiFID has been one of many changes experienced by the European equities market, leading to a complete transformation of the institutional trading environment. A large number of broker crossing networks and other types of dark pools report their trades as OTC trades. As a result, OTC trading market share has come under considerable scrutiny since the inception of these types of trading venues. Fierce debate rages in Europe about the market share of dark pools and OTC trading in the equities markets. The Federation of European Securities Exchanges (FESE) released a paper in 2010 stating that 40% of equities trading was being conducted OTC by brokers internally. The Association for Financial Markets in Europe (AFME) disputed this number, arguing that only 16% of equities trading was real OTC liquidity. In summary, dark pool trades may print as OTC, but not all OTC prints are dark pool trades. It is important that market participants and regulators understand the true meaning of OTC and all it encompasses before introducing any legislation to curb dark trading and crossing networks. Dispute aside, various types of trades currently fall under the OTC umbrella in Europe. Incorrectly, many market participants believe that the majority of these OTC trades are being conducted in dark pools and broker crossing networks.

- **Confusion over SI:** Another contributing factor to the confusion around the OTC number is the ineffectiveness of the SI regime, which, post-MiFID, has not been universally applied across brokers throughout Europe. A year after MiFID, only a couple of brokers were registered as SIs; many others were not because the definition was slightly ambiguous and there was no element of enforcement for brokers that did not register but that provided market-making on a regular basis. Universal application of the SI regime would see the number of OTC trades decrease because market-making trades between brokers and clients would fall under the SI trade reporting flag. Definitions for technical reporting trades and standardization of post-trade reporting flags across reporting venues—created by regulators that are aware of the distinctions between different types of OTC trades—would provide a clear picture of liquidity in Europe and help traders accurately understand where and how trades are being executed.

MIFID II

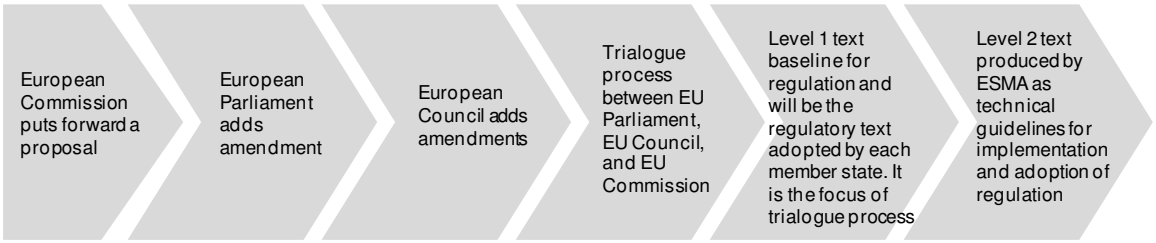
After reviewing the overall impact of MiFID, the European Commission released a reviewed directive (MiFID recast) as well as a regulation, the Markets in Financial Instruments Regulation (MiFIR), in October 2011. Together, they are known as MiFID II.

European legislation can be enforced under two mechanisms:

- **A directive**, once adopted by the European Parliament and European Council, is then passed down to each member state. The directive essentially provides a framework for the legislation, and the practical implementation elements are left to the member states to decide upon themselves. This in effect leaves elements of the legislation open to interpretation by individual European regulators.

- **A regulation**, on the other hand, once adopted by the EU Parliament and EU Council, comes into effect immediately for all European individuals and is adopted across the European markets consistently. Some European markets, such as Spain, have not abided by the MiFID directive while the rest of Europe has, so it is understandable that the EU Commission has proposed a regulation as well as a directive. Points that are crucial to the EU Commission are included in the regulation to ensure that every financial institution follows them. The European Securities and Markets Authority (ESMA) is the Europe-wide regulatory body that has the power to enforce the regulation across all European member states. The process of European legislation is displayed in Figure 16.

Figure 16: The European Legislation Process



Source: Aite Group

Within the MiFID II legislation, the European Commission has tackled some of the unintended consequences of MiFID I, including:

- A clearer definition for SIs
- A solution for a consolidated tape
- Creation of a new trading venue, the organized trading facility (OTF), that will reduce the amount of trading conducted OTC; within this new category, a subsection was created for BCNs.

The European Commission defines an OTF as:

> any system or facility, which is not a regulated market or MTF, operated by an investment firm or a market operator, in which multiple third-party buying and selling interests in financial instruments are able to interact in the system in a way that results in a contract in accordance with the provisions of Title II of Directive [new MiFID].

The OTF category is a broadly defined execution venue that seeks to encompass trading that takes place OTC (i.e., outside of a RM or MTF).

Because the creation of the OTF category is in the new MiFIR regulation, it will be applied immediately across all member states once adopted by the European Parliament and European Council. To ensure a level playing field between RMs, MTFs, and OTFs, the proposal notes that these venues will have identical pre- and post-trade transparency as well as organizational and

market surveillance requirements. The main differentiator of an OTF to other trading venues is that the operator of an OTF has an element of discretion as to how a trade will be executed. RMs and MTFs lack an element of discretion regarding how orders are transacted on their platforms. Subsequently, OTFs will offer an alternative functionality or service to market participants (as compared with existing venues).

This element of discretion associated with how trades are executed in OTFs does raise some concern that operators could possibly profit from how they execute their client trades. OTF operators will be running these venues abiding by investor protection, conduct of business and best execution rules, and legislation, but the EU Commission feared that this was not enough. As a result, the EU Commission's proposal states that the proprietary capital of an operator is banned from its OTF venues. This means that a broker operating an OTF will not be able to use its own capital to execute against client orders.

The EU Commission created this category to apply to all asset classes, including equities, bonds, and derivatives, and it encompasses different types of trading, including order book and quote-driven systems. For different types of instruments with varying degrees of liquidity, appropriate and calibrated organizational and transparency rules will apply. For equities, the EU Commission created a subsection under the OTF category for BCSs. The EU Commission defines a BCS as an "internal electronic matching system operated by an investment firm which executes client orders against other client orders."

The EU Commission believes that the use of proprietary capital to execute client orders is akin to market-making services. It is clear to distinguish between a crossing venue, which falls under a BCS, and market-making, which falls under SI. The EU Commission proposal states that an SI should not be allowed to bring together third-party buying and selling interests as is permitted for RMs, MTFs, and OTFs. An SI is not a trading venue.

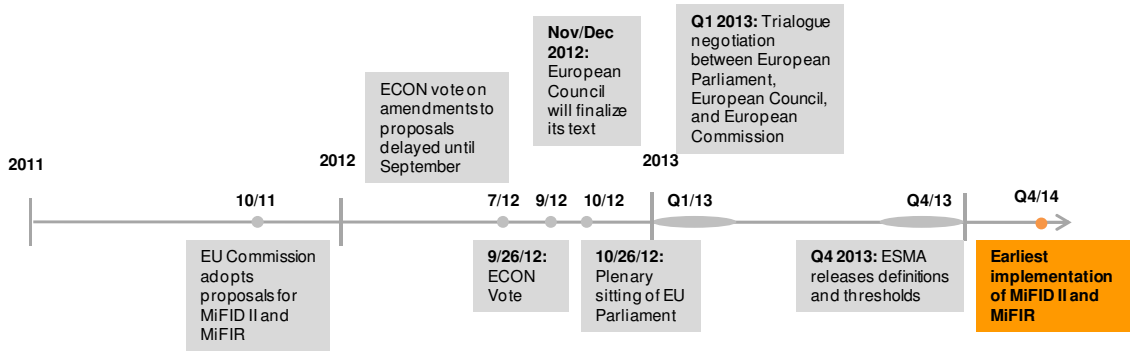
The German Member of European Parliament (MEP), Markus Ferber, is the rapporteur for MiFID II; in this capacity, his duty is to essentially guide the legislation through the legislative process. Throughout 2012, Markus Ferber has highlighted his desire to omit OTFs from the equities market. Other MEPs, such as Kay Swinburne, have, however, expressed their support for the OTF category in equities, highlighting the need for an additional category to encompass broker crossing facilities. Other MEPs, such as Arlene McCarty, have said that the OTF category should be removed completely from all asset classes as it is ill defined and would add complexity to the European securities markets. On October 26, 2012, the European Parliament as a majority decided that the OTF category should exist only for bonds, structured finance products, emissions allowances, and derivatives.

NEXT STEPS IN THE REGULATION TIMELINE

The review of MiFID began in 2011, but there is still a long way to go before the final legislation is implemented. The European Parliament has finalized its amendments, and the European Council is in the process of finalizing its own texts for the directive and regulation. Once the texts have been finalized, the European Parliament, Council, and Commission will begin negotiations to determine the final directive and regulation. Next, ESMA will be charged with putting together technical advice for the regulation that will give information on definitions, thresholds, and the application of the regulation. Once this is complete, the MiFID II and MiFIR texts can be

adopted—they are expected to go into effect during late 2014 or early 2015. A summary of the estimated regulation timeline for MiFID II/MiFIR is displayed in Figure 17.

Figure 17: Estimated Timeline for MiFID II/MiFIR



Source: Aite Group

SPREAD OF MARKET FRAGMENTATION IN EUROPE

In 2006, a trader looking to execute a trade in Europe had few options in terms of where to place that order. Traditional, long-established exchanges ruled Europe with a strangle hold, giving traders few options but to use their venues to place orders. Further, those venues were far from inexpensive, and their speed and efficiency were less than stellar. By summer of 2008, things had changed drastically, with MiFID bringing about radical change in the European exchange landscape, throwing open the doors to allow MTFs to start up. At that point in time, it appeared that old-school exchanges would be overwhelmed and conquered by the more nimble, efficient, and less costly MTFs. New MTFs were sprouting up faster than investment firms could keep track of them (Table D), and even more announced that they would set up shop in the near future.

Table D: First-Generation European MTFs, Post-MiFID

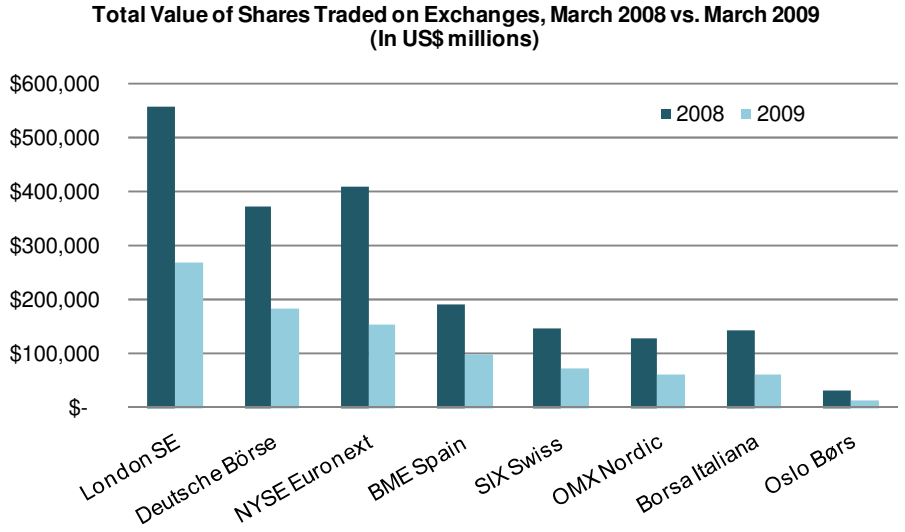
Firms/Projects	Launch Date	Ownership	Type
Chi-X Europe	April 2007	Instinet, BNP Paribas, Citadel, Citi, Credit Suisse, Fortis, GETCO, Goldman Sachs, Merrill Lynch, Morgan Stanley, Optiver, Societe Generale, UBS, Van der Moolen	Displayed
Equiduct	2008	Borse Berlin	Displayed and non-displayed
Euro Millennium	Q2 2008	NYFIX	Non-displayed
ITG Europe	1986	ITG	Non-displayed
Liquidnet	2006	Liquidnet	Non-displayed
Project SmartPool	Q2 2008	NYSE Euronext, BNP Paribas, HSBC	Non-displayed
Turquoise	Q3 2008	Citi, Credit Suisse, Deutsche Bank, Goldman Sachs, Merrill Lynch, Morgan	Displayed and non-

Firms/Projects	Launch Date	Ownership	Type
		Stanley, UBS, BNP Paribas, and Societe Generale	displayed
BATS Europe	Q4 2008	BATS	Displayed

Source: Firms

Then the bottom fell out of the markets, and all predictions of which MTFs would rule Europe were rendered void. By summer of 2009, with markets in a tailspin, the ultra-thin margins that had allowed MTFs to survive by having relatively high trading volume in a very narrow range of securities (usually the securities included in the major indexes, such as the FTSE-100) had begun to dry up as the value of securities being traded had shrunk along with the volume decline. MTFs, which in 2008 looked poised to put up a good fight against established exchanges such as the LSE and Deutsche Boerse, were struggling to hold onto the market share they had gained. When comparing the value of shares traded on the European exchanges with those of the previous year, it is easy to see just how drastically markets suffered (Figure 18).

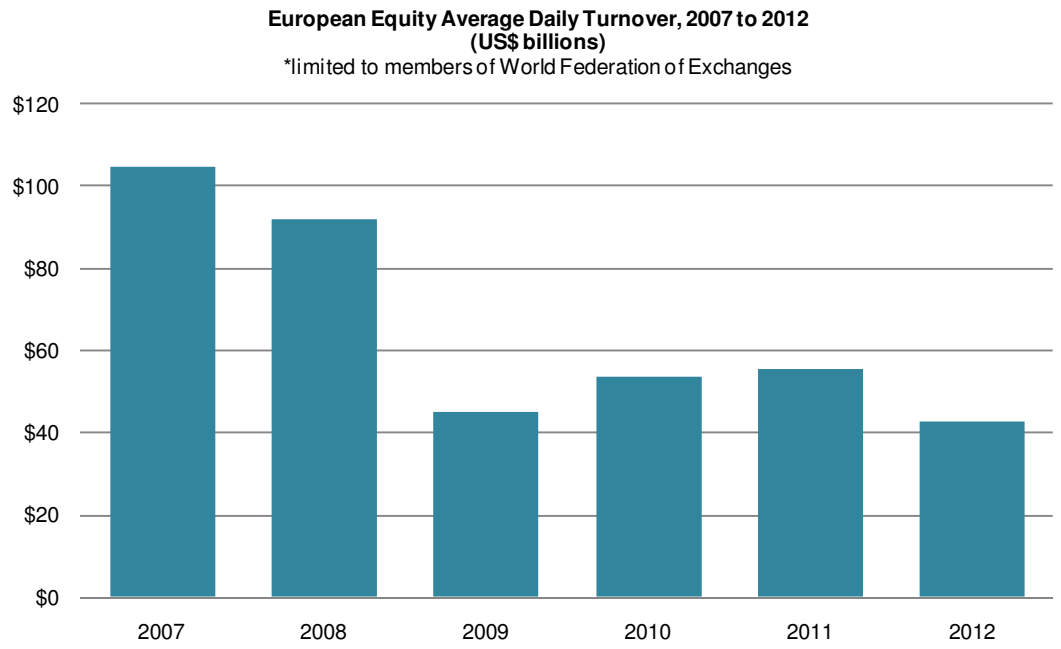
Figure 18: Collapsing Trading Volume in Europe Post-Credit Crisis



Source: Aite Group

Since the precipitous decline in 2009, European equity volume has not truly recovered, making the competition for market share even tougher (Figure 19). For larger, traditional exchanges, this downturn was difficult to bear, as they generally have a much higher cost structure (i.e., a much larger number of full-time employees) than newer, smaller MTFs. The established exchanges, however, having been in existence for decades, also had a more diversified source of revenue—including transactions, market data, listing, and, more often than, not technology—to help sustain them through this lean period.

Figure 19: European Equity Volume

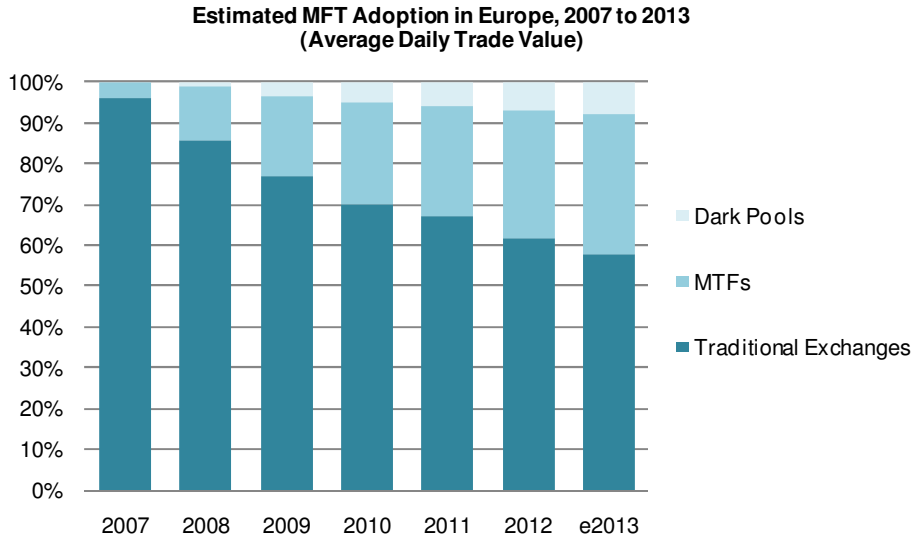


Source: World Federation of Exchanges, Aite Group

Since 2009, numerous new MTFs have entered the marketplace, either as independent new MTFs or (more typically) launched by incumbent exchanges to compete against the likes of BATS and Chi-X. While the lack of volume may have presented itself as barrier to entry to potential new venues, over the last four years, alternative execution venues have made their presence felt in the European trading arena.

In the first four months of 2009, 15% of European equity orders were traded on MTFs. Chi-X led the pack of MTFs in percentage of European equity trades, with an average of 9.4% of market value traded in the first four months of 2009. Turquoise peaked at 5% of LSE trade volume earlier in 2009 but quickly slumped to only 2.5% once the liquidity agreements it had in place with its nine co-owner banks expired. Part of the volume that was lost by Turquoise moved to Chi-X in April, helping Chi-X's impressive increase. By the end of 2012, MTFs and dark pools in the European market accounted for 38% market share of all pan-European trading volume (Figure 20).

Figure 20: Market Share of Traditional Exchanges vs. MTFs



Source: Exchanges, MTFs, broker-dealers, World Federation of Exchanges, Aite Group

One could also argue that continuing volume stagnation has dampened market fragmentation, leading to some consolidation in the marketplace as venues struggled to justify their existence in a low-volume environment. Two notable consolidations have had a huge impact on Pan-European market competition:

- LSE acquisition of Turquoise in early 2010
- BATS Europe acquisition of Chi-X in late 2011

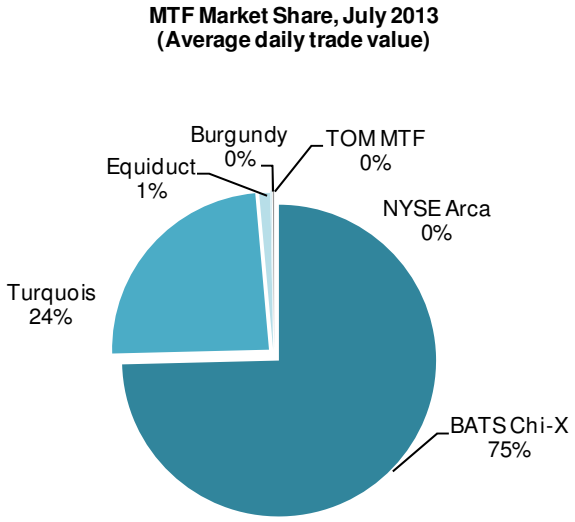
While LSE's acquisition of Turquoise can largely be seen as a defensive move to shore up its declining market share in FTSE 100, the new combination of BATS/Chi-X has clearly established itself as the largest pan-European execution venue (Figure 21).

Figure 21: BATS Chi-X European Market Presence

Source: Fidessa Fragmentation Index

Focusing on the MTFs, BATS Chi-X, not surprisingly, has become the dominant player, accounting for 75% of all volume represented by MTFs. Once-promising MTF Turquoise is a distant second, at 24% of market share. Most other venues each account for less than 1% of market share (Figure 22).

Figure 22: Market Share Analysis of MTFs in Europe

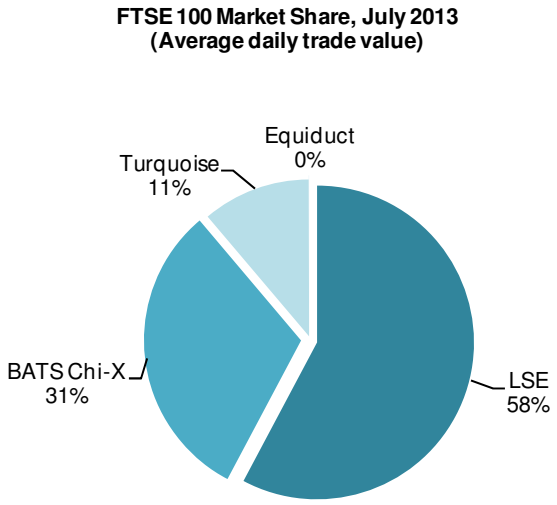


Source: Fidessa Fragmentation Index

While the battle for pan-European trading market share remains highly competitive, competition within specific market centers illustrates varying degrees of success by alternative trading venues. Still, the fact remains that the monopolistic nature of local markets no longer exists, and the penetration of MTFS into major financial centers has been a huge success in several countries since the implementation of MiFID.

- **United Kingdom**: The most liquid and largest equities market in Europe, the penetration of MTFs remains the highest within the LSE-listed stocks, with the LSE accounting for slightly less than 58% of market share. Including Turquoise, which is owned by the LSE, the combined market share of the LSE currently stands at 69%. BATS Chi-X has an impressive market share of 31% (Figure 23).

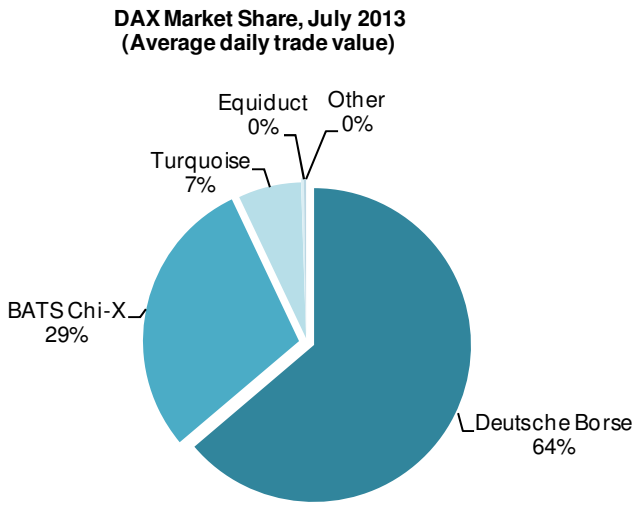
Figure 23: Market Share for FTSE 100



Source: Fidessa Fragmentation Index

- **Germany**: Deutsche Boerse currently accounts for 63% of the German market share; another strong presence, BATS Chi-X, holds 29% (Figure 24). Turquoise is a distant third at 7%, making the German market truly a competition between two execution venues.

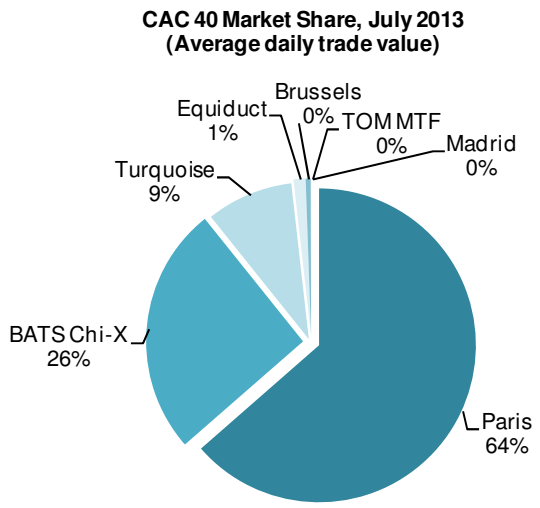
Figure 24: Market Share for DAX



Source: Fidessa Fragmentation Index

- **France**: The market share battle for French equities looks quite similar to the German market, with Paris (part of Euronext) accounting for 64% of market share and BATS Chi-X holding a strong second place at 26% (Figure 25). While Turquoise has nearly 10% of market share, the market share of Turquoise remains quite minor when compared to its main MTF competitor, BATS Chi-X (this construct is similar to that of other markets).

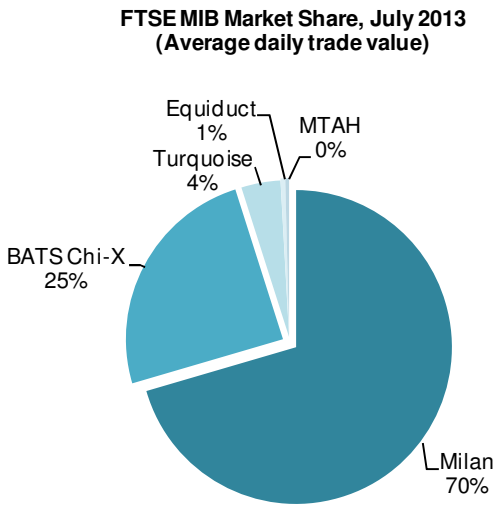
Figure 25: Market Share for CAC 40



Source: Fidessa Fragmentation Index

- **Italy:** Borsa Italiana has managed to hold onto 70% of market share in Italian equities, followed once again by BATS Chi-X at an impressive 25% market share. Turquoise once again rounds out the top three with 4% of market share (Figure 26).

