Oxera

What would be the costs and benefits of changing the competitive structure of the market for trading and post-trading services in Brazil?

Prepared for
Comissão de Valores Mobiliários

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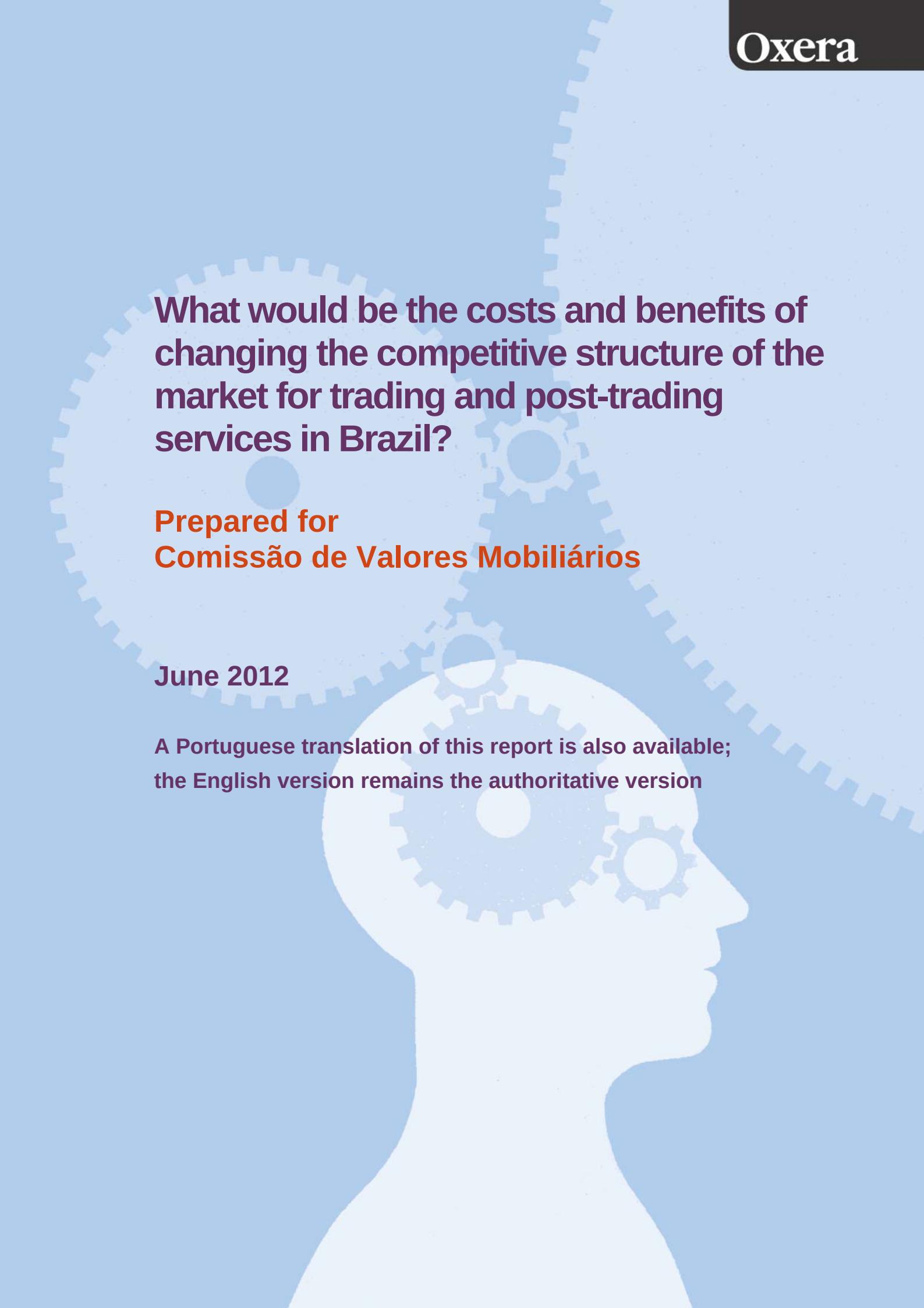
A Portuguese translation of this report is also available; the English version remains the authoritative version



Executive summary

Objectives and methodology

Comissão de Valores Mobiliários (CVM), the securities and exchange commission of Brazil, instructed Oxera to assess the potential costs and benefits of introducing more competition into the market for trading and post-trading services in Brazil. The study explores the barriers to entry that may exist, and, given the characteristics of the Brazilian stock market, identifies the most suitable regulatory framework.

This report presents Oxera's findings, which are summarised below.

Conceptual framework (section 2)

Stock markets are important for economic development. They provide important functions that help to mobilise savings for the purposes of productive investment. In particular, stock markets facilitate the trading of company stock (shares).

Historically, stock markets have had a strong tendency to exhibit characteristics of natural monopoly. Technological limitations (mainly regarding effective communication) meant that each region would typically need its own single market. However, in the past two decades, new technologies and the Internet have transformed securities markets and increased the potential role for competition, particularly for the provision of trading services.

To guide the assessment of how introducing competition would affect the Brazilian capital market and economy, a conceptual framework is presented in section 2 for considering the role of competition between stock markets. Here, the extent to which the markets for trading and/or post-trading services are a natural monopoly is assessed, together with the nature of competition if it can or does occur.

In terms of trading services, there was an era when exchanges were natural monopolies. However, changes, such as the demutualisation of exchanges and technological advances, appear to have increased the scope for competition. For example, automation of trading has replaced floor-trading specialists, and significantly reduced entry barriers in terms of the initial set-up costs. Traders can more easily buy and sell on multiple exchanges simultaneously, as they are able to compare price information between exchanges instantaneously.

Although trading naturally consolidates when exchanges and traders are homogeneous, theoretical literature and international experience also shows that multiple exchanges can co-exist if they cater for different preferences among the investors—for example, offering a choice between faster execution on one venue and executing larger block orders on the other. This ability to satisfy the needs of different types of investor is one of the benefits of fragmentation. Other benefits that can arise when exchanges compete include stronger incentives to innovate and erode the inefficiencies (or just profits) of a monopolistic incumbent. This can result in lower explicit transaction costs and an increased scope of products available.

For post-trading services, the role of competition remains more limited, particularly in terms of central securities depository (CSD) services. To ensure that the number of shares owned at any one time matches the number of shares that exist, the primary CSD function, of keeping dematerialised securities in book entry form, tends to be a monopoly function for each specific security. It is also possible to have additional institutions that undertake CSD-

type functions. For example, in Brazil, this type of institutional structure exists for the creation of American depositary receipts (ADRs). However, this may create an inefficient duplication of costs in the system, which, combined with the loss of economies of scale in providing CSD services, is likely to limit the extent to which competition between CSDs can be expected to result in fee reductions and cost savings for investors.

Competition in the market for central counterparty (CCP) services is possible in principle, as is evidenced by the experience in Europe. However, economies of scale, together with network externalities, are stronger in relation to CCP services than in relation to trading platforms. This means that one typically observes more trading platforms than CCPs in any financial centre. CCP entry in Europe has also exploited the national nature of incumbent CCPs by offering clearing for major European securities on a single platform. Adopting a similar strategy in Brazil—for example, by offering clearing for major Latin American securities—may not be as effective.

Key characteristics of the Brazilian market for trading and post-trading services (section 3)

To assess the impact of changing the market structure for trading and post-trading services, it is first necessary to consider the current characteristics of the market. Relevant aspects include, for example, the current market structure and the expected growth path of the market. In the case of the Brazilian stock market, it is also important to consider how the regulatory regime—in particular, the high level of the requirements in relation to transparency—might affect the impact of changing the market structure. The findings of this analysis can be summarised as follows.

– **Market structure**: Brazil has a large number of brokers and custodians relative to the size of the market, and activity is not heavily concentrated. However, in terms of trading and post-trading services providers, BM&FBovespa is effectively the monopoly provider of all trading, clearing and settlement services for most stocks. ADRs provide a possible alternative to trading on BM&FBovespa for some of the major companies listed on Bovespa; however, for certain types of Brazilian investor, there can be some (self-) regulatory, legal or tax barriers. (see section 3.2).

– **Scale of the market**: having grown rapidly over the past ten years, at an aggregate level the Brazilian stock market is now close to the scale of the stock markets in Australia and some European countries such as Italy, Germany and Spain where competition has been introduced. If the Brazilian economy continues to grow, the Brazilian equity market is also likely to continue to grow over the coming years. This suggests that, in principle, there is sufficient scale for multiple trading platforms to compete efficiently. However, with the possible exception of Australia, new entry has been characterised by venues catering for a relatively specialised section of total trading. Typically, these trading venues are dark pools, crossing networks or similar, which are not permitted in Brazil.

– **Regulation**: there are some distinguishable characteristics of regulation in Brazil that are reflected in the market practice. Of most importance are the regulations that ensure transparency in relation to the beneficiary end-owner. This prevents the use of crossing networks and dark trading pools. It has also resulted in Companhia Brasileira de Liquidação e Custódia (CBLC) requiring each transaction to be settled at the end-investor level—ie, CBLC does not net trades between clients of the same custodian. Thus, compared with financial centres where such netting does occur, CBLC may undertake more transactions and provide part of the service normally undertaken by the custodian. This should be taken into account when drawing cost comparisons.

Another characteristic of regulation in Brazil is the role of the exchange, Bovespa, in translating the high-level rules set by the CVM into concrete trading rules. This arrangement

is relevant because, should multiple venues exist, it could result in a duplication of resources and scope for differences in rules between platforms. This arrangement is not unique to Brazil; it is not uncommon for stock exchanges to set trading rules for their exchange, and has not prevented effective competition.

Charges for trading and post-trading services in Brazil (section 4)

As Bovespa is the only infrastructure provider of trading and post-trading services for transactions in equities in Brazil and competitive pressure from ADRs may be limited, the fees charged for trading and post-trading services could be higher than they would be in a competitive market.

In section 4, the fees that investors incur in using Bovespa for trading and post-trading are analysed and compared with the fees in a number of other financial centres. The comparators were chosen to include financial centres of a range of sizes, including those smaller as well as larger than Brazil, and those where the providers are subject to different degrees of competition.

In terms of trading fees, the stock exchanges appear to fall within one of three groups:

– those with fees in excess of 1.5 basis points (bp);
– those with fees between 0.4bp and 1.5bp;
– those with fees below 0.4bp.

Since the rebalancing of Bovespa's fees in 2011, trading fees now lie in the middle group, and are similar to trading fees at Borsa Italiana, BME and Singapore Stock Exchange. Trading fees are still somewhat higher at Bovespa than at a number of other stock exchanges, including those that face competitive pressure, such as the London Stock Exchange, Australia Securities Exchange, Toronto Stock Exchange and NYSE.

As with trading fees, post-trading fees range from one financial centre to another, and within financial centres but for different users. In terms of trading and post-trading fees paid to infrastructures, the financial centres appear to fall within one of the following three groups (in this section the term 'financial centre' is used to refer to the full infrastructure value chain—ie, the exchange, the CCP and the CSD):

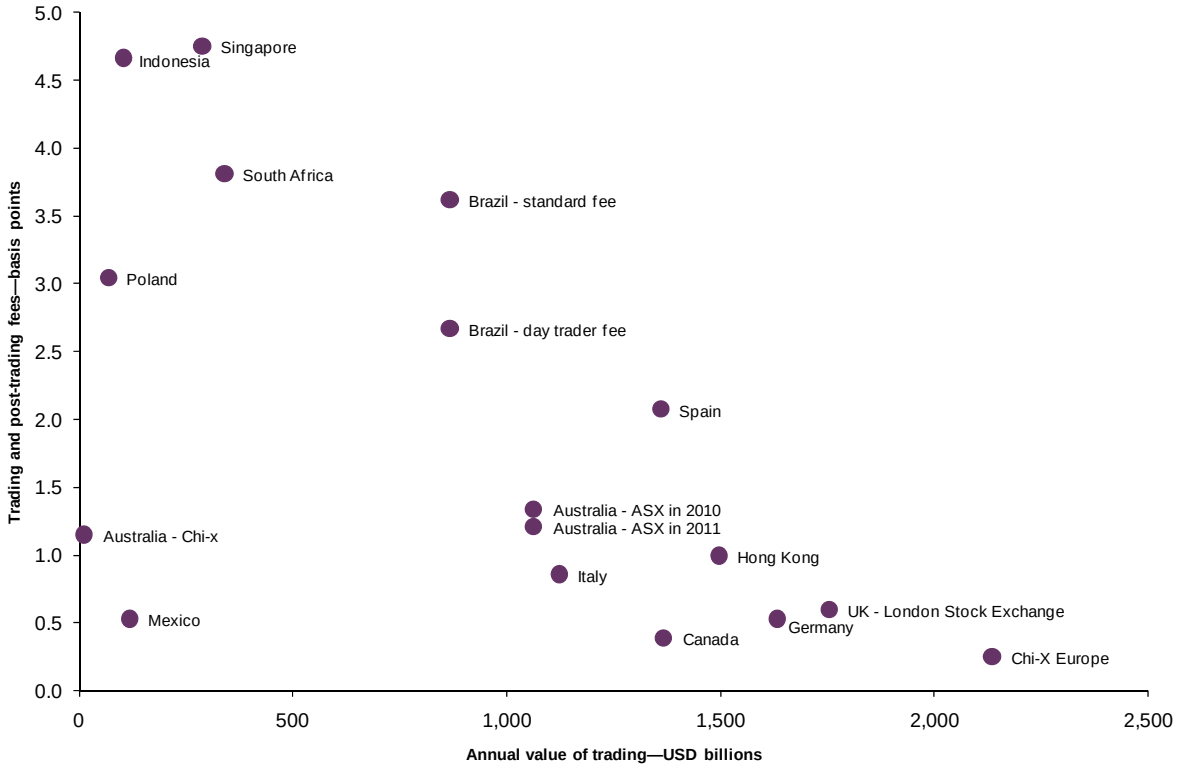
– those with costs in excess of 9bp;
– those with costs between 2bp and 6bp;
– those with costs below 2bp.

Bovespa lies in the middle group, with costs generally comparable to those in Poland, Indonesia, Singapore, South Africa and Spain. Compared with trading and post-trading in the USA on NYSE, the cost of trading and post-trading in Brazil on Bovespa is 13–27 times greater, while, compared with trading and post-trading on the Buenos Aires Stock Exchange, the cost of trading and post-trading on Bovespa is less than half. Compared with trading on ASX in Australia, a market in which competition has recently been introduced, the cost of trading and post-trading at Bovespa is twice as high.

Notably, in all the smaller financial centres where trading costs are relatively low (ie, given the size of these markets), post-trading costs are high (eg, in South Africa and Singapore). Similarly, where trading costs are high, post-trading costs are often relatively low (eg, in Poland). Of the 17 trading platforms considered, 11 are vertically integrated with the CCP and CSD and a further two have some form of common ownership. In such financial centres, it may be more appropriate to consider the total trading and post-trading costs. Although the total fee may be cost-reflective, the fees for the individual components of trading and post-trading may not.

The figure below presents the relationship between the total cost associated with infrastructure trading and post-trading services, and the value of trading at each stock exchange. In comparison to the trading fee-only analysis, when post-trading fees are incorporated, the evidence of economies of scale is quite strong. This suggests that once the scale of trading in Brazil is taken into account, costs are not necessarily out of line with those observed in other international financial centres

Relationship between the cost of trading and post-trading and the value of trading—institutional investors using large intermediaries



Note: For each financial centre considered, the value of Electronic Order Book (EOB) trading on the relevant trading venue in 2010 is reported. Argentina has been excluded because the costs of 9bp are much higher than in the other financial centres considered. The USA has been excluded because the value of EOB trading on NYSE was much higher than in the other financial centres considered.
Source: World Federation of Exchanges statistics and Oxera analysis.

In Brazil, the CSD, CBLC, holds accounts at the end-investor level, and therefore delivers the security directly into the end-investor's account. By comparison, in other financial centres, omnibus accounts are held at the CSD, and securities are subsequently transferred between the clients in an omnibus account by custodians, rather than the CSD. This means that the Bovespa CSD processes more settlement transactions per trade than CSDs in other financial centres. Furthermore, it manages a greater number of individual accounts. To account for this, the cost of trading and post-trading is re-computed, including estimates of custodian settlement and custody charges for both Brazil and two of the comparator financial centres where omnibus accounts are held at the CSD: Germany and the UK.

The impact of including the custodian fees is to narrow the difference between the cost of trading and post-trading in Brazil and in the UK and in Germany, particularly as the value of the client's order in a particular security falls. However, across the full range of investor trading characteristics considered, Brazil remains more expensive.

The overall conclusion that can be drawn is that trading and post-trading fees in Brazil are not low when compared with the fees charged in other financial centres. This finding holds even once the scale of operations at Bovespa and the differences in the types of service

provided by Bovespa are taken into account. This provides an indication of the potential benefits of introducing competition, which are assessed, along with the costs of introducing competition as part of the cost–benefit analysis (see sections 7–11).

International experience of introducing competition (sections 5 and 6)

International experience in introducing competition into the market for trading and post-trading services provides useful insight into the potential effects of introducing competition in Brazil. As set out in the conceptual framework in section 2, the direct implications of introducing competition into this market can be grouped according to the impact on the following:

- the explicit costs and quality of trading and post-trading services provided by infrastructure providers;
- market liquidity and the implicit costs of trading;
- the stability of the trading environment and the associated cost of regulating it;
- the cost of connecting and using multiple trading platforms.

Drawing on empirical literature prepared by academics and regulators considering primarily stock markets in Europe and North America, and supplemented by primary analysis and research into the experience in Japan, Australia and Canada, the following conclusions can be drawn.

- **Impact of competition**: entry by alternative trading venues can create competitive pressure and drive cost savings, price reductions and service enhancements by the incumbent. The prices and services provided by the entrant may also be superior to those prevailing in the market. However, entry by alternative trading platforms does not always succeed, and, as in Japan, may not always drive significant efficiencies in the incumbent. Competition may be limited to the more liquid stocks, although its benefits may continue to flow through to the trading of other stocks owing to the use of standard trading fees for all stocks on an exchange.

- **Liquidity**: overall, competition has been found to have a neutral, or beneficial, impact on market liquidity, although this depends on the extent to which liquidity between different trading venues is linked.

- **Market stability**: fragmentation can increase the costs of market supervision. The need to supervise multiple markets may require regulators to enhance their regulatory infrastructure and/or increase the number of market supervision staff.

- **Brokers' costs**: the entry of additional trading platforms may create additional costs in relation to connectivity, IT and staff, among others. Brokers in Europe have been expected to incur additional costs in order to comply with best-execution rules.

Competition has not been the only factor contributing to the observed cost savings and price reductions in international stock markets. Other important factors include decimalisation and technological advance.

In terms of how financial market regulation might be affected by introducing competition, the specific areas likely to be affected and the overall lessons that can be drawn from international experience can be summarised as follows.

- **Data fragmentation**: introducing competition can result in the fragmentation of price information, which can significantly increase costs to investors. In the USA, Europe and Canada, market participants were originally left to consolidate the information themselves. More recently, regulation in these markets has begun to introduce a framework for centralising the consolidation of trading data.

– **Best-execution rules**: where brokers incur differential costs in relation to the use of different trading platforms and these are not passed through directly to investors, the possibility arises that the interests of the investor (the broker's client) and the broker may not be aligned. In particular, if the best price available for the security is in a trading platform that is relatively expensive (in terms of costs to the broker), the broker may have a financial incentive to use the cheaper trading platform which has the worse price for the investor. Thus, in order to ensure effective competition when there are multiple trading venues, best execution rules generally need to be adapted.

– **High-frequency trading**: introducing competition may increase the prevalence of high-frequency trading and therefore its regulatory focus. When trading is fragmented across multiple venues, it is also important to ensure a coordinated and consistent approach to regulation intended to control extreme price movements.

– **Access to services provided by the incumbent**: when introducing competition, the regulator needs to consider whether it is appropriate to intervene to regulate access to the incumbent. For example, when the incumbent CCP or CSD is vertically integrated with the incumbent stock exchange, in the absence of regulatory intervention, access to the new entrant may not be provided on terms that are conducive to effective competition. When competition is introduced at the CCP level, the regulator also needs to consider how to regulate interoperability arrangements from a market stability objective.

Costs and benefits of introducing competition through entry at the trading platform level, or trading platform and CCP level (sections 7–11)

Cost–benefit analysis (CBA) is a systematic process for calculating and comparing the costs and benefits of a particular state of the world with the status quo. It provides a conceptual framework in which estimates of the costs and benefits—including both quantitative and qualitative estimates—can be compared in terms of their magnitudes, different effects, and impacts on different stakeholders.

In this study, a CBA is undertaken to evaluate the potential costs and benefits for producers and consumers of two different competitive entry scenarios: in the first scenario, entry occurs only at the trading level and the new entrant relies on the CCP and CSD services of the incumbent. In the second scenario, entry occurs at the trading and CCP level. Both entry scenarios are compared against the baseline scenario which represents the status quo—the state of the world that can be expected if there were no further increase in competition in the market for trading and post-trading services in Brazil. (See section 7 for more detail on the scenarios considered in the CBA.)

The table below summarises the estimated, ongoing, direct impact of introducing competition. This excludes the potentially significant impact on the wider economy arising from a reduction in the cost of capital, and one-off set-up costs. Owing to the considerable uncertainties involved in this type of analysis—for example, over exactly how Bovespa might respond to competition—the results are presented as ranges of quantitative estimates or more qualitative descriptions of potential outcomes.

Summary of the estimated direct impact of introducing competition, per year

	Counterfactual scenario 1	Counterfactual scenario 2
Explicit cost of trading and post-trading	Fall by around US$18.6m–US$89.3m	Fall by around US$80.9m–US$268.9m
Brokers' costs	Increase by around US$2.9m–US$5.3m	Increase by around US$2.9m–US$5.3m
Implicit costs	Significant impact not expected	Significant impact not expected
Changes in volumes	Increase by 0.6–3.8%	Increase by 3.4–11.7%
Net impact for investors	Costs fall by US$13.3m–US$86.5m Transaction costs fall by 0.4–2.6%	Costs fall by US$75.6m–US$266.1m Transaction costs fall by 2.3–8.1%
Infrastructure revenues	Fall by around US$11.2m–US$71.9m	Fall by around US$59.7m–US$238.0m
Infrastructure costs	Increase by around US$8.0m–US$15.8m	Increase by around US$21.5m–US$27.3m
Net impact for infrastructure providers	Producer surplus is expected to fall by around US$26.9m–US$83.3m	Producer surplus is expected to fall by around US$87.4m–US$260.2m
Increase in the costs for regulatory authorities (CVM and Banco Central do Brasil)[1]	Increase by around US$10.3m	Increase by around US$10.5m

Note: [1] This includes a transfer of activities from Bovespa Supervisão de Mercados (BSM), and therefore costs to BSM are expected to decline.
Source: Oxera.

The table shows that the results of the CBA depend greatly on the assumptions used, and there is no clear outcome in relation to the net benefits minus the costs when consumer and producer surpluses are treated equally. Under certain assumptions, the scenarios for the increase in competition in the Brazilian stock market can produce a net benefit to the stakeholders considered, whereas other sets of assumptions do not produce net benefits.

In addition, given that the majority of the impact on the consumer and producer surplus is driven by changes in the fees charged by the incumbent, and therefore approximately balance, the impact on the wider economy from either increased trading or a reduction in the cost of capital facing companies is important when evaluating the overall effect. Although the magnitude of these two effects is uncertain, their direction is likely to be positive for the economy overall.

While the CBA cannot provide a precise quantification of the overall impact of introducing competition, it does provide useful findings on how introducing competition will affect different participants in the market. In particular:

– investors using the Brazilian stock market can be expected to benefit from an increase in competition as they are the primary beneficiaries of likely reductions in the prices of trading and post-trading services. This assumption is likely to hold even with full pass-on of additional brokers costs to investors;

– by contrast, entry into this market is likely to significantly reduce profits for infrastructure providers, owing to lower prices and the duplication of some fixed and variable costs. Unless there is a significant increase in efficiency, the loss of producer surplus could be of a similar magnitude to the gains in consumer surplus for investors;

– there is likely to be a significant increase in the cost of regulation, which may be passed on to investors in some way. Other wider economic implications, such as the effect on market stability, are more difficult to assess, but if regulation is effective in introducing competition in a measured and controlled manner, are not expected to be significant;

– the core benefit from the introduction of competition arises from the reduction in the prices charged by the incumbent, while the economic costs arise from the duplication of facilities with economies of scale and the increased complexity of regulation. As a result, much (but not all) of the benefit of competition might be achieved if the price reductions could be achieved by alternative means;

– the reduction in trading and/or post-trading prices can be expected to have some impact on the cost of capital for Brazilian-listed companies, which, at the margin, is likely to stimulate investment and economic growth. This could have a substantial (positive) impact on the wider economy.

Regulatory options (section 12)

The regulatory options are considered according to the following logical steps.

– The simplest option would be to do nothing—the status quo. Bovespa would be likely to continue as the monopoly provider of services in Brazil because entry by either a trading platform on its own or a trading platform with a linked CCP would be difficult, if not impossible, without the cooperation of CBLC at either the CCP level or the CSD level.

– Without directly affecting the operations of Bovespa, the regulator could facilitate entry of both a trading platform and CCP—the vertical model. However, there could be significant economic barriers to entry for this outcome and there would still need to be cooperation between the new CCP and the existing CSD functions of CBLC.

– An option with lower entry costs could be the entry of a trading platform with access to the incumbent CCP—the open-access model. This would require the cooperation of the incumbent to ensure that access to the CCP was provided on reasonable terms.

– If conditions are not deemed to be right for entry at present, there is an option in the short term for monitoring trading and post-trading fees, with a view to putting downward pressure on prices while ensuring that, if conditions for entry changed, entry would not be impeded unnecessarily.

Other variants on regulatory options are considered within this framework. Putting in place a new regulatory regime to support entry, at the trading platform or the CCP level, is likely to take considerable time and effort. It could be argued that, at present, a lack of entry would be unlikely to cause significant harm, except to the extent that it limits the opportunity for trading and post-trading fees to decline as the scale of the market increases (or the likelihood of this arising), or limits the ability of market forces to squeeze inefficiencies out of the existing infrastructures (if they exist), or reduce monopoly profits (if these exist). For this reason, the following three-pronged approach is proposed:

– self-imposed price monitoring and benchmarking by the incumbent;
– creating the pre-conditions for access to the (new multi-asset class) CCP;
– developing market supervision and regulation.

For a detailed explanation of this three-pronged approach, the reader is referred to section 12.7.

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1 Introduction

Comissão de Valores Mobiliários (CVM), the securities and exchange commission of Brazil, wants to understand the potential costs and benefits of introducing more competition into the market for trading and post-trading services in Brazil. It wishes to explore the barriers to entry that may exist and suitable regulatory frameworks, given the particular circumstances of Brazil. To inform CVM, Oxera has conducted a study, the overall objective of which is to identify the most appropriate regulatory framework for ensuring the efficient operation of the Brazilian stock market.

The study was conducted in four phases.

– **Phase 1: economic analysis**—primarily desk-based research to inform the study from an international perspective.

– **Phase 2: review of the Brazilian stock market**—detailed examination of Brazil's particular circumstances, including interviews with stakeholders, assessment of Brazilian data and comparisons with the international perspective.