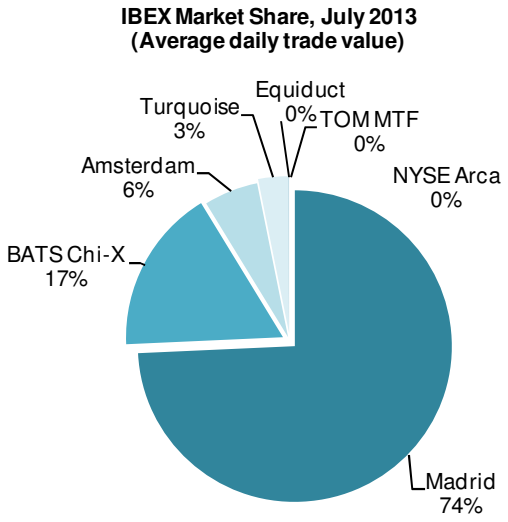
Figure 26: Market Share for FTSE MIB



Source: Fidessa Fragmentation Index

- **Spain**: One of the last markets to actually implement MiFID, Bolsa de Madrid did not face real competition until early 2012, almost five years after MiFID came into existence. Not surprisingly, then, Bolsa de Madrid has held onto 74% of Spain's equities market share. As in markets, BATS Chi-X has the second position, with 17% of market share. The position for third place remains tight, with Amsterdam and Turquoise at 6% and 3%, respectively (Figure 27). Considering that true market fragmentation did not occur until 2012, the overall penetration of MTFs into the Spanish market has been quite impressive to date.

Figure 27: Market Share for IBEX



Source: Fidessa Fragmentation Index

KEY IMPLICATIONS OF MARKET FRAGMENTATION IN EUROPE

This section will focus on implications of market fragmentation for four specific areas:

- Best execution
- Connectivity and routing
- Consolidated tape
- Self-regulation and rule-making

EUROPEAN BEST EXECUTION

Under the original MiFID directive, firms are required to formulate, maintain, and demonstrate their best execution policies and practices on behalf of their clients. They will be required to maintain a five-year history of customers' trades, own quotes, and trade execution data, as well as statistics on execution venues used to complete execution, etc. The ability to capture, store, and analyze accurate and timely trade and customer-related data was seen as the key to successful regulatory compliance. This key element of MiFID put additional pressure on the data management infrastructure of all major European market participants.

Europe's best execution regulation has been an area of contention since MiFID I, as many market participants were concerned that it was not as stringent and prescriptive as required. MEPs have included a separate clause under best execution which specifically applies to retail investors in Europe. Since MiFID I, market participants, including Knight Capital, Citadel, and Equiduct have campaigned for best execution for the retail investor. They were concerned that retail investors were not being given access to alternative venues that may provide them with better executions.

MEPs have included an amendment specific to this point: Brokers are now required to declare the top five execution venues on a quarterly, rather than annual, basis.

They have also replaced the word "reasonable" with "necessary" in the definition of best execution. MEPs also mention that advances in technology related to monitoring of best execution should be considered when applying a best execution framework, but there is no clear stipulation for what technology or methodology should be applied for monitoring best execution. The clause now reads:

> Member States shall require that investment firms take all *necessary* steps to obtain, when executing orders, the best possible result for their clients taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order.

EUROPEAN CONNECTIVITY AND ROUTING

The need for connectivity and routing (especially SOR) grew in magnitude of importance as fragmentation infiltrated the major European financial markets. Most of the European brokers also recognized the direct relationship between best execution and establishing the appropriate connectivity and routing capabilities. As market competition increased across Europe, brokers found that ensuring connectivity to all major venues had become a competitive necessity. A crucial element of achieving competitive connectivity has been overall development of SOR capabilities.

Due to the complexity involved in aggregating data and defining appropriate routing parameters within the SOR engine, the evolution of the SOR market in Europe has not been simple. In fact, the lack of a consolidated tape to represent the pan-European market, along with the convoluted nature of the European post-trade landscape, has made leveraging SOR for best execution quite difficult. Even if one were to focus on a single factor of capturing best price, the dispersed nature of the European market and varying local interpretations of MiFID have made it so that working out where the best (all in) price is at any instant is actually a real technical challenge. MiFID I also stopped short of mandating brokers to find the best price, which meant that all they had to do was establish a written execution policy and stick to it. As an extreme example, a German broker could write in its policy that it guaranteed at least as good as the Deutsche Boerse price (irrespective of the stock), and that was perfectly acceptable and legally compliant, even if it was a foreign stock and the investor would have gotten a much better price elsewhere.

With a weak regulatory "stick" for SORs and a very complex technical implementation, the market in pure-play SOR vendor market appears fairly small for Europe. Most people simply rely on broker algos for their smart routing (they do not at present typically carry much of a premium over pure DMA). There are also market centers that provide SOR service, but only BATS Chi-X does that consistently.

In addition to the brokers, European money managers are responding to MiFID requirements with SOR implementations, both to prove best execution and to keep up with the expanding pool of liquidity choices, and they have proven to be an eager market for providers. HFT firms have also been exploring SOR providers.

Similar to other major markets, compliance with best execution requirements is a major driver for European firms, which makes the reporting capabilities of SOR a key piece of functionality.

EUROPEAN CONSOLIDATED MARKET DATA

Decreased transparency for buy-side traders—which is directly related to the lack of consolidated market data—is one of the major unintended consequences of MiFID I. Additionally, with no standardization surrounding condition codes (trade flags) or data format, creation of a consolidated tape was impossible. On top of this, many incumbent exchanges only offered market data in a bundled package of pre- and post-trade data. Pre-trade data is redundant for a consolidated tape, but paying for it in a bundled fee makes the cost of a consolidated tape drastically more expensive.

Longer term, adoption of electronic trading in Europe has been severely limited without the organization of a consolidated tape. This fragmented-data issue has created a negative scenario around fragmented liquidity, and the lack of a consolidated tape makes a fragmented liquidity landscape difficult to navigate, leading to some frustrated European market participants. This issue has been present in Europe for five years; many firms have attempted to create a solution, but the ideal scenario has yet to appear. We have, however, seen some movement toward solving this problem—incumbent exchanges now offer their market data in an unbundled form, allowing the purchase of post-trade data. Additionally, a working group of market participants has agreed upon standards related to condition codes and data format of market data.

Three consolidated tape options were proposed to the industry: the U.S. model, which involves a single tape produced by a non-profit entity, a single tape following public tender, or multiple competing tapes. The European Commission has proposed to allow multiple competing commercial tape operators, but buy-side firms have raised fears that the data will merely be fragmented across multiple—potentially incomplete—tapes under this model.

Creation of a consolidated tape in Europe would have a massive impact on best execution and market participants' ability to measure whether they are actually meeting best execution. The latest attempt at creating a consolidated tape was initiated by the COBA Project, launched in late 2012 with the vision of creating a framework for establishing a pan-European consolidated tape (focused only on post-trade data). Three key tenets of the COBA Project included the following:

- Establishing an independent consolidated tape administrator (CTA)
- Defining unified tape specifications
- Developing a pricing schedule for consolidated tape and a revenue-allocation model

This ambitious initiative ultimately failed, despite the fact that there is overwhelming recognition of a pan-European consolidated tape. Ultimately, lack of support from the key market participants made it impossible for the COBA Project to continue. Hurdles to pushing ahead with the project include the following:

- European exchanges' hesitancy to share pre-trade quote data, which they view as vital part of their current revenue stream in their local markets

- Lack of strong support from sell-side firms, which are more concerned about the impact of adopting best practices for OTC trade reporting and looking for reduction in market data costs
- Buy-side firms' unwillingness to incur additional costs for development of consolidated tape
- Data vendors were willing to adopt common technical specification and standards to enhance consolidated data quality and consistency but not fully convinced that the market would be willing to pay for just post-trade data without pre-trade quote information
- Regulators unwillingness to endorse any commercial ventures associated with consolidated tape

To a certain degree, the European market currently faces a classic chicken-or-egg dilemma: Regulators want data vendors to lead the movement toward creating a pan-European consolidated tape, but vendors are looking for a regulatory mandate to lead the way.

EUROPEAN SELF-REGULATION AND RULE-MAKING

In contrast to the U.S. regulatory regime, the concept of self-regulation has not been widely accepted in Europe. Driven by demutualization of exchanges (turning them into for-profit commercial entities) as well as the overarching regulatory framework of the EU to create a harmonized, single financial market, the major trend within the European securities market has been the overall consolidation of regulatory and supervisory market functions in the hands of government agencies.

Directives enacted by the European Commission have mandated local government regulators to assume various regulatory functions that were at one point the responsibility of exchanges. These include the following:

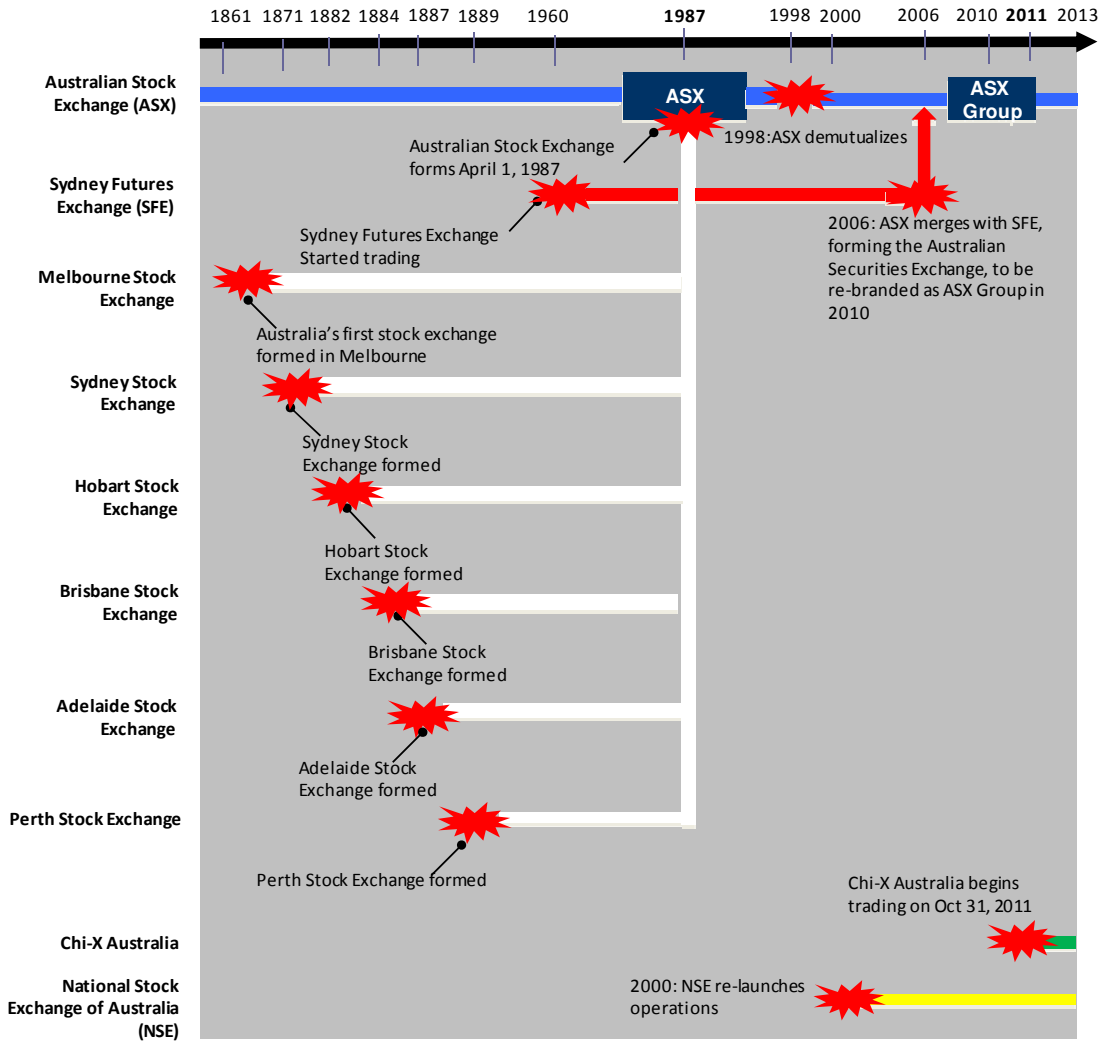
- Taking over primary responsibility for addressing market conduct
- Assuming responsibilities for approving prospectuses and for many listing functions
- Through MiFID, regulatory agencies establishing a common framework for regulating exchanges and their members

The general view within the European market has been that as exchanges continue to face competition and become public companies themselves (looking to maximize their own profit margins), it would be inappropriate for these exchanges to hold onto significant regulatory responsibilities. This separation of the commercial and regulatory aspects of running a market center is the core foundation of regulatory regimes across most of the major European financial centers. Having exchanges also performing the role of SRO has been viewed as conflict of interest potentially hindering increased competition. Still, it should be noted that most European exchanges, even without an official SRO status, continue to provide limited supervisory functions related to their markets. For example, exchanges will share the role of market surveillance to identify potential trade abuse but will typically defer to the regulator to take the lead role in the actual investigation.

MARKET STRUCTURE EVOLUTION IN AUSTRALIA

Fragmentation is still in the relatively early stages in Australia, which is one of the most recent and unique markets in which we can observe significant market structure evolution. From 1987 until 2011, Australian equity trading was almost entirely dominated by the Australian Stock Exchange (ASX), which has shared only a small portion with the state-owned National Stock Exchange (NSX) since 2000. ASX was created through legislation by the Australian Parliament that provided for the incorporation of the six previously existing stock exchanges located in the cities of Adelaide, Brisbane, Hobart, Sydney, Melbourne, and Perth.

Figure 28: Australian Market Structure Evolution



Source: Aite Group

ASX made history in 1998 when it became the fourth exchange worldwide to demutualize and the first to list on its own market—a development that was subsequently emulated by many

exchanges around the globe. After demutualization, ASX pursued a number of strategic commercial initiatives, including a successful merger with the Sydney Futures Exchange (replacing the name Australian Stock Exchange with Australian Securities Exchange), and proceeded to evolve into a fully vertically integrated business, down to the clearing and settlement level. ASX's monopoly on the Australian capital market remained until October 2011, when Chi-X Australia opened its doors to market participants. While market participants are generally still undecided on whether the ultimate costs of fragmentation will outweigh the benefits, most have accepted the recent market structure changes, signifying the end of ASX's monopoly as inevitable.

MAJOR REGULATORY EVENTS IN AUSTRALIA

The first significant regulatory change that set the Australian market on the path leading to today's reality involved consolidation instead of fragmentation, when the Australian Parliament legislated the amalgamation of the country's existing six securities exchanges. This development birthed the modern Australian securities market and allowed ASX to emerge as the trading center for the equities market. At this time, the newly formed ASX launched the Stock Exchange Automated Trading System (SEATS), one of the first fully automated trading platforms of its kind, thus providing an ideal environment to grow the freshly amalgamated Australian market's liquidity.

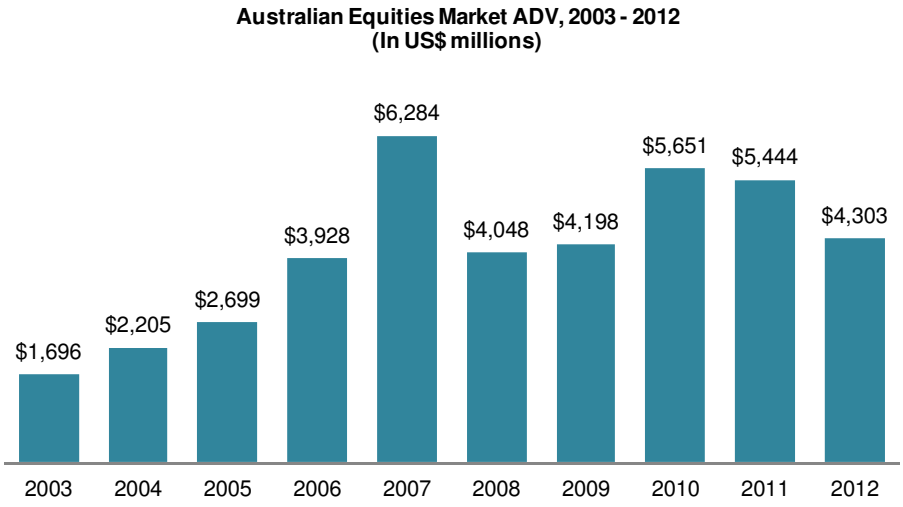
The next regulatory milestone for the Australian market opened the door for the demutualization of ASX. In December 1997, regulatory authority the Australian Securities and Investments Commission (ASIC), augmented the existing Corporations Law to allow for the possibility of demutualization. This development arrived in response to proposals from ASX and over 96% approval of demutualization from ASX members, with the goal of allowing the exchange to increase flexibility, funding, and its ability to take advantage of commercial opportunities. Essentially, ASX would have the opportunity to grow as a business.[1] For market structure and regulation, the key effects of this legislative change involved introducing the concept of shifting supervisory responsibilities to ASIC (which operates with legislative authority)[2] instead of ASX in order to prevent conflicts of interest. This concept of regulatory transference was later codified in the Corporations Act of 2001.

More than a decade after demutualization, Australian trading had grown sufficiently in liquidity and sophistication to spur serious regulatory discussions regarding the viability of introducing competition in the exchange space (Figure 29). In August 2009, the Australian Government announced the decision to transfer supervisory responsibility to the umbrella of ASIC, resulting in an amendment to the Corporations Act of 2001, the Corporations Amendment (Financial Market Supervision) 2010—the key piece of legislation ultimately facilitated market structure fragmentation**.** Passed in March 2010 and implemented in August 2010, the Financial Market Supervision Act provided the legal basis for ASIC to issue a series of Market Integrity Rules (MIRs) governing ASX and any other eventual entrants in the exchange landscape.

1. "Market Demutualisation and Cross Border Alliances," Jillian Segal, ASIC, April 2002.

2. Regulations set forth by ASIC must be given Ministerial consent and may be disallowed by Parliament.

Figure 29: Australian Equities Market ADV Evolution



Source: WFE

Placing oversight of the capital markets entirely in the hands of the government-backed regulatory body was the crucial first step toward building a market structure conducive to new entrants, and thus allowed ASIC to responsibly license Chi-X Australia as an exchange operator. As a result of this mandate, ASX was compelled to overhaul several of its operating rules as well as rebrand certain subsidiary entities, including ASX Market Supervision, which became ASX Compliance.

ASIC's Market Integrity Rules were not written with the intention of dramatically changing the existing functional regulatory regime. Rather, the regulations were issued with the intention of creating fairness in a fragmented marketplace, specifying risk management as a guiding fundamental principle. Table E summarizes ASIC's market integrity legislation for existing venues of all types, although ASX and Chi-X Australia are the only significant equity trading venues in terms of market share.

Table E: Australian Market Integrity Rules

ASIC Regulation	Venue(s)	Key Components
Market Integrity Rules (ASX Market) 2010	ASX	Participants and representatives, client relationships, records, trading, takeovers, market operators, capital requirements, accounts and audit, futures market transactions, capital liquidity requirements, net tangible asset requirements, risk requirements (counterparty, large exposure, positions, underwriting)
Market Integrity Rules (ASX 24 Market) 2010	ASX 24 (SFE)	Market participants, trading principles, market operator, capital requirements, accounts and audits, margins and right of close out
Market Integrity Rules (Chi-X	Chi-X	Participants and representatives, client relationships, records, trading, takeovers, market operators, capital requirements, accounts and audit,

ASIC Regulation	Venue(s)	Key Components
Australia Market) 2011	Australia	futures market transactions, capital liquidity requirements, net tangible asset requirements, risk requirements (counterparty, large exposure, positions, underwriting)
Market Integrity Rules (APX Market) 2010	APX Energy Exchange	Market participants, trading responsibility of market participants, conduct of others
Market Integrity Rules (IMB Market) 2010	IMB Ltd.	Market participants
Market Integrity Rules (NSXA Market) 2010	NSXA	Market participant business and activities, discretionary accounts and managed funds, trading principles, financial requirements and recordkeeping
Market Integrity Rules (SIM VSE) 2010	SIM VSE	Market participants, financial records and arrangements, trading requirements, market participant business

Source: ASIC

In addition to the regulatory documents covering specific venues, ASIC also released Market Integrity Rules for Competition in Exchange Markets (2011), setting out overarching regulatory principles applicable to all market participants and covering following areas:

- Extreme price movements—including order entry, extreme cancellation range, and transparent cancellation policies
- Best execution
- Pre-trade transparency—including reporting requirements for crossing systems
- Post-trade transparency
- Market operators— including trading suspensions, information sharing, synchronized clocks, and tick sizes
- Participants—including transactions, trading suspensions, and single trade confirmations in multiple markets

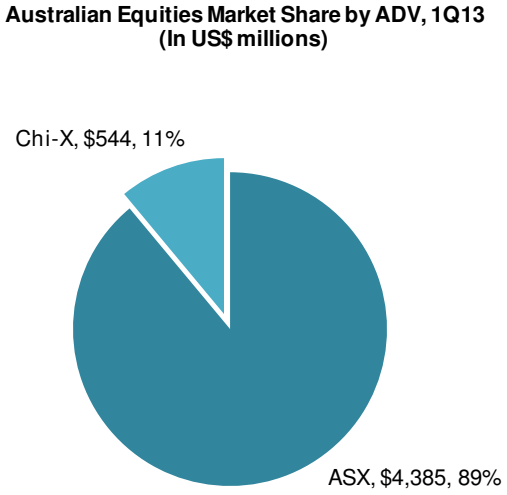
HFT activity has been increasingly falling under ASIC's radar. Estimated at comprising 20% to 25% of total market turnover, Australian HFT is facing growing scrutiny, as is HFT in many other markets. In March of 2013, ASIC released proposed amendments to the Market Integrity Rules (governing Competition, ASX, ASX 24, and Chi-X Australia), which are specifically written to cover dark pools and HFT. The proposed regulation covers client relationships, trading, pre- and post-trade transparency, and crossing systems.

SPREAD OF MARKET FRAGMENTATION IN AUSTRALIA

Without question, the Australian equities market has transformed since the introduction of competition a mere 20 months prior to this writing. Of the markets included in this study, Australia is unique in its experience of fragmentation; moreover, its market structure evolution is still in the relatively early stages. Unlike the United States, Europe, and Canada, the Australian market greeted the introduction of competition with only one existing exchange dominating 99% of trading and equity ADV accounting for only 2% of global volume. Additionally, the structural shift has brought only bilateral trading, resulting in a duopoly instead of a heavily fragmented market. These unusual characteristics also provide us with interesting results to consider—results that could infer a relevant precedent for other markets with similar characteristics.

Chi-X Australia launched trading on October 31, 2011, offering six equity listings and two ETFs during an initial testing period.[3] The remaining ASX200 constituents and ASX-listed ETFs were incorporated nine days later, with all ASX-listed stocks trading on Chi-X Australia by May 2013. Market share for the competitor moved in tandem, slowly reaching by 5% in August 2012, but doubling to 10% by the end of the year. Chi-X Australia market share now represents 12% to 17% of Australian value traded and 15% to 18% of shares traded. Figure 30 and Figure 31 display the fragmentation of Australian trading during Q1 2013.[4] Chi-X Australia speculates that its market share could rise to 20% by the second half of 2013.

Figure 30: Australian Equities Market Share, Value Traded

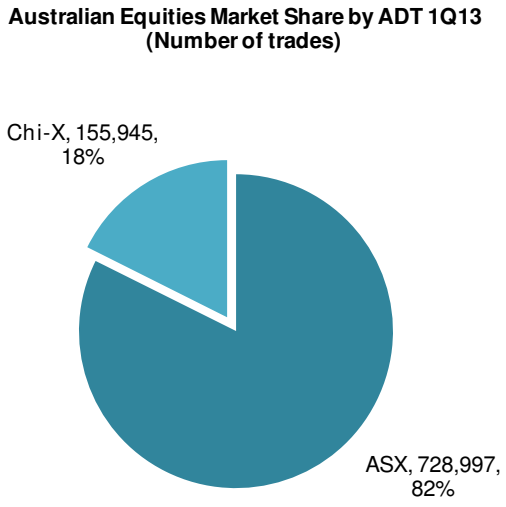


Source: ASIC, WFE

3. Consisting of Australia's six most liquid stocks, BHP, CSL, LEI, ORG, QBE, WOW, and two ETFs, STW and ISO.

4. The National Stock Exchange (NSX) also trades Australian equities but accounts for less than 1% of ADV, so it has not been included here.

Figure 31: Australian Equities Market Share, Number of Trades



Source: ASIC, WFE

A sizeable part of Chi-X Australia's success can be attributed to its significant retail investor participation, reported at 31% of aggressive order flow, or more than double the equivalent proportion on ASX. Much of this popularity is due to Chi-X Australia's efficient midpoint order system, which has allowed retail investors to see tangible price improvement.

Not all Australian liquidity is represented by official trading data, however; there is still unlit activity to account for. In addition to the execution venues offered by ASX (Table F: ASX Additional Execution Venues), a number of dark crossing systems are provided by market participants and other third parties, such as Liquidnet, in addition to networks that automatically match client order flow, such as Price Improvement Network (UBS), CrossFinder (Credit Suisse), and Sigma X (Goldman Sachs).

Table F: ASX Additional Execution Venues

Name	Description
VolumeMatch	An ASX-operated venue that facilitates the matching of large orders (over US$1 million)
CentrePoint	An ASX-operated venue that references the midpoint of the bid-ask spread on ASX's CLOB; they are anonymous unpriced orders that are executed in time priority
PureMatch	A parallel CLOB aimed at HFTs and other users of high-speed trading technology, it allows trading in the 200 most liquid securities and seeks to encourage HFTs

Source: ASX

KEY IMPLICATIONS OF MARKET FRAGMENTATION IN AUSTRALIA

This section will focus on implications of market fragmentation for four specific areas:

- Best execution
- Connectivity and routing
- Consolidated tape
- Self-regulation and rule-making

AUSTRALIAN BEST EXECUTION

At the highest level, ASIC has defined the meaning of best execution to be that "participants must take reasonable steps to obtain the best outcome for [a] client" during the order and execution process. The maximum penalty for violators of the best execution policy is A$1 million. ASIC differentiates between retail and institutional clients when delineating the specifics of this definition:

- **Retail clients:** For retail clients who have not given specific instructions, ASIC defines the "best outcome" as the best Total Consideration.
- **Institutional clients:** For institutional clients who have not given specific instructions, ASIC defines the "best outcome" as either or any combination of price, costs, Total Consideration, speed, likelihood of execution, or other relevant outcome.

For both retail and institutional clients, ASIC has provided exceptions to the best execution obligation in the case of conflicting specific instructions given by the client. The participant must take the same "reasonable steps" to execute the order as the client specifies as long as those instructions meet certain criteria:

- The conflicting instructions are expressed clearly and unambiguously in writing or verbal recording (if the instructions are verbal, the recording must be retained for seven years).
- The conflicting instructions must also be specific to an order:
  - There are no exceptions to this for retail investors—conflicting instructions cannot be accepted in the form of any standing agreement.
  - For institutional clients, conflicting instructions can be accepted as standing instructions but must be separate from the standard terms and conditions of a client agreement; additionally, the conflicting standing instructions must be reviewed periodically and must be renewed after a one-year period.
- The participants cannot in any way encourage or induce clients to give conflicting instructions.

ASIC also specifies additional requirements and restrictions for participants, which must document the process of complying with all policies and procedures, specifically:

- Order books or equivalents
- Methods of handling and executing client orders, and circumstances under which parts of the process will be automated or manual
- Agreements to monitor compliance policies

Pricing between the two exchanges tends to work in tandem due to the market forces of arbitrage, and best execution means slightly different things to retail vs. institutional customers. For retail brokers, their mandate is to deliver the best end result to the customer, whereas institutional brokers' mandate is to dictate their cost basis.

AUSTRALIAN CONNECTIVITY AND ROUTING

The launch of Chi-X Australia operations understandably triggered speculation regarding prospects for SOR technology and additional connectivity in Australia, compounded by the market's healthy level of participation by high frequency traders. Given that ASX has used the automated trading system SEATS since its formation in 1987, when the technology was among the first of its kind, most participants were already using updated connectivity infrastructure when the arrival of an additional exchange revitalized market opportunities. Nearly immediately after ASIC's intention to facilitate market fragmentation became clear, ASX collaborated with Fidessa to launch ASX Best, an SOR platform that upgraded the existing ASX Workstation by providing routing and data consolidation capabilities.

Chi-X Australia experienced relatively few hurdles related to connectivity, as it was met with multiple favorable conditions upon commencing operations. Australia's market has always tended toward a high concentration of institutional investors, a result of its sizeable pension fund assets, which naturally attracts a high number of global brokerage houses with enhanced connectivity infrastructure, thus requiring little investment to connect to the new market entrant. Additionally, Chi-X Australia benefitted from its existing relationships with many global brokerages, formed during the course of the exchange's experience in other markets. The exchange also reports success with retail brokerages as a result of the attractiveness of its fee structure and midpoint crossing services for retain investors. In addition to Australian market leader IRESS, which has been connected to Chi-X Australia since the start of trading, many leading global providers now provide connectivity to the new venue, including SunGard, Broadridge, Fidessa, and Equinix (the primary data center for Chi-X Australia's matching engine).

SOR capabilities will become increasingly essential as Chi-X Australia's market share expands. Many Australian broker-dealers, particularly the larger banks, are considering or are in the process of developing proprietary SORs, hoping to develop new differentiating products. Moreover, many Australian buy-side firms are said to be considering near-term adoption of TCA platforms, which should serve to compound the demand for accurate and timely execution data extraction.

AUSTRALIAN CONSOLIDATED MARKET DATA

When ASIC began issuing the Market Integrity Rules to set the stage for the introduction of competition, the regulator also recognized that producing consolidated pre- and post-trade data is necessary in a fragmented marketplace in order to achieve best execution. Departing from the Canadian model of a single, regulator-chosen provider, ASIC decided that multiple private consolidators would be allowed to provide consolidated tape offerings, a framework overwhelmingly favored by market participants. In order to be sold to the marketplace, however, consolidated feeds must meet certain regulatory standards that [5] govern the following areas:

- **Minimum service standards**: ASIC has defined the minimum service for data consolidators as top five bids and offers as well as all post-trade information.
- **Fairness in availability and fees**: Data must be offered equally to all customers, and fees for individual components should be offered separately; additionally, data should be available at no charge after a short delay.
- **Quality of data**: Data should be validated in real-time.
- **Systems and technology**: Providers must ensure control over their systems and procedures to manage disruptions.
- **Organizational governance**: Providers must have procedures in place to prevent conflicts of interest.
- **Data security**: Appropriate measures should be in place to ensure data security and integrity.

Interesting, developing quality consolidated data after fragmentation is notably less of a challenge in the Australian market than it has been in certain other markets, due to participants' longstanding emphasis on the ability to view full market depth. Likewise, ASX market data products have never differentiated between Level I and Level II data – the default offering has always been Level II with full market depth, providing a panorama of both light and dark trading. Not surprisingly, ASX market data has also historically been more expensive in comparison to other exchanges around the world. Chi-X Australia currently does not charge for market data.

AUSTRALIAN SELF-REGULATION AND RULE-MAKING

As described earlier in this section, the first transformation in the self-regulatory regime maintained by ASX since its formation in 1987 occurred in order to manage potential conflicts of interest stemming from the demutualization and self-listing of ASX. The Parliamentary legislation that made demutualization possible introduced the concept of shifting regulatory burden, which was later codified in greater detail in the Corporations Act of 2001. Key areas brought to attention included:

- Market surveillance obligations of exchanges
- Reporting and compliance requirements for exchanges

5. Explained in detail in ASIC Regulatory Guide 223.283

- Enhanced regulatory powers related to auditing and exchange compliance
- Appointment of ASIC as the listing authority for ASX, while ASX fulfills this role for other listed entities

Adopting all formerly self-regulatory obligations in 2010 to facilitate the introduction of competition imposed significant costs for ASIC and ultimately the Australian government. Table G displays a summary of additional regulatory obligations.

Table G: ASIC Responsibilities Before and After Assuming Regulatory Obligation

Before Obligation	Additional After Obligation
Assessing and undertaking preliminary reviews of referrals from exchanges	Real-time market surveillance and post-trade analysis to identify breaches of MIRs
Investigations on enforcement actions on cases referred by the exchange	Monitoring compliance with MIRs
Enforcement actions against breaches of Corporations Act	Administering disciplinary framework for breaches of MIRs
Monitoring participant conduct against their obligations under the Corporations Act, including licensing requirements	

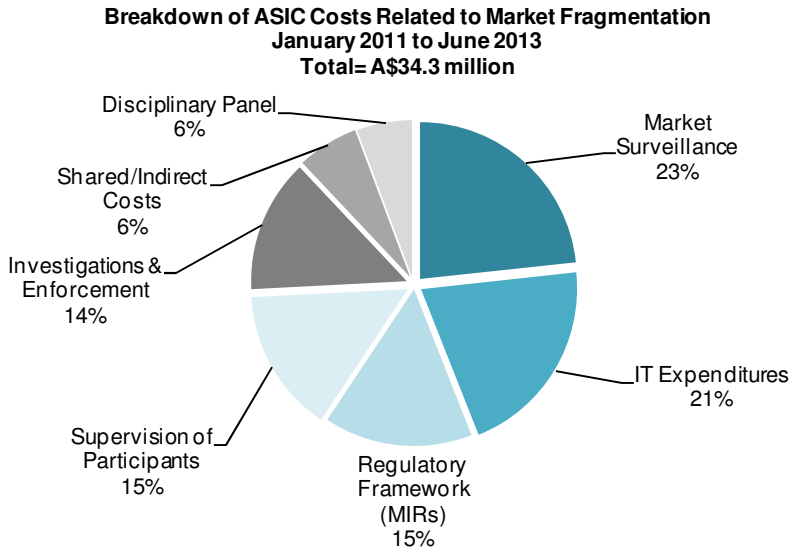
Source: ASIC

From January 2011 to June 2013, ASIC's total additional costs incurred as a result of the new regulatory functions necessitated by market fragmentation stood at A$34.3 million, which was somewhat evenly split between the cost of implementing the policy to promote market competition and the transfer of supervision. Unsurprisingly, the largest individual portion of these expenditures encompassed either direct or indirect related to market surveillance needs.

Technology infrastructure, which includes continuing upgrades to ASIC's Integrated Market Surveillance System (IMSS)[6], necessitated the largest portion of spending, followed closely by direct costs related to executing the market surveillance function (including real-time surveillance). Figure 32 provides a detailed breakdown of ASIC's expenditure allocation during the period of January 2011 to June 2013. We note that ASIC reports an additional A$7.7 million spent from August 2010 to June 2011, bringing the total cost of introducing competition to the Australian exchange to A$42 million.

6. ASIC purchased the IMSS, provided by NASDAQ SMARTS, in March of 2010.

Figure 32: Costs Incurred by ASIC Related to Market Fragmentation



Source: ASIC, Aite Group

To recoup the expenditures associated with its new role in market supervision, ASIC instituted a cost-recovery policy by activating a charge-back mechanism put in place by the Australian Government in 2002. The cost-recovery schedule is levied in the form of fees and varies by market participant, with the variance related to the portion of costs incurred by the specific participant. Chi-X Australia and ASX also pay additional fixed and variable fees on a quarterly basis. The types of charges required by ASIC are summarized below:

- **Fixed fees for market centers:** Both Chi-X Australia and ASX are charged certain fixed fees per quarter, although they are not equal (Chi-X Australia pays 64% more per quarter). Quarterly fees relate to specific costs, such as:
  - Setting up real-time surveillance with the ASIC IMSS
  - Connecting the ASIC IMSS to trading platforms
- **Variable fees:** ASIC charges activity-based fees based on the number of transactions and number of messages reported during a period. Each participant's responsibility is determined by market share and portion of costs.
- **Minimum trading fees for participants:** Beginning in July 2013, ASIC imposed a flat minimum trading fee of A$ 1,835 per quarter on market participants in additional to the variable fees, reasoning that the pool of regulatory resources is available to all direct participants regardless of activity.
- **Futures market fee:** ASX 24 pays a separate fixed fee per quarter.
- **Smaller markets fee:** NSX, SIM, IMB, and APX each pay a minimal fixed fee for market surveillance, which is not real-time.

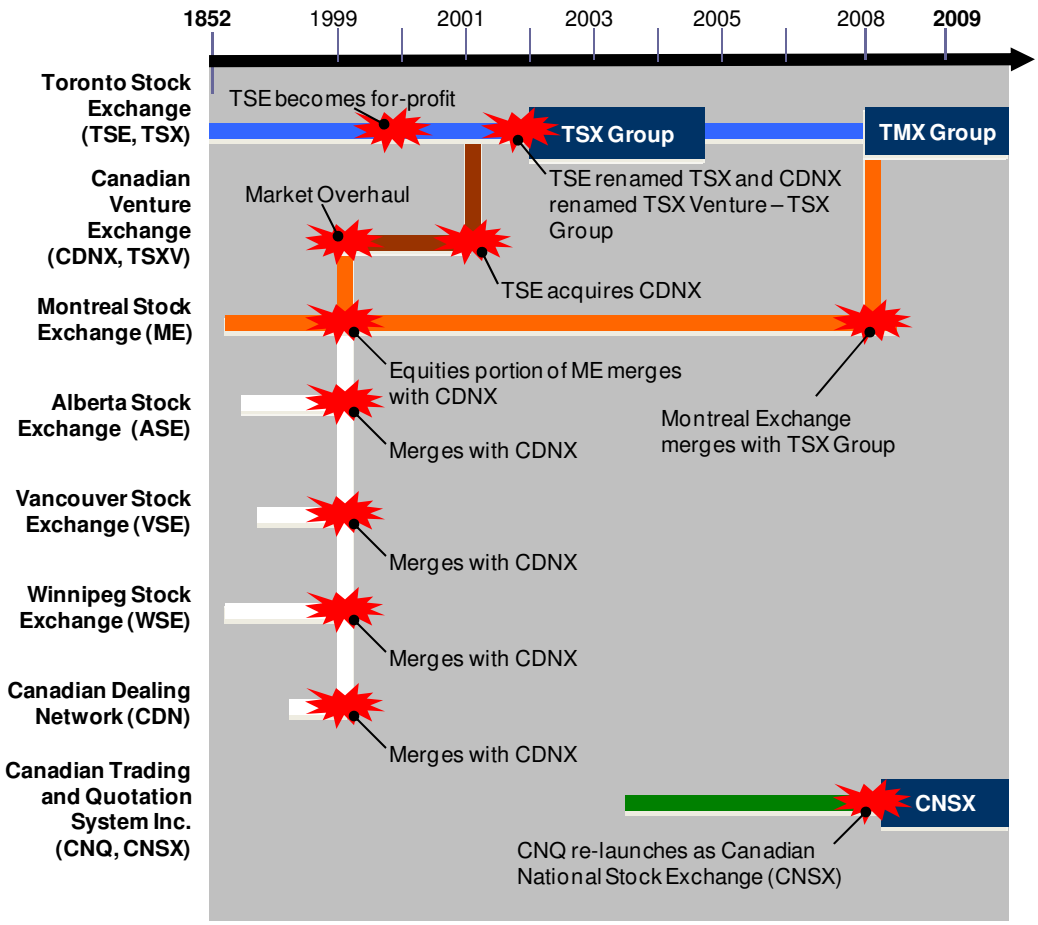
Market participants are divided as to whether the costs of introducing competition have been worth the benefits. While some recently produced academic studies argue that the answer is yes—in terms of improved price discovery and smaller bid-ask spreads—institutional players in Australian trading tend to be somewhat agnostic about whether the costs have been justified, although most consider the new multi-market structure to be a long-term positive development. However, we note that many smaller domestic participants are strongly and vocally displeased with the total cost burden, particularly since ASIC's recent introduction of a quarterly minimum trading fee. Indeed, in an environment of limited trading volume, the ultimate cost-benefit outcome of fragmentation is likely to be more favorable for Australia's global institutional market participants.

MARKET STRUCTURE EVOLUTION IN CANADA

The landscape of the Canadian equities market has gone through several drastic changes in the past decade. Almost 10 years ago, the Canadian exchanges overhauled their entire market structure, leaving the domestic market with a sole exchange for senior equities: the Toronto Stock Exchange (TSX). This restructuring also left Canada with two national exchanges for junior equities: the Canadian Venture Exchange (CDNX) and the Canadian Trading and Quotation System (CNQ, Figure 33).

Approximately two years after the restructuring of the Canadian exchanges was completed, the TSX began leveraging its dominance in senior equities and acquired the small junior equities exchange CDNX, which was renamed TSX Venture Exchange (TSXV). The TMX Group—a Canadian exchange conglomerate comprising the TSX, the TSX Venture Exchange, and the Montreal Exchange—was formed in 2008. Despite what is essentially a monopoly held by the TMX Group in the Canadian market, the exchange consolidations were in part a strategic move, accelerated by the arrival of ATSs.

Figure 33: Consolidation in the Canadian Exchange Market



Source: TMX, CNSX

The Canadian equities market currently resembles the U.S equities market in terms of competitive structure. While the consequences of market fragmentation and overall adoption of electronic trading have become growing concerns in the Canadian equities market for regulators and market participants alike, it has not hindered the rise and growth of ATSs in Canada.

MAJOR REGULATORY EVENTS IN CANADA

The entrance and operation of ATSs in Canada would not have been possible without a change in equities market regulations opening the doors for such platforms. In July 1999, shortly after the reorganization of the Canadian stock exchanges, the Canadian Securities Administrators (CSA) proposed and passed legislation to this effect. Called the National Instrument Marketplace Operations 21-101 (NI 21-101) and the National Instrument 23-101 (NI 23-101), or the "ATS Rules," the legislation allowed ATSs to operate in Canada and created a framework for the operation of exchanges and ATSs. (The success of ATSs in the neighboring United States and the European markets positively influenced the decision.) ATS rules were enacted in December 2001, creating the framework for the regulation of these alternative trading systems.

Canada's main set of trading rules governing equities trading was enacted in 2002 by Market Regulation Services Inc. (RS), the predecessor to the Investment Industry Regulatory Organization of Canada (IIROC). All trading of equity securities in Canada became subject to this new trading rules, called the Universal Market Integrity Rules (UMIR). Prior to implementation of UMIR, each exchange had its own set of rules to regulate its market. Because of expected increased competition in the Canadian equities market, UMIR was established to ensure universal set of rules that can govern activities across the different venues and eliminate the chances of potential regulatory arbitrage. Ultimately, UMIR was developed to ensure "integrity, and a fair, orderly marketplace."

The CSA decided to go with a competitive market model, which calls for competing pools of liquidity that operate as separate entities and are required to report to a regulatory body. The proposed plan was executed in a two-step process:

- The first phase got all pre- and post-trade data among all liquidity pools reporting to one system to provide BBO prices on equity trades. This single system is responsible for consolidating and maintaining all the data for public record and trading benchmarks.
- The second phase involved market integration, in which all stock exchanges were permitted to route orders through all trading systems.

In terms of operational guidelines, ATSs in Canada have the option of becoming an exchange or becoming a dealer or member of an exchange. If the ATS is a member of either an exchange or dealer, it must become a member of IIROC.

Similar to the U.S. and European markets, Canadian regulators are contemplating various potential regulatory changes in the marketplace in light of increased market competition and overall changes in market structure, driven by previous regulatory changes, technology

innovation, and the entrance of new market participants. Some of the key regulatory issues related to institutional equities trading include the following:

- **Change in trade-through rule responsibility**: The trade-through rule (aka order protection rule), mandates that an order needs to be routed to an execution venue with the best price. Previously in Canada, the broker-dealer had the responsibility of upholding the trade-through rule. Starting in February 2011, the obligation now resides with execution venues, requiring them to develop and maintain specific policies and procedures to ensure order protection. While trade through rule also exists in the U.S. market, one major difference is that this applies to depth of book in the Canadian market; in the U.S. market, it only applies to top of book.
- **Dark pool regulation**: In April 2012, CSA and IIROC released their final regulations related to dark pools, mandating the following:
  - All visible orders must have priority over dark orders if interacting on the same venue.
  - Executions taking place in dark pools whose shares are 5,000 or less must give the active participant at least a full-tick price improvement over the Canadian NBBO (or half a tick if the spread is only a single-tick wide).
  - Price improvement is not mandated for those orders whose value is greater than C$100,000.
  - Dark orders meeting the characteristics of under 5,000 shares and less than C$100,000 and originating from Canada cannot trade on U.S. dark pools unless they also receive a full single-tick price improvement.
- **Broker preferencing**: Very unique to Canadian market structure, the practice of broker preferencing enables brokers to cross buy and sell orders on exchanges and ATSs while jumping the queue of other orders that may have entered the market first. TMX has been providing broker preferencing since the late 1990s to attract flow from large Canadian brokers, which has also helped maintain overall market transparency (the resulting trades are printed directly to TMX). Broker preferencing in essence enables large Canadian brokers to internalize on various execution venues, a practice that could potentially disadvantage smaller brokers that lack enough liquidity to internalize. The major issue here is that if the regulator bans broker preferencing, all of the major Canadian brokers may be tempted to develop their own crossing platforms, leading to a huge increase in dark pool activities in Canada.
- **Directed action order:** Parties initiating orders have the ability to select the venue where the trade is to be executed. The "directed action order" acts as an instruction to the marketplace on which the order is entered not to check for better-priced orders on other marketplaces and to immediately execute or book the order (in which case the Participant or Access Person entering the order assumes the responsibility for the execution or booking of the order not to result in a trade-through). In using a directed action order, the

Participant or Access Person assumes the obligation for trade-through protection, and the marketplace executes the order without delay or regard to any other, better-priced orders displayed by another marketplace. In order to be able to use a directed action order, the Order Protection Rule requires that the person entering the order must "establish, maintain and ensure compliance with written policies and procedures that are reasonably designed to prevent trade-throughs."

- **NI 23-103:** Essentially, under NI 23-103, market participants are required to establish, document, implement, maintain, and enforce risk management policies and supervisory controls, reasonably designed in accordance with prudent business practices, to manage "the financial, regulatory and other risks associated with marketplace access or providing clients with direct electronic access." These policies and procedures must ensure that all trades are monitored; specifically required are automated pre-trade controls and regular post-trade checking. Marketplace participants must regularly assess the effectiveness of their risk management program, including services provided by independent third parties or delegated to an investment dealer. (Conditions are attached to delegating control over risk management activities to a dealer.)

  The CSA also singles out automated order systems for special attention: Their use must not interfere with fair and orderly markets, participants must understand them sufficiently well to manage the risks they pose, they must be tested at least annually, and participants must "have controls in place to immediately and at any time disable the automated order system to prevent orders generated by the automated order system from reaching a marketplace."

  CSA made final amendments to the existing NI 23-103 in July 2013, which governs electronic trading and market access. The CSA first published NI 23-103 for comments in April 2011 finalized it in June 2012 without the direct electronic access (DEA)-related provisions to allow the CSA sufficient time to align these requirements with amendments to IIROC's UMIR. Prior to this, rules regarding DEA were being set by individual execution venues but not necessarily uniformly. Amendments made to NI 23-103 essentially ban naked access and require dealers to ensure that proper controls are in place to monitor risks associated with trading on a market-wide basis.

SPREAD OF MARKET FRAGMENTATION IN CANADA

The Canadian equities market has been quietly going through major market structure changes over the last five years. Often overlooked by its much larger neighbor down south, the Canadian market has nonetheless transformed considerably since the introduction of first ATS in the market in 2005.Most recently, after spurning the courtship of the LSE, the TMX Group was ultimately acquired by the Maple Group,[7] a consortium of major market players in Canada.

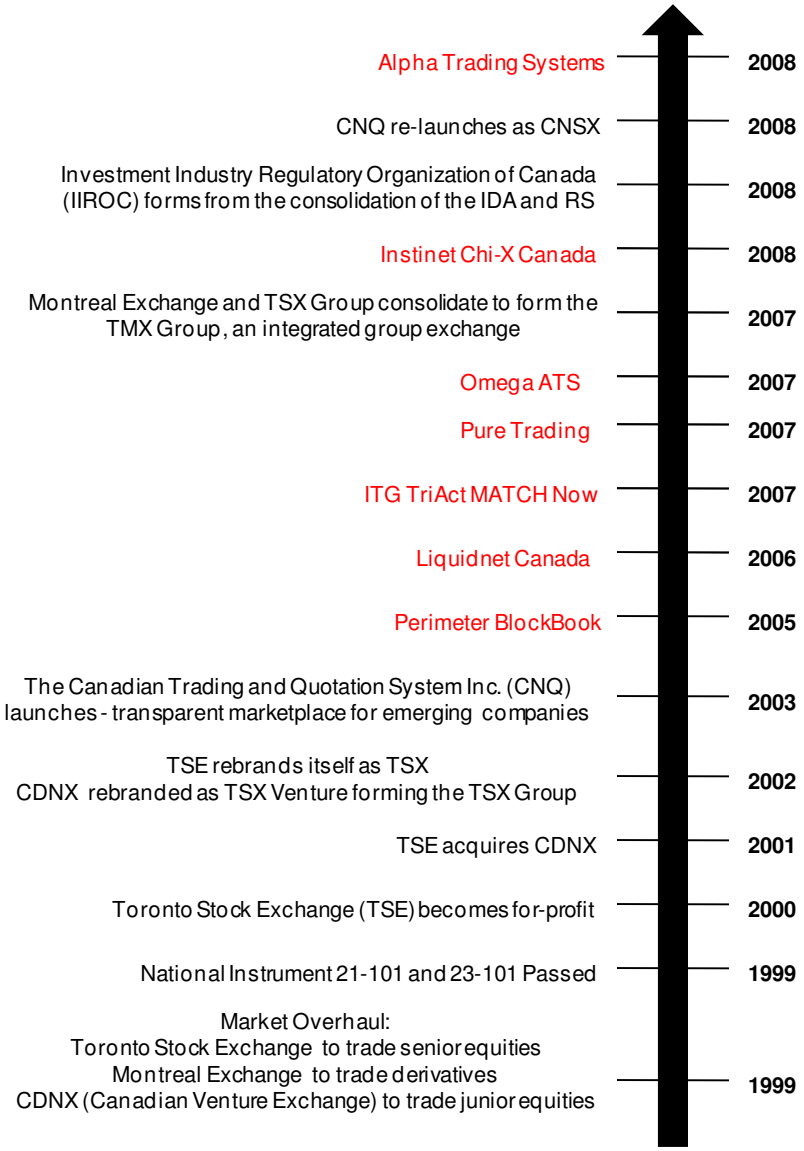
7. Maple Group members include Toronto Dominion Bank, CIBC, National Bank of Canada, Bank of Nova Scotia Canada, Alberta Investment Management Corp, Caisse de depot et placement du Quebec,

Maple Group also acquired Alpha Trading, the largest ATS in the Canadian market, which also happened to be a broker-owned platform.