– **Phase 3: assessment of the costs and benefits of introducing competition**—assessing the potential impact of increased competition in Brazil, based on the international perspective, the Brazilian environment and quantitative modelling of key indicators of efficiency.

– **Phase 4: options for regulation**—identification of options for the regulatory framework of the Brazilian stock market to achieve the desired outcomes.

This report presents the findings of these four phases.

1.1 Sources of information

In order to conduct this study, Oxera drew on a wide range of information sources, including desk-based research and discussions with different stakeholders in the Brazilian stock market.

The desk-based research for this study covered:

– relevant academic literature and other publicly available studies on the development of stock markets, used to identify the relevant economic theory, empirical studies and other evidence on the conduct of competitive markets;
– past studies by Oxera relevant to this study, including studies on trading and post-trading services, the cost of raising capital, and competition in stock markets. The study also drew on Oxera's expertise in regulatory best practice and the approach to cost–benefit analysis (CBA);
– information from regulators (including published reports and ad hoc analysis) on the development of stock markets, policies implemented, and outcomes from the delivery of efficient allocation of capital;
– publicly available information and data on the Brazilian stock market through an examination of reports, studies and press articles;
– publicly available information and data on other international stock markets for the purposes of the benchmarking exercise;
– information provided by the CVM, BM&FBovespa and other stakeholders that was not publicly available.

Information for the study was also collected through an extensive series of interviews with stakeholders in the Brazilian stock market, including:

– investors, including pension funds, investment fund managers and international investors;
– brokers, including Brazilian brokers and international brokers (mainly international banks);
– BM&FBovespa, the incumbent infrastructure provider;
– other infrastructure providers, some of which have announced an interest in operating in Brazil;
– CVM and the central bank, Banco Central do Brasil;
– other regulators of stock markets in other countries.

1.2 Terminology

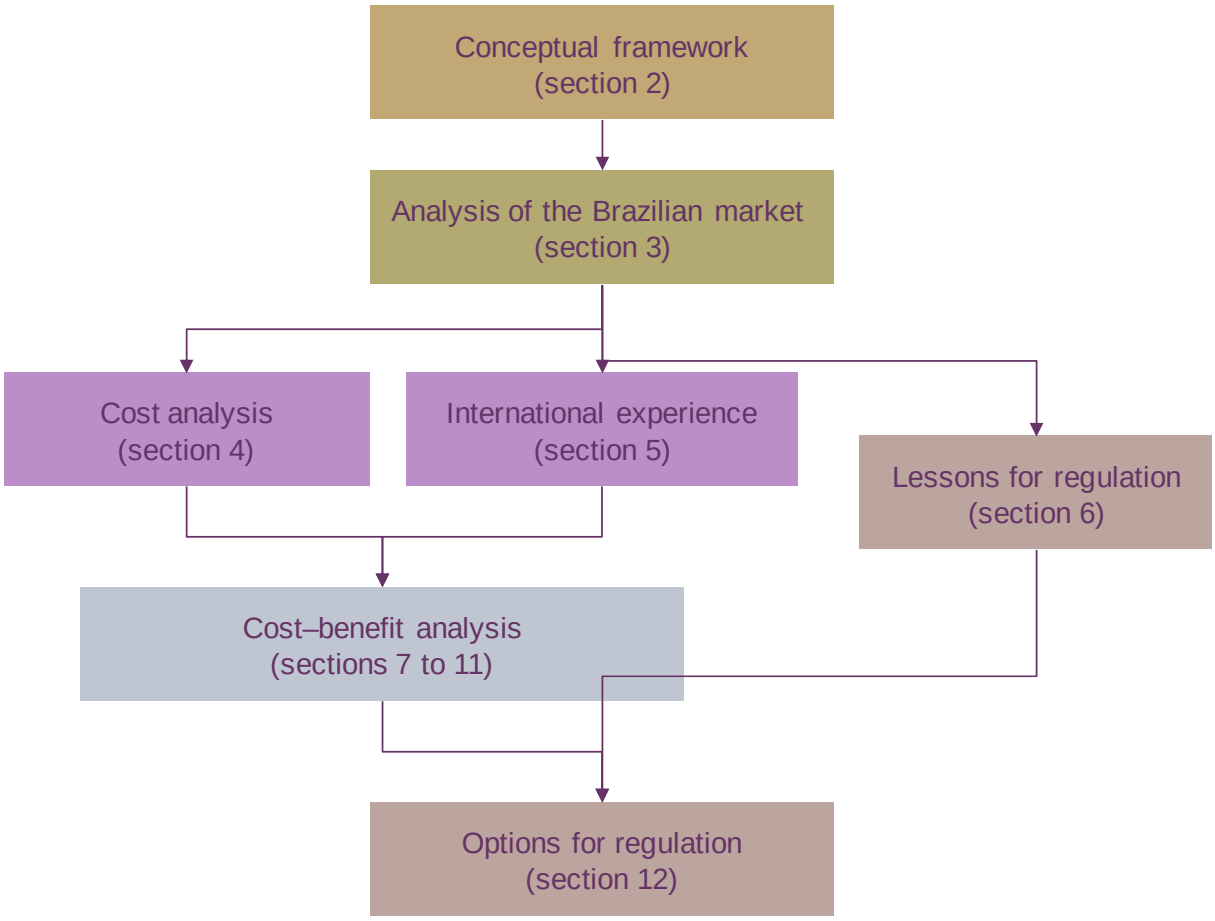
In this report, the Brazilian stock exchange provided by BM&FBovespa is generally referred to as Bovespa. This reflects the focus of the analysis on the equity trading functions. The derivatives exchange is referred to as BM&F.

In line with how Bovespa sets trading and settlement fees, the costs of trading and post-trading are generally presented in this report in basis points (bp) relative to the value of the trade.

1.3 Structure of the report

This report draws together the outputs from the four work phases into a coherent structure that presents the conceptual framework, analysis of the Brazilian market, detailed cost analysis, CBA and the lessons for regulation. Figure 1.1 illustrates the structure of the report, followed by a detailed description of the content and purpose of each section within the report.

Figure 1.1 Structure of the report



Source: Oxera.

– Section 2 presents the conceptual framework adopted in this study for assessing competitive outcomes in the market for trading and post-trading services.
– Section 3 describes the Brazilian stock market, its 'value chain' and the degree of competition therein, as well as giving an overview of the development of the market and the main aspects of the regulatory framework.
– Section 4 presents the results of a comparison of the explicit costs of trading and post-trading in Brazil with those in other financial centres. Other indicators are also analysed in this section, such as the implicit costs of trading.
– Section 5 sets out key findings from international experience of introducing competition, including in relation to fragmentation, market liquidity, stability and explicit trading costs.
– Section 6 identifies lessons for effective regulation, drawing on the experience of a selection of countries that have recently sought to introduce competition into their stock exchanges.
– Section 7 sets out a framework within which to use CBA to assess the impact of introducing competition for trading and post-trading services in Brazil.
– Section 8 considers how introducing competition for trading and post-trading services in Brazil could affect investors.
– Section 9 considers how introducing competition for trading and post-trading services in Brazil could affect infrastructure providers, including both the incumbent and any new entrants.
– Section 10 considers how introducing competition could affect the wider economy. The way in which competition could be expected to affect the cost of capital for listed

companies is analysed, as are the potential repercussions on market stability and regulation.

– Section 11 summarises the results of the CBA.

– Section 12 assesses the options for the regulatory framework in light of the lessons drawn from the analysis of this study.

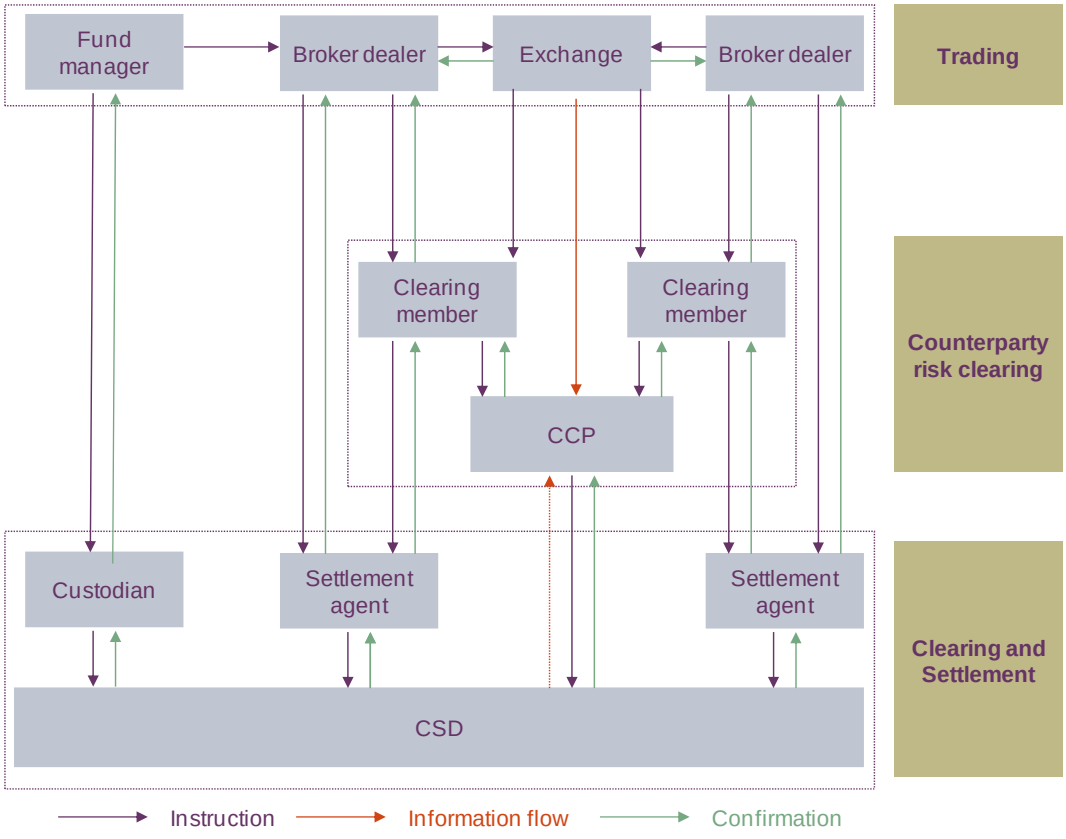
The report concludes with a summary of the main findings of the study.

2 Conceptual framework

A stock market facilitates the trading of company stock (shares). It provides a venue (physical or virtual) through which brokers can trade stocks with one another, acting on behalf of clients or from their own account (proprietary trading). The operation of investors buying and selling securities through a stock broker is underpinned by a complex value chain of trading and post-trading services that involves many specialised services. Some trading and post-trading services are provided by infrastructure providers, which include trading platforms, central counterparties (CCPs) or clearing houses and CSDs. Figure 2.1 presents a stylised illustration of the value chain for the provision of trading and post-trading services for equities for *local* investors.[1] In the text below the figure, the activities undertaken by the different types of infrastructure provider are described in turn.

The specific value chain for trading in Brazilian equities is considered in detail in section 3, in addition to other features of the stock market in Brazil.

Figure 2.1 Stylised illustration of the value chain for flow-related activities



Notes: The arrows in this figure show the provision of flow-related activities only.
Source: Oxera analysis.

Activities in the equity trading and post-trading value chain are complex, and involve many processes and a variety of service providers and market participants. In general, at the infrastructure provider level, the activities can be broadly categorised as trading, clearing and settlement. The current stock exchange in Brazil (Bovespa) provides all of these services.

[1] There can be some differences in the value chain for trading in equities for foreign investors; for example, a global custodian is often used.

– **Trading** is usually initiated when an order is placed and then executed at a trading platform. Platforms include exchanges, multilateral trading facilities and crossing networks. In addition to simple trade execution, these platforms may provide other services for which fees are charged (or fees are varied, depending on how the customer accesses or uses the platform). These services include order management, fees for failed trades, reductions in fees for market-making, volume discounts and fee differentials, depending on whether the trading is active or passive.

– CCPs provide **counterparty risk clearing** services. In general, clearing involves the preparation of a transaction for settlement, and comprises trade netting (bundling multiple transactions into a single settlement order), and settlement instruction (processing the matched and netted trades to be sent for settlement). CCPs also provide fail management and related risk management services.

– CSD provide **settlement services**. Settlement is the pre-settlement positioning (ensuring that the buyer has the monies available and that the seller has the securities available) and the completion of a transaction through the transfer of ownership of assets and monies. Settlement is initiated once the CCP has cleared the trade (if routed via CCPs), or, for gross trades not cleared by the CCP, once the trade is executed and ready for settlement. These services are usually provided directly by CSDs or indirectly by custodians/settlement agents, which maintain accounts with the CSDs. Other services provided by CSDs for which fees are charged include (but are not restricted to) collateral management, netting, and custody and safekeeping-related activities, including corporate action processing.

In this report, these services are referred to as trading services and post-trading services.

This section sets out a broader conceptual framework for what might be expected from a stock market in terms of the outcomes, and how its operation should be considered in terms of competitive outcomes. This framework is required in order to form the basis for assessing the competitive environment in the Brazilian market and whether change would be appropriate.

The framework includes:

– the functions of the stock market, including providing access to capital, orderly and efficient price formation, and trading liquidity provision;
– a methodology for considering competitive market situations;
– potential implications of introducing competition into the market for trading and post-trading services.

2.1 Functions of the stock market

Stock markets are important for economic development owing to their role in mobilising savings for the purposes of productive investment. As well as trading and post-trading services, stock markets provide facilities for the issue and redemption of securities and the payment of income and dividends. Savers benefit from the ability to invest in a company through a stock market as a result of:

– efficient price formation producing a price for the security that reflects the views of many competing traders and investors on the fundamental value of the security;
– orderly price formation, which means that prices are generally not affected by market manipulation or abuse by dominant players, or by technical problems;
– liquidity in trading, which means that securities can be bought and sold quickly and with relatively little impact of a single transaction on the price at which they are traded.

These factors are considered in turn below.

2.1.1 Efficient price formation

With many traders competing in a competitive market, the prices at which securities are being traded should reflect most, if not all, of the information that is publicly available at that time on the securities and the underlying asset. In finance theory, this leads to the 'efficient markets hypothesis', according to which financial markets are 'informationally efficient', as one cannot consistently achieve returns in excess of average market returns on a risk-adjusted basis, given the information available when the investment is made. While the hypothesis should be treated as an approximation only—particularly given the findings of behavioural economics on the non-rational decision-making of investors and traders[2]—it is generally accepted that successful stock markets do result in prices that largely reflect traders and investors' current interpretation of available information.

Broadly, this result is likely to hold in practice if a stock exchange (or other type of trading platform) involves many different traders and investors with a wide range of strategies but broadly similar access to information and to the trading platform. The result is less likely to hold if trading is dominated by a few investors, which can lead to individual decisions having a large impact on the market, or where access to information or exchanges is restricted or uneven.

2.1.2 Orderly price formation

Orderly price formation refers to price determination not being affected by manipulation from dominant investors, the company management or other influential parties; or by technical problems within the trading environment; or, more generally, price instability unrelated to perceptions of fundamental value.

The regulatory framework of the Brazilian market for trading and post-trading services addresses these issues, as regulatory frameworks of other markets also attempt to do (in differing ways). This study takes as given certain elements of the Brazilian regulatory framework, as discussed in section 3.3, but does consider orderly price formation more generally when assessing different competitive situations and options for the regulatory regime. This assessment is required because the competitive situation in the market for trading and post-trading services could affect orderly price formation and influence the effectiveness of the regulatory regime in achieving this outcome. For example, regulation designed to stop market manipulation is likely to be different for a single (to some extent self-regulating) stock exchange than it is for multiple competing stock exchanges.

Corporate governance is also an important component in this regard. Stock exchanges play an important role in setting standards for corporate governance through their requirements for listing: shares have to be listed on an exchange in order to be traded, and, in order to be listed, standards for corporate governance (such as independent external audits of financial accounts) have to be met. Listing requirements can differ between exchanges, with competitive pressures potentially in both directions: some pressures act to encourage lower standards (eg, a 'race to the bottom' to attract companies to list); others encourage higher standards (eg, an indicator of quality to investors).

Ultimately, efficient and orderly price formation should result in the prices of securities largely reflecting the investors' perceptions of the fundamental value of the underlying assets, and therefore provide some security to investors that what they decide to buy is really worth what it costs (or at least is generally perceived to be so).

2.1.3 Trading liquidity provision

Trading liquidity refers to the ability to buy or sell an asset in a short period of time without causing a significant movement in the price of that asset when there is no change to its fundamental value. In further detail, liquidity refers to:

[2] For example, see Shleifer, A. (1999), *Inefficient Markets: An Introduction to Behavioural Finance*, Clarendon Lectures in Economics, Oxford University Press.

– the ‘depth’ of the market—the impact that large trade volumes have on price;

– the ‘breadth’ of the market—the proportion of the overall market that is participating in the market’s upward or downward move, with a liquid market always having significant numbers of both buyers and sellers. The bid–ask spread is a common indication of market breadth: with plenty of buyers and sellers, the extent to which an individual trade affects prices is limited, and therefore the difference between the prices that an investor achieves if buying versus selling (the bid–ask spread) is less;

– market resilience—the period of time taken to reach equilibrium in the event of significant price fluctuations, such as those caused by important news or large trade volumes. A resilient market is a robust market where prices revert to a mean or fair value within a short period of time.

Liquid markets should therefore facilitate the purchase or sale of securities in a way that is least disruptive—ie, at minimal loss to nominal values, at low transaction costs, and within a short timeframe. The more liquid a market is, the wider is the set of potential counter offers for any outstanding transaction, and hence the greater is the probability of a favourable match. Thus, investors are generally attracted to markets with greater liquidity as it means that they can acquire a position, or exit from that position, easily without their own transaction causing the price to move against them. Therefore, liquidity is crucial to both the development and the growth of markets.

Market liquidity is also crucial to price stability and potentially to financial system stability, as a liquid market is better able to absorb systemic shocks. For instance, a liquid market is able to cushion the price volatility caused by sudden shifts in investor risk appetite.

Given the importance of liquidity to effective market trading, one question of relevance to this study is whether the introduction of competition could result in fragmentation of trading, thereby potentially affecting liquidity. This is discussed in section 2.3.

2.2 Framework for competitive market situations

This study focuses on the impact that introducing competition into the market for trading and post-trading services could have on Brazil’s capital market and, more generally, its economy. The study therefore requires a conceptual framework for considering competitive market situations in this regard. This framework needs to form the basis for assessing the extent to which the markets for trading and/or post-trading services are a natural monopoly, as well as the nature of competition if it can or does occur.

2.2.1 Is a stock exchange a natural monopoly?

Stock exchanges, like other trading venues, have historically had a strong tendency to exhibit economies of scale in operational costs and network externalities in liquidity, and therefore characteristics of natural monopoly, or, at least, high consolidation.

The economies of scale in operation costs arise from the considerable set-up costs in establishing a trading venue, as well as the ongoing costs of maintaining the trading platform, monitoring transactions and listings, disseminating trade data, and arranging post-trade services. As many of these costs are fixed, the average cost per trade declines with the growth in trading volumes within a particular exchange, granting natural competitive advantage to larger trading venues. As a result, historically the prices that trading venues could charge for their services (ie, the transaction fees) may not be significantly constrained because the threat of entry is low and it may be possible to trade specific securities at only one trading venue.

Network externalities similarly favour larger scale because a large market offers more likelihood of matching buyers and sellers, as well as more liquidity to absorb the price impact of a particular trade. As a result of these liquidity externalities, much of the early theoretical

literature on market fragmentation argued that, provided that trading systems and investor preferences are the same, trading has a natural tendency to gravitate towards the most liquid venue.[3] The result is likely to be natural monopoly.

Historically, there were more stock exchanges because technological limitations (mainly regarding effective communication) meant that each region would need its own single market: in other words, there were many regional natural monopolies. This was the case in Brazil (see section 3) as well as other countries, including the USA[4] and France. Improved communications typically made consolidation of regional exchanges possible, resulting in national natural monopolies.

In the past two decades, however, widespread diffusion of new technologies and the Internet have transformed securities markets. For example, automation of trading replaced floor-trading specialists, which significantly reduced entry barriers in terms of the initial set-up costs.[5] Traders can more easily buy and sell on multiple exchanges simultaneously, as they are able to compare price information between exchanges instantaneously. For example, if all traders were aware of activity and ready to trade on all markets, market liquidity would effectively be the same for all stock markets, regardless of their size. Similarly, a stock could be listed on two markets ('dual-listed') without any issues for liquidity if all traders were active on both markets.

Although trading naturally consolidates when exchanges and traders are homogeneous, theoretical literature also shows that multiple exchanges can co-exist if they cater for different preferences among the investors—for example, offering a choice between faster execution on one venue and executing larger block orders on the other. This ability to satisfy the needs of different types of investor is one of the benefits of fragmentation.[6]

Competition between exchanges can also bring benefits by creating stronger incentives to innovate and by eroding the inefficiencies (or just profits) of a monopolistic incumbent, which can lower explicit transaction costs and broaden the scope of products available. These benefits can be substantial—for example, a theoretical study shows that competition can be welfare-improving because liquidity externalities are smaller than the potential welfare losses from a monopolistic exchange.[7]

The reduction in the economies of scale may suggest that stock exchanges can compete with one another in an 'oligopoly' situation rather than tending towards monopoly. In this situation, there are different types of investor demanding different services, different volumes and different liquidity, which could encourage competing exchanges to occupy different niches rather than tending to be similar.

In summary, both the literature and the experience in various countries suggest that it is possible for trading platforms to compete effectively and potentially produce benefits for investors using the stock market. However, as explained below, there are likely to be costs as well. Furthermore, the scope for competition will depend on the specific circumstances of the market concerned. Therefore, the purpose of this study is to assess both the costs and the benefits of introducing competition *in Brazil*, and the consequent implications for the appropriate regulatory framework.

[3] See Mendelson, H. (1987), 'Trading mechanisms and stock returns: An empirical investigation', *Journal of Finance*, **42**:3, pp. 533–53; and Pagano, M. (1989), 'Trading volume and asset liquidity', *Quarterly Journal of Economics*, **104**:2, pp. 255–74.
[4] See Bagheri, M. and Nakajima, C. (2004), 'Competition and integration among stock exchanges', *Oxford Journal of Legal Studies*, **24**:1, pp. 69–97.
[5] See Domowitz, I. and Steil, B. (1999), 'Automation, trading costs, and the structure of the securities trading industry', in R.E. Litan and A.M. Santomero (eds), *Brookings-Wharton Papers on Financial Services*, Brookings Institution.
[6] See Harris, L. (1993), 'Consolidation, fragmentation, segmentation and regulation', *Financial Markets, Institutions & Instruments*, **2**:1, pp. 1–28; Hendershott, T. and Mendelson, H. (2000), 'Crossing networks and dealer markets: competition and performance', *Journal of Finance*, **55**:5, pp. 2071–116.
[7] See Economides, N. (1996), 'The economics of networks', *International Journal of Industrial Organization*, **14**:6, pp. 673–99.

The next section considers the nature of competition that can exist given these factors and technological developments.

2.2.2 What form can competition take in the market for trading and post-trading services?

Outside the Brazilian equities market (which requires all equity trading to occur on the regulated market), the market for trading and post-trading services for securities includes several possible trading venues:

- the traditional regulated stock exchanges, which are the focus of this study;
- alternative trading systems (ATS), such as multilateral trading facilities (MTFs) in Europe and electronic crossing networks (ECNs) in the USA—electronic platforms aggregating buying and selling interests in a security, operating outside the regulated stock market;
- systematic internalisers—firms that regularly execute clients' orders against their own book or against the orders of their other clients.

In Europe, the Markets in Financial Instruments Directive II (MiFID II) has created a new category (for regulatory purposes) of trading platform—an organised trading facility[8]—the European counterpart to the swap execution facilities of the US Dodd–Frank Act, which were created to satisfy the G20 requirements.[9]

In addition to competition between these types of platform, there can be competition between traditional stock exchanges. In primary markets, exchanges can compete to attract the listing of securities, and can be expected to compete along the dimensions of their fees, the listing standards they impose, the quality and quantity of the investment capital to which companies obtain access as a result of listing on the exchange, and the quality of the secondary market. In secondary markets, exchanges can compete by attracting trading volumes in securities already listed on another exchange, through a combination of their transaction costs, the liquidity of the securities to be traded, and the existence of, or price of, additional services (eg, data, co-location, etc).

Competitive outcomes can also vary along the value chain within stock markets. Although most financial centres have only one CSD, in an increasing number of financial centres there are multiple CCPs and trading platforms, with differing degrees of vertical and horizontal integration.[10] For example, the infrastructure for trading equities may be:

- a single vertically integrated trading platform, CCP and CSD (as is the case in Brazil);
- a vertically integrated stock exchange and CCP/CSD combination, whereby other competing trading platforms have access to the vertically integrated CCP/CSD (as is the case in Australia);
- a single CCP/CSD, but vertically disintegrated at the trading level, with multiple trading platforms accessing the CCP/CSD (as is the case in the USA);
- multiple vertically integrated exchanges and other trading platforms, with different competing trading platforms using their own separate CCPs which can be separate from the CSD. This model can be observed in Europe to some extent;
- multiple trading venues and multiple CCPs competing with one another, without vertically integrated ownership structures. This model can be observed in Europe to some extent.

From a theoretical point of view, there is not much scope for competition at the primary CSD level. For a more detailed explanation, see Box 2.1.

[8] See the discussion in European Commission (2010), 'Review of the Markets in the Financial Instruments Directive (MiFID)', December, available at http://ec.europa.eu/internal_market/consultations/docs/2010/mifid/consultation_paper_en.pdf.

[9] See G20 Pittsburgh Summit Declaration, September 24th–25th 2009, G20 Toronto Summit Declaration, June 26th–27th 2010, and Communiqué of Finance Ministers and Central Bank Governors of the G20, October 14th–15th 2011.

[10] For a discussion of the emergence of new market structures in Europe, see Niels, G., Barnes, F. and Van Dijk, R. (2003), 'Unclear and Unsettled: The Debate on Competition in Clearing and Settlement of Securities Trades', *European Competition Law Review*, **24**, pp. 634–39.

Box 2.1 Clearing and settlement—the role of the CCP and the role of the CSD

Overview of security trading and post-trading infrastructure

In security markets where there is an exchange, a CCP and a CSD, the exchange matches buyers and sellers (at a specific price), the CCP steps in and takes over the counterparty risk (and may work out each participant's net position). The CSD then makes the transfers between its accounts (securities in one direction and/or money in the other) upon instruction from the CCP.

These three functions generally map onto trading (the exchange), clearing (the CCP) and settlement (the CSD). However, the legal definition of these activities and the precise activities undertaken by each institution (or parts of institution) may vary between financial centres. The services provided by CCPs and CSDs in the context of security trading, and the scope for competition in the provision of these services, are discussed in more detail below.