Initially though, the overall adoption of ATSs in Canada had a slow start due to the fact that both buy-side and sell-side firms were reluctant to participate. Dealers were hesitant to invest in order routing technology needed to participate in ATSs, and the advantages for clients were simply not embraced. As first set of ATSs emerged, the TMX took notice right away based on the experience of its peers based in the United States. The market overhaul and the various TMX acquisitions leading up to 2008 can be viewed as a pre-emptive measure to face the competition. In an attempt to avoid losing drastic amounts of market share, the TMX Group took measures to decrease trading costs and develop competitive technologies. In October 2008, the TMX Group announced a series of changes to its fee schedule for equity trading as well as a new Electronic Liquidity Provider (ELP) incentive program for the TSX. The ELP program offers aggressive fee incentives to experienced high-velocity traders who use proprietary capital and passive electronic strategies on the TSX Central Limit Order Book. These changes were intended to enhance trading activity and liquidity on TSX and TSX Venture Exchange, and to provide cost savings for all marketplace participants.

Canada Pension Plan Investment Board, Fonds de solidarite des travailleurs du Quebec, Ontario Teachers' Pension Plan Board, Desjardins Financial Group, GMP Capital, Dundee Capital Markets, and Manulife Financial.

Figure 34: Canadian ATS Timeline



Source: Aite Group

Since 2005, there has been an emergence of alternative execution venues outside of the exchanges in Canada: Alpha Trading Systems, Chi-X Canada, Liquidnet, MATCH Now, Omega ATS, and Pure Trading. Liquidnet Canada began operations in 2006. ITG TriAct's MATCH Now, Omega ATS, and Pure Trading launched in 2007, and Alpha Trading Systems and Chi-X Canada came into the market in 2008.

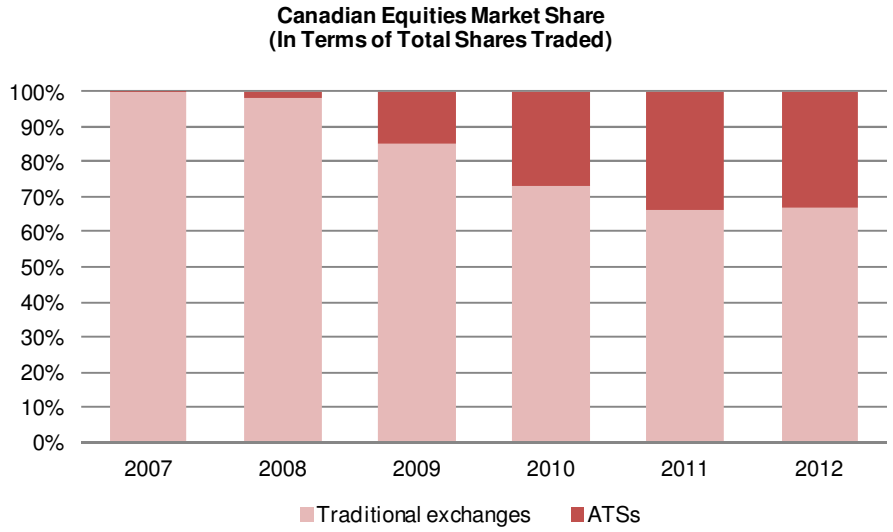
Though the much-anticipated arrival of Alpha Trading Systems (due to its broker ownership structure) and Instinet's Chi-X Canada (due to Chi-X's enormous success in Europe) signaled a new wave of competition in Canada, the competition within the Canadian equities market has not been a smooth one for ATSs when compared to the U.S. market. In fact, Perimeter Financial's BlockBook was the first ATS to begin operations in the Canadian equities market in 2005, but it

ceased operations as of February 2009. Block trading ATSs has simply not taken off in Canada, with Liquidnet showing very little growth over the last few years.

Even so, the impact of competition in the Canadian equities market has been clearly felt. Canadian ATSs gained about 10% of the market share in March 2009 alone. This may not sound astounding overall when compared with the United States and Europe, but it showed that the grip once tightly held by the TMX was beginning to loosen rather quickly.

The overall market clout of Canadian ATSs continues to increase with a gradual buildup from 2008 to today. Regarding the overall market share of ATSs in the Canadian equities market, 2009 was the pivotal year in which the dominant position of TMX started cracking, getting below the 90% market share. By the end of 2012, TMX's market share had declined to less than in shares traded (Figure 35).

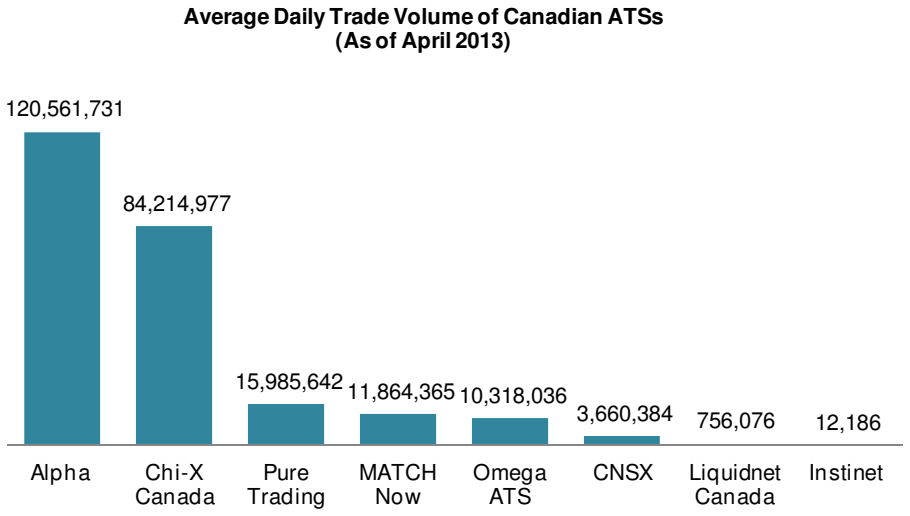
Figure 35: Growth of Canadian ATS Market



Source: IIROC

Focusing on individual ATSs, Alpha Trading System outpaces the rest of the firms in terms of average daily share volume, averaging approximately 120 million shares per day as of April 2013. At that time, the second-largest ATS was Chi-X Canada, with 84 million shares per day. There is a huge drop off in volume after the top two ATSs, with Pure Trading representing a very distant third place at 16 million shares per day (Figure 36).

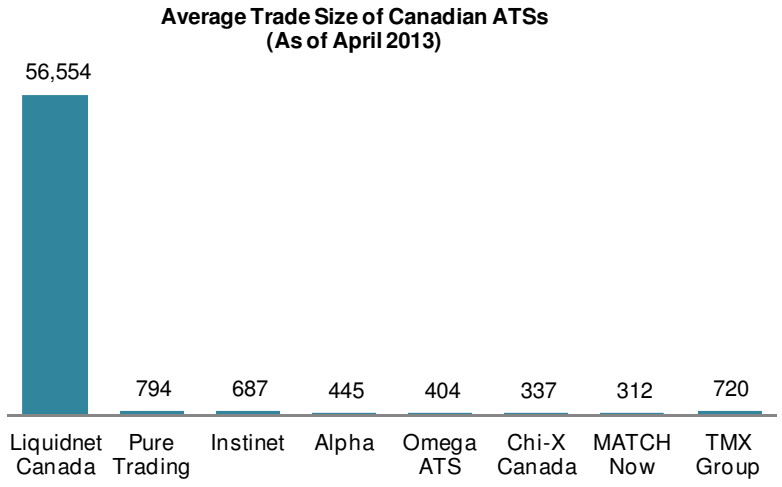
Figure 36: Average Daily Share Volume of Canadian ATSs



Source: IIROC

Not surprisingly, Liquidnet Canada has the highest average trade size (approximately 58,000 shares per trade), but it has struggled to achieve significant market share, as mentioned earlier. Pure Trading is the next highest, with 794 shares per trade. Match Now, on the other hand, had the smallest average trade size, with 312 shares per trade. As a comparison, TMX's trade size was 720 shares (Figure 37).

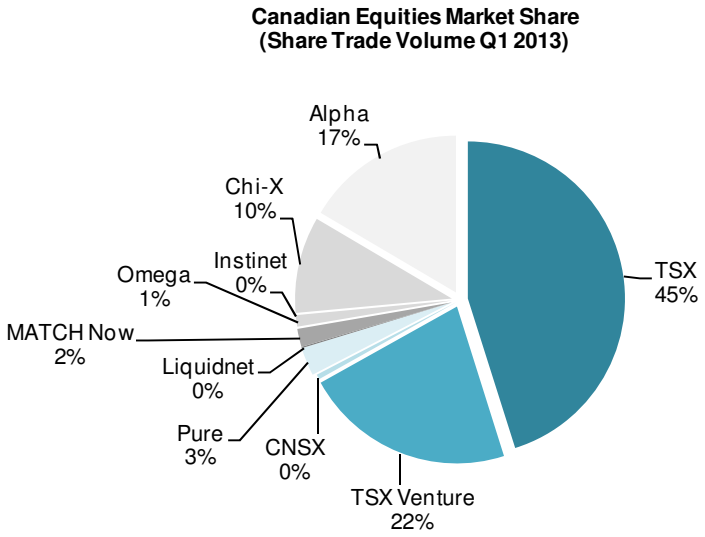
Figure 37: Average Trade Size of Canadian ATSs



Source: ATSs, IIROC, Aite Group
TMX Group figure only representing TSX average trade size

With growing competition, TMX accounted for 67% of the Canadian equities market in February 2011 by volume of shares traded, followed by Alpha, with 17% market share. Chi-X has been rapidly gaining momentum since the acquisition of Alpha by the Maple Group, and it currently represents a healthy 10% market share (Figure 38).

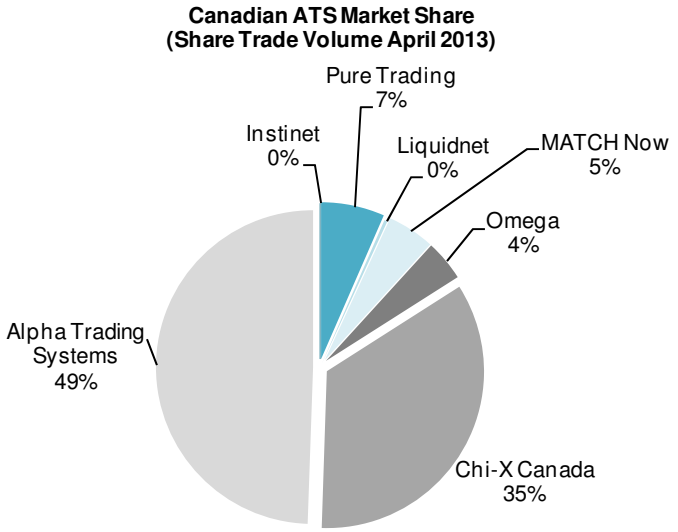
Figure 38: Market Share of Canadian Equities Market



Source: IIROC

Examining the market share battle within the ATS market alone, as of April 2013, Alpha currently occupies 49% of the market, followed by Chi-X Canada with 35%. Pure Trading represents 7% of the ATS market (Figure 39).

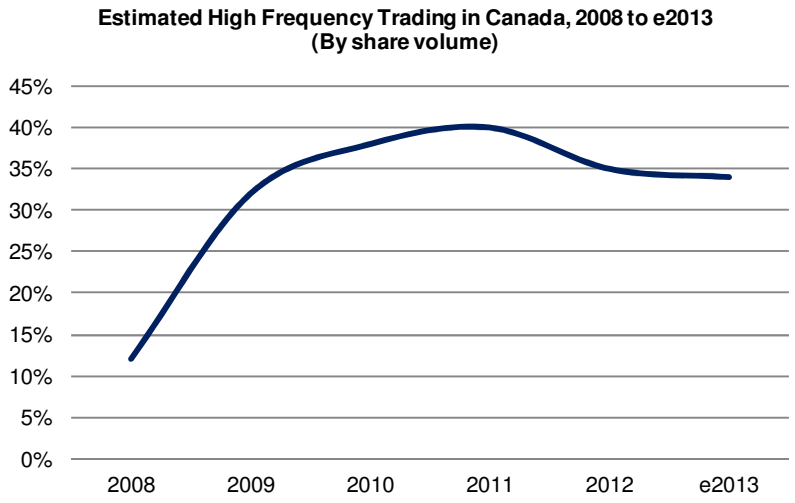
Figure 39: Market Share Analysis of Canadian ATS Market



Source: IIROC

One of the key industry discussions taking place in Canada is the role of HFT in equities market structure. The basic foundation for HFT took place starting in 2006 with emergence of alternative execution venues and introduction of maker-taker fee model in the Canadian equities market. The real influx of HFT in Canada began in earnest in 2008, with the TMX rollout of the ELP program designed to attract mostly U.S. high frequency firms into the Canadian market. The impact of HFT has been felt overnight, with 40% of the Canadian equities volume currently considered as high frequency at one point in 2011. HFT presence has gradually declined over the last couple of years as volume has declined in the Canadian equities market (Figure 40).

Figure 40: Estimated HFT Adoption in Canada



Source: Aite Group

KEY IMPLICATIONS OF MARKET FRAGMENTATION IN CANADA

This section will focus on implications of market fragmentation for four specific areas:

- Best execution
- Connectivity and routing
- Consolidated tape
- Self-regulation and rule-making

CANADIAN BEST EXECUTION

No longer dominated by a single exchange, the Canadian equities market has gone through a major transformation over the last five years since the emergence of Alpha Trading System in 2008. With the market share of TMX dipping below 70% in shares traded, Canadian buy-side traders face a drastically different market structure that has led to growing technology innovation and market complexity. Increased adoption of sophisticated trading tools required for DMA and broker-provided algorithms continues, while a certain level of uncertainty exists in the market due to potential regulatory changes.

For best execution, similar to other markets, there is high-level guidance in terms of setting policies and evaluating conditions to ensure reasonable levels of execution. More specifically, UMIR provides a list of factors that market participants need to take into consideration. A few sample factors follow:

- Execution price
- Speed of execution
- Certainty of execution
- Overall cost of transaction
- Direction of the market for the security
- Posted size on bid/offer
- Size of spread
- Liquidity of security
- Consideration for any specific client instructions

And similar to the U.S. market, Order Protection Rule does exist in Canada but that does not necessarily equate to best execution obligation. As mentioned earlier, order protection obligation, which once existed only at the broker level, is now also at the execution venue level, which has made routing capabilities among venues that much more important.

The ultimate impact of upholding the best execution obligation in a fragmented marketplace reduces down to connectivity and order routing services that can be supported by the brokers to ensure that they are meeting the necessary requirements and guidelines. While most of the

large U.S. brokers chose to build much of this infrastructure in-house, the major difference in the Canadian market has been that brokers have typically opted to use third-party vendor solutions. This divergence is largely due to timing – by the time Canada started experiencing market fragmentation, plenty of reliable third-party vendor solutions had emerged as a result of increased market fragmentation in the U.S. market.

CANADIAN CONNECTIVITY AND ROUTING

As the Canadian market has become increasingly fragmented, the need for sophisticated order routing has accordingly grown in importance. More specifically, firms now rely on SORs to make appropriate trading decisions. First-generation SORs in the Canadian market tended to focus on preventing trade-throughs, given that trade-through responsibilities initially resided with the brokers instead of the venues. As the market has continued to evolve, with the appearance of new automated trading firms (i.e., HFT), differentiated pricing schemes, and proliferation of order types, the overall functionality of SORs in the Canadian market has improved tangibly. Current leading vendors in this space are Integrated Transaction Services, IRESS, and Fidessa. Market centers such as Chi-X and Alpha have also joined this group as potential providers of SOR.

CANADIAN CONSOLIDATED MARKET DATA

The initial push for consolidated market data in Canada did not gain much traction, as most market participants believed that competition would naturally lead to multiple providers of consolidated data. In the absence of centralized, U.S.-style SIP, market centers published their data to different data vendors, leading to fragmentation in the market data space. Consolidating these various market data sources consumed many resources from vendors as well as market participants seeking to consolidated data internally. Vendors such as IRESS Canada and Thomson Reuters have also built Canadian consolidated market data solutions.

In 2009, after some years of uncertainty, the CSA selected TMX Group to assume the role of information processor, tasking the appointee with collecting, processing, and distributing consolidated market data for a period of five years. But the CSA action lacked details regarding a potential provision of revenue sharing, such as the framework that exists in the U.S. market. As part of the TMX Datalinx unit, TMX Group created the TMX Information Processor (TMX IP) to fulfill the role of data consolidator.

Despite the designation of TMX IP as the central IP, open competition continues to exist for consolidated market data, and competing products are available for market participants. At one point, Alpha collaborated with Thomson Reuters to develop a competing consolidated market data solution.

With the acquisition of Alpha, TMX Datalinx has emerged as the widely accepted collector and distributor of consolidated market data. The uncertainty in the consolidated market data space that had created pre-trade and post-trade transparency issues has been largely addressed in recent years. Establishing a stable consolidated market data source was a crucial step toward cost efficiency in this area, as relying upon a regulator-sanctioned IP to collect and distribute consolidated data ensures uniformity and eliminates the need to maintain multiple consolidated feeds. While there is nothing theoretically wrong with leveraging competing consolidated feed

vendors within a marketplace, in this case, the regulator-appointed model is the most efficient method of ensuring that best execution methods are met.

CANADIAN SELF-REGULATION AND RULE-MAKING

Unlike other major financial markets, Canada lacks a centralized, national securities regulator. The CSA, a highly proactive organization that brings the provincial securities commissions together to develop harmonized regulations, has energetically mobilized resources to address a range of issues meriting coordinated attention.

To be clear, the CSA is not a regulatory authority. The organization was formed by regulators from all the provinces and territories, and appreciating its collegial role is essential to gaining an understanding of Canada's regulatory apparatus. The CSA's stated mission is to "give Canada a securities regulatory system that protects investors from unfair, improper or fraudulent practices and fosters fair, efficient and vibrant capital markets, by developing a national system of harmonized securities regulation, policy and practice."

From a regulatory viewpoint, however, the organization's principal contribution is to provide a forum through which provincial regulators can jointly develop consistent approaches to emerging issues. The CSA's work is exemplified in the development and implementation of Passport, a system of mutual recognition through which issuers and registrants are automatically granted access to capital markets in other participating jurisdictions by obtaining a decision from their principal regulator and meeting the requirements of a single set of laws.

IIROC and the Mutual Fund Dealers Association of Canada (MFDA) are the country's major SROs:

- **IIROC**: Created in 2008 through the merger of the Investment Dealers Association and Market Regulation Services Inc., IIROC oversees all investment dealers and trading activity on Canadian debt and equity marketplaces, including exchanges and alternative trading systems. It operates under CSA oversight. Alberta, British Columbia, Newfoundland and Labrador, and Saskatchewan have delegated to IIROC the authority to register dealer firms and their individual employees or agents, while Ontario and Québec have delegated authority only to register individuals. IIROC members include TSX, TSXV, CNSX Markets, and numerous alternative trading systems.
- **MFDA**: MFDA oversees the distribution side of the Canadian mutual fund industry. It is recognized as an SRO by the regulatory authorities in Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, and Saskatchewan, and, in cooperation with the Autorité des marchés financiers, it actively participates in mutual fund regulation in Québec.

Unlike the exchanges in the U.S. market, TMX Group is not an SRO, and certain companies within the group are regulated by various securities regulatory authorities in Canada as marketplaces:

- Ontario Securities Commission (OSC): TSX, Alpha, TMX Select
- Autorité des marchés financiers (AMF): Montreal Exchange
- Alberta Securities Commission (ASC): TSX Venture, NGX

- British Columbia Securities Commission (BCSC): TSX Venture

IIROC has in recent years purchased NASDAQ SMARTS market surveillance technology platform to effectively monitor Canadian trading activities.

GLOBAL TECHNOLOGY COST IMPLICATIONS OF MARKET FRAGMENTATION

There are many potential costs associated with market fragmentation, such as the implicit cost of participating in a fragmented trading environment. Instead of analyzing what Aite Group views as intangible aspects of spending, however, this section will purely focus on potential technology cost implications for major market participants that are trying to stay competitive as well as to ensure that they are meeting best execution obligations in a fragmented market environment.

One thing to note is that most of the cost analysis in this section is based on data gathered from global broker-dealers, exchanges, and buy-side firms with worldwide presence that actively compete in numerous fragmented markets. As a result, tangible costs associated with fragmentation for smaller market participants or those market participants competing in less market fragmented marketplace can expect to see lower costs points for various components, assuming that such technology infrastructure components are readily available locally and that there are no hidden costs for those vendors to enter these markets.

CLOSELY TIED TO BEST EXECUTION OBLIGATION

There is no doubt that the majority of the required spending in a fragmented marketplace is geared toward virtually consolidating the fragmented market so that proposed best execution obligations can be met effectively. Key technology components involved in today's fragmented market include the following:

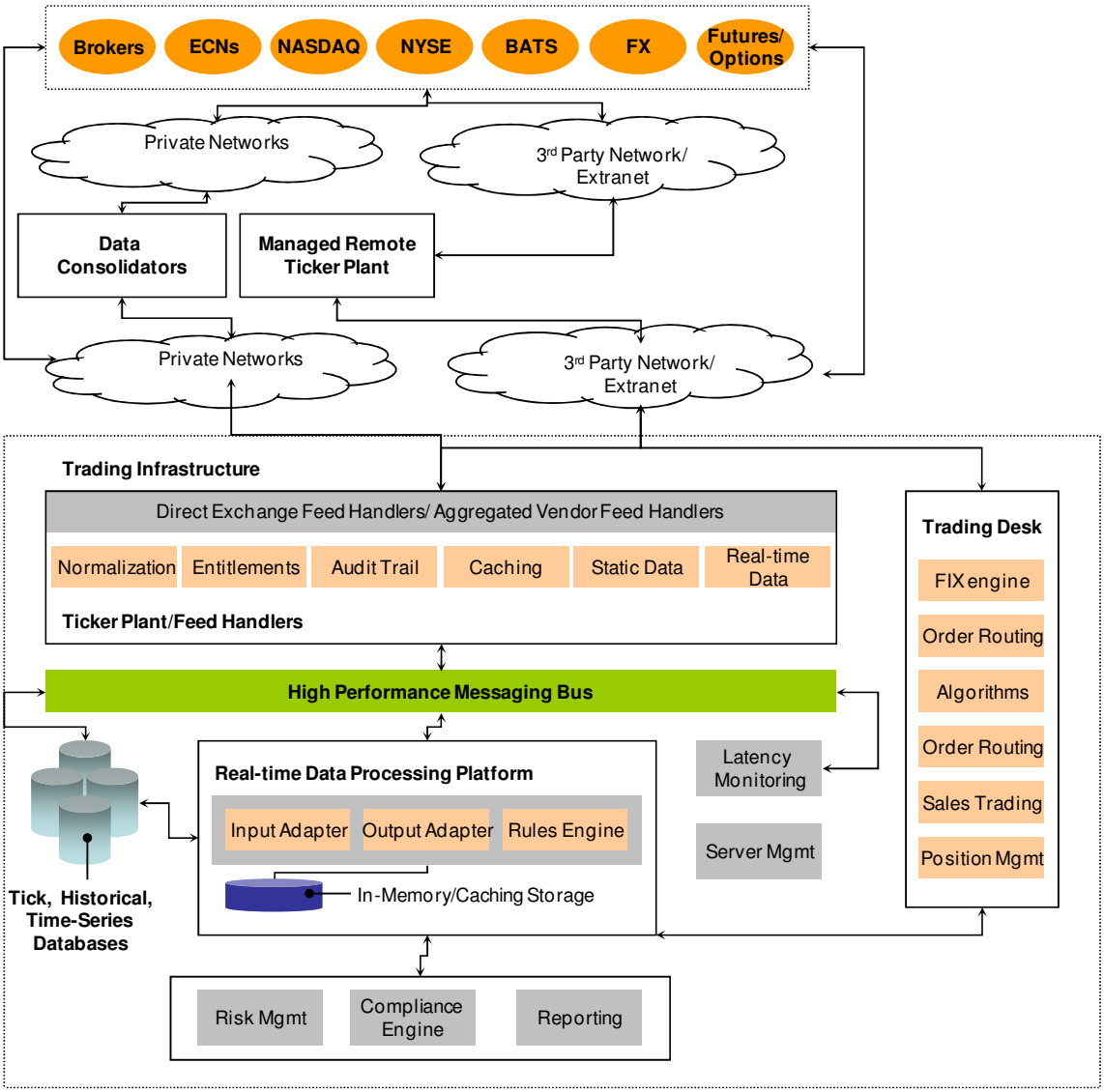
- **Market data infrastructure:** One of the biggest challenges in a fragmented market is capturing, normalizing, aggregating, analyzing, and storing market data to feed trading platforms. In a single market scenario, receiving feed from a single source takes the complexity out of the picture, regardless of how clean or accurate that particular data feed could be. In a multi-market environment, on the other hand, dealing with multiple data feeds that have different formats, latency levels, and quality requires much commitment from the technology side (robust and flexible feed handlers, ticker plant, low latency messaging middleware, storage capabilities, and more). Building a market data infrastructure from scratch is typically one of the more expensive endeavors a market participant can undertake.

- **Consolidated data:** While large market participants would typically opt to rebuild a consolidated view of the market by subscribing to direct feeds from specific market centers (a much more expensive proposition), the need for cost effective and timely consolidated data feeds is universal and crucial to addressing best execution.

- **Colocation:** As latency associated with trading continues to decline, driven by increased adoption of automated trading, colocation or proximity hosting has become an essential component of an actively trading firm's overall trading infrastructure.

- **Connectivity:** Connectivity is the basic foundation for electronic trading, for receiving market data and routing orders at various market centers would not be feasible without the core pipes that connect all of the major market participants.

Figure 41: High-Level Trading Infrastructure



Source: Aite Group

- **SOR:** As markets fragment, leveraging SOR has become not only an operational efficiency play but also a reliable compliance support as firms program SOR engines to align with their best execution policies.

- **Pre-trade risk management:** Monitoring and controlling market center access in a single market environment is relatively straightforward, and allows the market center and member firms to have a holistic view of their clients' overall trading activities (and the various risks associated with them). In a multi-venue market,

monitoring and measuring trading risk across different venues becomes quite complicated, creating a need for reliable pre-trade risk capabilities.

- **Trade surveillance and compliance**: Electronic trading currently occurs in microseconds in most developed financial centers, and monitoring these trading activities requires real-time trade compliance technology for brokers, market centers, and regulators alike.

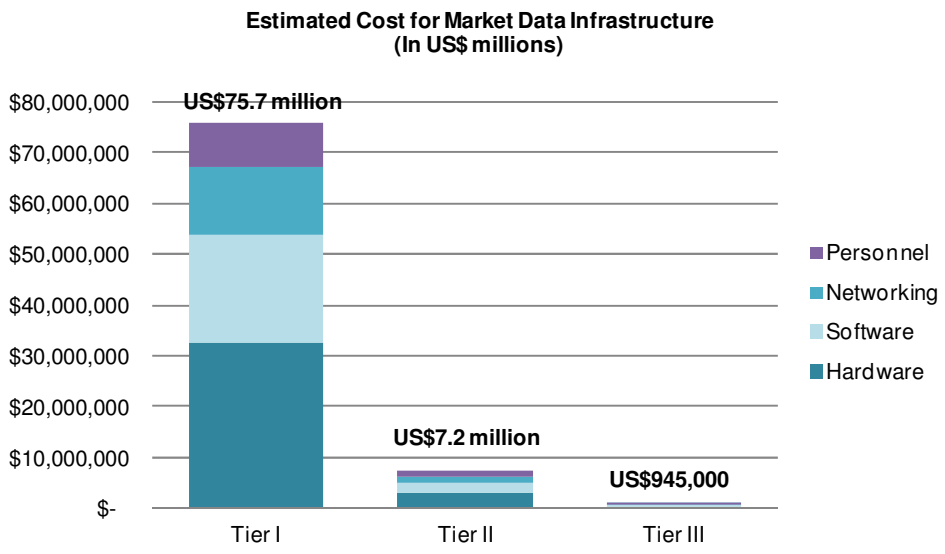
The remainder of this section focuses on estimated costs associated with specific technology components stemming from market fragmentation.

MARKET DATA INFRASTRUCTURE

The cost of market data infrastructure varies depending on the type of broker. Tier-1 brokers are the top 10 global brokers that have operations worldwide, and they have typically built market data infrastructure internally. Annual spending for Tier-1 brokers for market data infrastructure is conservatively around US$75 million per firm (Figure 42), excluding cost of market data. A few of the largest Tier-1 brokers currently spend close to US$200 million annually per firm, including market data.

Tier-2 brokers tend to be more domestically oriented, with enough resources to have a competitive electronic trading offering. They also tend to leverage vendor solutions and services for market data infrastructure. Tier-2 brokers are currently averaging approximately US$7 million per firm annually on market data infrastructure. Tier-3 broker spending on market data infrastructure, typically outsourced, currently stands at less than US$1 million annually per firm.

Figure 42: Estimated Spending on Market Data Infrastructure Per Broker

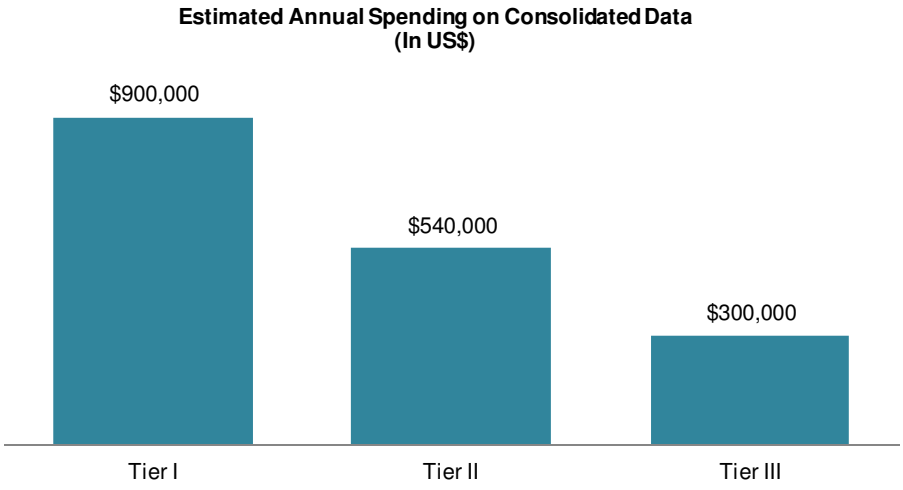


Source: Aite Group

CONSOLIDATED DATA EXPERIENCE IN THE U.S. MARKET

Costs associated with consolidated data will vary quite a bit depending on the number of markets, speed of feed, depth of market, and more. A few of the larger brokers may take in direct feeds and build their own proprietary consolidated feeds, while others may opt to take in more than one consolidated data to ensure accuracy and redundancy. Assuming the brokers are taking in a vendor-provided data solution, Tier-1 brokers will typically spend US$900,000 annually on consolidated market data per firm. Tier-2 spending is considerably lower, at US$540,000 per firm (Figure 43).

Figure 43: Consolidated Data Spending Per Broker



Source: Aite Group

GENERAL COSTS ASSOCIATED WITH COLOCATION

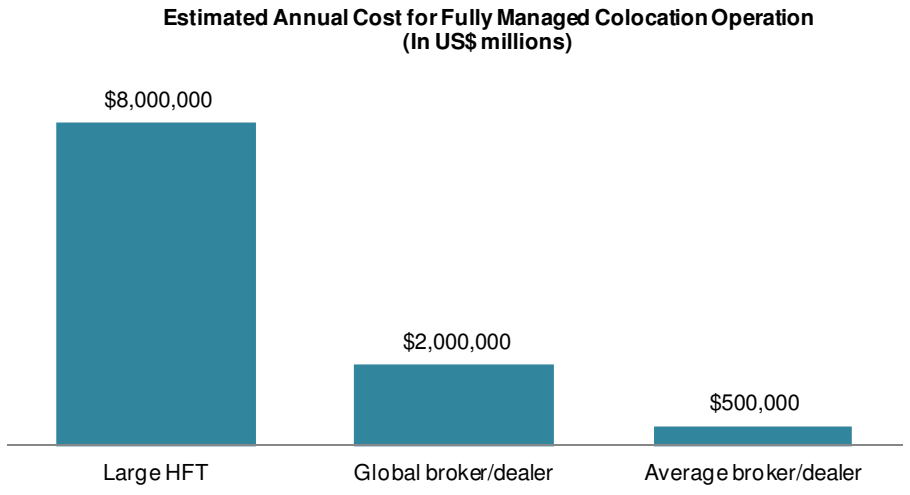
As markets continue to become electronified and the level of latency associated with trading plummets (as it has over the last decade), the information advantage that firms used to enjoy has been replaced by competitive edge based on latency. For electronic market-makers and large brokers dealing with massive amounts of client order flow, operating in a colocated environment has become a competitive requirement. The overall costs of colocation can vary quite a bit depending on the strategy of market participants as well as the physical fragmentation of matching engines:

- **Physical fragmentation of matching engines**: Even within a fragmented market, if all of the competing market centers' matching engines are located in a single data center, much lower telecommunication costs can be expected, as well as the availability of more cost-effective way of cross-connecting matching engines to substantially lower connectivity fees. The reality is, however, that most major matching engines tend to be physically fragmented as well; a good example of this is the U.S. equities market, where the top four market centers' matching engines are in four separate data centers.

- **Market participant strategy**: While larger firms may opt to colocate into as many data centers as possible to maximize their latency edge, others may select a single data center for colocation, being closest to the market center where they do most of the trading.

A typical large global broker currently spends approximately US$2 million annually on colocation. A smaller broker may spend a fraction of that, at US$500,000. Plenty of colocation options are being provided by outsourced managed trading services, and smaller firms looking for more cost-effective options could certainly get the benefits of colocation for less than US$100,000 annually. In comparison, a very large HFT firm can spend upwards of US$8 million annually on its colocation environment (Figure 44).

Figure 44: Estimated Colocation Costs Per Firm



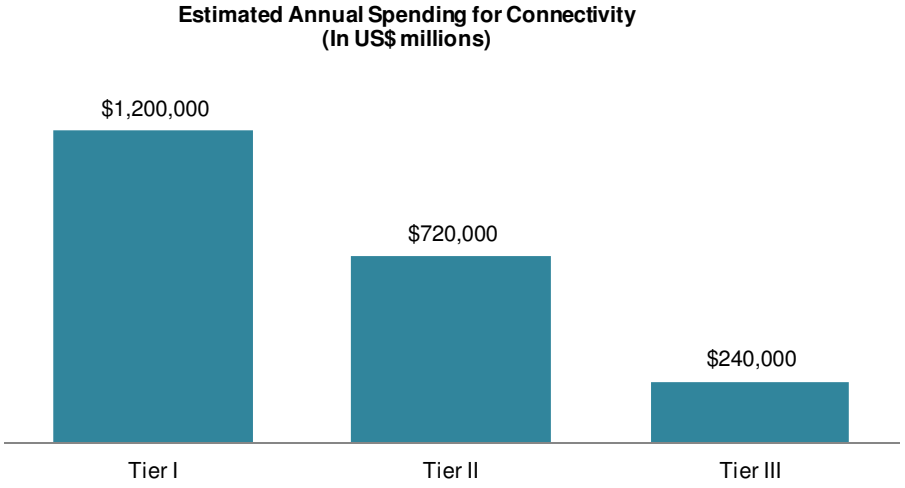
Source: Aite Group

GLOBAL CONNECTIVITY COSTS

Cost associated with connectivity is completely dependent on how important it is for the broker to have a global footprint. Even for the largest brokers, it is pretty rare for them to connect to every single venue out there, simply because the costs of connecting with certain markets (i.e., those with minimal trading activity) would outweigh any benefits of actually maintaining that particular connection. As a result, a handful of small-broker-licensed routing services function as the order router for small market centers.

Overall, Tier-1 brokers typically spend well over US$1 million annually on connectivity per firm, while Tier-2 brokers are burdened with approximately US$700,000 per firm. Tier-3 firms currently stand at around US$250,000 per firm (Figure 45).

Figure 45: Estimated Connectivity Spending Per Broker



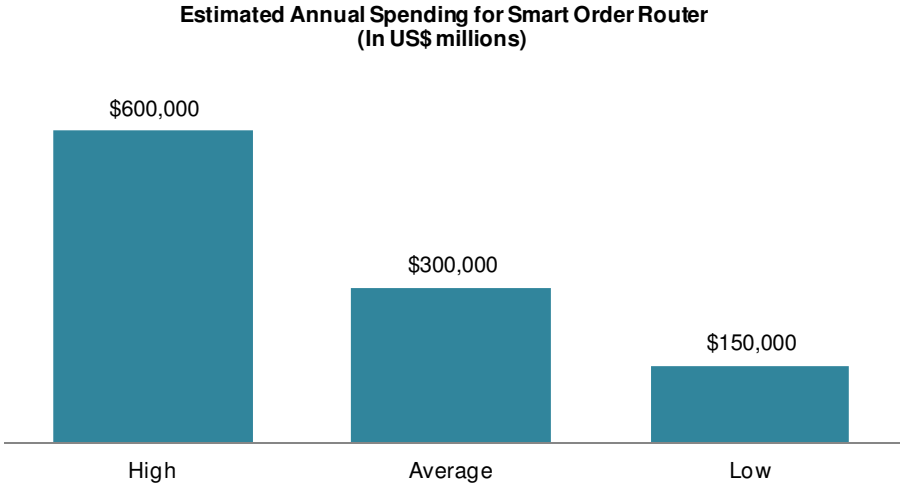
Source: Aite Group

SMART ORDER ROUTING

SOR platforms play a pivotal role in fragmented markets, enabling both brokers and market centers to make sub-millisecond order routing decisions based on preset parameters, typically aligned with best execution obligation. In fact, one could reasonably argue that usage of SOR itself can be viewed as complying with best execution obligation (assuming the SOR logic is aligned with best execution policy). Similar to other technology components, cost for SOR can also vary widely, depending on the total number of routable venues (also on access to dark pools), ability to handle order types, latency levels, and complexity of data input and analysis. SOR capabilities are offered by brokers, market centers, and vendors; pricing schedules can be either on a fixed-cost basis (i.e., license fee) or per share (if the provider has a broker license). The per-share approach would have a lower fixed cost, but overall pricing can be a lot higher than the fixed-cost pricing schedule if overall trading volume is high.

On the higher end of the spectrum, SOR can cost approximately US$600,000 annually per firm; on the lower end, it can go for a relatively affordable US$150,000 per firm. Average cost currently stands at US$300,000 per firm (Figure 46).

Figure 46: Estimated SOR Spending Per Firm



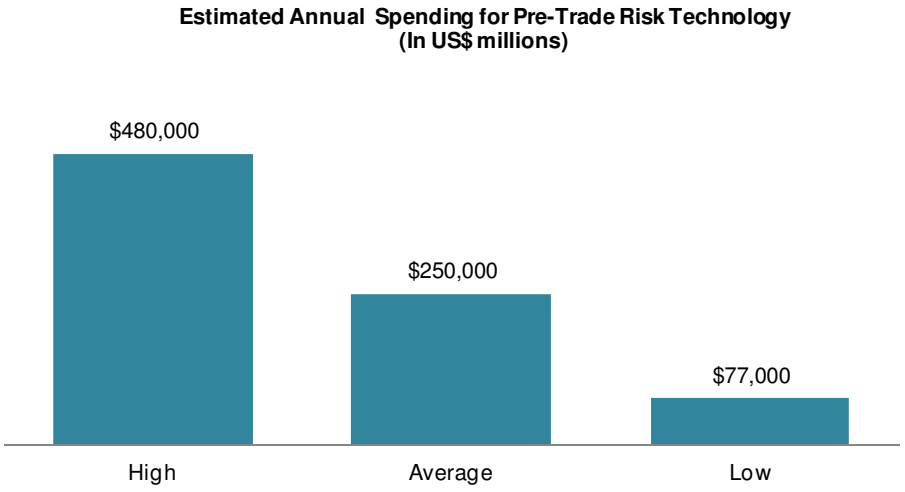
Source: Aite Group

PRE-TRADE RISK MANAGEMENT

One of the major issues surrounding electronic trading (and automated trading in a particular) over the last three years in the U.S. equities market has been the practice of enabling non-member firms to use the MPIDs of members to directly access market centers with the non-members using their own trading infrastructure (and hence no direct real-time supervision from the member firms). Regulators became concerned that this lack of supervision by market center members could potentially increase systemic risk. As a result, tighter supervision of pre-trade risk management has been mandated, and similar rules have been implemented outside of the U.S. market.

Cost of pre-trade risk platforms depends on number of venues, number of trading rules checked, level of latency, and reporting capabilities. On the higher end, one could expect to pay close to US$500,000 annually per firm on maintaining this function, whereas on the lower end, certain vendor products will support pre-trade risk management for under US$80,000 annually per firm (Figure 47).

Figure 47: Estimated Spending on Pre-Trade Risk Per Firm



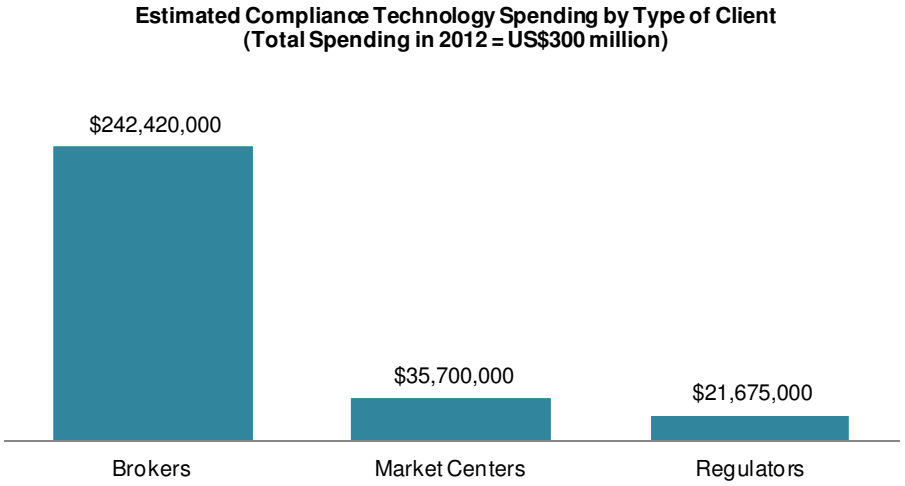
Source: Aite Group

MARKET SURVEILLANCE AND MONITORING COMPLIANCE

Another crucial part of operating in a fragmented marketplace is the growing premium on sophisticated, real-time market surveillance and trading compliance platforms. Ability to take in data from multiple venues and analyze through the noise to identify any suspicious trading activity has become a requirement for all major market participants, including brokers, market centers, and regulators. The good news is that there are plenty of vendor options when it comes to compliance technology, and there really is no need for any firm to try to build this capability from scratch.

Average cost for trade compliance platform for a broker currently stands at US$250,000 annually. This is typically a subscription-based, hosted service. On the market center and regulator side, the cost a lot more expensive, at US$750,000 and is typically installed on-site. At the end of 2012, total IT spending in trade compliance reached US$300 million, with a majority of the spending being represented by the broker community (Figure 48).

Figure 48: Estimated Total IT Spending on Trade Compliance



Source: Aite Group

ESTIMATED IMPACT BY MARKET PATICIPANT TYPE

As discussed above, costs related to market fragmentation will vary quite widely depending on several factors:

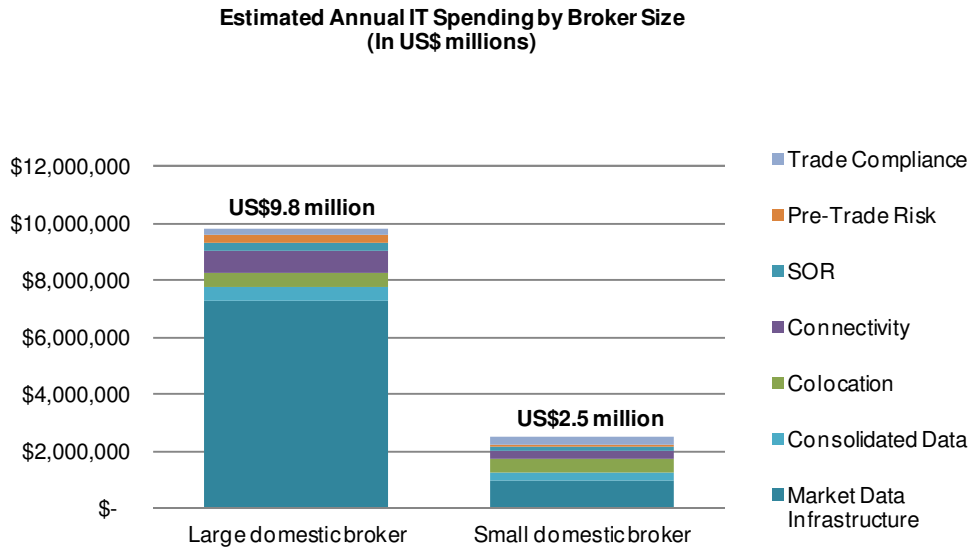
- **Extent of market fragmentation**: Costs associated with operating in a market with two competing venues will be markedly cheaper than operating in a market with more than 40 execution venues.
- **Availability of third-party vendor solutions:** Enough advancement has been made on the vendor side to accommodate fragmentation much more affordably than a decade ago. If such solutions are not available in a given market, however, costs of fragmentation would certainly go up.
- **Any hidden taxes or legal barriers**: Any unforeseen local taxes or legal barriers for any of the solutions to enter local markets can inadvertently increase the overall cost of fragmentation.
- **Sensitivity to latency**: Basic correlation exists between high costs and low latency. If a market participant is willing to live with a certain level of latency for cheaper costs, this can drastically lower the overall costs.

Assuming no hidden costs and unforeseen local market conditions (both business and legal), the rest of the section analyzes the overall potential cost for specific types of market participants.

BROKER-DEALERS

For brokers, IT costs associated with navigating a fragmented market environment will vary quite dramatically depending on how active the broker wants to be in terms of facilitating overall trading activities. Market data infrastructure forms the core foundation of every operation. For a large domestic broker with extensive connectivity to most major market centers and robust collocation infrastructure, the overall cost can easily reach US$10 million annually per firm. A small broker with selective connections that is willing to live with certain level of latency can compete effectively with a US$2.5 million annual cost per firm (Figure 49).

Figure 49: Estimated Average Cost for Broker-Dealers

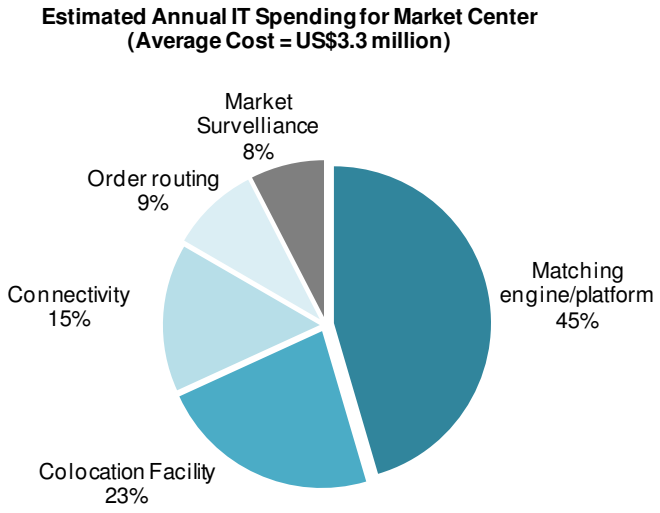


Source: Aite Group

MARKET CENTERS

For market centers in moderately fragmented marketplaces, the cost of a matching engine and its annual maintenance would be one of the higher costs to ensure that it can compete at the appropriate latency level. Reliability and consistency of the matching engine are equally important to latency figures. Market centers can expect to spend approximately US$3.3 million annually per firm to remain competitive in a fragmented marketplace (Figure 50).

Figure 50: Estimated Average Cost Per Market Center

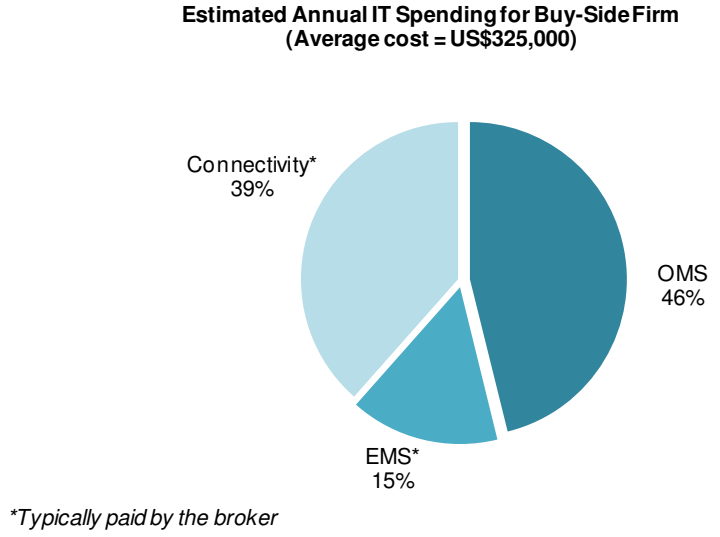


Source: Aite Group

BUY-SIDE FIRMS

While this study did not evaluate the overall cost for buy-side firms in detail, typical core technology components can be viewed as trading platforms and connectivity. Buy-side firms' compliance and reporting capabilities are typically embedded in the price for order management systems (OMS). An actively trading buy-side firm operating in a fragmented market environment can expect to spend approximately US$325,000 annually per firm, with more than half that actually being paid for by its brokers (Figure 51).