The role of the CCP

CCPs provide central counterparty clearing and may also provide netting services:

– **Central counterparty clearing**: after a trade is agreed between a buyer and seller on an exchange, the CCP steps in and becomes the buyer to all sellers, and the seller to all buyers. In this way, buyers (sellers) do not face counterparty risk from the specific counterparty to their trade (for which they are unlikely to know the specific identity of their counterparty), as the CCP guarantees the transaction. During the period between the agreement to trade (ie, the transaction across the exchange) and the time when the securities are moved out of the seller's account and into the buyer's account (which is typically three days later), the CCP has taken on the default risk of the trading parties. In doing so, the CCP will charge a fee and (usually) require that the parties commit collateral (margin) to reduce the loss that the CCP would incur if one of the parties fails to deliver the security or the money.

– **Netting**: when sending instructions to the CSD to move securities and money around, the CCP can send the instructions in exactly the same form as the transactions were undertaken—eg, send 100 of security XXX from the old owner's account (Account A) to the new owner's account (Account B), and send $YYY in the opposite direction. Alternatively, particularly when the account holders have made multiple transactions and especially where there are multiple transactions in the same security, the CCP can net these bilateral transactions—eg, if Account A has made three transactions buying Security Z and two transactions selling security Z, the instruction to Account A is to send just the net position in Security Z nominally to (or from) the CCP, with a similar net instruction in relation to money. At the CCP, all these transactions will (normally) net to zero, since, for all the net buyers of the security, there is a matching net position of all net sellers, and the total amount of money paid to buy the net position in these securities is matched by the total amount of money received for the net selling of those securities.

Both services benefit from economies of scale. However, in relation to netting, the reduction in the number of transactions that need to be processed by the CSD (see below) also depends on the number of transactions that each account undertakes and on whether there are multiple transactions in the same security that are settled at the same time. The existence of beneficial owner accounts in Brazil reduces the scope for netting.

The role of the CSD

Where securities have been dematerialised, physical certificates do not exist. Instead, the ownership of securities is tracked through book entries at a depository, usually maintained and managed electronically. In the case of Brazil, book entry at the depository is at the final beneficial owner level. Therefore, in the Brazilian system, when stocks are bought and sold across an exchange, the CSD transfers the security directly from the account of the previous owner to the account of the new owner, with a transmission in the opposite direction of money.

Because it is important to ensure that the number of shares owned at any one time matches the number of shares that exist, this primary CSD function (of keeping dematerialised securities in book entry form) tends to be a monopoly function for each specific security. However, it is also possible to have additional institutions that undertake CSD-type functions, but where the institutions involved are not the primary depository for the dematerialised security. This type of institutional structure already exists for the creation of ADRs and to facilitate the international and cross-border trading of securities (although the same technique can be used purely domestically):

– **ADRs**: typically, an ADR is created by a custodian bank as a shadow for a specific security (or sometimes for multiples of that security—eg, units of 10 shares) in the jurisdiction within which the trade takes place. These shadow securities are backed by that custodian bank holding the original securities in its account in the primary CSD. In the case of the ADRs for Brazilian securities, the relevant custodian bank will have an account at CBLC, in which it will hold the relevant securities to back the ADRs that it will have sold to US investors and which those investors can trade on NYSE or NASDAQ, for example. When the ADRs are bought and sold, they will be moved between the relevant accounts within the relevant depositary structure in the foreign jurisdiction;

– **international trading outside the primary CSDs**: in this case, one CSD (CSD B) can hold an account in another CSD (CSD A—the primary CSD for the relevant security). In this way, securities whose primary CSD is CSD A can be (apparently) held by the customers of CSD B in their respective accounts in CSD B. The total holdings in CSD A's securities held by CSD B's customers will appear in CSD B's account in CSD A. Movements of the securities *within* CSD B's customers will result in movements only between accounts in CSD B. CSD B's account in CSD A will show no change. Only if a transaction takes place between a customer holding a security in CSD A with a customer with an account in CSD B (or vice versa) will there be any change in the CSD B's account in CSD A. Under these circumstances a net transfer into, or out of, CSD B's account in CSD A will be required. The movement to or from CSD B's account in CSD A will be from other customers of CSD A, who will have participated in a transaction (at the trading platform level) with a customer who currently holds (or wants to hold) the security in CSD B.

When CSDs have accounts with each other, the beneficial owner of the securities cannot be established by looking only at the primary CSD (this is also the case when omnibus accounts are allowed or required in a CSD). To establish beneficial ownership, the second CSD would need to reveal who the beneficial owner was in their accounts.

In theory, therefore, it would be possible to create a CSD-type institution that could participate along with another CCP and trading platform for the trading Brazilian securities in Brazil. By holding an omnibus-type account in CBLC (ie, the primary CSD), this secondary CSD could transfer shadow securities between its customers' accounts and create a net transfer within CBLC into and out of its omnibus account when the transactions it has dealt with from its customers (ie, those using the new trading platform and CCP) do not net to zero.

Operating such a system introduces an additional level of complexity that can be expected to restrict the flexibility of investors when choosing between trading venues. When a transaction takes place, the buyer/seller will wish to obtain the best price they can from the entire pool of potential counterparties. Restricting the pool of counterparties to those with accounts in the same CSD would tend to fragment liquidity on a transaction-by-transaction basis. Some minimum level of interconnection between CSDs will be necessary to ensure that all participants at the trading level are potential counterparties to each other. At the minimum, the new CSD would require an omnibus account in CBLC and it would be necessary to be able to identify which CSD held the relevant beneficial owner accounts for each transaction.

An alternative approach would be to enable the multiple CCPs to send settlement instructions to the primary CSD. This would preserve the simplicity of having all the beneficial owner accounts in one place, while allowing for competition in both the trading and the CCP functions.

Source: Niels, G., Barnes, F. and Van Dijk, R. (2003), 'Unclear and Unsettled: The Debate on Competition in Clearing and Settlement of Securities Trades', *European Competition Law Review*, **24**, pp. 634–39.

With improved technology, the range of options for competition widens as it becomes increasingly cheaper and quicker for buyers and sellers to communicate with one another in different ways. Therefore, the network and operational cost advantages of a single exchange system bringing together buyers and sellers in a vertically integrated infrastructure decline. However, the economic importance of securities trading means that regulation and close monitoring of the market for trading and post-trading services continue to be necessary. At the heart of this study is analysis of the regulatory regime with reference to increasing competitive pressures.

2.2.3 What are the dimensions of competition?

For the users of competing trading venues, the main considerations when selecting a trading venue are:

- the direct cost of trading and post-trading services, in terms of fees charged;
- other costs arising when using the trading venues, such as access fees, IT costs, communications costs, etc;
- liquidity in the trading environment, which determines the implicit costs and speed of trading;
- the quality of the trading environment, in terms of the reliability of the infrastructure and the choice of services;
- the stability of the trading environment, in terms of resolution of trading failures and market stability in times of shocks or crises.

The implications, both positive and negative, of these issues for the introduction of competition are discussed next.

2.3 Potential implications of introducing competition

Introducing competition into the market for trading and post-trading services has a number of potential implications that are considered in this study as the foundation for the CBA. This section gives an overview of the main costs and benefits of introducing competition.

2.3.1 Potential benefits of introducing competition: reduction in direct costs of trading and post-trading services

In general, economists expect the prices in a monopolistic market structure to be higher than in a competitive market, and therefore that the introduction of competition will bring down the price of the supplied products and services. The price fall has two components: a reduction in the ability of the suppliers to exploit market power, and a greater incentive on the suppliers to improve efficiency and reduce unit costs. However, this assumption may not hold in the extreme case of a natural monopoly where the economies of scale are sufficiently high for the cost advantage of the monopolist to outweigh the incentive to charge higher prices and any inefficiency in production. That said, the case for natural monopoly has been weakened by technological change.

As analysed in section 5, there is experience in various financial centres of direct costs falling where multiple trading platforms offer trading in the same securities. Therefore, to consider the benefits that could arise if an additional trading platform were to provide trading services in Brazil, it is relevant first to assess the current cost of trading in Brazil, to ascertain the extent to which such costs could fall. This is the objective of section 4, which estimates the cost of trading in Brazil, and draws comparisons with other financial centres.

2.3.2 Potential costs to brokers

The introduction of competition into the market for trading and post-trading services could potentially affect explicit costs for the users of the stock exchange, other than the direct fees charged by the exchange, such as:

- the costs to brokers of communicating with the stock exchange;
- the IT infrastructure required by brokers and investors for the purposes of trading;
- the cost of accessing data, and, in the case of multiple exchanges, comparing data from different exchanges;
- the impact on margin offsetting;
- potentially, additional settlement costs for trades conducted across platforms.

In markets with multiple competing trading platforms, best-execution policies tend to mean that brokers need to be connected with all of the main trading platforms (or use other brokers that have direct access to the trading platforms). This creates additional cost for brokers in

terms of needing to communicate with more than one exchange and requiring IT infrastructure that can trade on multiple platforms.

The materiality of these costs will typically depend on the nature of the broker. Large international brokers are likely to have systems in place for communicating with multiple trading platforms, as is the case in major markets in the USA and Europe. For smaller brokers, however, the cost may be more significant.

Other costs may arise for brokers using multiple trading platforms. The cost of the complete set of market data may rise, since it is coming from multiple sources and needs to be integrated and compared across platforms.

There is also a potential loss of margin offsetting. A broker has to provide a deposit to the CCP to protect it from financial loss should that broker fail to honour its contract with the CCP. (This might occur, for example, if the broker goes bankrupt between entering into the contract with the CCP and delivering the security or cash to the CCP.) This deposit is known as a 'margin'. However, since brokers are likely to have numerous buy and sell positions with the CCP (for different end-investors), they can offset the margin that would be applicable for each transaction against one another, so the overall margin required is much smaller than the sum of the parts. If the trading on a single large exchange becomes a number of smaller exchanges, each with their own CCP, the brokers' positions are likely to be split so that the extent of margin offsetting is likely to be less overall, although this depends on the extent of the interconnectedness of the CCPs and the margining arrangements they might have between themselves.[11]

Lastly, there can be additional settlement costs due to the reduction in the extent of settlement netting with multiple exchanges, for reasons similar to the loss of margin offsetting. Buy and sell trades conducted on a single exchange can be netted at settlement (if this is allowed), but would not be netted in this way if conducted on two different exchanges.

2.3.3 Impact on market liquidity and the implicit costs of trading

Introducing competition into the market for trading and post-trading services will necessarily lead to some fragmentation of the market, although this does not necessarily mean a loss of market liquidity or an increase in the bid–ask spread (the implicit cost of trading). From a theoretical point of view, the impact of fragmentation in this respect is ambiguous, and the results from the academic literature are also ambiguous (see section 5). In summary, fragmentation may cause a loss of market liquidity if some traders do not have access to all trading venues, but could improve liquidity if access to all venues is good and lower fees or improved service result in greater trading volumes.

Section 5 examines these issues in more detail.

2.3.4 Choice and quality in the trading environment

As noted above, multiple exchanges can co-exist if they cater for different preferences among investors—for example, offering a choice between faster execution on one venue and executing larger block orders on the other.[12] This ability to satisfy the needs of different types of investor could be a benefit of fragmentation.

Similarly, competition between exchanges could bring benefits by creating stronger incentives to innovate, which could broaden the scope of available products and pricing structures.

[11] With full interoperability at the CCP level, it would be possible for margin offsetting to continue across all trades conducted on the different trading platforms.

[12] In this example, the market impact of a trade will vary by the type of trade being executed. The venue offering fast trading may deliver a small market impact for a single low-value trade, but would deliver a large (negative) market impact if a high-value trade were transacted across it. The venue offering a block trade facility may offer a smaller market impact to large block trade, but would offer a worse price to the single low-value trade.

2.3.5 The stability of the trading environment

Introducing competition could have an impact on the stability of the trading environment, to the extent that it affects the orderly operation of trading and post-trading services and, in particular, the robustness of the clearing system in the face of financial shocks. The robustness of the system can be considered in terms of many different possible shocks, but some common threats to the system include:

– 'technical' shocks, where disorderly operation of the stock exchange or market abuse results in sudden price changes, failed orders, or other problems (eg, the 'flash crash' in 2008[13]). This can include IT system problems with the exchange;
– broker default risk, which can result in difficulties in identifying beneficial owners and can damage confidence in the system.

Introducing competition might weaken the system if it means entry by trading platforms that are less able to withstand shocks, or weakens the regulatory framework. However, having multiple platforms could also reduce risks to the system, by providing alternative trading platforms if the main platform stops functioning.

2.3.6 The cost of regulating the trading environment

Experience from countries that have introduced competition into the market for trading and post-trading services suggests that it tends to increase the cost of regulation (see section 6.2). Owing to an increase in the number of market operators, regulatory bodies are required to enhance their market surveillance activities as the market becomes more fragmented. This involves upgrading technological arrangements and hiring more staff to deal with higher levels of market activity and market developments.

Additional costs may arise for the regulator where functions previously carried out by the incumbent stock exchange (as a form of self-regulation) are shifted to the regulator. These would not be incremental costs to the financial system overall, except to the extent that the incumbent was able to carry out these tasks more efficiently than the regulator. However, there are also likely to be additional regulatory activities that are incremental costs to the financial system.

[13] On May 6th 2010 the Dow Jones Industrial Average index fell about 1,000 points (or about 9%) and recovered within minutes. This episode is referred to as the 'flash crash'.

3 What are the key characteristics of the Brazilian market for trading and post-trading services?

This section reviews some of the key characteristics of the Brazilian market for trading and post-trading services, focusing on those aspects that are relevant when assessing the impact of changing the market structure. It begins with an overview of the Brazilian securities market for transactions in equities, considering the characteristics of the Brazilian economy and how these have affected the scale of the Brazilian stock market (section 3.1). Having grown rapidly over the past ten years, at an aggregate level the Brazilian stock market is now close to the scale of the stock markets in Australia and some European countries such as Italy, Germany and Spain (see Figures 3.3, 3.7 and 3.8).

The current functioning of the Brazilian stock market, in terms of market concentration, is then considered in more detail. The combination of a relatively small number of listed companies and concentration of trading in the top 5% of companies[14] (around 20 companies) means that the liquidity in certain Brazilian stocks is greater than the aggregate value of trading might imply (see Figures 3.12 and 3.13). This also means that a new entrant would need to offer trading in only a few companies in order to cover a relatively high proportion of all equity trading in Brazil.

Section 3.2 examines the current value chain and competitive environment for trading and post-trading services in Brazil. Through a sequence of integration agreements which began in 2000, Bovespa has become the main provider of trading and post-trading services for Brazilian equities. The competitive pressure from American depository receipts (ADRs) is limited by taxation and (self-) regulatory measures on the types of security that domestic institutional investors can hold (for example CVM Instructions No. 450 and 456). In contrast, there is a large number of financial institutions providing brokerage, custodian and clearing services.

The relevant aspects of the regulatory regime in Brazil are described in section 3.3. Of most importance are the regulations that ensure transparency in relation to the beneficiary end-owner. This prohibits certain trading styles, such as dark pools and crossing, that are commonly offered by new trading venues elsewhere. It also results in Companhia Brasileira de Liquidação e Custódia (CBLC) settling each transaction at the end-investor level—ie, CBLC does not net trades between clients of the same custodian. This is taken into account in the comparison of costs presented in section 4.

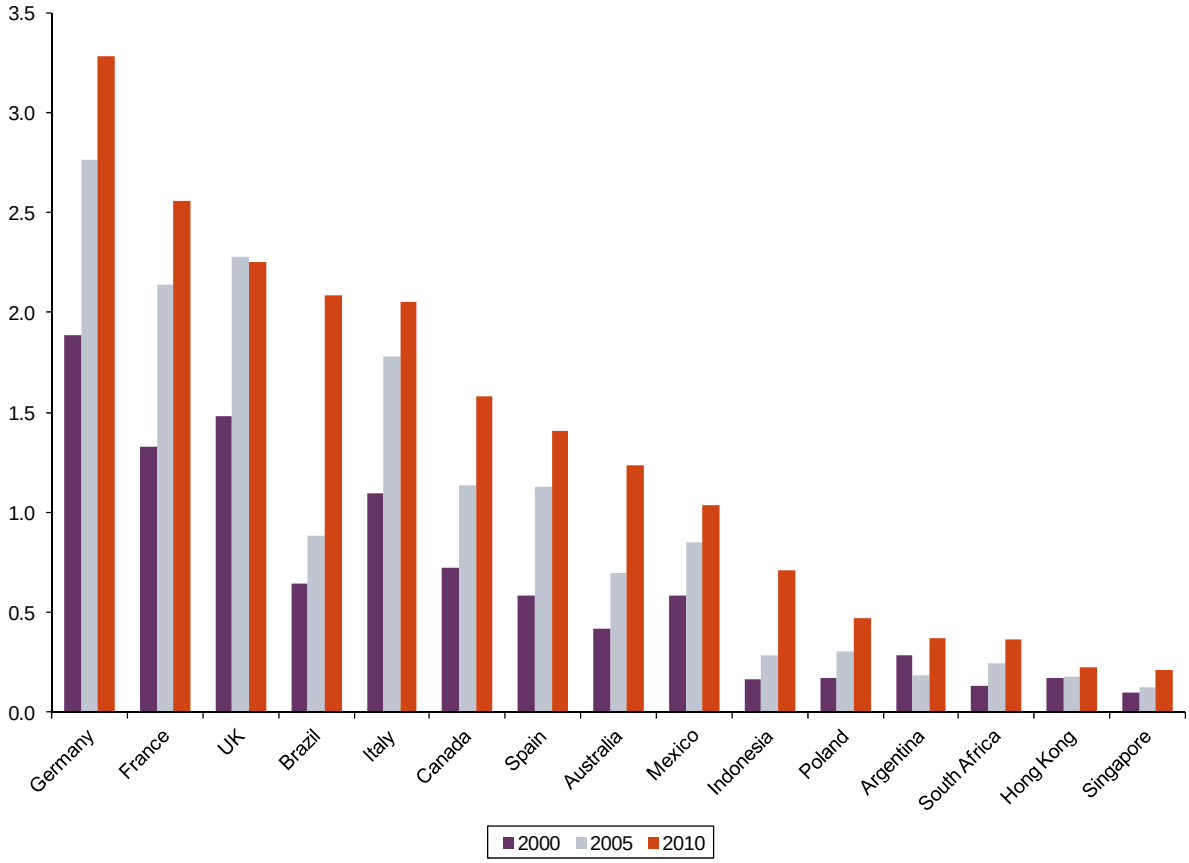
3.1 Overview of the Brazilian securities market

3.1.1 Characteristics of the Brazilian economy

In 2010, the Brazilian economy recorded a GDP of US$2.1 trillion, comparable to the levels of European economies such as the UK or Italy (see Figure 3.1). Despite two worldwide crises, Brazil recorded healthy economic growth between 2000 and 2010, when real GDP grew by an average rate of 3.1% per annum. GDP in current US dollars (which is an important measure in terms of the value of the economy from the point of view of foreign investors) recorded much stronger growth over that period due to the strength of the currency (as shown in Figure 3.1).

[14] This refers to the top 5% of companies listed on Bovespa, as measured by market capitalisation.

Figure 3.1 Gross domestic product by country (US$ trillion, May 2011 prices)

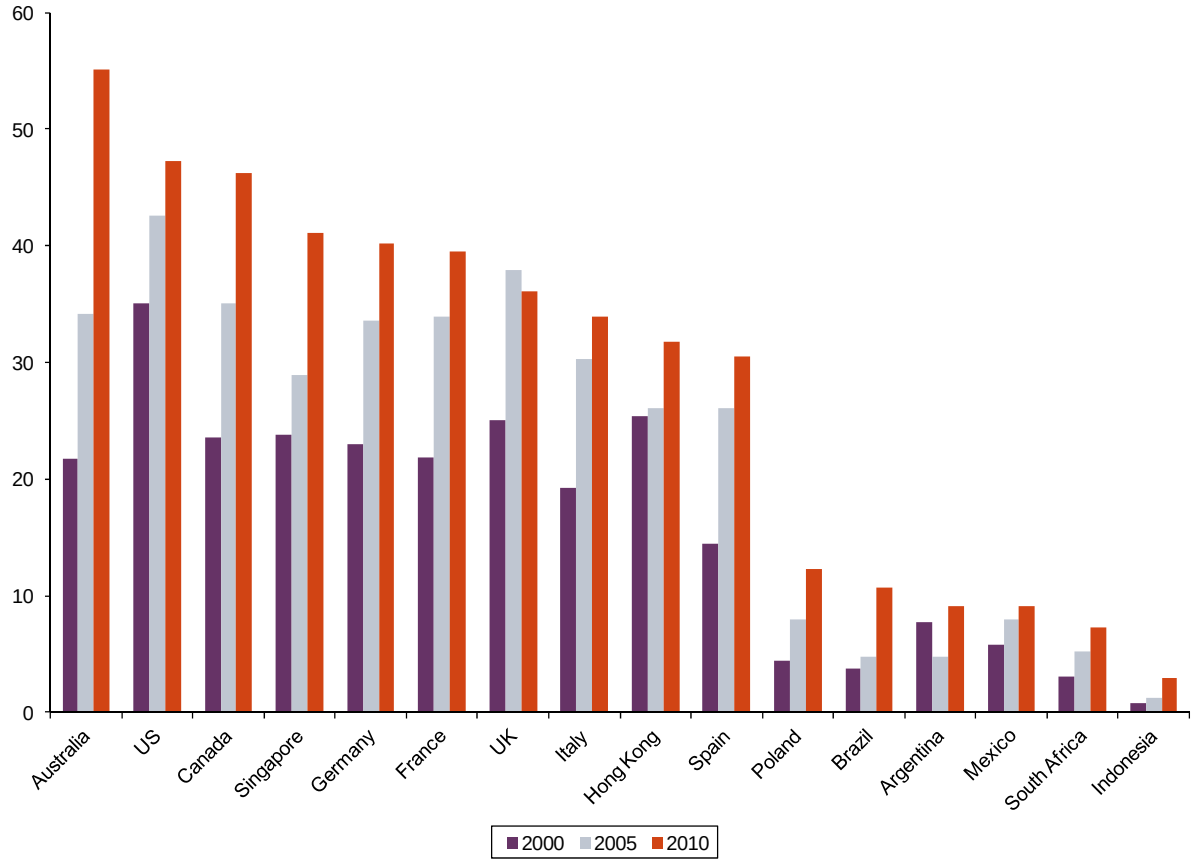


Note: GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes, minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of manufactured assets or for depletion and degradation of natural resources. Data is in US dollars as at May 2011. Dollar figures for GDP are converted from domestic currencies using single-year official exchange rates. The USA has been excluded: GDP was US$9.9, US$12.6 and US$14.6 trillion in 2000, 2005 and 2010 respectively.
Source: World Bank and Australian Department of Foreign Affairs and Trade.

Robust overall GDP growth was accompanied by rising GDP per capita, more than doubling between 2000 and 2010 in US dollar terms (from US$3,700 to US$10,700). Figure 3.2 shows that this level is still significantly below the more developed economies: five times lower than Australia and approximately three times lower than that in the UK or Italy. This suggests that further growth could be likely. Neoclassical economic theory predicts convergence in market capitalisation (also known as market value) per capita between economies with similar characteristics (eg, economies with similar saving rates) over the long run.[15] Compared with other major economies of the region (Mexico, Argentina), however, GDP per capita is now higher.

[15] Solow, R.M. (1956), 'A Contribution to the Theory of Economic Growth', *Quarterly Journal of Economics*, **70**:1, pp. 65–94.

Figure 3.2 Gross domestic product per capita by country (US$ '000, May 2011 prices)

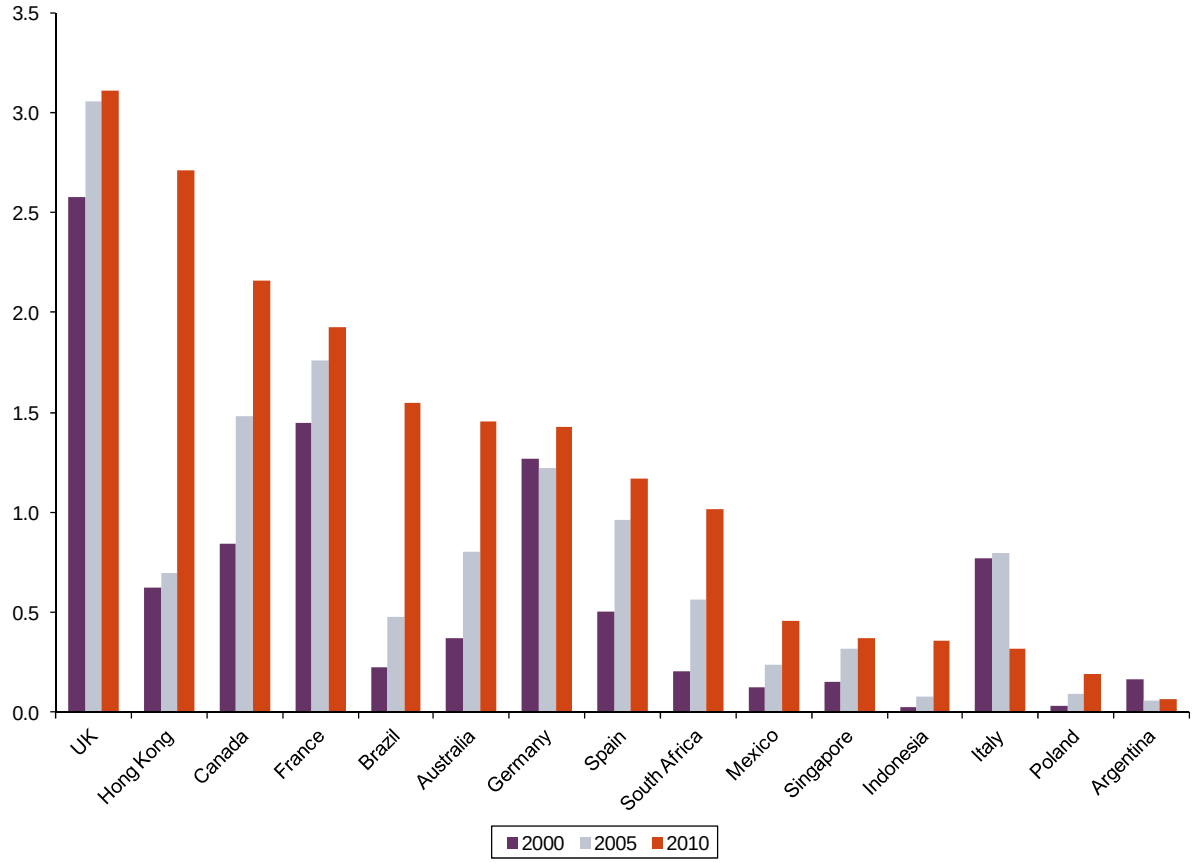


Note: GDP in US dollars as at May 2011 divided by mid-year population.
Source: World Bank.

Brazil's financial markets have followed closely the trend set by the overall economy, with domestic capitalisation rising more than sevenfold from US$0.2 trillion in 2000 to 1.5 trillion in 2010 (Figure 3.3). As with total GDP, the overall capitalisation measure places Brazil ahead of some of the European economies such as Germany or Spain (US$1.4 trillion and US$1.2 trillion respectively). However, market capitalisation per capita is still significantly below the level observed in the more developed European economies (Figure 3.4). This could suggest that further growth is likely. As with GDP per capita, neoclassical economic theory predicts convergence in market capitalisation per capita between economies with similar characteristics over the long run.[16]

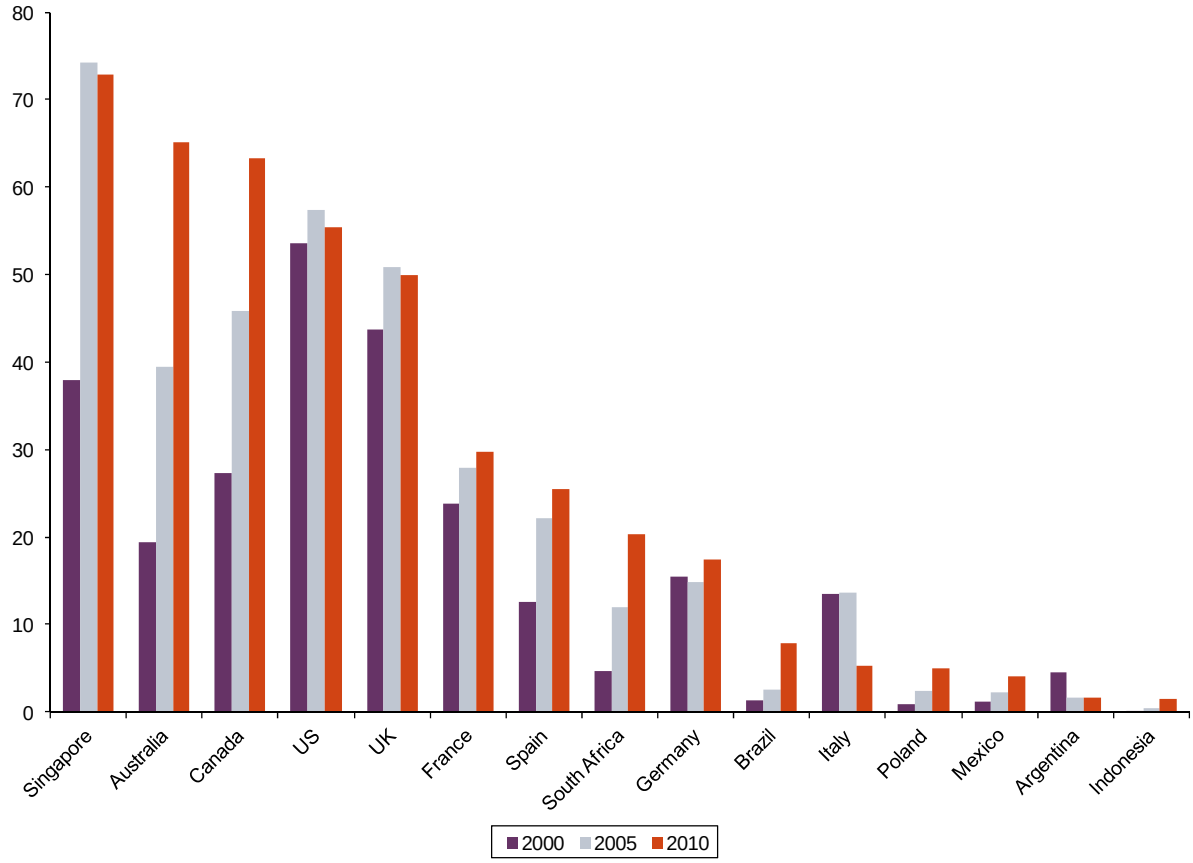
[16] Solow (1956), op. cit.

Figure 3.3 Domestic market capitalisation by country (US$ trillion, May 2011 prices)



Note: Market capitalisation is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles. Data is in US dollars as at May 2011. The USA has been excluded: capitalisation was US$15.1, US$17.0 and US$17.1 trillion in 2000, 2005 and 2010 respectively.
Source: World Bank.

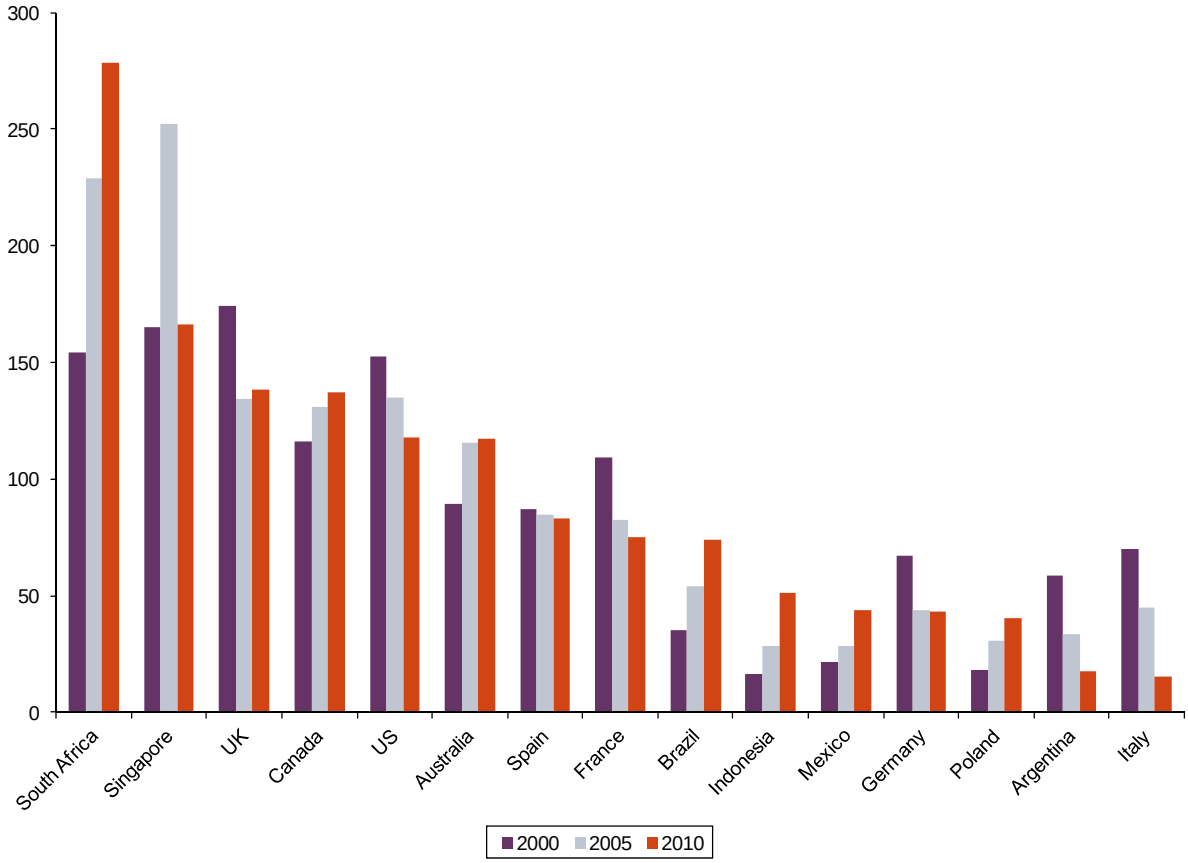
Figure 3.4 Domestic market capitalisation per capita by country (US$ '000, May 2011 prices)



Note: Market capitalisation is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles. Population taken at the mid-year point. Data is in US dollars as at May 2011. Hong Kong has been excluded—market capitalisation per capita was US$94,000, US$102,000 and US$384,000 in 2000, 2005 and 2010 respectively.
Source: World Bank.

Between 2000 and 2010 market capitalisation as a proportion of the overall Brazilian GDP rose from 35% to 74% (Figure 3.5). The current level of Brazil's capitalisation versus GDP is broadly comparable with that of developed European economies such as Spain or France (83% and 75% respectively), but is lower than in the financially oriented centres such as Hong Kong (1,208%) or Singapore (166%).

Figure 3.5 Domestic market capitalisation as a proportion of GDP by country (%)



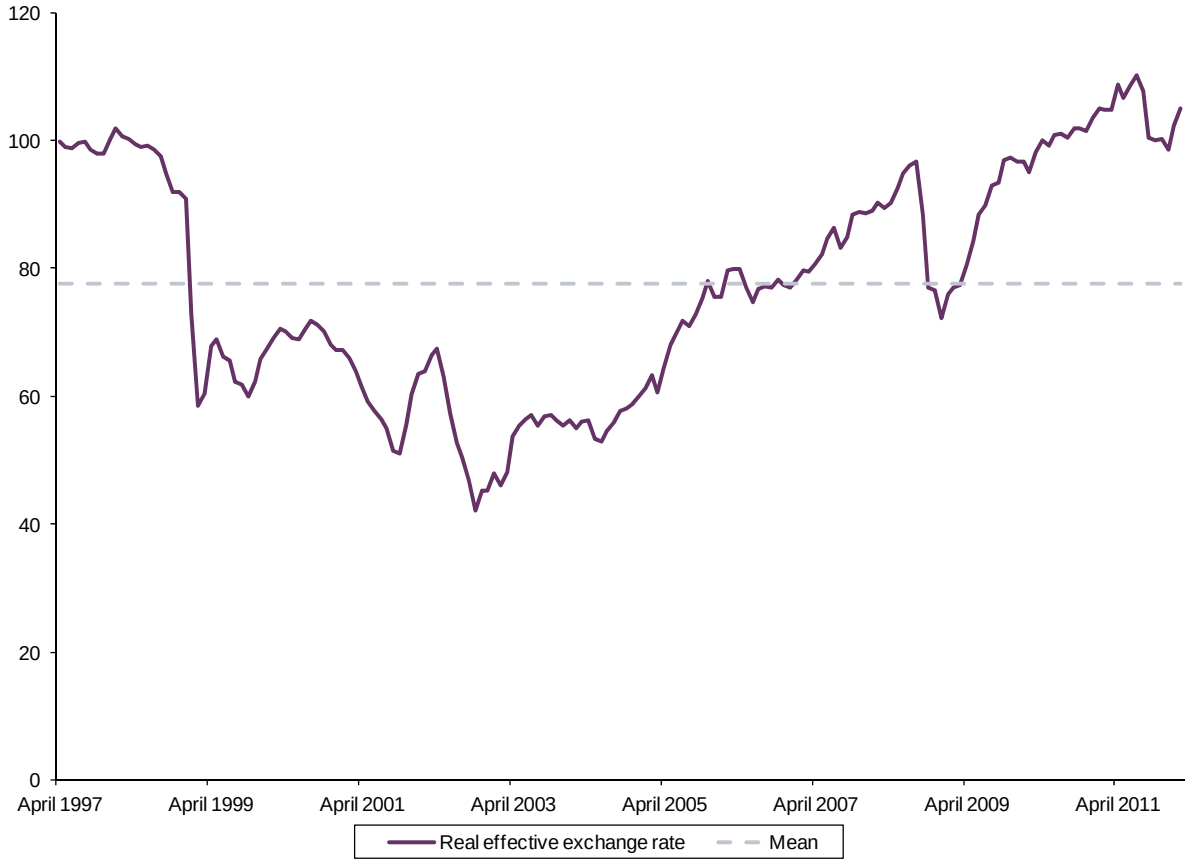
Note: Market capitalisation is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles. Hong Kong has been excluded—the equivalent capitalisation was 369%, 390% and 1,208% in 2000, 2005 and 2010 respectively.
Source: World Bank.

Various commentators have noted that the Brazilian real exchange rate has been strong since 2009, which is believed to be supported to some extent by expectations of strong growth in the oil and gas sector.[17] Based on measures of purchasing power parity, the currency has risen substantially since 2003 (see Figure 3.6 below).

The appreciation of the Brazilian exchange rate is relevant to bear in mind when drawing comparisons in value terms between Brazil and other financial centres. For example, although, when measured in US dollars, domestic capitalisation at Bovespa rose more than sevenfold between 2000 and 2010, after adjusting for the appreciation in the Real, the growth was approximately halved over the period.[18]

[17] For example, the *Economist*'s Big Mac Index finds that Brazil had the most highly valued currency in 2011. See http://www.economist.com/blogs/dailychart/2011/07/big-mac-index.
[18] Cumulative inflation between 2000 and 2010 was 90%, leading to a real increase in the domestic market capitalisation, as expressed in 2000 US$, from US$0.2 to US$0.8 trillion. Source: World Bank data and Oxera analysis.

Figure 3.6 Brazilian real effective exchange rate (index, 2010=100)



Note: Effective exchange rate weighted against a cost price index on a basket of 61 countries (broad index) and trade data.
Source: Bank of International Settlements.

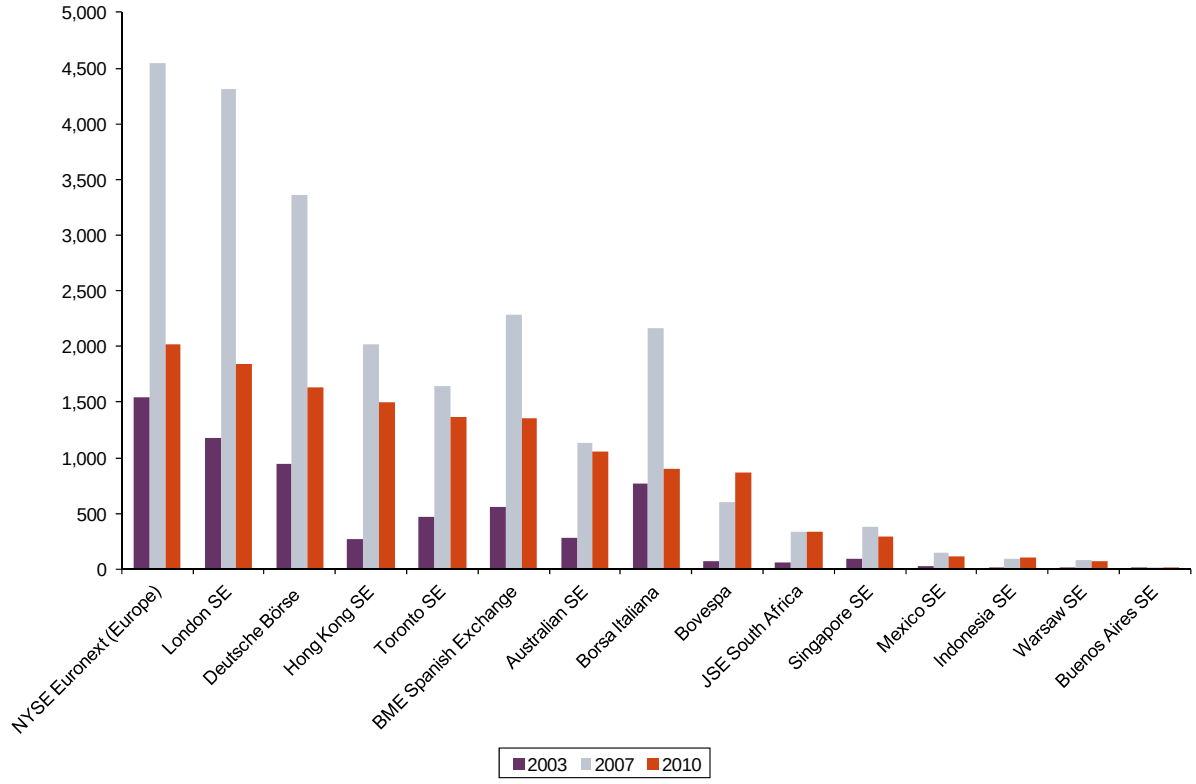
3.1.2 Developments in the securities market

Between 2003 and 2010, the value of the Brazilian equities market increased substantially. Share trading via the Electronic Order Book (EOB) increased twelvefold in value, as illustrated in Figure 3.7 below.[19] This rate of growth is the highest among the comparators considered (Indonesia and Warsaw both achieved approximately sevenfold growth). When adjusting for the increase in the real exchange rate, the increase in the value of share trading is smaller, but still substantial, at threefold since 2003.

Bovespa is one of the few exchanges where the value of trading has continued to increase through the recent financial crisis; it recorded a 45% growth between 2007 and 2010. Among the comparators, only Indonesia Stock Exchange grew in the same period. At present, Bovespa's total value of share trading is below some of the more developed western economies, but ahead of peers from the region.

[19] In Europe a substantial proportion of the total value of trading reported to an exchange is executed off-exchange (via negotiated and reported deals). The comparison drawn here considers trades executed only on the EOB of each exchange.

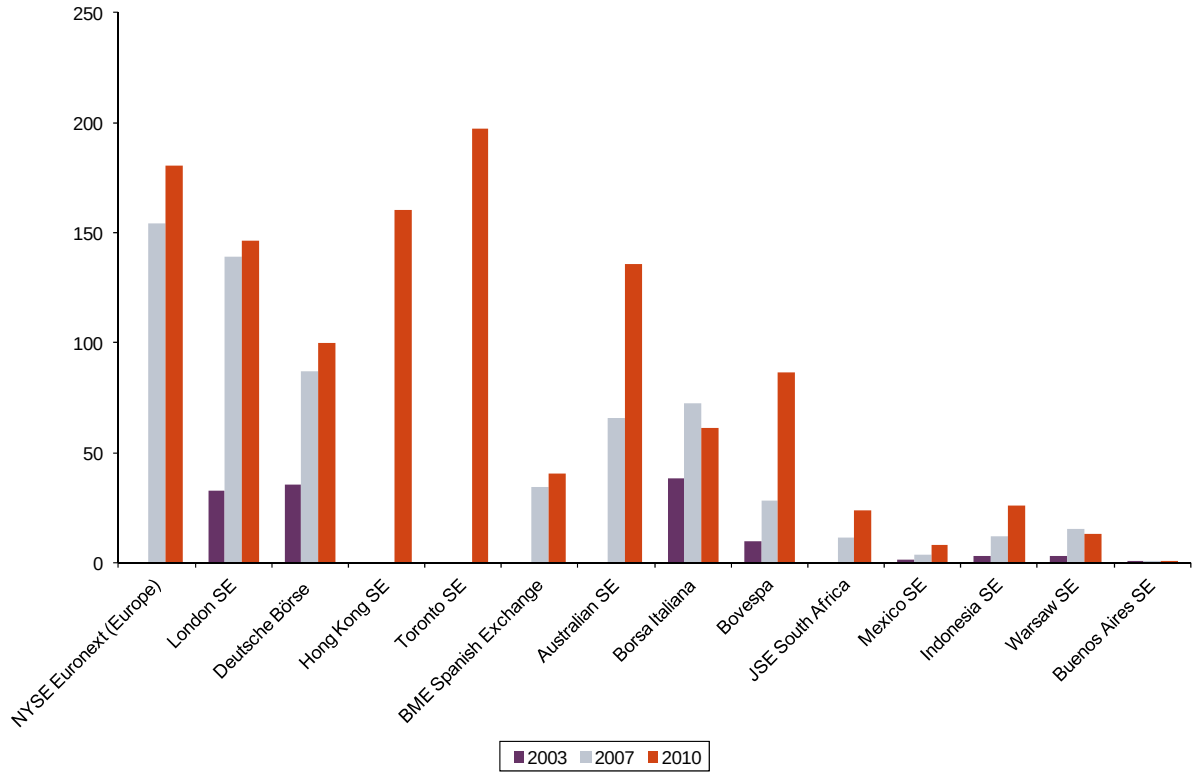
Figure 3.7 Annual value of share trading via Electronic Order Book (US$ billion, May 2011 prices)



Note: The value of share trading is the total number of shares traded multiplied by their respective matching prices. Includes EOB trades only. NYSE Euronext (US) and NASDAQ excluded; the NYSE Euronext (US) annual value of share trading was US$10, US$29 and US$18 trillion in 2000, 2005 and 2010 respectively; NASDAQ's annual value of share trading was US$7, US$17 and US$13 trillion in 2000, 2005 and 2010 respectively. The Argentina Stock Exchange value of share trading was less than US$10 billion in each of the years. In 2009 the London Stock Exchange and Borsa Italiana merged and since 2010 the World Federation of Exchanges has reported consolidated data. The 2010 figures have been sourced from data released by the two stock exchanges. Data is in US dollars as at May 2011.
Source: World Federation of Exchanges, London Stock Exchange data, Borsa Italiana data, Oxera analysis.

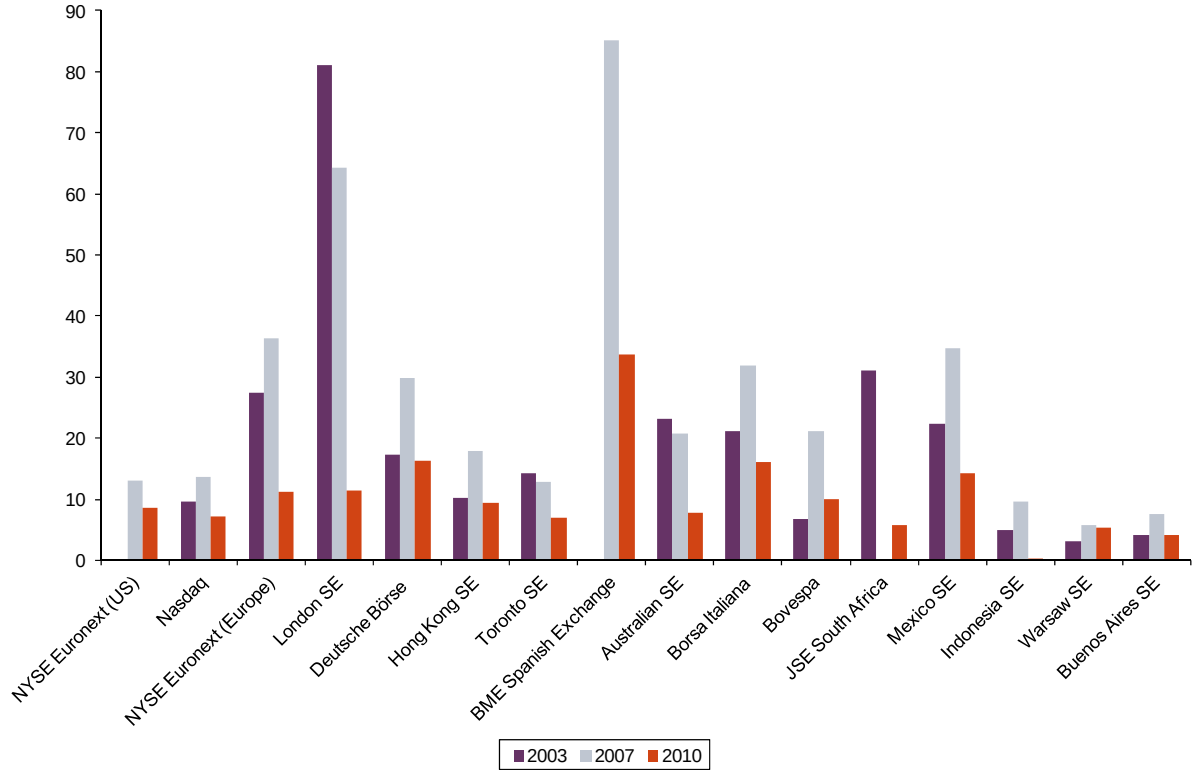
Growth in Bovespa's total value has been accompanied by strong growth in the number of EOB transactions, which increased approximately eightfold between 2003 and 2010 (see Figure 3.8). Only Indonesia recorded similar growth levels over the same time period. At present Bovespa records a similar volume of transactions as Deutsche Börse, although the average value of trades at Bovespa is around 60% lower than that on the German exchange, while being on a par with the major international exchanges (including NYSE Euronext (Europe) and Hong Kong, see Figure 3.9).

Figure 3.8 Total annual number of trades via the Electronic Order Book (m)



Note: This figure presents the number of transactions on each exchange undertaken via the EOB during the period. The number is single-counted (ie, includes one side of the transaction only). Exchanges are ordered by the annual value of EOB trading in 2010; for some countries data for some years was not available. NYSE Euronext (US), NASDAQ and Singapore Stock Exchange excluded; NYSE Euronext (US) recorded 2.1 billion trades in 2010; NASDAQ recorded 1.8 billion trades in both 2007 and 2010. Data unavailable for all years for the Singapore Stock Exchange; the Argentina Stock Exchange recorded approximately 1m EOB trades in each of the years. In 2010, the London Stock Exchange and Borsa Italiana were disaggregated from the London Stock Exchange Group figures.
Source: World Federation of Exchanges, London Stock Exchange data, Borsa Italiana data, Oxera analysis.

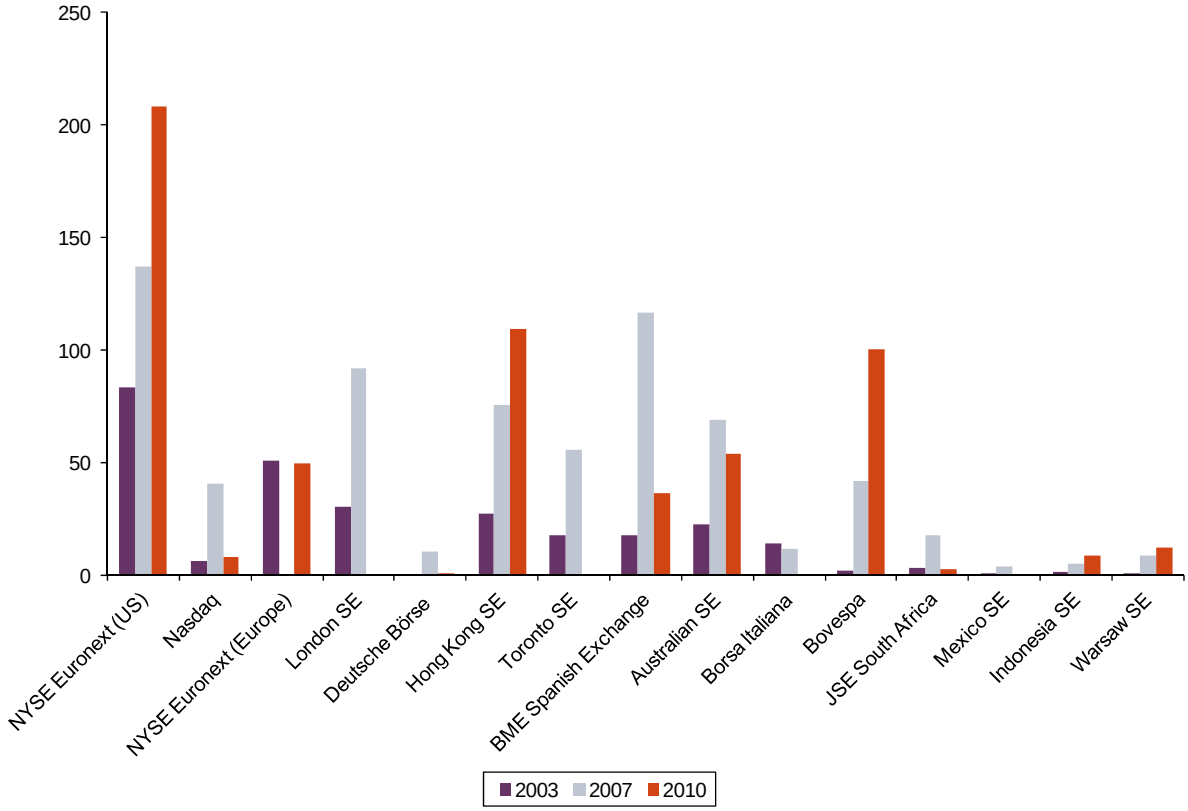
Figure 3.9 Average value of trades via the Electronic Order Book (US$ '000, May 2011 prices)



Note: The total value of share trading via the EOB divided by the total number of trades in equity shares via the EOB. Exchanges ordered by the annual value of EOB trading in 2010. Singapore omitted due to a lack of data. In 2010, the London Stock Exchange and Borsa Italiana were disaggregated from the London Stock Exchange Group figures. Data is in US dollars as at May 2011.
Source: World Federation of Exchanges, London Stock Exchange data, Borsa Italiana data, Oxera analysis.