Figure 51: Estimated Average Cost Per Buy-Side



Source: Aite Group

CONCLUSION

Market fragmentation has become a reality in different financial markets worldwide. Based on a decade's worth of analysis across several regions, Aite Group finds that there is nothing intrinsically positive about market fragmentation. It is true that fragmentation has been accompanied by a decline in explicit trading costs and increased market innovation, but negative, unintended consequences have also led to the creation of a complex trading environment—one that might not be beneficial for any investor. Overall, the following concluding remarks can be made about key implications for the four major areas of consideration:

- **Best execution**: The definition of best execution globally is very high level, at best, and currently left open to much interpretation. While price is always an important variable to consider, it is never the sole factor. Still, complying with best execution obligations is often the leading driver for investment in IT infrastructure, as doing so allows firms to remain competitive and compliant at the same time.
- **Connectivity and routing**: If best execution should be viewed as specific written policy and procedure, connectivity and routing represents the necessary plumbing and logic to fulfill the promise of best execution. Currently, there are ample providers of both connectivity and routing services, and these will continue to lower the price of entry into a fragmented marketplace.
- **Consolidated market data**: Other than in the U.S. market and, to a lesser degree, in the Canadian market, the provision of consolidated data has been wrongfully overlooked and can be viewed as one of the reasons for increased costs for operating in markets such as Europe. Lack of consolidated market data also adds unnecessary complication to complying with best execution.
- **Self-regulation and rule-making**: While the U.S. market has fully embraced the SRO model, the rest of the world looks quite different. Regulators in non-U.S. markets have simultaneously viewed exchanges as necessary SRO and potential conflict of interest. In those markets, exchanges still remain active in terms of identifying potential compliance failures, but the investigation of and, ultimately, disciplining of illegal activities resides firmly in the hands of the government regulators.

ABOUT AITE GROUP

Aite Group is an independent research and advisory firm focused on business, technology, and regulatory issues and their impact on the financial services industry. With expertise in banking, payments, securities & investments, and insurance, Aite Group's analysts deliver comprehensive, actionable advice to key market participants in financial services. Headquartered in Boston with a presence in Chicago, New York, San Francisco, London, and Milan, Aite Group works with its clients as a partner, advisor, and catalyst, challenging their basic assumptions and ensuring they remain at the forefront of industry trends.

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ANALYZING THE COSTS OF EXCHANGE COMPETITION

A Look at the Experiences of the United States, European Union, Canada and Australia

Prepared by Rosenblatt Securities Inc. for BM&F Bovespa SA

July 29, 2013

Table of Contents

Introduction and Executive Summary

On June 13, Brazil's securities regulator, the Comissão de Valores Mobiliários (CVM), issued a request for comments from market participants regarding the potential introduction of competition with BM&F Bovespa SA, which is currently the only venue on which exchange-listed stocks may change hands in Brazil. In this document, the CVM specifically asked for advice about how to handle three aspects of exchange competition: best execution policies, market-data consolidation and potential changes to the self-regulatory and rulemaking structure. The CVM request for comment specifically cites the experiences of several developed markets that have in recent years made the transformation from single or dominant exchanges to competing trading venues, and asks for relevant details from these jurisdictions that may inform its own decisions.

Following the release of the CVM request for comment, BM&F Bovespa (BVMF) engaged Rosenblatt Securities to analyze the experiences of Australia, Canada, the European Union and the United States, focusing solely on the best-execution and market-data-consolidation regimes adopted in these jurisdictions, with the goal of informing its responses to the CVM request. In the pages that follow, we provide detailed accounts of how each of these markets has handled the issues in question, and how the specific rules and structures they adopted have affected market participants.

The frameworks governing best execution and market data become particularly important when markets evolve from a single or dominant exchange to multiple venues that display and execute orders. Both the concept of best execution and the management of market data also become more complex and difficult to manage as alternative venues compete with the national, incumbent or listing exchange. The two issues are closely linked: the need for consolidated market data flows from best-execution obligations. Once new venues are allowed to compete with a previously dominant or sole market, brokers and investors must consider whether shares can be bought and sold at superior prices — or with a better overall experience, including execution price, accruing to the end client — on venues other than the main exchange.

Additionally, managing best execution and data as trading fragments across multiple markets often introduces substantial costs for some market participants, particularly

brokers, dealers and other intermediaries charged with handling and executing end-investor orders. This report attempts to quantify and estimate, to the extent possible, the costs borne by such intermediaries in markets that experienced a change from dominant exchanges to multiple venues.

Notes on Methodology and Scope

In conducting our research, we relied on a variety of sources. These include public documents and records, such as legislation, regulation and guidance adopted and provided by government entities in the relevant jurisdictions, as well as academic and other studies. We also relied upon the public disclosures of exchanges and alternative venues regarding the various fees they charge to members and subscribers. Additionally, we corresponded with a wide array of market participants and regulatory personnel in Australia, Canada, the EU and the US. These telephone conversations and e-mail exchanges, which included discussions with brokers, trading-venue executives, market-data professionals, proprietary traders and regulators, served two primary purposes. First they allowed us to accurately interpret both the intent and practical application of the often difficult-to-understand language used in legislative and regulatory texts. Second, this correspondence gave us a richer appreciation of what effects the various best-execution and market-data policies have had on market participants, as well as the nuances that often come with applying complex fee schedules for various exchange services. Finally, we relied on our own knowledge of market practices, gleaned from operating as a broker and member of multiple exchanges and ATSs in the United States, and from longstanding contacts with market participants globally.

In preparing this report, we have been charged specifically with analyzing best-execution and market-data policies, and the costs intermediaries incur to comply with them. Transitions from dominant, incumbent exchanges to multiple venues also affect the experiences of end investors, including specifically the costs associated with implementing their ideas and strategies. In some instances, such transitions have coincided with significant reductions in these implementation costs for both retail and institutional investors. The United States during the past 16 years stands out as one example of this. However, it is not clear whether or to what extent the introduction of exchange competition

and related market-structure and behavioral changes directly caused this reduction in costs for end investors, given other major structural changes during the same time period, including new order-handling rules and the decimalization of price quotes. Additionally, the evolution of market structure away from centralized national or listing exchanges in such jurisdictions also presents a burden for end investors, in terms of having to understand and monitor their outcomes in a vastly more complex environment. And any benefits accruing to end investors as a result of these transformations must also be weighed against the increased costs to intermediaries of navigating a more-complex structure, which can sometimes result in these middlemen passing through some of their costs, indirectly, to clients. Moreover, there are often substantially higher costs and complications associated with regulating a market in which transactions are scattered among multiple venues.

Our study of the Australian, Canadian, EU and US experiences explicitly *does not* consider the effects of transformations in these places on end investors, or on regulatory costs. Rather, we focus, in keeping with our mandate, on how best-execution and market-data policies have affected the operating costs of intermediaries.

Summary of Our Findings

The experiences of Australia, Canada, the European Union and the United States suggest a number of potential approaches for the CVM in Brazil, as well as for other regulators globally that may be contemplating the advent of competition with national exchanges. As we will demonstrate, each has taken a slightly different course with respect to best-execution regimes and the consolidation of market data. In all cases, there are significant costs for the brokerage community, but these can vary greatly with particular paths taken by regulators.

It is reasonably clear that highly prescriptive best-execution regimes, focused on mandating executions at the best displayed prices market-wide, tend to support venue proliferation, as well as higher (or at least less flexible) connectivity and data costs. Markets with such a regulatory structure — examples in the group of jurisdictions we studied are Canada and the United States — can also expect knock-on effects like greater structural complexity, including proliferation of exchange order types and off-exchange venues. Conversely, regimes that offer intermediaries significant latitude to take into account factors other than

best price, such as execution size, speed or fees, can result in lower costs for some market participants than they would bear in a strict order-protection environment. These effects can be seen, to varying degrees, in the experiences of Australia and the European Union.

We believe that of the two topics considered in this report, the regulatory approach to best execution is paramount. As stated earlier, the need for market data stems from market participants' best-execution obligations. Decisions about how best execution is to be defined and pursued, then, directly affect what decisions should be taken regarding market data. For example, regulations that require — either explicitly or implicitly — market participants to regularly access liquidity on venues other than the dominant or listing exchange, by definition, make consolidated market data vitally important to fulfilling best-execution requirements. When setting up such regimes, regulators would do well to consider mechanisms that help to control the costs of both connectivity and market data, such as allocation schemes that divide data revenues among exchanges according to their respective contributions to price discovery and liquidity. Even with such controls or mechanisms in place, such as the tape-revenue sharing scheme in the United States, strict inter-exchange price-protection regimes can create artificial subsidies for venues with *de minimis* market shares. But without them, as is the case in Canada, exchanges can extract higher rents from market participants.

However, in some cases poorly thought-out market-data policies can also make best execution very difficult to enforce. Europe stands out as a prime example here, with the lack of a consolidated tape contributing to confusion and high market-data costs for some market participants – particularly the big banks that elect to equate best execution with best price and route customer orders accordingly.

When analyzing the experiences of other jurisdictions, it is also very important to consider market size. Generally speaking, larger markets can support a greater array of execution venues. Taking just a few percentage points of market share in a very big market can be a sustainable business proposition for an upstart trading venue, whereas similar market-share levels in jurisdictions with less total trading activity may not be sufficiently profitable without relying on outsized connectivity and data fees. Additionally, regulators in smaller markets may anticipate a limited number of viable alternatives to the primary exchange and

act accordingly when establishing best-execution and market-data policies. As we will explain in detail shortly, the choices that regulators make regarding best execution can also have a profound effect on the number of venues that appear in a given jurisdiction. Generally speaking, highly prescriptive, rules-based best-execution regimes tend to encourage greater fragmentation, by requiring market participants to access the best prices regardless of where they are displayed. Imposing such a strict regime in a small market may result in outsized costs falling on the broker and dealer communities. This is best illustrated by the example of Canada, which we examine in greater detail in the following section.

Average Daily Value Traded on Major Fragmented Equity Markets (in BRL)

	2011	2012	2013	# of Lit/Protected Venues
USA	421,969,352,016	413,809,193,474	461,512,148,221	13
EU	175,063,950,324	157,414,722,338	186,548,571,232	21
Japan	32,710,326,809	35,168,660,835	78,328,536,838	3
Canada	16,051,815,539	15,239,760,048	16,117,027,754	9
Australia	7,859,746,980	7,587,486,616	8,848,856,396	2
Brazil	6,096,258,910	6,861,333,188	7,187,606,464	1

Sources: Arcavision, BM&F Bovespa, Investment Industry Regulatory Organization of Canada, Thomson Reuters
2013 data through June, except Brazil (May)

Various Approaches to Constructing Best Execution Frameworks

Regulators face an array of challenges in adapting best-execution regulations to allow for competition with a previously dominant listing or national exchange. Competing venues may regularly make securities available at prices that are superior to those displayed on the primary market. However, some market participants may view best price as just one component of best execution, which has long been a somewhat amorphous, hard-to-define concept in the securities industry. For example, the quantity of shares available at a given price can be of great importance, particularly for those seeking to buy or sell very large quantities while minimizing the impact of their outsized orders on market prices. Additionally, the rules, structures and systems of individual trading venues may affect execution quality. A market may advertise the best available price for a security at a given point in time, for instance, but take so long to process and execute an incoming order that its quote becomes inferior to rivals during that time interval. Such delays may result from

the inherent structure of the market, such as depending on a manual trading floor or auction process,[1] or from systems issues or outages.

Consequently, regulators have found it necessary to establish rules and principles to govern best execution in multiple-venue markets. The fundamental challenge of doing so is to strike a balance between, on the one hand, providing sufficient protection for end investors from mispriced or otherwise poor executions and, on the other hand, giving intermediaries enough latitude within the regulatory framework to meet individual client needs and respond to specific market circumstances.

Regulators in the four jurisdictions we examine here — Australia, Canada, the EU and the US —each have taken slightly different approaches to multiple-market best execution frameworks. We believe it is best to think about these varying stances in terms of a continuum, from highly prescriptive, rules-based regimes focused on best price to highly flexible, principles-based regimes that allow brokers to weigh an array of factors other than best price. If we consider each of the four markets we analyze here in this context, and organize them from most prescriptive to most flexible, they fall in the following order:

- **Canada** comes down strongly on the side of best execution equaling best price, with minimal exemptions, and offers full depth-of-book price protection for displayed bids and offers.
- **The US** also operates under a best-price regime, with minimal exemptions, but only offers price protection for quotes at the top level of each venue's order book.
- **Australia**, coming latest to the game, has put forward a hybrid approach that adheres to best price for retail orders but provides brokers with greater flexibility when executing for wholesale clients.
- **The EU** has a principles-based system, in which market participants must establish, and share with both regulators and clients, written policies for achieving best execution, but are essentially free, within reason, to define it in their own terms.

[1] This was an issue in the United States during the early-to-mid-2000s, when the comparatively slow execution-turnaround time at the New York Stock Exchange helped prompt rules offering "trade-through" protection only to quotes that could be accessed in automated fashion.

In the remainder of this section, we will provide further details about each of these jurisdictions, running in order from the most highly prescriptive to the most flexible. In each case we will cite:

- The appropriate best-execution regulations or principles, as well as written guidance provided by regulatory authorities, where available.
- Any differentiation in these regulations or principles based on customer or transaction type.
- The effect these regulations or principles have, as a practical matter, on market participants who must comply with them — including specific costs where obtainable or possible to estimate. Note that we have attempted to quantify the recurring fees charged by exchanges for order-entry ports and and co-location services. But the true costs of connectivity would in practice be substantially higher when including one-time membership fees, as well as personnel costs related to building and maintaining order routing technology, mandatory periodic upgrades to the software for each venue and changes to order types and fee schedules, all of which can require systems changes and testing for brokers.

Best Execution in Canada

Canada's best-execution rules are the most highly prescriptive of the four developed markets we examined. On July 1, 2012, Canadian regulators made effective a series of amendments to National Instrument 23-101. These, among other things, clarified the definition of best execution, establishing depth-of-book protection for all displayed bids and offers from being "traded through," or bypassed for inferior price quotes. They also imposed requirements on both trading venues and brokers to prevent the entry and execution of orders that would result in trade-throughs.

Previously, Canadian dealers were required to "make reasonable efforts to ensure that the client receives the best execution price on a purchase or sale of securities by the client." In so doing, dealers were expected to "not execute a transaction on a marketplace that could be filled at a better price on another marketplace or with another dealer." But following the migration of market share away from the previously dominant Toronto Stock Exchange,

beginning in 2008, to a host of newly launched, alternative trading systems, regulators moved to clarify the best execution rules.

The amended NI 23-101 broadly defines best execution as "the most advantageous execution terms reasonably available under the circumstances." More specific definitions and rules, clearly providing for depth-of-book order protection, are laid out in Parts 1 and 6 of NI 23-101.

Part 1 defines protected orders as bids and offers displayed on auto-ex marketplaces and visible to the wider market by means of a consolidated data processor or vendor. It further defines as a "trade-through" any execution of a buy order at a price that is higher than *any* protected offer, or any execution of a sell order at a price that is lower than *any* protected bid.

Part 6 requires marketplaces to establish policies and procedures designed to prevent trade throughs. It also mandates that brokers take steps to avoid violations. But the rule specifically identifies situations in which trade-throughs are permissible, such as:

> Situations in which where one marketplace judges that better a price on an away market is inaccessible or difficult to efficiently access because of that market having technical or systems issues.[2,3]
>
> Execution of a Directed-Action Order (DAO). A firm can use a DAO to simultaneously access liquidity at the best-displayed prices in the market at a given moment, as well as at inferior price levels. Without the DAO, orders executed against the quotes at inferior price levels might otherwise be deemed impermissible trade-throughs. The Canadian DAO is similar to the Intermarket Sweep Order (ISO) established in the US under Regulation NMS.

As we have alluded to earlier, the provision of strict, market-wide limit-order protection tends to support a higher number of competing limit-order books. In Canada, depth-of-book order protection means, practically speaking, that market participants must have a way of

---

[2] In any such case the marketplace experiencing issues is required to notify both regulators and any relevant securities information processor

[3] Brokers also may route around marketplaces having systems issues, but must notify the markets in question as well as all regulatory authorities

accessing protected orders on every displayed market, no matter how infrequently any one of these markets may actually be the only one displaying the best price in a given situation. For the biggest dealers, as well as many mid-tier firms, this means maintaining direct connections to all lit marketplaces. As we will discuss in more detail in the next section, it also means having to see real-time, depth-of-book (or Level II) market data from each of these venues. Without this data, it would be impossible for dealers to determine where protected orders reside among the many lit markets in Canada and, therefore, to comply with best-execution policy.

Indeed, the proliferation of venues in Canada has been greater than one might expect for a market of its size. One useful way to measure this is to compare Australia, Canada and the US, with respect to market size and number of lit venues.[4] Canada's average daily turnover is roughly twice that of Australia's, but it has more than four times as many lit marketplaces. Conversely, the United States dwarfs Canada in turnover terms by a ratio of nearly 29:1, but in terms of protected, quoting markets by a measure of just 1.4:1.

Average Daily Turnover and # of Lit Venues in Major Fragmented Equity Markets (in BRL)

	2011	2012	2013	# of Lit Venues
USA	421,969,352,016	413,809,193,474	461,512,148,221	13
Canada	16,051,815,539	15,239,760,048	16,117,027,754	9
Australia	7,859,746,980	7,587,486,616	8,848,856,396	2

Sources: Arcavision, Investment Industry Regulatory Organization of Canada, Thomson Reuters
2013 data through June

And the ranks of market centers continue to grow. As recently as June 2011, there were seven lit venues in Canada. TMX Group, the parent of the Toronto Stock Exchange, launched a second market, TMX Select, in July 2011. Chi-X Canada did the same, with CX2, in May 2013. And a consortium of market participants is launching yet another venue that will offer a lit component, Aequitas, that will bring the number of displayed markets to 10.

The costs associated with fulfilling best-execution obligations in Canada are thus among the most onerous in the world. In this section we address the costs of connectivity to multiple venues (market data will be covered in the next section). These include the fees charged by

[4] We exclude the EU from this analysis because, unlike Australia, Canada and the US, it is a collection of several national markets, each with their own exchanges, knitted together by common regulation, as well as a handful of newer, pan-European venues launched following the MiFID directive in 2007.

marketplaces for brokers to establish connectivity (often referred to as administrative or maintenance fees, and charged on a monthly basis per connection), as well as co-location services, which are also a consideration for many dealers. This stems in large part from the fact that trade-through protection is offered only to automated markets, making speed of order entry, acknowledgement, confirmation and cancellation critical for all market participants. Reducing the time lag, or latency, of such messaging is particularly important for liquidity providers, who need to carefully manage the risk that the quotes they display will be executed at the wrong times — such as when prices are about to move against them, making it harder to profitably flatten their exposures on either side of the market — or become stale. Consequently, many automated market-making firms avail themselves of co-location services provided by exchanges and other vendors. These services permit members of trading venues to place their order-entry servers in the same data centers as the venues' matching engines, thereby minimizing messaging latency. Once co-located liquidity provision becomes widespread, other market participants find it necessary to take similar services. For example, major brokers providing algorithmic agency brokerage services often choose to co-locate their own routing technology, so that they may optimally interact with the most sophisticated market participants.

Taken together, these costs can be substantial. Consider just the connectivity fees charged by exchanges (see "Connectivity Fees for Canadian Marketplaces" table on next page). The cost for maintaining one "line," or order-entry session, with each of Canada's nine displayed markets, is C$5,400 per month, or C$67,800 per year. For major market participants, such as the five dominant dealers in the Canadian equity market, multiple order-entry sessions — in some cases 100 or more, spread across the nine displayed venues — are necessary to satisfy client order flow. Assuming a base level of 10 sets of connections to each market for each of the biggest Canadian dealers, then, costs for order-entry ports alone can easily run up to C$54,000 per month — or about C$650,000 per year — for the biggest Canadian dealers.

Tacking on co-location fees brings connectivity costs significantly higher. The two major co-location centers for the Canadian equity market are TMX Group's data center in Markham, Ontario and Equinix's TR1 data center, about 16 miles to the south at 121 Front Street in Toronto's financial district. The Markham site offers co-location with the TSX, TSX Venture

Exchange and TMX Select matching engines (and, soon, Alpha, which was acquired by TMX Group as a result of the Maple Group transaction involving TMX last year). Chi-X Canada's matching engine is run out of Equinix TR1. Space in the Markham facility costs C$8,000 per month per cabinet. Equinix TR1 cabinets are C$1,300 per month. A major dealer running an agency algorithmic execution business for institutional investors typically takes two to three co-lo cabinets to handle this flow. At Markham, that means a monthly co-location bill of as much as C$24,000 – or C$288,000 annually. This, combined with the estimated order-entry port charges of about C$650,000 annually, brings connectivity costs into the neighborhood of C$1 million per year for the biggest dealers. Firms offering sponsored market access for short-term-oriented, quantitative asset managers and proprietary trading firms can require far more co-location cabinets – as many as 15 to 30, bringing their co-location bills into the C$4 million+ range annually.

Connectivity Fees for Canadian Marketplaces

Venue	Market Share	Admin (Connection) Fee (C$)
TSX	50.15%	1,500/month
TSX Venture	18.08%	750/month
Chi-X Canada	12.59%	500/month
Alpha	11.57%	1,250/month
Pure Trading	2.05%	500/month
TMX Select	1.75%	350/month
CX2	1.49%	350/month
Omega ATS	1.15%	200/month C$125/mo for each order-entry session above 10
CNSX	0.50%	none

Sources: Company Reports, Investment Industry Regulatory Organization of Canada
Market Share is % of volume traded during Q213

The biggest market participants can more easily absorb some of the fixed costs of market fragmentation, such as exchange connectivity and co-location, than can mid-tier and smaller firms. Additionally, as the nature of liquidity provision has changed in Canada, traditional dealers have been unable to compete with newer, independent, automated proprietary trading firms that are adept at making markets electronically. These dealers find themselves abandoning principal trading, in which revenues come from providing liquidity and capturing the bid-ask spread, and increasingly accessing liquidity, as agent, on behalf of

clients. This means crossing the spread more often than capturing it, and paying the associated "taker" fees to remove liquidity from the various trading-venue order books. As their profit margins decline, these dealers and brokers are incentivized to get bigger, thus spreading across a larger revenue base the costs of connectivity, data, transaction fees and other charges levied by an array of trading venues. The combination of increased fixed costs and higher variable trade-execution fees, then, puts a premium on scale in the brokerage industry. This, in turn, may encourage concentration and consolidation over time and endanger the existence of specialized, boutique brokers.

Strict trade-through protection, combined with high fees for removing liquidity from trading-venue order books[5], also gives dealers a powerful incentive to divert customer order flow to the venues charging the lowest fees for removing liquidity on behalf of customers, all other things (namely, best price) being equal. This, at least in the short term, can result in further fragmentation, as brokers starting their own trading venues — in many cases so-called dark pools that do not post bids or offers and therefore contribute less to price discovery than do displayed markets — primarily to avoid exchange fees and thereby fatten their profit margins. This occurred in Canada, with several major dealers banding together in November 2008 to start the Alpha ATS. Alpha originally served as a "printing" venue for block trades but later became the country's second-biggest dark pool, through its Intraspread facility, which began trading in June 2011 and specifically allowed dealers to internalize retail order flow. The growth of dark trading, which reached a record 5.87% of total volume in August, prompted Canadian regulators to introduce new rules, on October 15, requiring either block size or significant price improvement for dark trades. Since then, dark market share has retreated to about 2% (most recently, 2.25% in June).

Best Execution in the United States

Best execution in the US is only slightly less prescriptive than the Canadian approach. Rather than full depth-of-book price protection, US regulators require only top-of-book order protection, as called for under Regulation National Market System, commonly known as Reg NMS, which was adopted in 2005 and fully implemented in 2007.

[5] Unlike in the United States, the other of the four markets examined here that provides strict trade-through protection to displayed quotes, there is no cap on lit-market access fees in Canada

Just as Canada's amendments to NI 23-101 came in response to the evolution of equity market structure — and, particularly, the fragmentation of liquidity away from the Toronto Stock Exchange toward alternative markets like Chi-X Canada and Alpha — Reg NMS represented an attempt by the US Securities and Exchange Commission to modernize its rules to better accommodate changing competitive and practical realities. And the US had long permitted competition among several exchanges and the National Association of Securities Dealers (which launched the Nasdaq automated quoting platform for its member dealers in 1971), with certain conditions. In 1975, for example, following an SEC study on the growth of institutional investment in the country, the US Congress passed a series of amendments to the Securities Exchange Act of 1934 "to remove barriers to competition" and "foster the development of a national securities market system," among other goals.[6] The US experience with encouraging competition among exchanges, then, is best considered with a longer time horizon, including some analysis of the regime created by the so-called '75 amendments as well as the more-recent introduction of Reg NMS.

The '75 amendments established what has since been known in the US as the National Market System. The goal was to better knit together the various market centers that had developed for executing investor orders, particularly in the wake of a volume explosion, driven by the ascendance of pension funds and other institutional asset managers, during the "go-go years" of the 1960s. These big investors were increasingly availing themselves of options other than the NYSE, which historically had served the needs of individual investors and their relatively smaller orders. Non-NYSE alternatives at that time included the growing ranks of off-exchange market makers (often referred to as the "third market," after the two main listing markets of that time, the NYSE and the American Stock Exchange) who committed large amounts of their own capital to fill block orders in NYSE-listed issues as principal. Some brokers also were establishing specialist operations on the regional exchanges that had long existed in the US, including the Midwest Stock Exchange (now the Chicago Stock Exchange), Pacific Stock Exchange (now NYSE Arca), Boston Stock Exchange

[6] Notably, the '75 amendments also established a national clearing and settlement utility, which has ensured the fungibility of positions between rival exchanges and off-exchange venues. This is a critical strength of the US system compared with that of the EU, which addressed competition among trading venues in the 2007 Markets in Financial Instruments Directive, but failed to establish a unified, market-wide post-trade system for these competing venues to plug into.