Similar trends can be observed with regard to capital raised through shares on the individual stock exchanges. Figure 3.10 shows that Bovespa achieved substantial growth in the value of new capital raised through shares between 2003 and 2010, increasing more than fiftyfold to in excess of US$100 billion. The value of capital raised in 2010 on Bovespa exceeded that on a number of established stock exchanges such as NYSE Euronext (Europe). A large proportion of the new capital raised on Bovespa in 2010 was raised by Petrobras.

Figure 3.10 New capital raised through shares (US$ billion, May 2011 prices)



Note: The aggregated value of money raised on the primary market with offer of shares (already issued or newly issued) in the period. Exchanges ordered by the annual value of EOB trading in 2010. London Stock Exchange and Singapore Stock Exchange have been excluded owing to a lack of data. Data is in US dollars as at May 2011.
Source: World Federation of Exchanges.

3.1.3 Implications of developments in the Brazilian securities markets

The size of the Brazilian securities markets is an important consideration when analysing the potential impact of increasing competition.

For some of the services provided by stock exchanges and CSDs, there are economies of scale, such as in the processing of trades.[20] Therefore, if Bovespa's operations are not sufficiently large-scale, there is concern that introducing an additional trading venue could result in inefficient duplication of costs. In this context, the effectiveness and sustainability of competition between the new trading venue and Bovespa would be questionable. Economies of scale (or lack thereof) may also account for cost differences between different financial centres.

The growth in the value of trading on Bovespa has been such that the value of trading in 2008 was comparable to that on the Australian securities exchange (ASX) in 2006, when increasing competition for the incumbent exchange also came under close consideration by the regulator. This could suggest that a significant loss of economies of scale from greater competition in Brazil is less likely.

The costs of operating an exchange depend on the number of trades executed as well as their value. As shown in Figure 3.8, the number of equity transactions on Bovespa rose sevenfold between 2003 and 2010 and is currently at a level comparable to Deutsche Börse. At the same time, the average value of trades rose considerably prior to the recent financial

[20] Malkamaki, M. (1999), 'Are there economies of scale in Stock exchange activities?', Bank of Finland Discussion Papers 4/99, March.

crisis (see Figure 3.9). The average value of a trade and the number of trades on Bovespa is now broadly equivalent to exchanges such as Deutsche Börse and the Australian stock exchange.

Another aspect that can affect the impact of introducing an additional trading venue is the extent to which the market is sufficiently liquid to support trading on two different venues. Network externalities can create an incentive for liquidity to migrate towards the more liquid venue, although the way that the trading venues are linked, as a result of direct regulatory requirements or through the links created by brokers being able to trade in multiple venues, has an impact on liquidity fragmentation (see section 5). Therefore, if the total value of trading in a particular stock is not sufficiently high, and/or there are only a few liquid stocks, multiple trading venues (at least in terms of full-service regulated exchanges) may not be sustainable.

Three ways of measuring this dimension of total market liquidity are considered in more detail below: the total value of trading; market capitalisation; and market concentration.

The total value of trading on Bovespa is compared in Figure 3.7 with that on several other stock exchanges. It is broadly comparable with the Australian Stock Exchange, Borsa Italiana and Bolsas y Mercados Espanoles (BME, the Spanish stock exchange). However, this focus on local stock exchanges does not present an accurate picture of the total value of trading in each financial centre. The value of trading in domestic stocks that takes place on other trading venues is excluded (eg, locally but off-exchange, on alternative trading venues, on foreign stock exchanges, or in ADRs).

Complete data on the total value of trading for all financial centres is not readily available; however, Table 3.1 presents the value of local trading that occurs off the main exchange for ASX and some European financial centres.

Table 3.1 Fragmentation of trading by venue, February 6th to 10th 2012 (%)

		Proportion of trading on, or reported to, the main exchange:	
Stock index	Main exchange	by value	by volume
FTSE 100 index	London Stock Exchange	57	57
CAC 40 index	NYSE Euronext (Paris)	61	60
DAX index	Deutsche Börse	68	72
FTSE MIB	Borsa Italiana	83	87
ASX 200	ASX	98	98
IBEX	BME	95	95

Source: Fidessa.

For the UK, France and Germany, off-exchange trading can be quite substantial—for example, more than 40% of trading in FTSE 100 shares (by volume and value) occurs on alternative trading venues to the London Stock Exchange, such as BATS Chi-X Europe, Turquoise, Nyse Arca Europe and Equiduct. Thus, although the value of trading on Bovespa is about 50% of that on Deutsche Börse or the London Stock Exchange (see Figure 3.7), there is significant additional local trading in German and UK equities on alternative trading platforms.

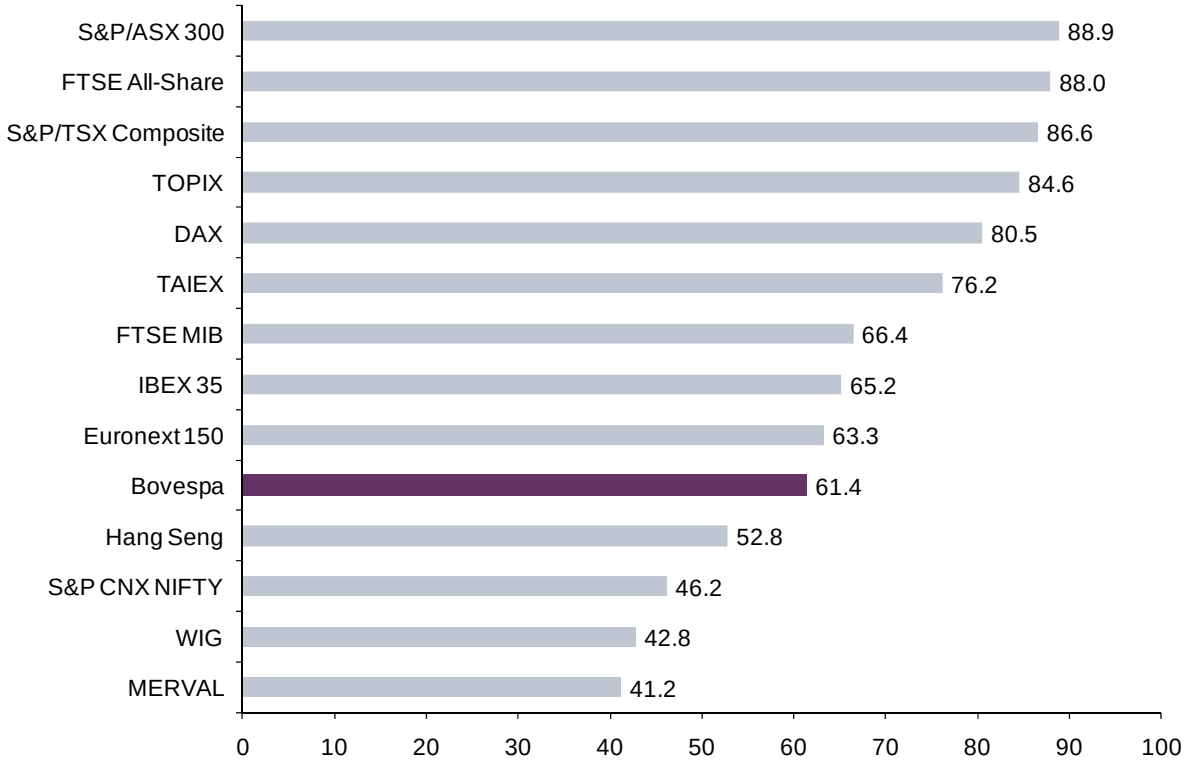
In the absence of additional growth in trading activity, splitting the local Brazilian trading between, say, two trading platforms would reduce the value of trading on Bovespa further below those observed in Europe.

Table 3.1 also shows that the local main exchange in some financial centres is still the main venue for trading in local stocks—for example, this is *currently* the case for ASX and BME. This confirms the finding that, as a financial centre, Brazil is comparable in size to Australia and Spain.

Market capitalisation is another way of measuring the extent to which trading in domestic stocks is sufficient to support multiple venues. As shown in Figure 3.3, market capitalisation of domestic companies listed on Bovespa is comparable to the value on the BME, Australia Stock Exchange and even Deutsche Börse. However, when considering market capitalisation, it is also appropriate to consider whether free-float capital[21] is also at a comparable level.

Figure 3.11 shows that free float on Bovespa is low relative to indices for the London Stock Exchange, ASX and Deutsche Börse, but comparable to the indices traded on BME and Euronext. The lower level of the average free float implies that there is a lower proportion of the domestic market capitalisation to trade. This will tend to reduce the value available to trade compared with the simple measure of domestic market capitalisation.

Figure 3.11 Free-float capital for selected stock exchange indices, April 2012 (%)



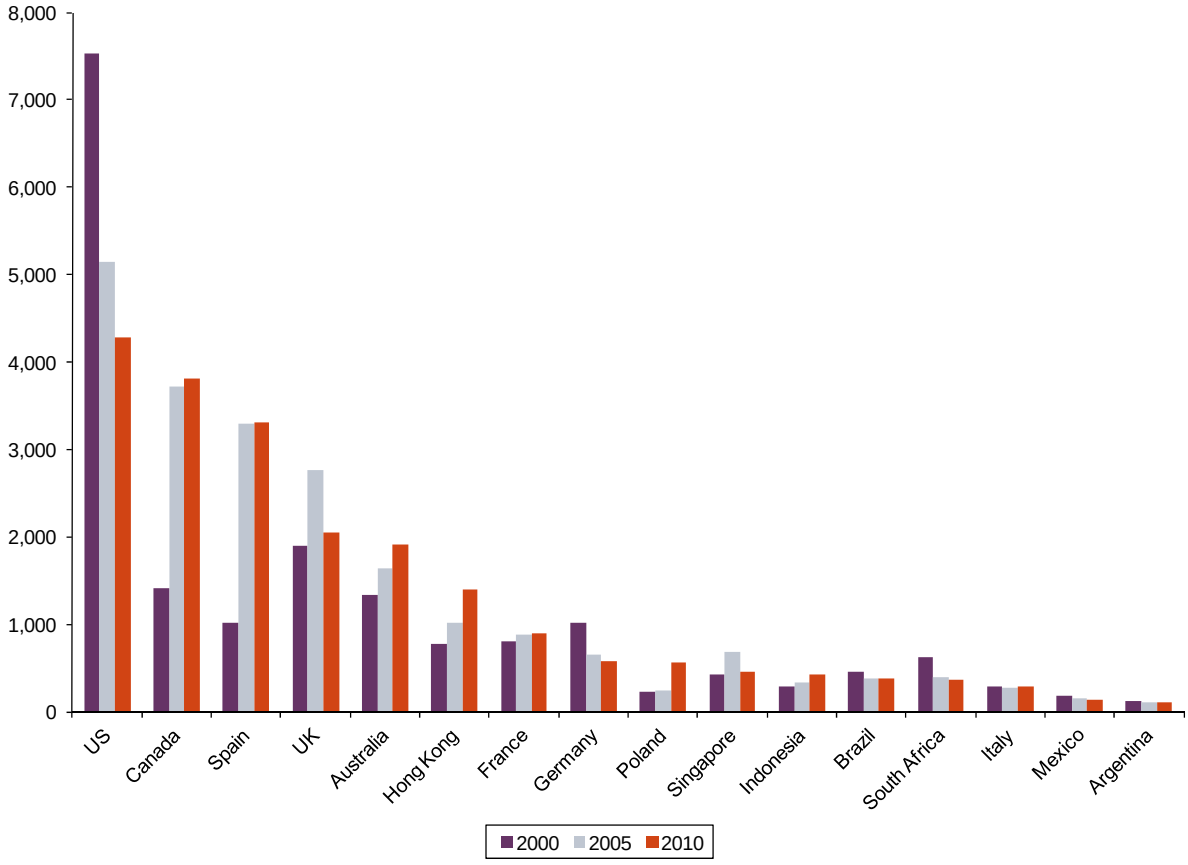
Note: The S&P/ASX 300 index includes companies listed on ASX; the FTSE All-Share index companies listed on the London Stock Exchange; the S&P/TSX Composite index companies listed on the Toronto Stock Exchange; the TOPIX index companies listed on the Tokyo Stock Exchange; the DAX index companies listed on the Frankfurt Stock Exchange; the TAIEX index companies listed on the Taiwan Stock Exchange; the FTSE MIB index companies listed on Borsa Italiana; the IBEX 35 Index companies listed on the Madrid Stock Exchange; the Euronext 150 Index companies listed on Euronext NV; the Bovespa Index companies listed on BM&FBovespa; the Hang Seng Index companies listed on the Hong Kong Stock Exchange; the S&P CNX NIFTY index companies listed on the National Stock Exchange of India; the WIG index companies listed on the Warsaw Stock Exchange; and the MERVAL index companies listed on the Buenos Aires Stock Exchange.
Source: Datastream and Oxera analysis.

Trading in Brazil is relatively concentrated. As shown in Figure 3.12, the number of listed companies in Brazil is relatively low—at approximately 20% of the number in Australia or the

[21] Free-float capital is calculated by multiplying the equity price by the number of shares readily available in the market.

UK, although comparable to the number in Singapore, Indonesia or South Africa. The limited number of listed domestic companies reduces the number of stocks over which multiple trading venues would have to compete in order to cover a high proportion of the total market. Initially entrants often offer trading in a small subset of domestic stocks only (eg, Chi-X Australia entered with an offering of eight Australian stocks).[22]

Figure 3.12 Number of domestically listed companies

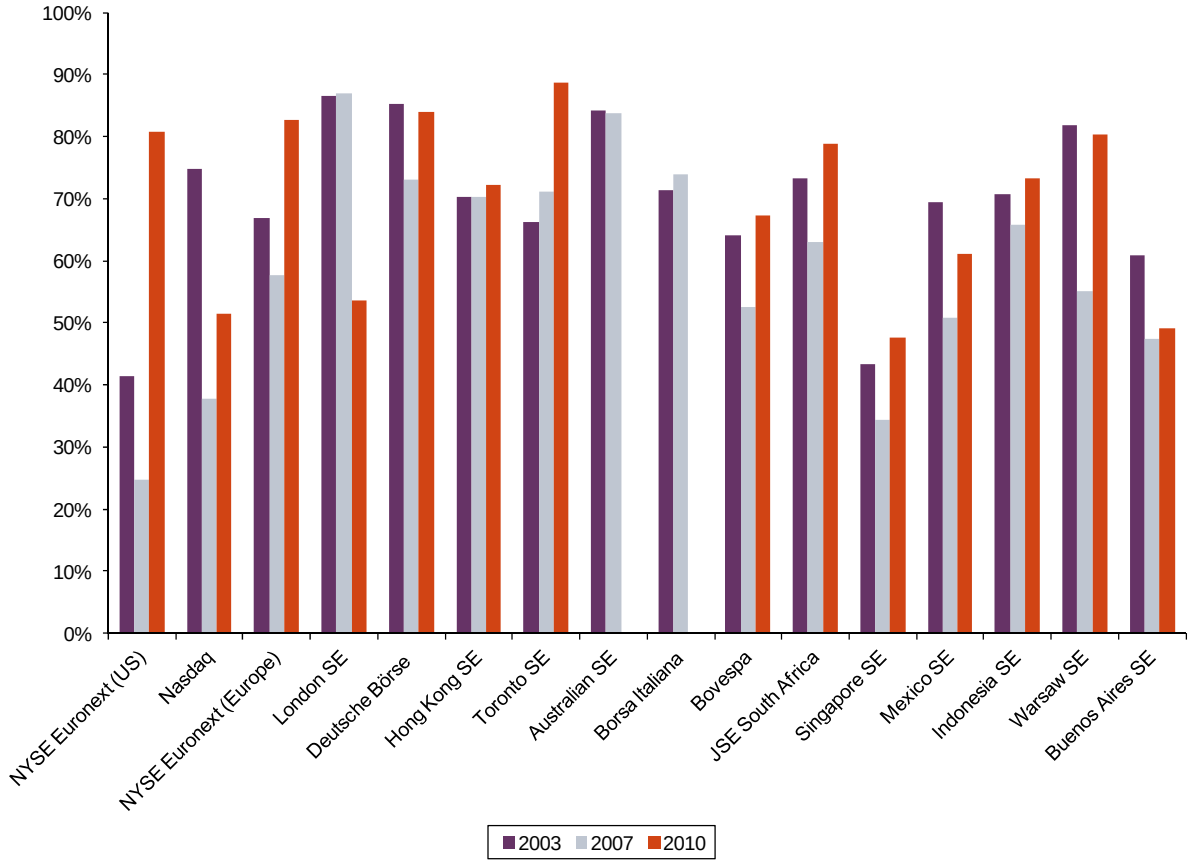


Note: Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. This indicator does not include investment companies, mutual funds, or other collective investment vehicles.
Source: World Federation of Exchanges.

Figure 3.13 below presents the value of trading in the top 5% of all domestically listed companies on Bovespa and other exchanges. Such trading accounts for around 67% of all trading on Bovespa (by value), which is comparable to the concentration of trading in a number of the European exchanges. This combination of a relatively small number of listed companies and trading concentrated in the top 5% of companies (in Brazil's case, around 20 companies) means that the liquidity in certain Brazilian stocks is greater than the aggregate value of trading might suggest. It also means that a new entrant would need to offer trading in only a few companies to cover a relatively high proportion of all equity trading in Brazil.

[22] *The Sydney Morning Herald* (2011), 'Slow start for rival bourse operator Chi-X', October 31st, available at http://www.smh.com.au/business/markets/slow-start-for-rival-bourse-operator-chix-20111031-1mqxc.html.

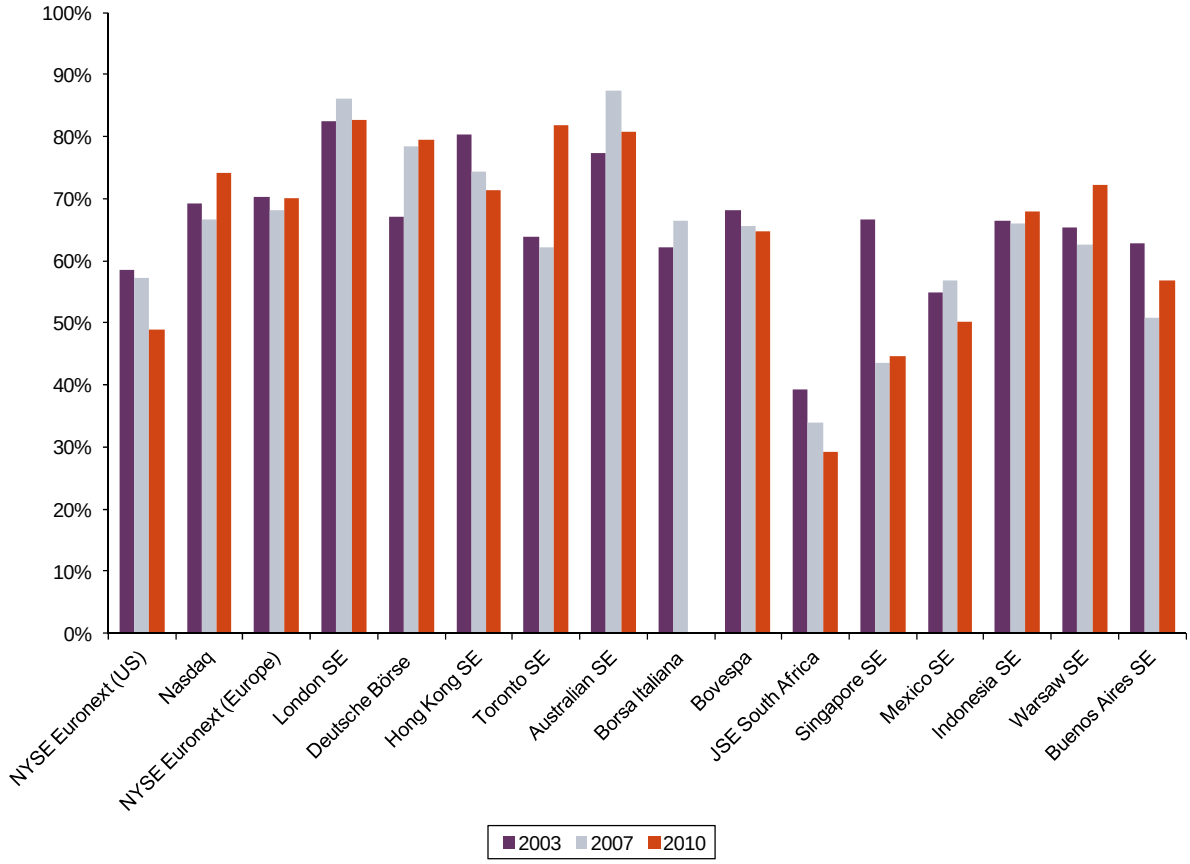
Figure 3.13 Share trading value of the top 5% of traded companies (as % of total)



Note: Market concentration shows the part represented by 5% of the most heavily capitalised domestic companies compared with domestic market capitalisation. Exchanges ordered by the annual value of EOB trading in 2010. BME Spanish Exchange excluded owing to a lack of data. In 2010, London Stock Exchange refers to Group.
Source: World Federation of Exchanges.

The same holds with regard to market capitalisation. The top 5% of companies by market capitalisation represent a significant share (approximately 65%) of the total market capitalisation, which is broadly comparable with many other exchanges (see Figure 3.14 below).

Figure 3.14 Market capitalisation of top 5% of capitalised companies (as % of total)



Note: Market concentration shows the part represented by 5% of the most heavily traded domestic companies compared with annual domestic value of trades. Exchanges ordered by the annual value of EOB trading in 2010. BME Spanish Exchange excluded owing to a lack of data. In 2010, London Stock Exchange refers to Group.
Source: World Federation of Exchanges.

3.1.4 Overall relative position of the Brazilian capital market

The indicators set out above place the Brazilian capital market in approximately the same position as Australia, in terms of market size and total trading value, and similar to many developed economies with respect to indicators such as the market capitalisation to GDP ratio. In terms of the size of the exchange, Bovespa is similar to a number of European exchanges where fragmentation has taken place (eg, Deutsche Börse), and countries with smaller economies (eg, ASX) but where trading fragmentation has not (yet) occurred.

In a number of countries where fragmentation in trading has occurred, there has been less fragmentation in the post-trading infrastructure. This infrastructure may still be operating at a larger scale than is available in Brazil, even if the individual trading infrastructure is of a similar size. This suggests that Bovespa is approximately of the size where competition at the trading level has been, or is being, introduced in other countries. A similar, but less clear-cut, picture emerges in the post-trading infrastructure, but here there are fewer examples of competition at the Brazilian level of scale. Australia is a good example of a similarly sized capital market where competition in trading, but not post-trading, is being introduced.

Brazil has reached this position relatively recently—in particular, in relation to trading volumes, it has experienced relatively rapid growth—while a significant number of those financial markets to which it is now broadly equivalent have seen trading levels tending to stagnate, particularly in relation to incumbent trading venues. Even though the current level of market capitalisation in Brazil is at broadly similar levels to that in France, Germany or Spain, the current observed recent rates of growth of the aforementioned financial metrics may suggest that the market will continue to grow over the coming years. As exchanges in

the established western European economies experience flatlining in their trading levels, and reduced levels of new capital formation, emerging economies such as Brazil may follow a different scenario—for example, a scenario of increases in activity in their capital markets.

3.2 Value chain and competitive environment

3.2.1 Market structure for trading in Brazilian equities

The main provider of trading and post-trading services for Brazilian equities is BM&FBovespa. Off-exchange (over the counter, OTC) trading of listed securities is prohibited (under CVM Instruction No. 461, with the exception of private transactions, see section 3.3) and, at present, Bovespa is the only stock exchange in Brazil. Some Brazilian companies are also listed in the USA, using ADRs (see section 3.2.2). However, the extent to which Brazilian investors can invest overseas is limited by regulation (see section 3.3). Bovespa is also the only provider of CCP and CSD services for equities in Brazil. Previously known as the Brazilian Clearing and Depository Corporation, the Brazilian equity CCP and CSD is now vertically integrated with trading services as part of the BM&FBovespa structure.

In the past, Brazil had multiple stock exchanges and multiple clearing houses: before 2000, it had nine exchanges and two clearing and settlement providers for equities. However, even by 1995, the São Paulo Stock Exchange (Bovespa) was responsible for the large majority of stock trading (around 85%), and trading on the other eight regional exchanges was linked through an electronic trading system (SENN), managed by the Rio de Janeiro stock exchange (BVRJ).[23] There were two (interoperable) clearing houses: Calispa, which cleared and settled trades on Bovespa, and Câmara Brasileira de Liquidação e Custódia (CLC), which cleared and settled trades on RJ/SENN. The interoperability allowed users to transfer positions from one depositary to the other overnight, and thereby to trade on both systems.

A sequence of integration agreements which began in 2000 led to the gradual concentration of the Brazilian stock trading activity in increasingly fewer venues. In 2000, the stock exchanges of São Paulo and Rio de Janeiro (BVRJ) and seven other Brazilian stock exchanges in other cities in Brazil were integrated and linked together. From 2002, there was only one trading venue for cash equities in Brazil, although the extent of competition between venues had been limited since 1989 when the BVRJ was widely seen to have lost its position as a main stock exchange following a stock market crash.

In 2007, Bovespa demutualised and became a for-profit company. The following year, in 2008, the Brazilian Mercantile and Futures Exchange (BM&F) and Bovespa merged.

3.2.2 American depositary receipts

While Bovespa holds a monopoly position for trading of equities in Brazil, it is possible to trade stocks of some Brazilian companies through ADRs in the USA. For example, as at January 2012, 53 (of 70) companies in the Bovespa index were ADRs traded in the USA.[24] There are 381 companies listed on Bovespa. Considering the development of trading in ADRs helps to assess the extent to which the availability of ADRs imposes competitive pressure on Bovespa.

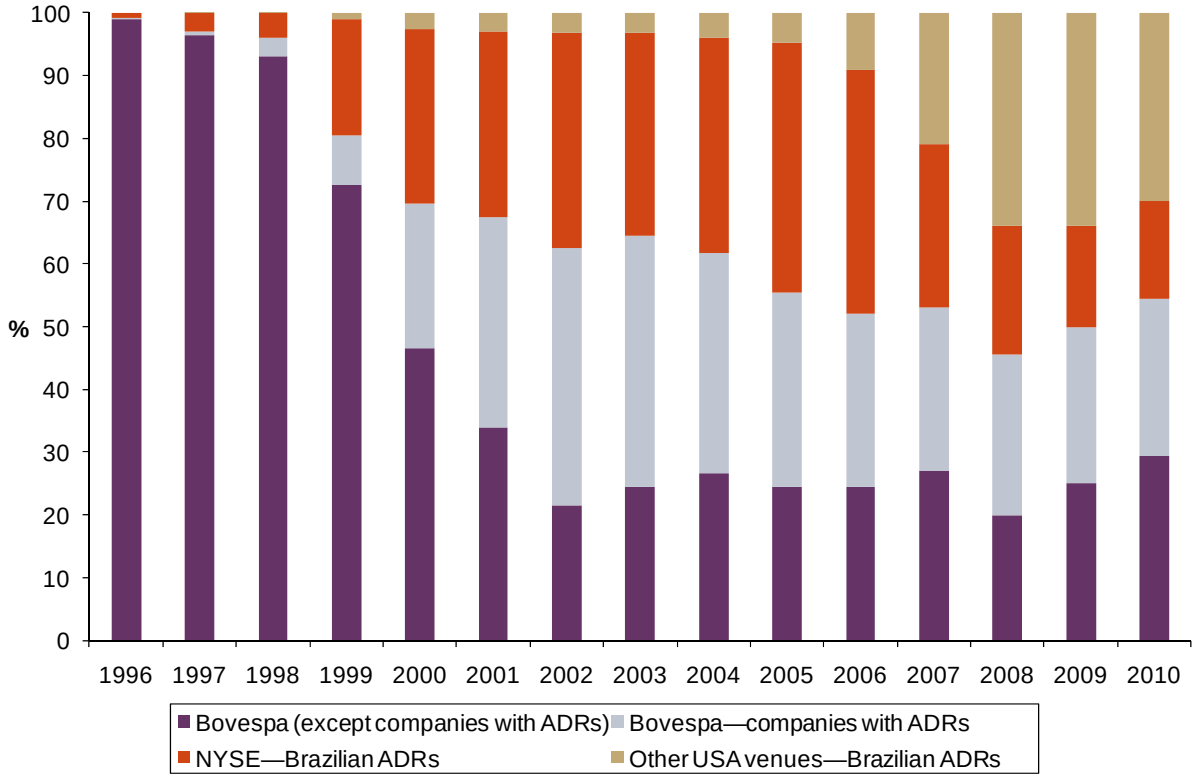
Regulation on foreign listing of depository receipts was introduced in Brazil on May 18th 1992. Given the lack of long-term finance in Brazil at the time, this type of instrument represented a useful tool for firms to access international markets for both primary and secondary market negotiations.[25] However, despite the potential attractiveness of ADRs, the

[23] Material provided to Oxera by CVM, 'Brazilian Capital Market: Institutional Features'.
[24] Source: Bloomberg.
[25] See, for example, Machado Caldeira, A., Castro Souza, R. and Soares Machado, M.A. (2008), 'Uso de Recibos de Ações nos Estados Unidos (ADRs) para Arbitragem', *Revista Eletronica de Sistemas de Informacao*, **7**:1, artigo 4 1; and Camargos, M.A., Barbosa, F.V. and Gomes, G.D. (2003), 'Integração de Mercados e Arbitragem com Títulos Transfronteiriços: ADRs - American Depositary Receipts', *Caderno de Pesquisas em Administração*, **10**:2, pp. 51–67.

value of trading in Brazilian ADRs remained on a relatively small scale until the end of the decade.[26]

As depicted in Figure 3.15, the proportion of trading in ADRs increased rapidly from 2000. Between 2002 and 2008, an increasingly large proportion of the overall trading volume for companies issuing ADRs (the blue, red and brown bars) was represented by ADR trading (the red and blue bars). The growth of trading in Brazilian ADRs did not prevent growth in total liquidity on the Bovespa exchange. Between 2003 and 2010 the value of trading on Bovespa increased by a factor of 12 (in nominal terms, and by a factor of three after adjusting for changes in the real exchange rate, see section 3.1.2). Furthermore, in general, the value of trading on Bovespa in the local shares of companies with ADRs does not appear to decline with the take-off of ADRs.

Figure 3.15 Development of ADRs over time (value of trading)



Note: The percentage is based on the value of trading of companies listed on Bovespa.
Source: BM&FBovespa presentation on financials for investors, March 2012, available from BM&FBovespa website.

The recent introduction and changes to capital controls in Brazil, as summarised in Table 3.2, provides an opportunity to assess the extent to which trading in ADRs imposes competitive pressure on Bovespa.

[26] The costs associated with the issuance of ADRs, together with the complexity of the US listing system, have been cited as reasons for the slow initial development of Brazilian ADRs. See, for example, Camargos, Barbosa, and Gomes (2003), op. cit.

Table 3.2 Key changes to the ADR taxation system in Brazil

Date	Act	Effect	Abbreviation
Oct 2009	Decree n. 6983 (19/09/09)	2% tax on foreign capital inflows on investments in publicly traded equities (ADRs excluded)	IOF.1
Nov 2009	Decree n. 7011 (18/11/09)	1.5% tax on the issuance of ADRs	IOF.2
Dec 2010	Decree n. 7412 (30/12/10)	2% tax on the cancellation of ADRs	IOF.3
Dec 2011	Decree n. 7632 (01/12/11)	Tax on foreign capital inflows and on the cancellation of ADRs set at 0%	n/a

Note: Table excludes historical amendments to headline rates.
Source: Oxera analysis.

IOF.1 increased the cost of trading on Bovespa relative to trading in ADRs. Empirical studies show that this resulted in a substantial shift of trading towards ADRs.[27] The volume of trading in local shares of Brazilian companies with ADRs rose by only 6%, while the volume of trading in Bovespa companies without ADRs rose by 20% and the trading volume in ADRs of Brazilian companies rose 23%.[28] This switching suggests that ADRs could impose some competitive pressure on Bovespa.

IOF.2 reduced the differential in relative trading costs by increasing the cost of trading in ADRs. In this case, empirical studies find that trading in both ADRs and local shares fell, particularly in the case of local shares of Brazilian companies with ADRs.[29] This suggests that trading in ADRs and local shares are complements rather than substitutes, and therefore competitive pressure on Bovespa from trading in ADRs is limited. The suggestion that local shares and ADRs can be complements is consistent with the hypothesis that some investors trade both ADRs and local shares as part of an arbitrage strategy. This is supported by the finding that, post-IOF.2, the sustained price differential between ADRs and local shares increased by 50%,[30] and by a number of other empirical studies that examine the impact of IOF.2.[31]

The overall conclusion drawn is that ADRs represent a source of potential competitive pressure for Brazilian equity markets, although this pressure appears to have had limited effect in the past. For example, if competitive pressure from ADRs on Bovespa was strong, one would expect trading fees to be similar, but this is not found to be the case (see analysis in section 4). Indeed, trading and post-trading fees appear to have diverged. While fees in the USA have come down over the past ten years, the total trading and post-trading fee charged by Bovespa has remained stable, at around 3.45bp.[32] This is another indication that the competition between Brazil and USA may be limited. The degree of substitutability between ADRs and Brazilian shares, may been reduced by taxation measures (as discussed above) and regulatory restrictions.[33]

[27] See, for example, Oxford Metrica (2010), 'The Unintended Consequences of a Brazilian Tax on Depositary Receipts'.
[28] The reaction was measured over 20 trading days (the maximum period between IOF1 and IOF2), relative to a 3-month average taken prior to IOF1.
[29] Ibid.
[30] Ibid.
[31] A number of empirical studies attribute the decline in trading in ADRs and local shares to the loss of arbitrage trading. See, for example, Sakamoto, F.A. (2011), 'A Diferença de Preços Entre ADRs e Ações de Empresas Brasileiras Como Oportunidade de Arbitragem', October, Financas Aplicadas. Rocha, I., da Cruz, K.V., Ribeiro de Toledo Filho, J. and Hein, N. (2009), 'Análise das Cotações dos American depositary receipts versus Cotações das Ações na Bovespa', *Perspectivas Contemporâneas*. Garcias, P.M. and Gusmão, I.B. (2008), 'Análise dos Custos de Transação, das Oportunidades de Arbitragem e da Eficiência de Mercado nas Empresas Brasileiras Emissoras de ADR', São Paulo, Congresso USP de Controladoria e Contabilidade.
[32] In 2004 the total trading and settlement fee charged by Bovespa was 3.5bp, very similar to the current charge of 3.45bp Earlier pricing schedules for Bovespa could not be found. The 2004 fees are based on an archived version of the Bovespa website: www.bovespa.com.br/Custosoperavioanis.htm.
[33] For example, national legislation often imposes restrictions on the exposure of domestic pension funds to foreign securities. In Brazil, for instance, holdings of foreign securities by Brazilian hedge funds are restricted by Instruction No. 450 and 456.

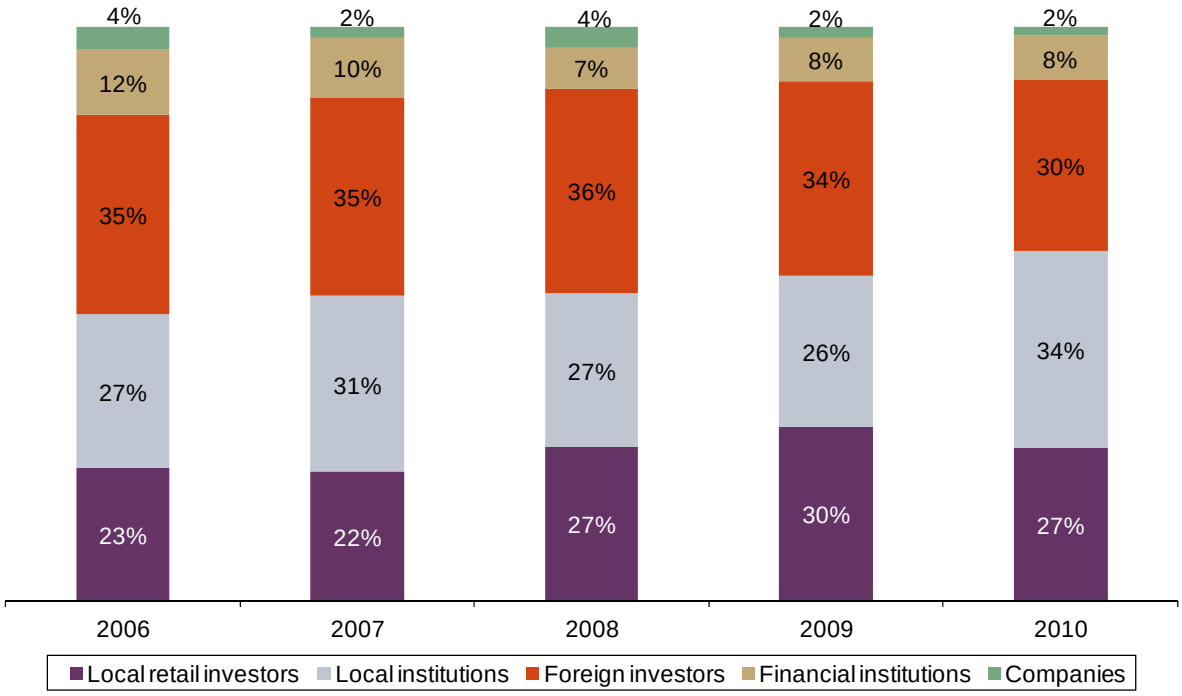
3.2.3 Market participants in the Brazilian stock market

A large number of financial institutions participate in the Brazilian securities market. Around 100 brokers, 75 clearing participants[34] and 180 custodians use the Bovespa exchange. This large number of brokers is reflected in relatively low concentration ratios. Using data on the total value of trading by each broker between January and April 2012, the top 10 brokers accounted for 58% of all trading, and the Herfindahl–Hirschman index (HHI)—a common ratio used by competition authorities to assess the degree of concentration within a market—can be calculated to be 438.[35] This HHI is well below the threshold of 1,000 recommended by the European Commission to be a signal of potential concentration within a market.[36]

Market participants interviewed for this study expected rapid consolidation of the Brazilian broker market, in part driven by the growing interest of global investors arising from the IPO boom of 2007/08 and the relative strength of the Brazilian market. Of the top 10 brokers, four are currently global brokers and a fifth (Link) is in the process of being purchased by a global bank (UBS).

Figure 3.16 gives a breakdown of the investors trading in Brazilian equities. Market participants interviewed for this study confirmed that most trades in Brazil are between end-investors, and that market-making and proprietary trading are relatively limited.

Figure 3.16 Average daily volume by investor group in the Bovespa segment (as a % of total, by value of trading)



Source: BM&FBovespa annual report, 2011.

[34] Based on Bovespa's statistics, clearing participants are computed as the sum of self-clearing agents and full-clearing agents, but excluding gross settlement agents.

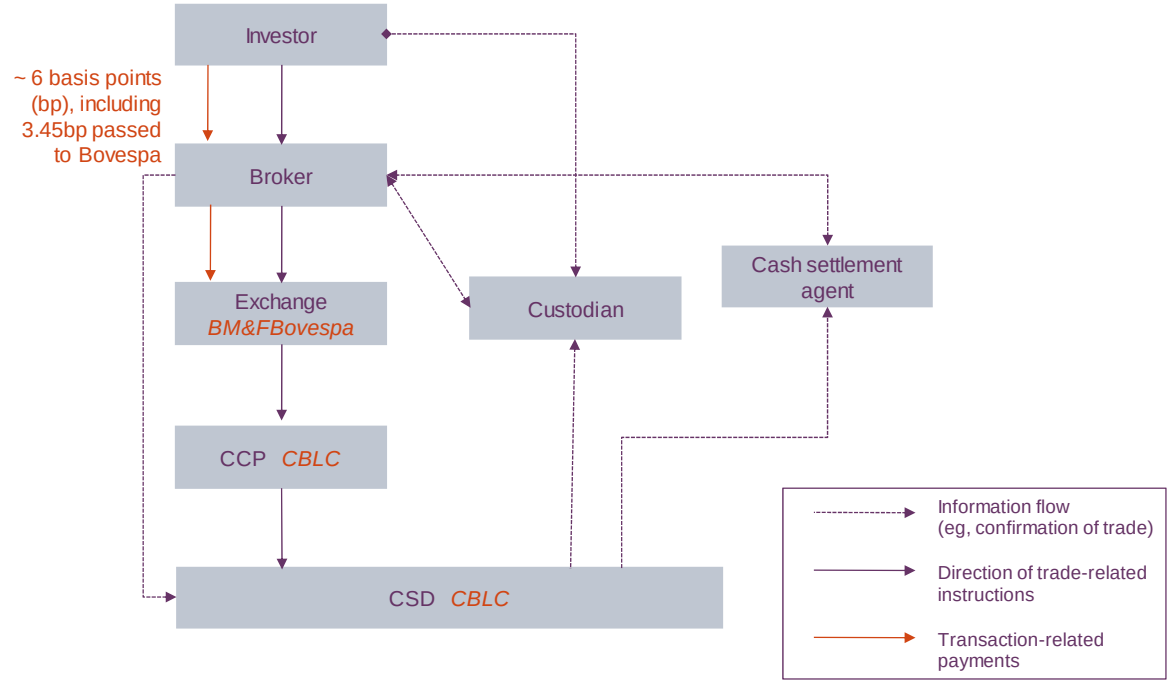
[35] The HHI for a market is calculated by adding together, the square of each firm's market share, for all firms in the market. Data on the value of trading by brokers in Brazil was provided by CVM and sourced from BM&FBovespa.

[36] European Commission (2004), 'Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings', February, Official Journal C 31 of 05.02.2004.

3.2.4 Value chain for equities

Figure 3.17 presents a stylised illustration of the value chain for the provision of trading and post-trading services for equities for *local* investors.[37] The activities undertaken by each type of market participant are then described in turn below the figure.

Figure 3.17 Stylised illustration of the value chain for flow-related activities



Notes: The arrows in this figure show the provision of flow-related activities only.
Source: Oxera analysis of interview responses and BM&FBovespa presentations.

Investors

To change a position in a Brazilian-listed stock, investors send a trade order to a local broker—ie, a broker domiciled in Brazil.

Brokers

In Brazil, listed shares can only be traded on an exchange (eg, brokers cannot internalise trades) and currently there is only one exchange, Bovespa. Therefore, all client orders for listed shares are executed on Bovespa. For each trade, brokers undertake the following activities:

– **execution**: the broker executes the client's trade order, which may involve splitting the trade up into smaller bids/offers;

– **verification of trades with exchange**: after execution, according to CVM Instruction no. 505/2011, the broker has 30 minutes to allocate each trade on the exchange to the beneficial owner level. There are some exceptions, in which case the time limit is 9.30pm on T+1;

– **informing client's custodian of the trade**: after execution, the broker has until 10am T+3 to confirm the trade and trade price with the client's custodian. If there are trades to be amended (either allocation or cash amount), these amendments need to be made on T+2 to avoid late settlements.

Brokers may also undertake other activities such as research, and may stimulate liquidity on the exchange, through proprietary trading.

[37] There are some differences in the value chain for trading in Brazilian equities for foreign investors.

Brokers are liable for the exchange fees on behalf of their clients, but, in the case of the trading and settlement fees, these are passed directly through to the client and are made explicit in the client's invoice.

Exchange

Bovespa runs an electronic trading platform that matches trades on a price-time basis. In some instances—for example, when an individual beneficial owner's holding of a company's stock exceeds a threshold—a trade may initiate an auction. The rules associated with auctions are detailed in Chapter IV of Bovespa's equity market operational rules.[38]

CCP and CSD

CBLC acts as both CCP and CSD for trades in Brazilian-listed equities, and is vertically integrated with the stock exchange, Bovespa. It receives all of the information that is necessary for settlement directly from the trading systems (Mega Bolsa and Sisbex) in real time.

CBLC transfers the shares from the selling beneficial owner's account to the buying beneficial owner's account, and simultaneously triggers the payment of the funds to the cash settlement bank of the selling broker through the Reserves Transfer System (STR). This delivery-versus-payment occurs at 3.25pm on T+3.

Custodian

In Brazil, as the broker and custodian are often part of the same financial institution, there can be some overlap between the types of service provided by the two parties.

The custodian's first role is in the matching of trades pre-settlement. The custodian receives information on the trade instructions from the broker—and, for institutional investors, the fund/fund manager—and matches this with the information received from the exchange. The second role is to instruct CBLC to transfer the shares by 3pm on T+3. After settlement, the custodian confirms whether the transfer of shares has been performed correctly, and arranges for financial settlement, which will often involve a cash settlement bank. There is some overlap between the role of the custodian and that of the broker in the settlement of trades in Brazil.

In contrast to many other financial centres, in Brazil shares cannot be held in omnibus accounts. CBLC directly settles trades at the end-investor level, and, as such, no netting can occur across client trades using the same custodian. This also means that the custodian does not need to transfer shares between its client accounts.

Custodians may also provide other services such as corporate actions, collecting dividends, and the wiring of cash transfers. A fund administrator may also provide custodian-type services for a fund, such as the provision of reports to the CVM, the calculation and payment of commissions to brokers, and more general fund accounting services.

Clearing member/cash settlement bank

The cash settlement agent arranges for the simultaneous payment of funds to the delivery of shares.

In comparison to shares where each beneficial owner has an account at the CBLC, only cash settlement banks hold accounts at the Central Bank. While the delivery part of a stock transaction is settled on a per-transaction basis, cash settlement banks net the payment sides of both for the same clients between trades, but also between clients.

[38] BM&FBovespa (2012), 'Operational procedure manual of Bovespa segment stocks and stocks derivatives', Chapter IV electronic trading session, January.

Failed trades

There is no required resource check and, as the broker cannot see the client's account (to confirm that resources are available) until after settlement should have occurred, failures can occur. To prevent such failures, brokers may require the stocks/cash to be available in advance, in particular in the case of retail investors.

If the client does not have the shares to deliver, CBLC automatically assigns the failed position to the BTC (Securities Lending System). If the failed position is available for borrowing, CBLC opens a borrowing transaction in the name of the failing investor. Should the position not be available, CBLC keeps the delivery outstanding and charges the failing clearing agent a 0.20% penalty fee. The seller has until SD + 1 to cover the failed delivery. If securities have not been delivered by 10am on SD + 1, CBLC again assigns the position to the BTC Lending Program for potential borrowing, and charges a further 0.20%. On T + 4, CBLC issues the buyer with a buy-in order for execution by T + 6. The buyer's broker must confirm the completion of this buy-in order to CBLC by T + 7. Once confirmed, the seller must pay all the related execution expenses, as well as the difference between the buy-in value and the value of the original trade.

3.3 Regulatory framework

3.3.1 Structure of regulation of Brazilian capital market

The Brazilian capital market and financial systems are regulated and monitored by the National Monetary Council (Conselho Monetário Nacional, CMN), the Brazilian Central Bank (Banco Central do Brasil, BCB) and the Brazilian Securities and Exchanges Commission (CVM), as set out below.

– The **CMN**'s primary role is to formulate monetary and credit policies for the financial and capital markets. In terms of the Brazilian stock market, relevant CMN policies include regulating brokers in terms of capital requirements and determining the rules governing foreign investment and foreign exchange in Brazil.

– When conducting business in the capital market, financial and other institutions authorised by the Central Bank to operate are also subject to regulation by the **CVM**. One of the CVM's key responsibilities is to oversee the activities of publicly held companies, organised OTC markets, exchange markets, and commodities and futures markets, as well as members of the securities distribution system, such as fund managers and asset managers.

– The **BCB** is responsible for implementing the monetary and credit policies established by the CMN, regulating foreign exchange market and capital flows, authorising new financial institutions, supervising existing ones, and overseeing the operations of public and private sector financial institutions. It also has the power to apply penalties.

Competition policy is led by the Conselho Administrativo de Defensa Economica (CADE).

Brazilian Securities Law 6385/1976 provides a framework for self-regulation, with the implication that, as a securities market operator, Bovespa is required to implement specific regulations for the registration and trading of securities in organised markets. For self-regulatory purposes, Bovespa has incorporated a specific entity, Bovespa Supervisão de Mercados (BSM). The self-regulation activities of BSM comprise:

– monitoring transactions, entities authorised to operate in the market, and the organisation and management of the securities market operator itself;
– ensuring that the securities market operator is performing its duty to enforce compliance by security issuers with the applicable legislation and regulations.

All rules drawn up by a stock exchange (implementing CVM regulation) must be approved by the CVM.

3.3.2 Specific aspects of Brazilian capital market regulation

A number of regulations have influenced the structure of the Brazilian securities market, including the following.

Identification of financial beneficiary

Brazil is a 'final beneficial owner' market. This means that the final beneficial owner of securities in every transaction carried out through Bovespa's trading systems must be identified, and the assets held in an individual account in the Bovespa Central Depositary. Thus, in the case of foreign investors, the non-resident investor's representatives in Brazil have to identify the final non-resident client. As part of this, client due-diligence processes conducted by custodial service providers and brokerage houses require final beneficiary identification.[39]

The main regulations regarding the final beneficial owner identification in Brazil are as follows.[40]

– Law no. 8.021/1990 stipulates that no payment or redemption regarding any security or investment will be made to unidentified beneficiaries, and that neither securities nor payments will be issued or paid in bearer form without the identity of the beneficiary being reported.

– Law no. 6.404/1976 explicitly provides that corporate bonds and shares be issued in nominative/registered form.

– CVM Instruction No. 505/2011 obliges brokerage entities to dutifully keep records of their clients and provide the exchanges and the clearing entities with accurate client data.

– CVM Instructions No. 325/2000 and 419/2005 determine that the same rules be applied for foreign investors, although it is understood that additional rules result in a different regime being available for foreign investors.

– CVM Instruction No. 461 requires the operator of an organised market to keep a record of all players admitted to the trading system, together with all transactions executed, to enable the committed party of each operation to be identified, subject to the regulations issued by the CVM. This information must be transmitted to the relevant clearing and settlement entity (Article 56).

Transparency and disclosure of information

In Brazil, stock exchanges are required by law to produce and disclose information on the transactions executed on the trading platforms. In particular, CVM Instruction No. 461 requires:

– the operator of the market to keep a record of transactions executed over the previous five years (at a minimum), and to clear and settle all transactions executed on the market either directly or through an entity authorised by the CVM;

– stock exchange operators to '[c]ontinuously release to the public, during the daily trades, at least the information on each transaction carried out, including the price, quantity and

[39] BM&FBovespa, 'Final Beneficial Owner', available at http://www.bmfbovespa.com.br/en-us/international-investors/final-beneficial-owner/final-beneficial-owner.aspx?Idioma=en-us.
[40] Ibid.

time, with a fifteen (15) minute delay at the latest' (Article 76). This information must also be published in a daily information report;[41]

– stock exchange operators to disclose a minimum amount of information (Article 62), including 'in the opening of each trading day, the minimum price, the maximum price, the weighted average price, the reference price or adjustment price and closing price, as well as the quantities traded on the previous trading day'.

Although the degree of detail required is generally lower than that required by the CVM, reporting requirements for exchanges are common in many financial centres.

Protection of investors through guarantee fund

CVM Instruction No. 461 also requires the creation of a loss-recovery mechanism to cover any eventual losses incurred by investors due to the actions of, or omissions by, intermediaries (Article 76). In the specific case of Bovespa, this mechanism is called the Investor Compensation Mechanism (MRP). Financial regulations allow Bovespa to recover the costs associated with the upkeep of this mechanism through the application of a fee approved by the CVM (Article 90).

Restrictions on access to international financial instruments

Only recently has it become possible for Brazilian investment funds to invest in foreign instruments: in 2007, with the inception of Instructions No. 450 and 456, the CVM initiated a reform aimed at allowing investment funds to access these instruments. At the time, CVM recognised the merit in granting access to risk factors that differ from those existing in Brazil, but also noted that a gradual move to a more open system was to be preferred to an abrupt change.[42] Indeed, while access to foreign financial instruments has been granted, a large number of regulatory restrictions remain.[43]

With the changes to Instruction No. 409—introduced by Instructions No. 450 and 456—investment in foreign instruments was permitted, subject to restrictions that depended on the investment strategy of the fund, for example. Under the new framework, many investment funds ('fundos multimercados') were allowed to hold a maximum of 20% of their portfolio in foreign assets. Alternative maximums apply to different types of investment fund.

After further consultations by the CVM, a new Instruction (Instruction No. 465/2008) was issued, granting unlimited access to offshore investments to those funds that required a qualified participation of R$1m from their investors and that accepted a change to their denomination to include the words 'foreign investment'.[44]

Off-exchange trading

Regulation allows for competition in the trading of equities, but bans OTC trading of listed equities:

– the simultaneous trading of shares on stock exchanges and organised OTC markets is prohibited, even though simultaneous trading on multiple exchanges or on multiple OTC markets is permitted. Simultaneous trading is possible for other types of security, however;[45]

– securities listed on organised markets cannot be traded outside of those markets.[46]

[41] Organised OTC markets do not have to disclose this information on a continuous base, but still need to issue a daily information report. See CVM Instruction No. 461, Article 105.
[42] Rangel de Moraes, L. (2008), 'Nova regulacao de investimento no exterior da suporte a desenvolvimento', March 6th, available at http://www.bmfbovespa.com.br/juridico/noticias-e-entrevistas/Noticias/080305NotA.asp.
[43] Including taxation mechanisms that could potentially discourage offshore investments.
[44] See Rangel de Moraes (2008), op. cit.
[45] CVN Instruction No. 461, Article 57.
[46] With a number of exceptions (eg, private trading or transfer through an IPO), as listed in CVM Instruction No. 461, Article 59.