(Now Nasdaq BX) and Philadelphia Stock Exchange (now Nasdaq PSX)[7], which offered execution of NYSE-listed shares. Market participants and regulators soon grew concerned about investors' ability to receive the best possible executions among these disparate trading venues, even as the NYSE continued to hold a dominant market share of the trading in NYSE-listed stocks.

To address this problem, the '75 amendments created a mechanism called the Intermarket Trading System (ITS), which became fully implemented in 1983. The ITS was a system of exchange rules that directed market participants to avoid trade-throughs in exchange-listed stocks, but did not explicitly prohibit them. Rather, ITS required exchanges to respond to orders from away markets seeking the best available price within a two-minute interval, and created a process through which aggrieved parties could complain to, and seek redress from, markets that traded through their quotes.

This worked reasonably well when all exchanges were manual, floor-based markets. But technological advancements — as well as separate regulatory actions such as the 1997 limit order display rules, the 1998 passage of Regulation ATS and the 2001 decimalization of US stock pricing — encouraged the growth of electronic trading and purely automated execution venues. In the years leading up to the adoption of Reg NMS, a collection of alternative marketplaces known as ECNs took approximately half of the market share in Nasdaq-listed stocks from the NASD dealers that traditionally had an oligopoly on trading in these issues. However, certain regulatory impediments, as well as the difference in order-turnaround time between these new markets and the NYSE, prevented the ECNs from competing effectively for trades in NYSE-listed securities. Specifically, ECNs frequently would be required to route liquidity-seeking orders to the NYSE when it was quoting the best prices. But it often took so long for the NYSE to respond that prices on the electronic venues would move, rendering the NYSE quotes inferior. The latency differences between the manual and automated markets, in both NYSE and Nasdaq-listed stocks (the latter were not covered by ITS), often resulted in trade-throughs, or transactions executed at prices that were worse than the best displayed quotes across all markets nationwide. Studies by SEC staff during the deliberations preceding Reg NMS concluded that "an estimated 1 out of

[7] Founded in 1790, the Philadelphia Stock Exchange was the first in the US. The NYSE's founding came two years later, with the famous Buttonwood Agreement of 1792.

every 40 trades for both NYSE and Nasdaq stocks are executed at prices inferior to the best displayed quotations, or approximately 98,000 trades per day in Nasdaq stocks alone."[8]

Frustration with this state of affairs among many market participants led the SEC, beginning in 2000, to conduct what it calls in the Reg NMS adopting release "a broad and systematic review to determine how best to keep the NMS up-to-date." The review, the release continues, "required the Commission to grapple with many difficult and contentious issues that have lingered unresolved for many years." Most pertinent to our subject matter here, Reg NMS both reaffirmed longstanding principles of best execution in the US — notably the link to best price — and made significant practical changes to the US best execution regime. Section II.B(4) of Reg NMS broadly states that "the duty of best execution requires broker-dealers to execute customers' trades at the most favorable terms reasonably available under the circumstances, i.e., at the best reasonably available price." More specifically, Rule 611 of NMS (known as the Order Protection Rule) prohibits trades occurring at prices lower than a "protected bid" or higher than a "protected offer." To be considered protected, a quote must be automated, displayed by an automated venue and represent "the best bid or offer of an exchange, the NASDAQ Stock Market or an association other than the NASDAQ Stock Market…."[9]

Practically speaking, in today's market, this means that only electronically accessible quotes displayed at the tops of the limit order books of automated exchanges are protected from trade-throughs. Quotes displayed by non-exchange limit order books — namely ATSs such as Lava FLOW and Credit Suisse's Light Pool — do not enjoy trade-through protection unless they are delivered to and displayed at the top of the book of a licensed exchange.[10] Any bids or offers displayed by exchanges that are not the *best* bid or offer on a particular exchange also do not enjoy trade-through protection. This makes the US order protection rule less prescriptive than Canada's full-depth-of-book regime, and means that US market participants require less data than do their counterparts in Canada to comply with best execution (more on this in the next section).

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[8] Reg NMS adopting release, pp 10-11

[9] Nasdaq had not yet become an officially licensed exchange at the time Reg NMS was adopted. The reference to associations other than Nasdaq at that time referred to the NASD's Automated Display Facility, which brokers and ATSs sometimes used to display quotes.

[10] This was also true of the BATS BZX and Direct Edge EDGA and EDGX markets while they operated as ATSs, prior to becoming registered exchanges in 2008 and 2010, respectively.

Even though US order protection is less stringent than its northern neighbor's, it still represents a strict, inter-market best-price obligation that has similar, if less intense, effects on fragmentation and the related costs borne by intermediaries. As in Canada, market-wide order protection supports a higher number of competing exchanges than would exist without such rules. To comply with the US order protection rule, brokers must be able to access every US exchange — either directly or indirectly, through routing arrangements with other exchanges or brokers — no matter how infrequently any one of these markets may actually be the only one displaying the best price in a given situation.

This is illustrated it in part by the growing number of exchanges since the adoption of Reg NMS. When the rules became effective there were nine stock exchanges in the US — NYSE, NYSE Arca[11], Nasdaq, and the American, Boston, Chicago, Cincinnati, ISE and Philadelphia Stock Exchanges.[12] Today, with the additions of BATS BZX, BATS BYX, the CBOE Stock Exchange, EDGA and EDGX, there are 13.[13] Another sign of the tendency toward venue proliferation in a strict-order-protection regime is the operation of multiple exchanges by single companies. Six companies operate the 13 US exchanges. The two biggest, NYSE Euronext and Nasdaq OMX, each operate three exchanges. Three other companies (BATS Global Markets, Direct Edge and CBOE Holdings[14]) each run two exchanges. Just one, the Chicago Stock Exchange, is a single-market operator.

But perhaps the most convincing evidence of the power of strict, market-wide order protection to support exchange proliferation is the stated plan of Nasdaq OMX when it attempted to in early 2011 to acquire NYSE Euronext's US securities businesses.[15] During a conference call to explain the deal to Wall Street analysts in April 2011, Nasdaq OMX CEO Robert Greifeld said that Nasdaq planned to continue to operate all six NYSE and Nasdaq US stock exchanges separately if his merger plan succeeded. Exchange consolidation, in other

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[11] The Archipelago ECN, one of many ATSs that took significant market share in Nasdaq-listed stocks from NASD dealers in the late 1990s and early 2000s, acquired PCX Holdings, parent of the Pacific Stock Exchange, in 2005. NYSE Group acquired Archipelago later that year. Today, NYSE Euronext operates the old Pacific Stock Exchange as NYSE Arca.

[12] Several mergers and acquisitions have changed the names and structures of some of the old regional and secondary exchanges. The Amex is now owned by NYSE Euronext and known as NYSE MKT. The Boston and Philadelphia exchanges were acquired by Nasdaq OMX and are today known as Nasdaq BX and Nasdaq PSX, respectively. The Cincinnati exchange has changed its name to the National Stock Exchange.

[13] The ISE Stock Exchange was acquired by Direct Edge and folded into EDGX

[14] CBOE Holdings owns 51% of the CBOE Stock Exchange, which last year acquired the National Stock Exchange.

[15] The plan was part of a joint bid by Nasdaq OMX and Intercontinental Exchange to break up a separate merger agreement between NYSE Euronext and Deutsche Börse Group

words, would continue to occur at the parent company level, where it could eliminate duplicative costs, but not on the individual-exchange level. In a market that protects the top of book at each exchange, operating six exchanges from the same technological infrastructure is a better business proposition than operating five, four, three, two or one. To be sure, other factors play a role in exchange proliferation and the operation of multiple books by single parent companies. The requirement that exchanges provide fair access to their execution services, also codified in Reg NMS (and part of Canada's NI 23-101), means that, unlike a broker or ATS, a single exchange has limited flexibility to offer individual members customized services. Access to the order book, order types and other exchange services must be offered on the same terms to all market participants. For example, exchanges cannot negotiate separate fees with two different customers. Consequently, to offer different fee schedules or market structures that might appeal to different market segments, companies often operate separate exchanges, each with their own clearly defined rules and fees that apply equally to all customers. Indeed, multiple markets operated by one company also exist in Europe, but to a lesser extent, and with pricing and structural experimentation, not the lure of multiple protected tops-of-books, the primary driver.

The costs of complying with the US order protection rule are substantial. Again, looking solely at venue connectivity (with market-data costs to be examined in the next section), it currently costs $4,200 per month ($50,400 per year) to connect to all 13 US stock exchanges. At many exchanges, the monthly connection fee covers multiple order-entry ports, with each additional port carrying a larger fee. As in Canada, major market participants — such as bulge-bracket brokers offering algorithmic trading services to institutional investors — may need about 10 order-entry ports per exchange to effectively execute client order flow. As a result, and considering the differences in fees for multiple ports outlined in the "Connectivity Fees for US Exchanges" table on the next page, connection costs alone can run major US brokers at least $35,700 monthly, or $428,400 annually.

The need for co-location is even greater in the speed-dominated US market, and the associated costs make total connectivity charges even higher. There are four major co-location centers for the US equities market: the data center for NYSE Euronext's markets, in Mahwah, NJ; the Nasdaq OMX markets' data center in Carteret, NJ; Savvis' Weehawken data

center, which houses the BATS exchange matching engines; and Equinix's NY4 facility in Secaucus, NJ, where Direct Edge runs its exchanges. Only the most active high-frequency trading firms co-locate at all four facilities. Typically, a big broker executing institutional client flow through its algorithms and smart router might choose to co-locate at one or two of the facilities housing the highest-market-share exchanges, and use so-called cross-connects to access other data centers. For the purposes of estimating the co-location costs of a major algo broker, we add together the fees charged by Nasdaq OMX and NYSE Euronext. The monthly cost for one high-density (maximum 10 kW) cabinet at Nasdaq's Carteret facility is $7,000[16]. A similar level of service at NYSE's Mahwah data center runs $10,500. A major algo broker might require two to three cabinets to process client flow. At that level, such a firm's monthly co-location services bill would come to about $52,500, or $630,000 annually. Taken together, connectivity and co-lo costs for a major US market participant would then run approximately $1.06 million annually, similar to that of a typical big dealer in Canada.

Connectivity Fees for US Exchanges

Venue	Market Share	Order-Entry Port Fees	Cost of 10 Ports
Nasdaq	15.79%	$400 each; Add'l ports $200 each	$1,200/month
NYSE	12.28%	$200 for first 5; $500 each thereafter	$2,700/month
NYSE Arca	10.59%	$200 for first 5; $500 each thereafter	$2,700/month
BATS BZX	8.54%	$400 each	$4,000/month
EDGX	8.12%	$500 each	$5,000/month
EDGA	3.28%	$500 each	$5,000/month
Nasdaq BX	2.37%	$400/pair; Add'l ports $200/pr	$1,200/month
BATS BYX	1.85%	$400 each	$4,000/month
Nasdaq PSX	0.88%	$400/pair; Add'l ports $200/pr	$1,200/month
Chicago Stk Exch	0.73%	$400 each	$4,000/month
CBOE Stk Exch	0.39%	$100 each	$1,000/month
NYSE MKT	0.36%	$200 for first 5; $500 each thereafter	$2,700/month
National Stk Exch	0.34%	$100 each	$1,000/month

Sources: Company Reports, Arcavision
Market Share is % of volume traded in June 2013
Order-Entry Port Fees are assessed monthly

[16] Nasdaq OMX has run a temporary discount program for new co-location cabinets in 2013. Under the program, which ran in January/February and is scheduled again for July/August, the cost of a new high-density cabinet would be $4,500 per month for two years.

Additionally, US brokers and dealers have faced the same challenges as their Canadian neighbors with respect to making the transition from being the market's primary liquidity providers to serving as automated agency brokers who are forced to pay fees to access protected quotes. However, in the US the damage from this effect is comparatively less onerous because Reg NMS caps the fees exchanges can charge to access quotes at 30 cents per 100 shares. Like the allocation of market-data revenues according to a formula that takes into account market share and time quoting at the National Best Bid and Offer, the access-fee cap militates against individual protected markets extracting excessive rents from market participants. As institutional commission rates have come down since the passage of Reg NMS, however, some brokers have begun complaining that access fees should be reduced, to better balance broker costs with revenues.

One way that brokers have tried to better manage costs without a reduction in the access-fee cap, however, is by diverting a greater portion of their trading activity off-exchange. Indeed, access-fee avoidance by brokers has contributed to a significant increase in trading on non-displayed, non-exchange markets in recent years. According to our analysis of volume on exchanges and various off-exchange venues, the portion of total US equity volume executed in such a fashion has more than doubled, from approximately 16% in the first quarter of 2008 to 35% in the second quarter of 2013. A large part of this growth has come from so-called dark pools, many of which are run by major brokers as internal crossing engines for their institutional clients' algorithmic orders. These dark pools — there are approximately 24 that handle significant volume — have increased their share of total US equity trading from just 5% in January 2008 to 14% in June 2013.

Best Execution in Australia

Australian regulators had the benefit of studying market-structure transformations in the US, EU and Canada when establishing the rules under which the country would introduce competition with ASX Ltd, operator of the Australian Stock Exchange, in equity trade execution. The Australian Securities and Investments Commission, which took over regulation of securities from ASX as part of the transition, struck a middle ground between the highly prescriptive, best-price-focused regimes in Canada and the United States and the

highly flexible, principles-based system adopted by the EU through its Markets in Financial Instruments Directive in 2007.

Australia's new best-execution policy is set out in Chapter 3 of ASIC's 2011 Market Integrity Rules, which broadly states that "when handling and executing an Order for a client a Participant must take reasonable steps to obtain the best outcome for that client." The rules go on to define "best outcome" more specifically, and establish different definitions for retail and wholesale orders. For retail orders, best execution is defined as "best total consideration." For wholesale orders, brokers are permitted to take into account a wider array of factors, including "price, costs, Total Consideration, speed, likelihood of execution or any other relevant outcome, or any combination of those outcomes."

ASIC provides exceptions to both standards for instances in which clients have provided "clear and unambiguous" instructions for handling a specific order in a way that would contradict the best-execution mandate. The rules state that such instructions should be written or, if provided verbally, recorded and retained by the broker for seven years. In these cases, brokers "must take reasonable steps to handle and execute the order in a way which satisfies the [client's] instructions." And, importantly, ASIC does not require brokers to connect to alternative venues, specifically because regulators did not want to repeat the experiences of Canada and the US in mandating costly connections to marginal market centers. Specifically, ASIC set out a transitional period for enforcement of best execution, through March 1, 2013, during which brokers specifically were not required to connect to alternative venues. And ASIC guidance specifically states that even after the sunset of that transitional period, brokers are only required to connect to competing venues when they have judged that the benefits outweigh the costs.

Still, for retail clients in Australia, practically speaking, best execution means best price. Technically, the use of the phrase "total consideration" in the rules allows retail brokers to weigh brokerage commissions, venue and post-trade fees along with the prices bid or offered for shares. But as a practical matter, Australian retail brokers typically charge a fixed commission that bundles all of these costs together, so best execution essentially means best price. However, the wiggle room afforded under "total consideration" does allow Australia's best-execution policy to flex with potential market-structure changes, such

as competitive clearing. Currently, ASX is the sole provider of clearing and settlement services for Australian equity trading. Chi-X Australia signed a long-term post-trade contract with ASX before launching, but has been exploring alternatives for when this arrangement ends, including partnering with other organizations to launch a competing post-trade provider in Australia. Should the fees charged by such an organization differ substantially from those levied by ASX, retail brokers would be able to weigh whether a lower clearing cost, borne by the client, would justify paying a slightly higher price when buying shares on the client's behalf — and vice-versa.

The substantial wiggle room offered to brokers executing institutional orders, however, means brokers can routinely ignore better prices posted on Chi-X Australia, the sole competitor to incumbent exchange ASX. And the specific rules and guidance that free brokers from connecting to competing venues, combined with best-execution rules that do not require a strict adherence to best price, means that some brokers handling only institutional order flow in Australia continue to connect and send all client orders only to ASX. This does not necessarily mean that these orders are being disadvantaged, as the presence of Chi-X Australia as a significant competitor, with automated market makers aggressively quoting tight markets, has pressed ASX participants to improve their quotes. It also has prompted ASX to reduce fees and improve its matching-engine technology, all of which benefits the broader Australian investment community.

Additionally, ASIC maintains a program through which it encourages brokers to actively monitor Chi-X Australia trading activity and consider whether the impact on best execution would outweigh connection costs. ASIC arranged for multiple market-data vendors to give brokers indications of instances in which they could have achieved better prices on Chi-X, and mounted an educational campaign in the brokerage community about these real-time alerts, as well as ways to conduct post-trade analyses of Chi-X data to inform their best-execution practices. ASIC combined this approach with phone calls to every broker in the country to check whether they had conducted such best-execution analyses, what they revealed and whether the brokers were considering connecting to Chi-X. This process is ongoing in Australia today.

We believe that Australia's careful, measured approach to introducing competition may be particularly instructive for CVM. ASIC took several steps to consider both the positive and negative aspects of how the US, EU and Canada had managed transitions from dominant to fragmented markets. Among these were commissioning detailed studies from outside consultants and inviting representatives of the Canadian regulatory community and equity trading industry to spend time in Australia, during the summer of 2010, as ASIC contemplated changes to the Market Integrity Rules. The Canadian representatives not only helped ASIC understand the pros and cons of various regulatory approaches, but also prepared Australian market participants about what to expect during the transition to competitive trading venues. ASIC's rules concerning best execution and, to a lesser extent, market data reflect this thorough study. They also represent an attempt to avoid some of the worst outcomes seen in jurisdictions, particularly Canada, in which highly prescriptive best-execution policies have contributed to venue proliferation and the associated complexity and costs for intermediaries.

But Australia's hybrid approach also does not appear to have unduly restricted competition with the incumbent market, ASX. Since its launch in October 2011, Chi-X Australia has taken substantial market share from ASX, and today executes approximately 10% of the country's equity volume. In addition to automated market-making firms, some of whom jointly own Chi-X Australia, the venue sees substantial liquidity-seeking flow from retail brokers that are mandated to achieve best price for their clients.

Australian Venue Connectivity Fees

Venue	Market Share	Monthly Fees	Annual Fees
ASX	88.5%	A$675	A$2,500, plus A$5,000 access to ASX Trade platform, A$4,000 for "trade feed"
Chi-X Australia	11.5%	A$1,300	

Sources: ASX, Chi-X Australia, Rosenblatt Securities

Australia's measured approach to best execution — requiring brokers to access the best market-wide prices for retail clients, while allowing far more leeway for institutional orders, yet stopping short of an absolute mandate that brokers connect to all trading venues —has led to far less exchange proliferation than in Canada and the US. To be sure, Australia is also

the smallest of the four jurisdictions we studied, at just 55% of the average daily turnover of the next biggest, Canada. But its two lit markets are just 22% of the total number in Canada, nine. Connectivity costs are also far lower. To be a member of ASX, a broker pays A$2,500 annually. Access to the ASX Trade platform is A$5,000 annually, and a "trade feed" that permits orders to be entered into the system runs A$4,000 annually. There are also monthly fees charged at a rate of A$675, bringing total annual connectivity costs for ASX to A$19,600. At Chi-X Australia, a similar level of service carries a monthly fee of A$1,300 (see "Australian Venue Connectivity Fees" table on previous page). Assuming a similar number of required connections as in Canada and the US, this puts the total annual cost for a major broker to connect to both markets at approximately A$209,000.

Co-location is also a less complicated and less costly undertaking in the Australian equities market. Because they can take other factors besides best price into account when executing institutional orders, many brokers do not regard co-location as essential. Those who do tend to co-locate at ASX, owing to its still-dominant market share. Chi-X Australia's matching engine is located at Equinix's SY3 data center in Sydney. The automated market-making firms that are the primary liquidity providers on Chi-X choose to co-locate there, but few others join them at this point. ASX offers co-location with its matching engine at its Australian Liquidity Centre, about three miles northwest of central Sydney. A high-density cabinet at the ALC costs A$5,500 monthly. A major broker taking two to three co-lo cabinets, then, would pay as much as A$16,500 per month, or A$198,000 annually. Together, estimated connectivity and co-lo costs of A$407,000 per year for a major market participant in Australia are far less than the approximately C$1 million (A$1.05 million) paid by similar firms in Canada and the $1.06 million (A$1.15 million) that big US firms lay out.

Best Execution in the European Union

The European Union's is by far the most liberal and flexible of the four best-execution regimes we examined. The Markets in Financial Instruments Directive (MiFID), which took effect in November 2007, ended the so-called concentration rules that previously required trades to be executed on national exchanges, for the first time enabling true competition in execution services. Article 21 of MiFID states that brokers must "take all reasonable steps to obtain, when executing orders, the best possible result for their clients taking into account

price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order." Like in Australia, there is an exemption for instances in which clients provide specific instructions, which requires firms to execute the order in question according to those instructions. Article 21 also requires firms to implement an order-execution policy that lists the destinations to which they send orders and the factors that drive routing decisions. Clients must be notified of, and consent to, such policies. Additionally, the directive requires brokers to continuously monitor the effectiveness of their best-execution policies, "to identify and, where appropriate, correct any deficiencies," including whether the current lineup of execution venues is sufficient to achieve best execution for clients.

The so-called Level 2 text of MiFID clarifies these principles somewhat. Specifically, Article 44 mandates that firms review annually the execution policies required under Article 21. Article 44 also defines "the best possible result" for retail orders as "the total consideration, representing the price of the financial instrument and the costs related to execution." This is very similar to the language in Australia's policy, except for one critical passage (emphasis added):

> For the purposes of delivering best execution where there is more than one competing venue to execute an order for a financial instrument, in order to assess and compare the results for the client that would be achieved by executing the order on each of the execution venues listed in the firm's order execution policy that is capable of executing that order, *the firm's own commissions and costs for executing the order on each of the eligible execution venues shall be taken into account in that assessment.*

The combination of this principles-based approach, which does not specifically provide trade-through protection to the best bids and offers throughout the EU, with brokers' express ability to consider their own costs when choosing among execution venues, means the EU provides brokers with the greatest amount of flexibility in obtaining best execution of any of the jurisdictions we analyze in this report.

Practically speaking, firms' compliance approaches fall into two main categories. First, very large, global banks and brokerages that operate not only in the EU but also in the US and

other major markets, tend to adopt routing practices that are very similar to what exists in the US, even in the absence of strict trade-through protection for the best EU-wide quotes. These firms often serve clients throughout the EU, as well as beyond its borders, who want to trade a wide variety of stocks listed in the various EU member states. Many of them already had invested in advanced order-routing technology, which they deploy in the US. These firms' clients tend to be more sophisticated than others investing in the EU and expect them to connect to multiple pan-EU venues. Such firms also can enjoy significant cost savings, scaled across the entirety of their client order flow, by executing trades away from incumbent exchanges. This was particularly true when MiFID first became effective, as the differential in execution fees charged by incumbent exchanges and the Mulitlateral Trading Facilities that sprung up to challenge them were far wider than they are today, following a series of substantial fee reductions by the likes of the London Stock Exchange, NYSE Euronext and Deutsche Börse. Consequently, these big, global organizations that execute client orders in multiple EU countries tend to connect to a wide variety of competing execution venues, obtain market data from them to gain a view of the best prices available on a pan-EU basis (though the lack of a true consolidated tape makes this very difficult, as we will illustrate in the next section), and route client orders to be executed at the best possible price — even though the letter of the law does not expressly require them to do this.

Then there are smaller brokers, many of which have clients primarily in a single EU country that invest primarily in stocks listed in that member state. These firms may not have technology that allows them to route orders for the same security to multiple execution venues. Their clients tend to be less sophisticated, and either unaware of or less concerned about the various options brokers face for executing their orders on venues other than the national exchange. Additionally, the scale of their client order flow may not be big enough to deliver enough savings from routing orders to MTFs, which typically charge cheaper execution fees than do the incumbent markets, to justify the costs of maintaining connections to the alternative markets and the order-routing technology (as well as market data) necessary to choose among them. Because MiFID permits them to take into account a broad range of factors when defining best execution — including "costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution

of the order," they often bypass alternative markets completely and connect only to one or a small group of national exchanges. Certainty of execution is a particularly important factor for these brokers, who are able to argue that the market shares of incumbent exchanges — still well above 50% in each of the major European national markets — mean more available liquidity and a better chance of filling client orders.

The fragmentation of EU clearing and settlement among multiple providers, organized roughly along the same lines that trade matching at national exchanges once was, represents a huge complication and impediment to best execution (at least as defined by best price) in the region. Consider again the two main groups of EU brokers we discussed above when relaying common order-routing practices. Members of the first group — the big, pan-European banks — typically are members of multiple clearing and settlement organizations throughout Europe. Firms in the second group — smaller, individual-country-focused brokers — may be members of a single post-trade provider, or clear trades through a larger organization that would pass through additional charges for executing across borders. The complications and costs related to clearing and settlement that come with routing an order to a destination other than the long-established, incumbent market, thus prevent many European brokers from doing so.[17] Only those with significant incentives to support the growth and success of MTFs such as Chi-X Europe (now BATS Chi-X CXE) and Turquoise (an MTF started as a bank consortium, that is now owned by London Stock Exchange Group) would become members of the upstart central counterparties supporting those venues — the European Multilateral Clearing Facility (EMCF) and Euro CCP (a division of US clearing and settlement utility DTCC), respectively.[18] These supporters have tended to be the big liquidity providers and banks that trade in very large volumes, often own stakes in these platforms and stand to gain the most from their success.