Concentration of trading

CVM Instruction 168 was introduced to create a procedure for shares auctions where a trade involves a substantial block of shares. An auction is required if a transaction involves more than 0.5% of ordinary shares or is more than five times higher than the average daily trading value over the past month. This instruction results in auctions occurring relatively frequently, according to brokers interviewed in Brazil for this study.

3.4 Implications of the key characteristics of the Brazilian market

From the analysis above, the key implications of the Brazilian market for this study can be summarised as follows.

– In terms of market capitalisation of listed companies and value of trading, Brazil has experienced strong growth and is now comparable to many established security markets in which multiple trading platforms exist, such as the German, French, Swiss, Spanish, Nordic European and Australian markets. Like all these financial centres, Brazil remains considerably smaller than the very large financial centres such as the USA and the UK. However, if the Brazilian economy continues to grow, the Brazilian equity market is likely to continue to grow over the coming years.

– Foreign investment in the Brazilian securities market is significant, at around one-third of total domestic market capitalisation. In 2010, in terms of the value of trading on Bovespa, foreign institutions have accounted for between 30% and 36% over the past five years (see Figure 3.16). Of the top 15 brokers by the value of trading in Brazil in 2011, five were branches of international players.

– Brazil has a large number of brokers and custodians relative to the size of the market, and activity is not heavily concentrated. For brokers, the HHI can be calculated to be 438,[47] substantially less than the threshold of 1,000 recommended by the European Commission to be a signal of potential concentration within a market.[48]

– BM&FBovespa is effectively the monopoly provider of trading, clearing and settlement services for trading in most stocks, with a small number of major companies also being available to be traded on ADRs, which are restricted in availability to Brazilian investors.

– There are some distinguishable characteristics of regulation in Brazil that are reflected in the market practice. Of most importance are the regulations that ensure transparency in relation to the beneficiary end-owner. This has resulted in CBLC requiring the settlement of each transaction at the end-investor level—ie, CBLC does not net trades between clients of the same custodian. Thus, compared with financial centres where such netting occurs, CBLC provides part of the service normally undertaken by the custodian. This should be taken into account when drawing cost comparisons. Another characteristic of regulation in Brazil is the role of the exchange, Bovespa, in translating the high-level rules set by the CVM into concrete trading rules. This arrangement is relevant because it could result in a duplication of resources should multiple venues exist, and scope for differences in rules between platforms. This arrangement is not unique to Brazil; it is not uncommon for stock exchanges to set trading rules for their exchange.

[47] Data on the value of trading by brokers in Brazil was provided by CVM and sourced from BM&F Bovespa.

[48] European Commission (2004), 'Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings', February, Official Journal C 31 of 05.02.2004.

4 How do the charges for trading and post-trading in Brazil compare with those in other financial centres?

Bovespa is the only infrastructure provider of trading and post-trading services for transactions in equities in Brazil. Although some stocks can also be traded as ADRs at trading platforms in the USA, competition from US trading platform in relating to trading and post-trading is likely to be subject to certain limits.[49] This may mean that fees charged for trading and post-trading services are higher than they would be in a competitive market.

The fees that investors incur in using Bovespa for trading and post-trading are analysed in this section and compared with the fees in other financial centres. A number of financial centres of different sizes and in which the infrastructure providers are subject to different degrees of competition are used as comparators. Reflecting the availability of data, the analysis focuses on the explicit costs of trading, the fees paid by investors. Implicit costs are considered in section 4.10.

The analysis also indirectly provides an indication of whether there could be benefits of introducing competition in trading and post-trading. In general, the higher the charges in Brazil compared with other similar financial centres, the more substantial the potential benefits of introducing competition. The potential benefits and costs of introducing competition are assessed as part of the CBA, in sections 7, 8 and 9.

4.1 Approach

At a high level, the prices or costs of trading and post-trading services can be assessed in one of three ways. One approach is to design a profile for a number of different users and to apply this to the pricing schedules of Bovespa and infrastructure providers in other financial centres. This will give an estimate of the total charges that each user in each financial centre pays. This is a standard approach for estimating the costs of services when the costs incurred depend on the profile of the user, and has been used by Oxera and infrastructure providers in studies of securities trading and post-trading, as well as in studies in other sectors.[50]

A second approach is to measure the unit cost for the trading and post-trading services according to the revenues (divided by the number or value of transactions) of the service providers. This approach, which Oxera has used in studies for the European Commission,[51] estimates the average costs incurred across the entire market. The results can then be cross-checked against an estimate of the total costs (divided by the number or value of transactions) incurred by the users of the services.

[49] There are a number of barriers such that ADRs are not perfect substitutes for locally traded stocks. These include regulations that limit international investment by Brazilian-domiciled funds, such as CMN Resolution 3,792 which restricts foreign investment of Brazilian pension funds, and the levels and volatility of financial transaction taxes that may be applied to trading in ADRs.
[50] See, for example, Oxera (2010), 'Costs of securities trading and post-trading—UK equities', prepared for Euroclear, February 26th, and EuroCCP (2008), 'The Clearing Industry in Europe: Cost Comparison'. For an example of the user profile approach outside the area of securities trading and post-trading, see Oxera (2006), 'The price of banking: an international comparison—a study prepared for the British Bankers' Asssociation', November.
[51] Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, May. Oxera (2009), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, July. Oxera (2007), 'Methodology for monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, July.

A third approach would be an assessment of Bovespa's profitability. If profitability were higher than would be expected in a competitive market, this would suggest that prices are relatively high and that there are potentially benefits of introducing competition.[52]

Each approach has advantages and disadvantages. The disadvantage of measuring costs on the basis of pricing schedules is that it can provide cost estimates for specific user profiles only, but not necessarily for an average user. Due to the high degree of variation in the profiles of actual brokers and investors, the approach does not allow for the entire industry to be captured. Each user is unique: the profiles of individual brokers are determined by the profile of their own trades and the profile of their underlying clients, and cannot be easily summarised in one user profile. The second approach does result in an average cost and, as it is based on actual revenue data, reflects the actual behaviour of brokers and investors. However, it requires a substantial amount of data from the providers in all financial centres included in the comparison. The data is often confidential and therefore not readily available.

To conduct a like-for-like comparison across financial centres, a user profile approach would have certain advantages. Costs can vary for two reasons: differences in prices and differences in the way brokers and investors use infrastructure providers. In the second approach, it would be difficult to assess to what extent the differences in costs across financial centres are due to differences in prices or differences in profiles. In the user profile approach, the profile can be kept the same across all financial centres so that differences in cost are due only to differences in prices rather than differences in profiles. The user profile approach also allows the costs of different types of investor (retail and institutional) and broker (small and large) to be estimated.

Undertaking a profitability analysis in a competition policy context requires detailed data (for example, to allocate revenues and costs to specific services) over a relatively long period of time. This data is not available in the public domain. Furthermore, even if profitability were in line with what would be expected in competitive markets, it could still be that prices are high, for example due to inefficiencies. Undertaking an in-depth profitability analysis is therefore beyond the scope of this study.

This study has taken the user profile approach. The profiles have been developed with great care and are to a large extent based on actual data received from market participants and Bovespa. To ensure that the findings are robust to plausible changes in the user profile, the assessment is complemented by a sensitivity analysis.

The purpose of the analysis is not to provide precise estimates of the costs in each financial centre, but to provide indicative estimates to assess whether the level of costs of trading and post-trading in Brazil are in line with those in other financial centres. The analysis has been undertaken using profiles of Brazilian investors and brokers, and therefore assesses Brazil as a financial centre. In other words, the analysis does not directly assess the performance of other financial centres—for such an assessment, other profiles may be required that better reflect the users in these financial centres.

The analysis involves the following steps:

– identification of the services that need to be analysed;

– identification of the fees that need to be analysed;

– design of the user profiles for investors and brokers in Brazil;

[52] In some European countries, assessing profitability is a standard tool in competition analysis. For an overview of the methodological issues, see Oxera (2003), 'Assessing Profitability in Competition Policy Analysis', paper prepared for the OFT, Economic Discussion Paper 6, July. For an application, see Oxera (2011), 'Does pay TV pay too much? Profitability analysis in the context of market inquiries', *Agenda*, September.

– identification of the financial centres that will be used as comparators;

– application of the user profiles to estimate the costs of using Bovespa and trading platforms in other financial centres for trading services;

– application of the user profiles to estimate the costs of using Bovespa and infrastructure providers in other financial centres for trading and post-trading services;

– inclusion of the costs of using custodians in the costs of trading and post-trading at the infrastructure level, thereby allowing for a better comparison between Brazil and other financial centres. As is explained below, in relation to post-trading Bovespa undertakes certain activities that in other financial centres (in the USA and in Europe, for example) are undertaken by custodians rather than by the infrastructure providers. To present as much as possible a like-for-like comparison, the costs of custodians are therefore added;

– a sensitivity analysis to ensure that the findings are robust (part of this analysis is presented in Appendix 1).

In principle, it would also be possible to assess the *end-to-end costs* of trading and post-trading in Brazil—ie, the total costs that an investor would incur in using not only the infrastructure providers but also intermediaries such as brokers and custodians. As explained, in the analysis below the costs of custodians are indeed added. Adding the costs of brokers is not necessary since the trading services across financial centres are relatively similar. Furthermore, adding brokers' costs would result in additional complexity as brokers often sell their services as a bundle, typically consisting of trade execution, access to analysts and research. Although in some countries there has been a trend towards unbundling these services, collecting data on the costs of unbundled services is not straightforward.[53]

Section 4.10 provides a short analysis of the implicit costs of trading.

The analysis presented in this section draws on Oxera's understanding of the nature of trading and post-trading in Brazil that has been developed during the course of this study (as summarised in section 3). Meaningful comparisons with other financial centres require a detailed understanding of the nature and cost of trading in these markets as well. For a number of comparators, this understanding had already been developed by Oxera through international studies.[54] To supplement and update this, additional research was undertaken, including interviews with infrastructure providers and regulators from some of the comparator financial centres. To ensure robustness, the results of the analysis have been cross-checked with information provided by Brazilian funds, fund managers and brokers about the trading and post-trading costs they have incurred. In addition, existing cost comparisons of trading in Brazil and other financial centres have been reviewed.[55]

4.2 Identification of relevant services and fees

The approach taken here is to design user profiles representative of typical investors currently active in the Brazilian market and apply these to the pricing schedules of Bovespa and the infrastructure providers in a number of other financial centres. However, because the way in which an investor trades in Brazil may be influenced by the cost of trading in this financial centre, a profile based on UK brokers and custodians has also been considered.

[53] See, for example, Oxera (2006), 'The Impact of the New Regime for the Use of Dealing Commission: Post Implementation Review', prepared for the UK Financial Services Authority, April.
[54] See, for example, Oxera (2006), 'The Cost of Capital: an International Comparison', report prepared for the London Stock Exchange'; Oxera (2009), 'Integration and connectivity options', report prepared for Budapest Stock Exchange; and various studies for the European Commission.
[55] The Canadian Depository for Securities Limited (2011), 'CSD Pricing Analysis', April.

As noted earlier, each trade has two sides—one for the buyer and one for the seller—with both sides normally paying trading and post-trading fees. In line with standard industry practice, the trading and post-trading costs for one side are presented here, measured as costs per transaction and per value of transaction.

The total costs to infrastructure providers in each financial centre cover four types of service, as follows.

– **Trading** is usually initiated when an order is placed and then executed at a trading platform. Platforms include exchanges, multilateral trading facilities and crossing networks. In addition to trade execution, these platforms may provide other services for which fees are charged (or fees are varied, depending on how the customer accesses the platform), such as order management, market-making, and a combination of active and/or passive execution strategies.

– CCPs provide **counterparty risk clearing** services. In general, the CCP becomes the counterparty to each side of a transaction that is executed at the trading venues, so assumes any counterparty risk that those trading on an exchange would otherwise have to assume. The service of clearing involves the preparation of a transaction for settlement, and comprises trade netting (bundling multiple transactions into a single settlement order), and settlement instruction (processing the matched and netted trades to be sent for settlement). CCPs also provide fail management and related risk management services.[56]

– CSDs provide **settlement services**. Settlement includes pre-settlement positioning (ensuring that the buyer has the monies available and the seller the securities available) and the completion of a transaction through the transfer of ownership of assets and monies. It is initiated once the trade has been cleared by the CCP (for trades that are routed via CCPs), or, for gross trades that are not cleared by the CCP, once the trade is executed and ready for settlement. These services are usually provided directly by CSDs or indirectly by custodians/settlement agents, which maintain accounts with the CSDs.

– CSDs also provide **custody and safekeeping** services, which involves account provision (at the end-investor or intermediary level), and, to varying levels of detail between different CSDs, the management of corporate actions. Other services that CSDs may provide, for which fees are charged, include (but are not restricted to) stamp assessment, collateral management and netting.

In line with the objectives of this study, the focus is on estimating the costs that arise directly from specific services relating to securities transactions (such as trading execution, clearing and settlement, and custody and safe-keeping). Other types of cost are not included, such as costs associated with the provision of data, or revenues from security lending. As these costs are not closely related to the volume and value of trading that an investor undertakes, when considered relative to the value of trading, they are generally small.[57] Implicit trading costs (such as market impact costs) are considered in section 4.10.

Infrastructure providers' pricing schedules typically consist of fixed charges (eg, membership and access charges) and variable charges (eg, per-transaction fees); this analysis considers both types.[58] To be able to draw comparisons between the costs of trading and post-trading

[56] When trading equities on stock exchanges and using CCP clearing services, investors/clearing members are required to post collateral. The costs associated with this holding of collateral at a CCP have not been included in this analysis because the amount of collateral is specific to the contract traded, and therefore the cost could vary substantially depending on the profile of the trader. In most financial centres, interest is paid on the collateral. Although the exact level of interest rate may vary, given the short settlement cycle, the difference in costs across financial centres is unlikely to affect the conclusions in this report.
[57] Trading and clearing fees accounted for 91% of Bovespa's revenues in 2010—see BM&FBovespa Annual report 2010.
[58] One-off application fees and connectivity costs have been excluded. When considered relative to typical volumes and values of trading, these fees are small and will not affect the results of the analysis.

in each financial centre, all charges for each type of service were aggregated and presented on as a fee per value of transaction and per transaction.

Different service providers charge for each of these services in different ways, usually per transaction, per value of transaction, or per share per transaction. It is also quite common for trading platforms to use a combination of the three. For example, trading platforms in Spain, Warsaw and Hong Kong charge per transaction and per value of transaction. Clearing and settlement services are usually charged per transaction and/or per value of transaction (either pre- or post-netting) and custody services are usually charged through a fee applied to the value of the assets under custody (although a number of CSDs do not have a separate charge for safekeeping services). Volume discounts are commonly provided.

There is variation in the way in which fail management is charged for. Some CSDs charge a substantial (penalty) fee that is independent of the value of the failed trade; others charge a fee relative to the size of the failed trade. It is quite common for fail management charges to depend on the number of days before settlement is reached. For a high-level overview of the pricing schedules of the infrastructure providers considered in this analysis, see Appendix 2 (Tables A2.1 to A2.3).[59]

The various ways in which infrastructure providers charge for their services mean that the characteristics of the user profile, which represents the way in which they trade (eg, the average number of daily orders and the average size of an order) can affect the cost of trading in each financial centre. In financial centres where trading fees are per transaction, a user that executes the same value of trade but over many more trades may face a higher total cost per value of transaction than in financial centres (such as Brazil) where fees are per value of transaction. Similarly, in financial centres where a greater proportion of post-trading fees are recovered through the custody fee charged on the basis of the value of assets under custody, a user with a low average velocity of trading (ie, which holds its trades for a longer period of time on average) may find post-trading more expensive than in financial centres where a greater proportion of post-trading fees are recovered through the per-transaction fee. To account for this, the user profile analysis has been complemented by a sensitivity analysis assessing the implications of changing the parameters of the user profile. The full results of the sensitivity analysis are presented in Appendix 1, and the impact of changing the average trade size and velocity is explored in section 4.6.

In Brazil, Bovespa charges its trading and settlement fees to the brokers, but these are passed on directly to the investors, whereas in the USA and financial centres in Europe, trading and post-trading fees are typically charged to intermediaries (brokers, custodians and clearing agents) and then recovered from their clients through their own trading and post-trading fees (together with their internal costs of trading and post-trading services and other services such as research). Thus, to estimate the costs of trading and post-trading in financial centres other than Brazil, profiles need to be designed for both investors and intermediaries.

Box 4.1 The beneficiary owner model in Brazil—implications for the analysis

In the USA and most financial centres in Europe, securities are typically held in 'omnibus' or 'nominee' accounts at the local CSD. These accounts are managed by an intermediary (often a custodian bank), and hold securities that are owned by several different investors. This is not the case in Brazil, where Bovespa holds accounts at the end-investor level.

One consequence of omnibus accounts is that the CSD may process fewer security settlement transactions than where end-investor accounts are held (eg, in Brazil), for one of two reasons:

– while, in Brazil, Bovepsa moves the securities from one end-investor directly to another (as illustrated in Figure 4.1), CSDs that provide omnibus accounts move securities only between the

[59] The results presented in section 4.5 include fail management costs, but these are not significant. Fail management costs are excluded within the sensitivity analysis included in Appendix 1 and the impact on the results is minimal.

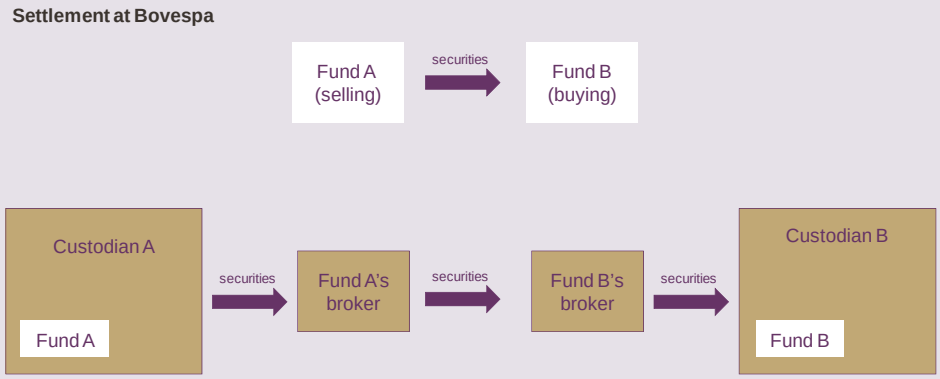
omnibus accounts. The subsequent transfer of securities between the clients in an omnibus account is carried out by the custodian rather than the CSD;

– at CSDs where omnibus accounts are held, trades between clients in the same omnibus account can be netted, which can reduce the total number of settlement instructions between the omnibus accounts. When netting occurs (typically done by the CCP), the impact on the number of settlement transactions at the CSD can be substantial. For stock exchange transactions, European CCPs often achieve high netting efficiencies, typically around 95%. Thus, for every 100 transactions across the exchange, there are five or fewer movements in the CSD. This type of netting does not take place in Brazil.

This means that the Bovespa CSD processes more settlement transactions per trade than CSDs in other financial centres. Furthermore, it manages a greater number of individual accounts. In the USA and financial centres in Europe, these activities are undertaken by custodians. To present as much as possible a like-for-like comparison, the costs of custodians are therefore added to the post-trading costs of using infrastructure providers. It should be noted that these activities do not affect the trading services. When comparing the cost of trading services offered by trading platforms across financial centres, no adjustment is made.

Another difference with most other financial centres is that, in Brazil, the securities are directly moved between the CSD accounts of the investors, while in other financial centres, securities are first moved from the CSD account of the investor to the broker (in the case of a sale) and then from broker to the other investor (see Figure 4.1). In other words, an additional transfer takes place. The costs of this transfer have been included in the analysis. These transfers tend to be (much) larger in value than the transaction size across the trading venues as they generally represent the total change in position in a security that the end-investor wishes to achieve.

Figure 4.1 Settlement of transactions at Bovespa and in other financial centres



Source: Oxera.

4.3 Identification of relevant fees and translating these into costs

The following sub-sections explain how the total cost for each level of the value chain has been calculated.

4.3.1 Trading platform costs

Different trading platforms charge for their trading services in different ways. Usually, there is a fixed fee—an access and/or membership fee for each firm to use the trading platform—and a variable fee—either a charge per transaction (common in Europe), per value of transaction (eg, Brazil), or per share per transaction (eg, Canada and the USA). Volume discounts are also often available. The total trading platform costs associated with each user profile can be calculated as follows.

– **Fixed fees**—each fixed fee can be converted into a per-value-of-transaction fee by considering the total (average) value of trading within the relevant period of time. The average value of trading is based on the assumptions of the user profile. For example, a monthly membership fee is divided by the average value of trading by the user in each month.

– **Volume discounts** can be incorporated by considering the total value of trading (or number of transactions) undertaken within the period of time to which the volume discounts apply. In financial centres where the trading platform fees are charged to the broker rather than directly to the end-investor (as they are in Brazil), volume discounts are based on the volume of services purchased by the broker. Therefore, to incorporate the volume discount in these financial centres, the average volume of trading by *brokers* (ie, not investors) needs to be considered. In financial centres where the discount is based on the volume of service purchased by the end-investor, the volume of trading by the end-investor needs to be considered. The value chain and pricing schedules in each financial centre have been carefully considered to ensure that the appropriate approach was taken.

– **Per-share per-transaction fees**—in the case of US and Canadian costs, where charges are per share per transaction, it is necessary to take into account the average number of shares per transaction in each financial centre, to calculate a fee on a per-value-of-transaction basis.

The total cost can be presented on a per-transaction basis by dividing by the average number of trades associated with the user profile, or, on a per-value-of-transaction basis, by dividing by the average value of trading associated with the user profile.[60]

4.3.2 CCP costs

Unlike in Brazil, where the charge for CCP clearing is included in the settlement fee charged by Bovespa, in most financial centres there is a separate charge for CCP services.[61] This service tends to be charged on a per-transaction basis (rather than per value of transaction, as in Brazil), which can be converted into a per-value-of-transaction basis in a similar way as is done for trading platform fees.

CCP services may be charged on a pre-netting transaction basis (per trade executed on the trading venue) or on a post-netting transaction basis (per settlement instruction sent). Where the charge is applied using the latter, information is required on the average netting efficiency ratio for the CCP. For European CCPs this information is available from the European Central Bank (ECB), and usually in the CCPs' annual reports.[62]

Similar to trading platforms, CCPs often charge fixed fees (membership/access) and per-transaction fees, and may offer volume discounts. These have been incorporated into the analysis in the following ways.

– **Fixed fees**—each fixed fee can be converted into a per-value-of-transaction fee by considering the total (average) value of trading undertaken by the user within the relevant period of time. For example, a monthly membership fee is divided by the average value of trading each month, based on the user profile.

– **Volume discounts** can be incorporated by considering the total value of trading undertaken within the period of time to which the volume discounts apply. As with trading platform volume discounts, in financial centres where the CCP fees are charged to the clearing member rather than directly to the end-investor, the volume discounts apply to the volume of activity of the *clearing member*. Therefore, in order to incorporate the volume discounts in these financial centres and calculate a representative clearing

[60] Fee per transaction (Fp) = $\frac{\text{Total cost for all transactions (C)}}{\text{Total number of all transactions (N)}}$ and average trade size (A) = $\frac{\text{Total value of all transactions (V)}}{\text{Total number of all transactions (N)}}$, and Fee per value of transaction (Fbp) = $\frac{\text{Total cost for all transactions (C)}}{\text{Total value of all transactions (V)}}$. So, Fbp = $\frac{Fp}{A}$.

[61] BM&FBovespa's pricing schedule does not make clear how the clearing service is charged for. BM&FBovespa clarified to Oxera that the CCP service is charged for through the settlement fee rather than the trading fee.

[62] See, for example, London Stock Exchange (2011), 'Delivering on our strategy: Getting in shape, Leveraging our assets, Developing opportunities', Annual Report, p. 21; or Deutsche Börse Group (2003), 'Zwischenbericht – Quartal 2/2003', Interim report, p. 5.

cost, the average volume of activity of a clearing member needs to be considered. This can be approximated by the average volume of activity by brokers, given that most brokers in Brazil are also clearing members.

– **Pre-netting transaction fees**—the total cost associated with pre-netting transaction fees is calculated by applying the fee rate (including any volume discounts) to the number of transactions as determined in the user profile.

– **Post-netting transaction fees**—to incorporate post-netting transaction fees, the number of post-netting transactions (settlement instructions) arising from executing the investor's trade(s) needs to be calculated by applying the netting efficiency for the relevant financial centre to the assumed number of transactions according to the user profile. The post-netting transaction fee rate (including any volume discounts) is then applied to this number to estimate a total cost. The base-case scenario uses the netting efficiency as reported (or calculated from ECB statistics) for each financial centre, and sensitivity analysis over the netting efficiency rates was undertaken. The results are robust to a large degree of variation in the netting efficiency rates.

– **Fail management fees**—to incorporate the total cost arising from failed trades, the base-case scenario assumes that 0.2% of a broker's trades fail, and that failed trades are resolved in one day. This is based on the value of failed US equity trades in 2010 and the total value of equity trading in the USA.[63] As fail management fees can be substantial, sensitivity analysis over a range of failure rates was undertaken, including a 0% failure rate (see Appendix 2).

The total cost can be presented on a per-transaction basis (by dividing the total cost by the average number of trades associated with the user profile), or a per-value-of-transaction basis (by dividing the total cost by the average value of trading associated with the user profile).[64]

4.3.3 CSD costs

In general, CSDs charge fixed fees (eg, membership and access fees) and two types of variable fee: a clearing and settlement charge (typically charged per transaction) and a custody fee (typically charged in proportion to the assets under management, AuM). Volume discounts are common, particularly in the case of the custody fee, in which case, where omnibus accounts are held, the volume discount is applied to the value of assets under custody of the intermediary (ie, the custodian). Where end-investor accounts are held (eg, in Brazil), the discounts apply to the value under custody held only by the end-investor.

– **Fixed fees** have been included in the analysis in exactly the same way as for trading platforms and CCPs.

The costs associated with per-transaction fees (clearing and settlement fees) were incorporated into the analysis in a similar way as for CCP services, but, where omnibus accounts are provided, the additional settlement instruction to transfer securities between the custodian and the broker was accounted for.

The remainder of this section explains in more detail the steps taken to estimate CSD costs. Whether netting occurs and whether fees were charged on a pre- or post-netting basis was carefully noted.

Fees applied to the number of post-netting transactions

The first step is to calculate the number of post-netting transactions (settlement instructions) arising from executing the investor's trade(s). There are two types of settlement instruction:

[63] Kaminska, I. (2012), 'Are some traders gaming the system via settlement failures?', blog, FT.com, March 1st.

[64] See footnote 60.

instructions to move the securities purchased into (or sold out of) the CSD account of the broker of the investor, and an additional instruction to transfer the securities between the broker and the end-investor (or, where the securities are held in the CSD in the custodian's omnibus account, to the end-investor's custodian).