Europe's liberal best-execution principles have produced far less venue proliferation than the more-prescriptive regimes present in Canada and the US. To be sure, the total number of lit venues in the EU, at 21, is seven more than the US and more than double the total in Canada. But the EU is unique among the four jurisdictions we studied, in that it is not a

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[17] Indeed, we are reminded here of a frequent refrain we heard from a senior incumbent-exchange executive in Europe during the early days of MiFID: "You can trade wherever you like, but then you have to clear and settle."

[18] EMCF and Euro CCP recently announced a merger that is expected to make trading away from incumbent exchanges a bit easier for European market participants.

single market but rather a collection of disparate national markets knitted together by common legislation. Of the 21 quoting venues in the region, 15 are national exchanges — such as the London Stock Exchange, Deutsche Börse, the four Euronext markets (Paris, Amsterdam, Lisbon and Brussels), Borsa Italiana, Bolsas y Mercados Españolas, SIX Swiss Exchange, the Irish Stock Exchange and the various Nasdaq OMX Nordic markets (Stockholm, Helsinki, Copenhagen, etc.) that had monopolies on trading their listed securities before MiFID. So some level of fragmentation was built in to Europe before MiFID brought about competition, owing to the legacy of national bourses in each country, each trading only their own listed stocks. Just seven of Europe's 21 lit venues — BATS Chi-X BXE, BATS Chi-X CXE, Equiduct, Turquoise, Burgundy, Quote MTF and TOM MTF — are MTFs or new exchanges that offer trading across the EU or in more than one of its member states. And only three of these — The two BATS markets and Turquoise — are major, truly pan-European markets, as Quote MTF and TOM MTF have *de minimis* market shares and Burgundy is focused on the Nordic markets. In most of the biggest member-state equity markets, there are just three to five lit-market competitors with the national exchange. In other words, trades in most European stocks can be routed to a maximum of four to six competing execution venues, compared with 13 exchanges for each US stock and nine for those listed in Canada.

The relatively small number of competing lit venues for any listed stock, combined with wide regulatory latitude for brokers to connect to only national exchanges in their countries if they so choose, gives European brokers considerable flexibility in managing their connectivity (and data) costs. Firms that choose to connect and route to multiple venues, seeking best price for customer orders, will have bigger connectivity bills as a result of exchange competition than those that don't, and the already fragmented nature of European equity markets means these costs — connecting to all the major national markets as well as alternative platforms — can add up quickly. Indeed, for a major market participant executing substantial pan-European client flow, connecting to all major national and alternative lit venues costs approximately €601,500 annually, assuming the same 10 connections per market needed for a major broker to process its client flow (see table, next page). But the brokers who choose to continue to connect only to their home-country listing market have seen little in the way of additional costs from fragmentation.

Connectivity Costs for EU Venues

Venue	Market Share	Annual Fee	Other Fees	Cost/10 Connections
LSE	15.0%	€16,210		€162,100
BATS Chi-X CXE	9.5%	€2,320		€23,200
Euronext	9.4%	€12,000	€10/message/second order-entry capacity fee	€120,000
Deutsche Börse	7.5%	€4,500	€6,000/yr per session after first two	€93,000
BME (Spain)	4.4%	€3,600/desk beyond first two		€28,800
Turquoise	4.1%	€2,320	€175 per 250 trades/sec (£3,475 max/participant)	€23,200
Nasdaq OMX Nordic	3.3%	€10,800		€108,000
Borsa Italiana	3.2%	£2,320		€23,200
BATS Chi-X BXE	2.5%	Included w/CXE		
Burgundy	0.02%	£2,000		€20,000

Sources: Thomson Reuters, BATS Global Markets, LSE Group, NYSE Euronext, Nasdaq OMX Group, Deutsche Börse Group, BME
Market Share is % of pan-European value traded for June 2013
BATS Chi-X offers access to both its CXE and BXE order books for a single price

The cost of co-location also can be significant for the big firms that choose to buy it. For this reason, many firms tend to operate their equity brokerage operations out of London and co-locate with the many European exchange data centers located in and around the city. Like in the US, co-locating in a single location often allows access to multiple markets. In the UK, for example, both the LSE and Turquoise, operated by the same parent company, house their matching engines in the same London data center, along with LSE's Borsa Italiana unit and the Oslo Börs matching engine, which runs on LSE's Millennium IT technology. Likewise, following the November 2011 acquisition of Chi-X Europe, the region's biggest lit MTF, by

BATS Global Markets, both the old Chi-X venue (now called BATS Chi-X CXE) and the old BATS Europe market (today BATS Chi-X BXE) can be accessed in the same data center, Equiniex's LD4 facility in Slough, outside London. The matching engines of all four Euronext markets are housed in NYSE Euronext's giant data center in Basildon, also a London suburb. Co-location costs are not readily accessible for EU markets, but thought to be roughly comparable with the cost of similar services in the US and Canada, and thus add substantial outlays for major market participants. However, smaller firms focused on one or a small number of individual countries likely will choose to not co-locate their trading applications and therefore will not bear this cost.

Anecdotal evidence from European market participants suggests that the costs of connectivity for the biggest brokers, however, goes far beyond the fee schedules of execution venues for access to matching engines. Mandatory upgrades of trading-venue software, new fee schedules and order types can all require systems changes and testing by brokers. Connections to new venues also require one-time membership fees, as well as compliance reviews of their rule books, policies and practices. These internal projects alone can run bulge-bracket brokers €500,000 or more annually, according to conversations with European market participants. And firms' ability to deal with these tasks has been negatively affected by soft volumes and difficult macroeconomic conditions in recent years, which have prompted massive operational staff cuts. In some cases, big banks have seen their personnel assigned to exchange connectivity shrink from more than 60 when MiFID was first implemented to less than five today, making new connections, as well as maintenance of existing connections, far more taxing on these organizations.

Various Approaches to Market-Data Consolidation

As we have stated earlier in this report, the degree to which market participants rely on consolidated data from multiple trading venues depends in large part on the best-execution regimes present in the jurisdictions where they do business. For this reason, decisions regarding best-execution policies are the very core of market-structure regulation and should be taken with the utmost care and consideration of the potential effects, both intended and unintended, on market participants.

Because of the strong link between best-execution policies and the need for — and costs of — market data, we consider in the same order in this section the four jurisdictions whose best-execution regimes we studied in depth in the previous section, beginning with the most highly prescriptive regime, Canada, and ending with the most flexible, the EU.

Canada

Canada did not explicitly set forth a framework regarding the distribution of consolidated market data in the July 2012 amendments to NI 21-103, or in the text of these rules prior to the amendments. Previously, in July 2009, the Canadian Securities Administrators, an umbrella group for Canada's various provincial regulators, awarded TMX Group a 5-year contract to act as a consolidated Information Processor. Consolidated equity-trading data are available directly through TMX's Datalink unit, as well as from vendors who package this data along with other information for Canadian banks and dealers operating in a variety of financial markets. These vendors include Thomson Reuters, the dominant player in Canada (with a market share in excess of 90%, according to market participants), and Bloomberg. In each case, the distributors tack on a fee to the individual data-subscription charges levied by each protected marketplace.

Practically speaking, Canada's full-depth-of-book best-price protection for displayed orders means that market participants involved in executing client trades must buy real-time, depth-of-book (or Level II) market data to comply with the country's best-execution policy. Additionally, the high level of venue proliferation that is supported by Canada's best-execution regime means that even personnel who are not directly involved in executing client transactions — such as representatives dealing with retail customers, investment bankers and securities analysts — typically are accessing top-of-book (or Level I) data from nine displayed venues to get a true picture of market prices. The associated costs can be very high. Our discussions with market participants and data professionals in Canada reveal that the cost of a data subscription delivered through the dominant vendor, Thomson Reuters, ranges from a low of C$55-65 per user for the country's biggest dealers to a high of C$150-170 per user for the smallest firms. This is just the fee charged by the vendor, and does not include fees for each marketplace's data, which the vendor passes through to customers. Considering both vendor fees and the appropriate mix of Level I and Level II

data needed by market participants, the total cost of consolidated equity market data in Canada can run as much as C$6.4 million annually for the biggest dealers. We attempt to estimate these costs for a range of market participants, according to their size, in the table below.

Canadian Market-Data Fee Estimates

	Big Dealer	Mid-Tier Firm	Small Firm
# of Users	3,000	500	120
Vendor Fees	C$2,160,000	C$495,000	C$230,400
Venue Fees	C$4,257,060	C$759,228	C$172,741
Total Annual Cost	C$6,417,060	C$1,254,228	C$403,141

Sources: Rosenblatt Securities, Trading Venue Fee Schedules (where available), Investment Industry Association of Canada
# of Users estimated based on discussions with market participants, representing midpoint of range for firm type
Exchange Fees based on fee schedule data, estimated numbers of Level I and Level II users for each firm type

It is important to note that the figures in the above table are rough estimates, based on conversations with Canadian market participants, who helped us to apply fees disclosed by the various venues to real-life situations and relayed lesser-known information about numbers of data users at firms of various types, as well as the split between which of these users receives Level II, as opposed to just Level I, data. Some firms choose to give only TSX Level I data to certain users that are not involved in executing client orders in the equity market. However, the TSX's dominant market share means that its data is a "must have" for anyone who needs a real-time price for a TSX-listed security. This inelastic demand for TSX data may give TMX Group considerable pricing power. Additionally, this bottom-up approach to building data costs estimates may not reflect discounts that very large enterprises may negotiate with the various displayed trading venues.

Still, the high costs of market data in Canada have led to widespread complaints from the dealer community — which, as we stated earlier, is also feeling squeezed by connectivity and transaction-matching costs at the various marketplaces. The Investment Industry Association of Canada, a membership organization representing dealers of all sizes, has been pushing aggressively for measures that would curb data costs. These include implementing a data-revenue allocation formula for splitting costs among the various displayed markets according to their contributions to price discovery and liquidity, similar

to the Reg NMS tape-revenue sharing plan, as well as a broader re-evaluation of Canada's best-execution rules.[19]

In November 2012, the CSA responded to this dissatisfaction by issuing a consultation paper seeking comment from market participants on real-time market-data fees. In this paper, the CSA acknowledged that the high cost of Canadian market data was cause for concern, stating that:

> "…the costs of acquiring real-time market data have been escalating in recent years due to an increasing number of marketplaces entering the market and charging for their market data. In addition, there is a concern that the current market structure and regulatory environment may be contributing to these increasing costs. Too high or excessive costs are a form of friction in the market. We would be concerned that such an outcome would be inconsistent with our mandate to foster fair and efficient capital markets. By not addressing these issues, we risk negatively impacting confidence in the Canadian capital markets."

Elsewhere in the paper, the CSA suggests that TSX and TSXV data costs are "reasonable" given their market shares, but that "marketplaces with a smaller market share are charging fees that are high in relation to their share of trading activity," and questions whether this is justified by the cost of producing that data. The paper also acknowledges that "the cost of consolidated data in Canada is higher than it is in the United States relative to trading activity," but suggests that differences in regulation, industry structure and the scale and size of the two markets may mean that some gap in this measure always will exist. The CSA is still evaluating comments on the paper, but appears to be at least considering the kinds of measures that the IIAC and others have been advocating to better control data costs.

United States

Although the US has a similar market structure and best-execution obligations to that of Canada, two factors ensure that market-data costs are not as onerous for US market participants. The first is that US order protection extends only to the best prices displayed

[19] The IIAC commissioned a study on Canadian market-data costs, which was released in 2011 and contains a wealth of information on both costs in Canada and how they compare with similar charges in the US and Europe. It would be very much worth the CVM's time and effort to review this document and speak with IIAC staff and members for more information.

at the top of each venue's order book, not to all displayed bids and offers across every marketplace. The second is the so-called tape-revenue sharing plan that the SEC implemented alongside the order protection rule when it crafted Reg NMS.

There are three consolidated "tapes" in the US: Tape A aggregates last-sale and quote data for NYSE-listed stocks; Tape C does the same for Nasdaq-listed issues and Tape B handles securities (mostly exchange-traded funds and notes) that are listed by NYSE Arca, BATS BZX and other exchanges). These securities information processors, or SIPs, however, allocate the revenue they receive from data consumers among the 13 US exchanges according to two main criteria: market share (known as the Trading Share) and time quoting at the best market-wide prices (known as the Quoting Share). Each of these two components is weighted the same when determining how much of the total revenue pool a given exchange receives. The total revenue available for sharing is largely determined by the number of subscribers — which, in turn stems from securities-industry employment, a primary driver of demand for data.

The tape-revenue-sharing system helps to partially curb the natural tendency of strict order-protection best-execution regimes to lead to venue proliferation. Exchanges only share in the fees paid for market data to the extent that they are contributing to price discovery and liquidity – by executing trades and displaying quotes that contribute to market-wide depth at the best bid or offer. Unlike in Canada, exchanges with *de minimis* market shares are unable to collect outsized data fees simply by dint of their protected-quote status.

However, this does not mean that market participants are happy with the costs of market data in a fragmented market governed by strict best-price order protection. In a recent presentation to the SEC on market-structure issues, for example, Morgan Stanley argued that the collective tape revenue shared by exchanges "grossly exceeds (the) costs" of producing that data. The firm also weighed in on the costs associated with connecting to small exchanges, asserting that "protected quote status should be **earned** — not an entitlement (emphasis theirs)."

And the revenue-sharing scheme also contributes somewhat to market-structure complexity, by incentivizing exchanges to develop order types that maximize the chances of

orders being displayed at the inside market. Such "price-adjustment" mechanisms have been a topic of controversy in the US, and make order routing and execution more difficult for some market participants to understand.

We have not conducted a bottom-up estimate of individual firms' data costs in the US, largely because the Reg NMS allocation system makes such an exercise prohibitively complex, particularly in the short time period we have had to conduct our analysis. However, there have been public disclosures about the total size of the US equity market-data revenue sharing pool. In 2004, according to a Traders Magazine article, the total tape-revenue pool was $434 million. By 2008, according to the SEC's January 2010 Concept Release on Equity Market Structure, that figure had risen to $464 million. Based on our discussions with US market participants who have knowledge of the revenue-sharing system, we believe that the total revenue pool for 2013 will be just $360 million, down from the earlier measures largely because securities-industry employment has fallen in the wake of the financial crisis.

Australia

Australian regulators did not mandate the creation of a consolidated tape when they amended their Market Integrity Rules in 2011 to allow for the introduction of competing execution venues. ASIC specifically recognized the importance of consolidated market data for firms charged with best-execution obligations. However, Australia is a bit of a special case in this regard because of local-market dynamics. Historically, the overwhelming majority of Australian market participants have accessed ASX through an order-management system provided by private vendor IRESS, which enjoys a market share in the neighborhood of 90-95% in the country, according to our conversations with industry professionals there. IRESS already acted as a distributor of ASX market data prior to the new market integrity rules and the launch of Chi-X Australia. Regulators were highly confident that IRESS would aggregate and deliver consolidated market data to market participants once competition commenced, and did not want to inadvertently anoint IRESS as a government-sanctioned consolidated tape provider by mandating that market participants use consolidated data. Based on our conversations with Australian market participants, we believe that IRESS is in fact acting as a data consolidator for the vast

majority of intermediaries who have connected to — or are at least monitoring prices on — Chi-X to fulfill their best-execution obligations.

Currently, the cost of consolidated data in Australia is far lower than in Canada or the US, primarily because there is just one venue — ASX — that charges fees for its data. Another reason for Australia's comparatively lower data costs may be that not all market participants are bound to execute at the best quoted prices. Wholesale orders can routinely trade on ASX at prices that are inferior to those posted on Chi-X, under Australia's hybrid best-execution regime. Retail orders effectively must be executed at the best displayed price, but there is no strict order-protection rule as in Canada and the US, and certainly not the depth-of-book protection we see in Canada, which seems to have played an important role in venue proliferation and high market-data costs there.

ASX currently charges A$55 per month per user for its ASX Total data feed. The rate increased earlier this year from A$45 per month, and does not include what IRESS or other vendors may charge users for broader data or other services. IRESS does not disclose this information publicly, and we were unable to obtain this information during the course of our research. Chi-X does not currently charge for its data, but it could possibly begin doing so in the near-to-medium-term, consistent with the approach of Chi-X Global in Canada, where its Chi-X Canada market began charging for data after building a significant market share. We believe that Chi-X Australia will charge substantially less for its data feed than does ASX. Because it is owned and supported by some of the world's biggest automated market-making firms, Chi-X's bid-ask spreads often are as good or better than those on ASX, and we believe that it accounts for a significant enough portion of quotes at the inside market to appeal, at a projected rate of A$10-20 per month per user, to some cost-conscious data consumers as a viable alternative to ASX data.

Assuming Chi-X does start charging for market data in the reasonably near future, and that the fee is as high as A$20 per user per month, the total portion of consolidated data costs attributable to venue fees in Australia will be A$75 per user per month, or A$900 per user per year, considerably less than the approximately C$1,400-1,500 (A$1,500-1,600) blended venue data fees we estimate per user per year in Canada. Furthermore, because connections to multiple marketplaces and strict best-price routing is not technically required under the

Australian best-execution regime, it's possible that Chi-X's introduction of a far lower fee for its data may lead to the aforementioned substitution effect and cause ASX to reduce its monthly fee to prevent market-share losses to Chi-X.

European Union

MiFID does not mandate the aggregation, distribution or use of consolidated market data. A wide swath of European market participants regards this as one of the most glaring oversights in the directive. Several industry professionals with whom we spoke noted that repealing so-called concentration rules, which required trades of shares listed on a national exchange to be executed exclusively on that exchange, was such a monumental change for the EU that legislators and regulators may not have wanted to take on even more controversy by mandating a consolidated tape. Indeed, recent efforts to tackle data consolidation as part of the ongoing review-and-amendment process commonly known as MiFID II, as well a private initiative called the COBA Project to create an industry-sponsored tape, reveal the powerful interests involved — particularly the national exchanges that have suffered substantial market-share losses in trade-matching as a result of MiFID and are loath to cede control over billions of Euros in market-data revenues.

In the absence of either a government-mandated or vendor-provided pan-European tape, some individual market participants collect and consolidate data from multiple venues on their own. The entities that do this typically are big banks and brokers serving clients who trade stocks across multiple EU member states, as well as some trading venues that compete with the national exchanges and offer best-price routing services to customers for a fee. Additionally, some MTFs that operate as "dark pools" — or markets that do not display price quotes — are required under MiFID to use a "reference price" when executing transactions. Practically speaking, using this "reference price waiver" to MiFID's pre-trade transparency requirements means that executions must be struck at the midpoint of the best bid and offer displayed by the reference market. For stocks that trade regularly not just on their listing market but also on lit MTF rivals like the BATS markets and Turquoise, this means that the dark MTFs in question must effectively calculate their own European best bid/offer for the purposes of determining the midpoint. And because of the unique nature of the EU equity market — as a collection of national markets knitted together by common

legislation and regulation, rather than a single national market, like the US, Canada and Australia, that saw rival venues step in to compete with one or two incumbents — the costs of obtaining direct data from the full array of displayed venues can be quite taxing. For instance, one veteran trading-venue executive with whom we spoke put the cost for consolidating data from five major venues, for the purpose of determining the best bid and offer across all of them, at €1 million annually.

Market Data Fees for Major EU Displayed Markets

	Per user/month	in £
LSE (UK Level I)	£28.00	£28.00
LSE (Int'l Level I)	£14.00	£14.00
LSE (European Level I)	€ 6.60	£5.69
Borsa Italiana (Level I)	€ 12.00	£10.35
BATS Chi-X Europe (Level I)	£20.00	£20.00
Euronext (Level I)	€ 59.00	£50.90
Deutsche Börse (Level I)	€ 56.00	£48.31
Total		£177.25
Total per year		£2,127.00

Sources: Trading Venue Fee Schedules

Some vendors offer data from each of the venues separately, but not as a "pan-European consolidated tape." The costs of the non-consolidated data obtained through these means also can be significant. For just the five biggest markets in the region, the venue portion of the cost alone (not including vendor fees) for obtaining Level I data comes to £177.25 (€205) per user per month, or £2,127 (€2,462) per user per year. This is more than three times the approximately A$900 (£541) per user per year that we estimate consolidated data would cost in Australia should Chi-X begin charging for data in the near future. It is also more than double the C$1,400-1,500 (£885-950) range we estimated for Canada. And it does not include many of the national exchanges operating in the EU, including Spain's BME and the Nasdaq OMX Nordic markets.

However, as with venue-connectivity costs, the flexibility in the EU best-execution regime allows individual market participants to minimize costs by choosing not to take data from multiple venues. The subset of firms that elects to connect only to the national exchange in its home country, or a small group of national exchanges, does not need data from the other

venues to fulfill its best-execution policy, and therefore can keep its costs far lower than those paid by the bigger market participants who observe best-price routing even in the absence of a strict, best-price-based order protection rule.

Ironically, the ability of some firms to limit their data intake to only their home-country national exchange may be feeding the problem of high costs for others who choose to create their own internal "tapes" by taking data from multiple venues throughout the EU. The significant base of local firms taking only their data give national exchanges a substantial cushion against price competition. In other words, a firm buying only one exchange's data is less likely to press for price cuts than one that is buying data from 10 or more exchanges and competing lit markets. This can result in prices for national-exchange data being higher than they otherwise would be, inflating the costs of those who construct their own internal tapes.

Additionally, some degree of high costs already was baked into the EU's market structure before MiFID, owing to the practice of individual stocks being tradable only on their national, listing markets. Even though new venues have sprouted to compete for this order flow, the incumbents still retain majority market share, making their data essentially irreplaceable for those large firms that choose to connect to all venues and route customer orders to the best displayed quotes across all of them. And as we've seen in Canada and Australia, European exchanges have been raising their data fees to help offset lost revenue in the increasingly competitive trade-matching business. Without a government-sanctioned utility, competing tapes run by data vendors or a revenue-sharing scheme like that which prevails in the US, market data will continue to represent a major cost for the biggest market participants in the EU.

Conclusions and Recommendations

Because venue-connectivity costs, as well as the need for market data and its associated costs, are determined in large part by a particular jurisdiction's best-execution rules, choosing a best-execution framework is probably the most critical decision for any regulator contemplating how to handle the introduction of competition with a long-dominant national exchange.

Highly prescriptive best-execution regimes that require brokers to route orders to the best displayed price quotes tend to result in greater lit-venue proliferation, and higher costs for connectivity and market data, than frameworks that offer brokers flexibility to consider factors other than best price, including size, speed and certainty of execution, as well as issues related to clearing and settlement. Such regimes also tend to support market-structure complexity beyond the number of lit venues, including disparities in how different market participants perceive the best displayed market-wide prices at a given moment, and more complex order types that are designed to prevent trade-throughs of protected quotes. Another layer of complexity comes from order-routing and compliance contingencies related to venue outages or systems issues, during which market participants may be permitted to execute trades on other markets displaying prices that are inferior to the exchange having technological problems or acting to slow down trading to avoid executing transactions at absurd prices because of other market participants' systems issues. The "flash crash" that occurred on May 6, 2010, in the US is an example of how such decisions by brokers can lead to outcomes that regulators may not have fully contemplated when establishing the best-execution rules under Reg NMS.

Additionally, choosing strict best-price order protection as the foundation for best execution can bestow tremendous market-data pricing power upon the displayed markets to which brokers are required to route customer orders. Without some mechanism for limiting market-data fees, lit venues may be able to extract outsized rents from such market participants. Methods for balancing this pricing power include the establishment of a market-wide data-processing-and-distribution utility, capping the fees venues can charge for data and establishing formulas that allocate data revenues according to industry demand and the contributions of individual venues to liquidity and price discovery (such as the Reg NMS tape-revenue sharing plan in the US).

The size of a market, in terms of value traded, is also very important when considering the appropriate best-execution framework and the effect it will have on market participants. Strict price protection may be more appropriate for bigger markets, where market participants can spread connectivity and data costs across larger-scale operations. The effect of full-depth-of-book order protection in Canada, for example, appears to be especially pronounced because of the small size of the market relative to others, such as the

US and the EU. Given that Brazil's equity market is slightly smaller than that of Australia — which, in turn, is the smallest of the four markets we examined in this report — we believe that the CVM should carefully consider the potential negative consequences for market participants of adopting strict best-price order protection for the Brazilian equities market.

As we did in the introductory section, we would like to stress that we specifically have not considered for the purposes of this report any effects on the outcomes of end investors that result from exchange monopolies giving way to competition. There is substantial evidence, particularly in the US, that end investors enjoy far better outcomes in today's more-complex, fragmented market structure than they did when the NYSE and Nasdaq enjoyed virtual monopolies over trading in their own listed securities, though this may have been caused by multiple factors and not just competition with incumbent exchanges. Our mandate was to explore the costs to the broker and dealer communities, and we believe it is clear that the advent of exchange competition brings considerable additional costs to bear on such entities.

We believe the CVM would do well to consider in great detail the experiences of other jurisdictions that have gone from centralized to competitive trading venues. Judging from the questions asked in its request for comment, the CVM is keenly aware of the need for such study. We believe that having regulators and key market participants from these jurisdictions visit Brazil would be valuable for the CVM as it considers the correct path forward.