– The first type is calculated by applying the netting efficiency as reported in the relevant CCP's annual report (or as calculated from the ECB statistics) to the number of (trading) transactions as determined in the user profile.[65]The total cost is then computed by applying the fee rate (taking into account any volume discounts) to the estimated number of post-netting transactions.[66]

– The cost of the second type depends on the number of transfers that need to be made between the broker and the end-investor (or the end-investor's custodian, as relevant). This depends on the number of different *stocks* traded by the end-investor each day. This study analyses the costs for a range of users, including retail investors who typically trade one or two stocks when they trade, but generally only trade once a week, and financial institutions who may trade ten or more securities every day.

To ensure robust results, sensitivity analysis was undertaken regarding the netting efficiency, and a number of different user profiles were considered.

Fees applied to the number of pre-netting transactions

– The total cost associated with fees charged on a pre-netting basis is calculated in the same way as above for post-netting, but the fee rate (taking into account any volume discounts) is applied to the number of transactions, pre-netting, as determined by the user profile.

Fees applied to the value of assets under management

Fees charged on the value of AuM were converted into a fee per value of transaction in the following way.

– **Volume discounts**—in order to calculate the appropriate custody fee rate, volume discounts need to be taken into account. Where omnibus accounts are held, these discounts are based on the value of AuM across the whole omnibus account. As omnibus accounts for local investors do not exist in Brazil, the average size of an such an account was estimated based on the size of custodian accounts in Europe adjusting for the relative size of brokers in Brazil and the velocity of turnover on Bovespa. In addition, a sensitivity analysis was undertaken. Where accounts are held at the end-investor level (eg, in Brazil for local investors), discounts depend on the value of assets held by each end-investor.

– **Value of AuM**—to estimate the custody cost associated with a given value of trading, it is necessary to consider how frequently the investor trades, and, therefore, for a given value of trading, what the expected average value of AuM is.[67] This can be calculated using data recorded by Bovespa on the total value of AuM, total annual value of trading and total number of accounts held by different types of investor. The implied velocity of trading ranges between 100% and 500% according to the type of investor.[68] As expected, the turnover velocity at the individual investor portfolio level is higher than that at the exchange level since free float is less than 100% of market capitalisation

[65] Total number of post-netting transactions (N_s) = number of transactions (N) $*$ (1 – netting efficiency rate) + 1.
[66] Total cost (C_s) = N_s $*$ fee rate.
[67] Assets under management = $\frac{\text{Total value for transactions (V)}}{\text{Velocity of trading}}$.
[68] Total number of post-netting transactions (N_s) = number of transactions (N) $*$ (1 – netting efficiency rate) + 1.

(eg, turnover on Bovespa is around 65%).[69] Sensitivity analysis taking a wide range of velocity (25% to 500%) was also undertaken to assess whether the analysis was robust.

The total cost can be presented on a per-transaction basis (by dividing the total cost by the average number of trades associated with the user profile), or a per-value-of-transaction basis (by dividing the total cost by the average value of trading associated with the user profile).[70]

4.3.4 Custodian costs

As described in Box 4.1, there are some differences in the services provided by Bovespa compared with CSDs in financial centres where omnibus accounts are held. In particular, while Bovespa directly moves the securities from one end-investor to another, CSDs which provide omnibus accounts move securities only between the omnibus accounts of intermediaries. It is the custodian rather than the CSD that transfers securities between the clients within an omnibus account.[71] The management of end-investor accounts at Bovespa may also result in more intensive custody and safekeeping services. For example, Bovespa passes information relating to corporate actions directly on to end-investors, while other CSDs may pass on the information to the omnibus account holders only, who then deliver this information further to their clients (the end-investors).

One way to control for the differences in services provided by Bovespa and provided by infrastructures in which omnibus accounts are held is to include custodian charges, and thereby estimate the complete cost associated with clearing and settlement, and delivering securities to an end-investor's account. To draw a like-for-like comparison, the analysis of the costs in Brazil then also needs to include custodian charges.

Custodians often charge fees based on the AuM and per-settlement transaction.

– Per-settlement transaction fees apply for each trade, in each security, by each investor. These can be converted into a fee per value of transaction by dividing by the average size of a client order, in each security, on each day.[72]
– Charges based on AuM can be converted into a fee per value of transaction by considering the velocity of trading of the end-investor.

Retail investors typically use their broker as the custodian and may face a different pricing schedule than institutional investors. Therefore, for retail investors, a separate analysis is undertaken by looking at the fees that brokers charge for trading and post-trading.

4.4 Design of investor and intermediary profiles

To compute the total cost of trading in each financial centre representative of a range of investors, the four user profiles presented in Table 4.1 below were considered. These profiles have been designed using data from World Federation of Exchanges and BM&FBovespa.

[69] Turnover velocity of domestic shares in 2010, World Federation of Exchanges statistics.

[70] See footnote 60.

[71] Strictly speaking, transfers between clients take place in the custodians' systems, not at the CSD.

[72] Data on the typical size of a client order in Brazil, for the range of user profiles considered, was provided by a number of brokers in Brazil.

Table 4.1 User profiles for investors

	User 1 Retail investor	User 2 Institutional investor—less active	User 3 institutional investor—more active	User 4 Financial institution
Assets under management (US$)	100,000	35,000,000	30,000,000	25,000,000
Total value of annual trades (US$)	600,000	70,000,000	120,000,000	250,000,000
Average order size (US$)	11,000	100,000	100,000	100,000
Average number of stocks traded per day	less than 1[1]	2 to 3	4 to 5	10

Note: [1] The retail investor is assumed to trade two securities on each day it trades, but to trade only 27 days a year.
Source: Oxera analysis, informed by World Federation of Exchanges statistics and data provided by BM&FBovespa.

User 1, representing a typical retail investor in Brazil, is assumed to hold on average a portfolio of 9 stocks and to trade on 27 days each year. Each time User 1 trades, it sells one stock and purchases a new stock, thereby trading in two stocks at a time, with a value of US$11,000 in each.

Users 2 and **3** represent institutional investors in Brazil. User 3 is more active, trading on average US$486,000 a day or US$120m a year, while User 2 trades slightly less, at US$283,000 a day or US$70m a year on average. Both profiles are representative of local Brazilian institutional investors. User 2 is also comparable to foreign investors who currently trade in Brazil. The average order size (value of trading, in each security, on each day) is assumed to be US$100,000. The actual trade size corresponding to these client orders is expected to be somewhat lower, as brokers commonly fragment trades to minimise market impact.

User 4 is the most frequent trader, with AuM of US$25m and turning this over ten times a year. This unique investor profile could represent a financial institution. Again, the average order size is assumed to be US$100,000.

In most financial centres, volume discounts provided by infrastructures are applied to the volume (or value) of activity undertaken by the intermediary, rather than the end-investor. In such financial centres, even a relatively small investor may indirectly benefit from large volume discounts should they use a large broker, or hold accounts with large custodians. Therefore, for each of the four user profiles, the cost of trading and post-trading in each financial centre was calculated assuming that they used different-sized brokers and custodians. The characteristics of the intermediary profiles considered are set out in Table 4.2. The daily number of trades, daily trading value and number of failed trades relate to the broker, while the average size of the CSD account reflects the size of custodian used. The first three intermediary profiles are representative of small, medium and large Brazilian brokers. The very large intermediary channel is representative of a large European intermediary.

Table 4.2 Intermediary profiles

	Small	Medium	Large	Very large
Average daily number of trades	12,500	30,000	50,000	100,000
Average daily trading value (US$)	137,500,000	330,000,000	550,000,000	1,100,000,000
Average size of CSD account (US$ billion)	1.73	8.64	43.18	95.00
Average number of failed trades	8	19	32	63

Source: Oxera analysis, informed by World Federation of Exchanges statistics.

4.4.1 Financial centres analysed

The cost of trading and post-trading in a number of financial centres has been analysed. The sample is not intended to be exhausted, but does include a total of 17 different trading channels covering 14 financial centres—a significantly broader sample than within existing analyses.[73]

The sample has been selected to include the larger financial centres such as the USA and the UK, and several financial centres that share similar characteristics with trading and post-trading services in Brazil. For example, Germany and Italy are considered since Deutsche Börse and Borsa Italiana have volumes and values of trading comparable to the levels observed on Bovespa.

Table 4.3 presents a high-level summary of the comparators considered, identifying some key characteristics, such as where competition does and does not exist, the degree of vertical integration, and, in order to indicate size and therefore give an indication of the degree of economies of scale, the value of transactions executed on the exchange in 2010. An overview of the pricing schedules is provided in Appendix 2.

[73] BM&FBovespa's own analysis compares the trading and post-trading infrastructure charges in Brazil with those in Germany. When comparing trading fees only, BM&FBovespa broadens the sample to include a total of six other financial centres to Brazil. See BM&F Bovespa (2011), 'New Fee Structure', August, presentation available at http://ri.bmfbovespa.com.br//upload/portal_investidores/pt/informacoes_financeiras/apresentacoes_videoconferencias/Tarifação_versão%20e%20inglês_15.08.11.pdf.

Table 4.3 Summary of comparators

Financial centre	Infrastructure providers	Vertically integrated?	Year significant trading on alternative trading venues began[1]	Number of equity trades in 2010 (m)[2]	Netting efficiency (%)
USA	NYSE NSCC DTCC	No[3]	Pre-2000[4]	2,050	98.0
Canada	Toronto Stock Exchange (TSX) CDS	No	2008[4]	197	97.6
Hong Kong	Hong Kong Stock Exchange (HKSE) Hong Kong Securities Clearing Company (HKSCC)	Yes	–	160	n.a.[5]
UK—LSE	London Stock Exchange LCH.Clearnet EuroClear	No	2008[6]	137	95.3
Australia—ASX	Australian securities exchange (ASX) ASX Settlement Corporation	Yes	–	135	n/a[7] (95)
Germany	Deutsche Börse Eurex Clearstream	Yes	2009	100	91.9
Brazil	**BM&FBovespa**	**Yes**	**–**	**86**	**n.a.[5]**
Italy	Borsa Italiana CC&G Monte Titoli	Yes	2009	61	95.6
Spain	BME Spanish Exchanges Iberclear	Yes	–	40	n.a.[5]
Indonesia	Indonesia Stock Exchange KPEI KSEI	Yes[8]	–	26	n/a[7] (83)
South Africa	Johannesburg Stock Exchange Strate	Yes	–	24	83.0
Singapore	Singapore SE (SGX)	Yes	–	21[9]	n.a.[5]
Poland	Warsaw Stock Exchange KDPW	Partly[10]	–	13	n.a.[5]
Mexico	Bolsa Mexicana de Valores CCV Indeval	Yes	–	8	n/a[7] (83)
Argentina	Buenos Aires Stock Exchange (BCBA) Caja de Valores	Yes	–	1	n.a.[5]
UK—Chi-X	Chi-X Europe LCH.Clearnet EuroClear	No	2008	na (value of trading in 2010 US$2 trillion)	95.3
Australia—Chi-X	Chi-X ASX Settlement Corporation	No	–	na	n/a[7] (95)

Note: [1] Year in which at least 10% of trading in the underlying equities of the stock exchange index occurs away from the incumbent (based on Fidessa information on the fragmentation of national stock indices). [2] This refers to the number of EOB trades executed on the exchange. [3] DTCC is a user-owned company. [4] Oxera analysis. [5] n.a. indicates that

either no netting is performed by the exchange or an estimate of the netting efficiency is not required to assess the costs of trading on the specific exchange—for example, because settlement charges do not depend on the number of transactions settled. [6] Assessments of the level of competition in the UK equity trading market performed by the UK Office of Fair Trading (OFT) in 2006 and 2007 appear to suggest the existence of potential—as opposed to actual—competition only. See OFT (2006), 'Anticipated merger between NYSE Group, Inc. and Euronext N.V.', October 12th, p. 4, and OFT (2007), 'Anticipated merger between NYSE Group, Inc. and Euronext N.V.', January 24th, p. 21. [7] n/a indicates that data was not available. The assumed netting efficiency used in the model is in brackets and is based on the calculated netting efficiency for CCPs of similar sizes. In the case of ASX Settlement Corporation, the netting efficiency rate was based on netting efficiency rates observed in the European CCPs considered, while for CCV and KPEI, the netting efficiency rate is based on the netting efficiency observed at Strate. [8] The Indonesia Stock Exchange owns KPEI and holds (directly and indirectly) a 28.5% stake in KSEI. [9] Number of equity trades on SGX Mainboard (single-counted) as provided by SGX. [10] The Warsaw Stock Exchange, Polish State Treasury and the National Bank hold equal stakes in the CCP/CSD (KDPW).
Source: World Federation of Exchanges database; ECB database and Oxera analysis.

4.5 Costs associated with trading services

The results in this section focus on the costs of trading services provided by infrastructures in each financial centre. The costs of post-trading services of clearing, settlement, fail management and custody are analysed separately in section 4.6.

Figure 4.2 presents the variation in trading costs according to the user profile.[74] The stock exchanges appear to fall within one of three groups:[75]

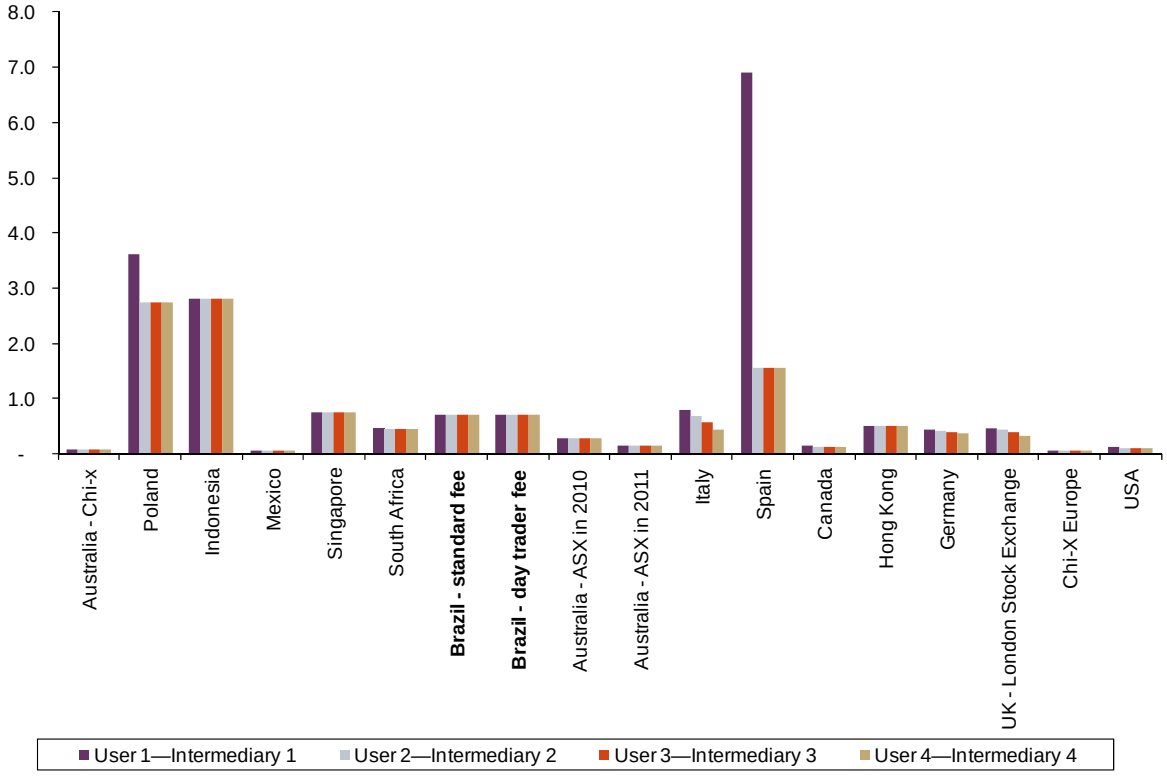
– those with fees in excess of 1.5 bp;
– those with fees between 0.4bp and 1.5bp;
– those with fees below 0.4bp.

Figure 4.2 illustrates that, since the rebalancing of Bovespa's fees in 2011, trading fees now lie within the middle group, and are very similar to trading fees at Borsa Italiana, BME and Singapore Stock Exchange. Trading fees are still somewhat higher at Bovespa than at a number of other stock exchanges, including those that face competitive pressure, such as the London Stock Exchange, Australia Securities Exchange, Toronto Stock Exchange and NYSE.

Figure 4.2 also illustrates that trading fees can vary substantially between different investors at some stock exchanges, with retail investors sometimes incurring much larger fees. This result is due to the potentially substantial volume discounts available at some stock exchanges. In particular, at BME, where one component of the trading fee decreases from 2.4bp to 0.3bp as the value of an investor's order in a security each day increases from €300 to €70,000, and, for order sizes in excess of €140,000, there is no charge based on the value of the transaction.

[74] As Buenos Aires Stock Exchange charges a bundled fee for trading and post-trading services, it has been excluded from this analysis.
[75] In this section the term 'stock exchange' is used to refer to all the trading venues considered in the cost analysis, presented in Table 4.3. This reflects the regulatory licence of each trading venue considered, with the exception of BATS Europe, which is licensed as an MTF under the UK Financial Services Authority.

Figure 4.2 Cost of trading services (bp)



Note: As Buenos Aires Stock Exchange does not distinguish between charges for trading and post trading services, Argentina has been excluded here; its bundled fee is 9bp.
Source: Oxera analysis.

Figures 4.3 and 4.4 consider the relationship between the cost of trading and the value of trading, to assess whether economies of scale might account for the difference in trading fees between stock exchanges. Two very different investor profiles are considered: Figure 4.3 presents the costs for User 3 (a local institutional investor) using the intermediary channel 3 (representative of large intermediaries in Brazil); and Figure 4.4 presents the costs for User 1 (a retail investor) using the intermediary channel 1 (representative of small intermediaries in Brazil).

In neither figure is there particularly strong evidence of economies of scale, if prices are reflecting underlying costs. This is largely because some of the smallest exchanges considered offer relatively low trading fees for both retail and institutional investors.

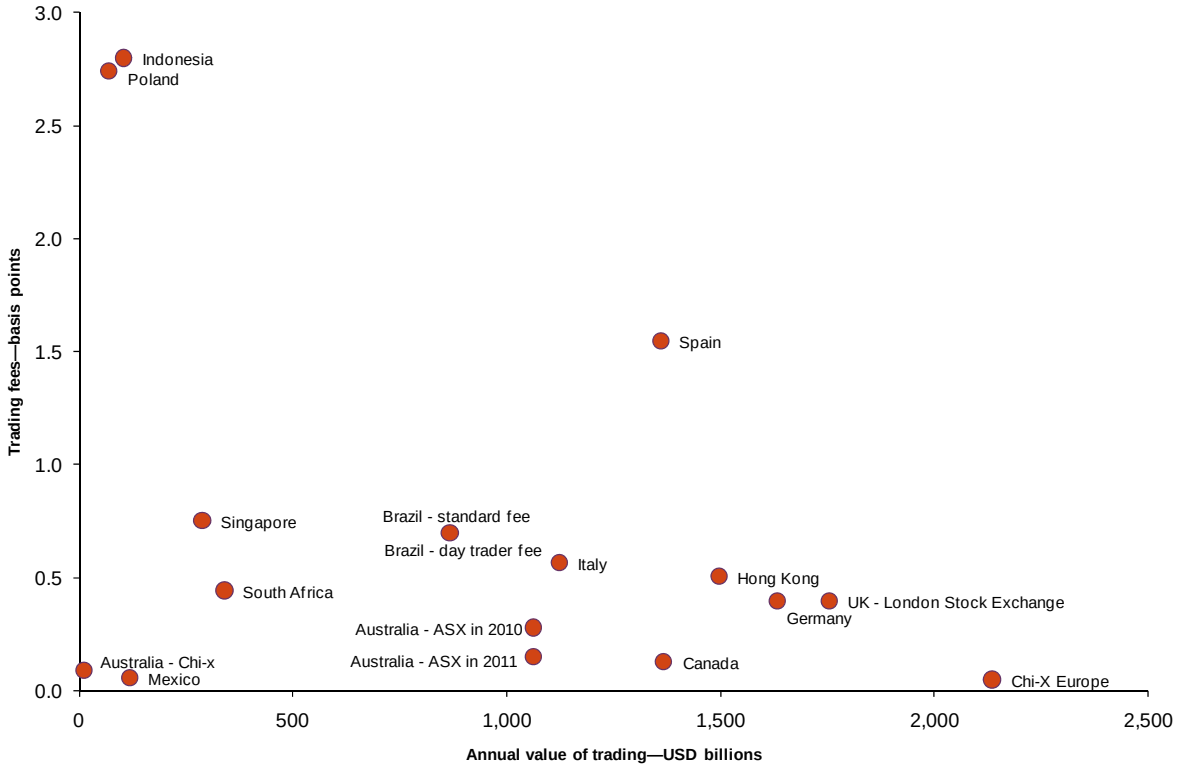
Of the four stock exchanges that have an annual value of trading below $200 billion, two (Warsaw Stock Exchange and Indonesia Stock Exchange) have relatively high trading fees; while other two (Bolsa Mexicana de Valores and Chi-X Australia) have much lower fees, of less than 0.1bp.[76] The low fees of Chi-X Australia are likely to reflect its very recent entry into the Australian equity market and efforts to obtain a sustainable market share. Chi-X Australia may also benefit from greater economies of scale than its current market share in Australia indicates, arising from the operation of a number of substantial international markets by its parent company. The low trading fees at Bolsa Mexicana de Valores are, however, quite notable and could suggest that even small stock exchanges can offer low trading fees. In addition, the value of trading at SSE and JSE is lower than at Bovespa (at around US$300 billion in 2010), although fees are comparable or lower than at Bovespa (at between 0.4bp

[76] Buenos Aires Stock Exchange does not distinguish between trading and post-trading costs, so has been excluded from this analysis. In 2010 its annual value of trading was $3.8 billion and its bundled fee was around 9bp. Source: World Federation of Exchanges.

and 0.8bp). If Mexico and Chi-X Australia are excluded, there appears to be some indication of economies of scale, with Bovespa on, or slightly above, the trend line.

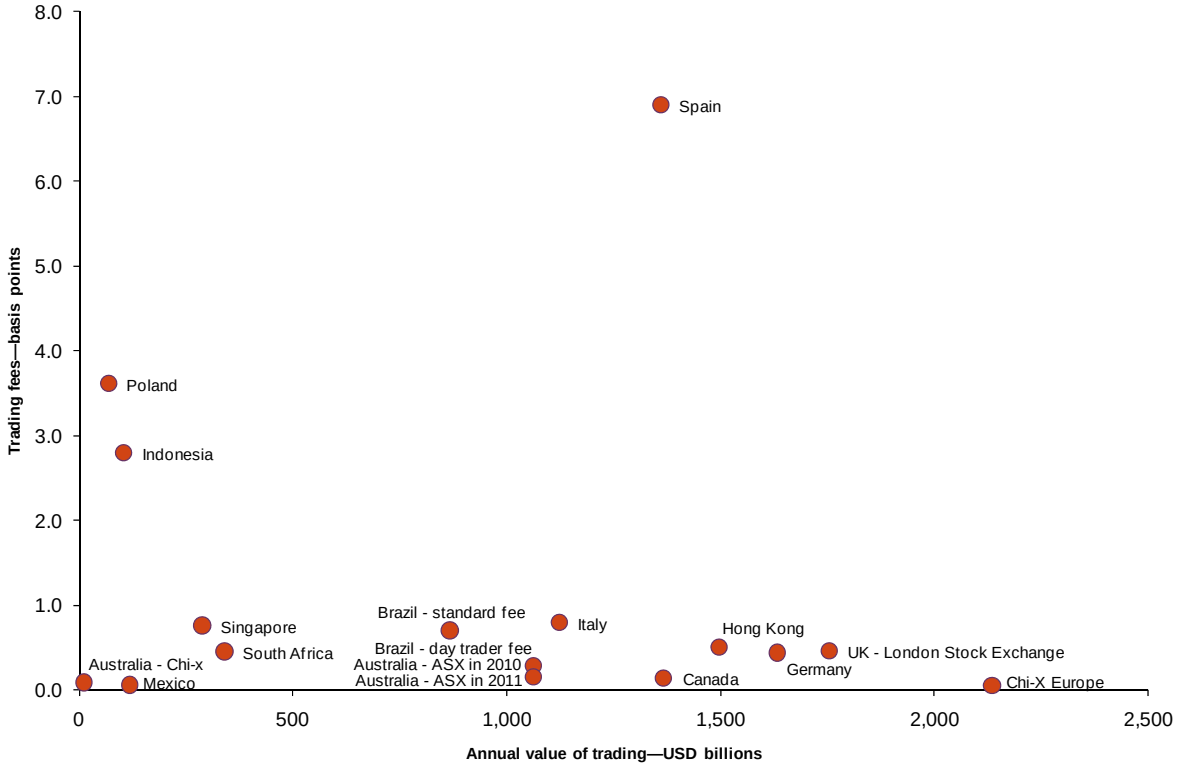
Once the annual value of trading exceeds US$500 billion, excluding BME, there is much less variation in trading fees. For both institutional and retail investors, trading fees range between 0.05bp and 0.7bp. Trading fees at BME do appear high, particularly in the case of retail investors, where fees are around 7bp. Fees for institutional investors are more comparable to those in other financial centres, at around 1.5bp.

Figure 4.3 Relationship between the cost and the value of trading—institutional investors using large intermediaries



Note: For each stock exchange considered, the value of EOB trading in 2010 is reported, taken from the World Federation of Exchanges. As Buenos Aires Stock Exchange does not distinguish between charges for trading and post-trading services, it has been excluded here; its bundled fee is 9bp. The value of trading at NYSE is much greater than at the other stock exchanges considered. To allow for a larger scale, to ease comparability between Bovespa and the other stock exchanges considered, NYSE has been excluded from the figure. In 2010, the value of EOB trading on NYSE was US$17.8 trillion, and trading fees are 0.11bp for institutional investors, 0.12bp for retail investors.
Source: World Federation of Exchanges and Oxera analysis.

Figure 4.4 Relationship between the cost of trading and value of trading—retail investors using small intermediaries



Note: For each stock exchange considered, the value of EOB trading in 2010 is reported, taken from the World Federation of Exchanges. As Buenos Aires Stock Exchange does not distinguish between charges for trading and post-trading services, it has been excluded here; its bundled fee is 9bp. The value of trading at NYSE is much greater than at the other stock exchanges considered. To allow for a larger scale, to ease comparability between Bovespa and the other stock exchanges considered, NYSE has been excluded from the figure. In 2010, the value of EOB trading on NYSE was US$17.8 trillion, and trading fees are 0.11bp for institutional investors, 0.12bp for retail investors.
Source: World Federation of Exchanges and Oxera analysis.

4.6 Costs associated with trading and post-trading—delivering securities to the omnibus account

The results in this section reflect the cost of trading and post-trading services provided by infrastructures in each financial centre. Intermediary costs (ie, the costs incurred by custodians) have been excluded and are considered in section 4.7. This means that in financial centres where omnibus accounts are held at the CSD, the cost reported reflects the cost to the end-investor of trading and delivering securities to their custodian's omnibus account. In comparison, where settlement at the CSD is at the final beneficiary owner level, the cost reported reflects the cost of delivering the securities into the end-investor's account.

Figure 4.5 presents the trading and post-trading infrastructures costs for a range of user profiles. As with the trading cost analysis, the range in costs both between financial centres and within financial centres but for different users can be quite substantial. In this case the financial centres appear to fall within one of the following three groups:[77]

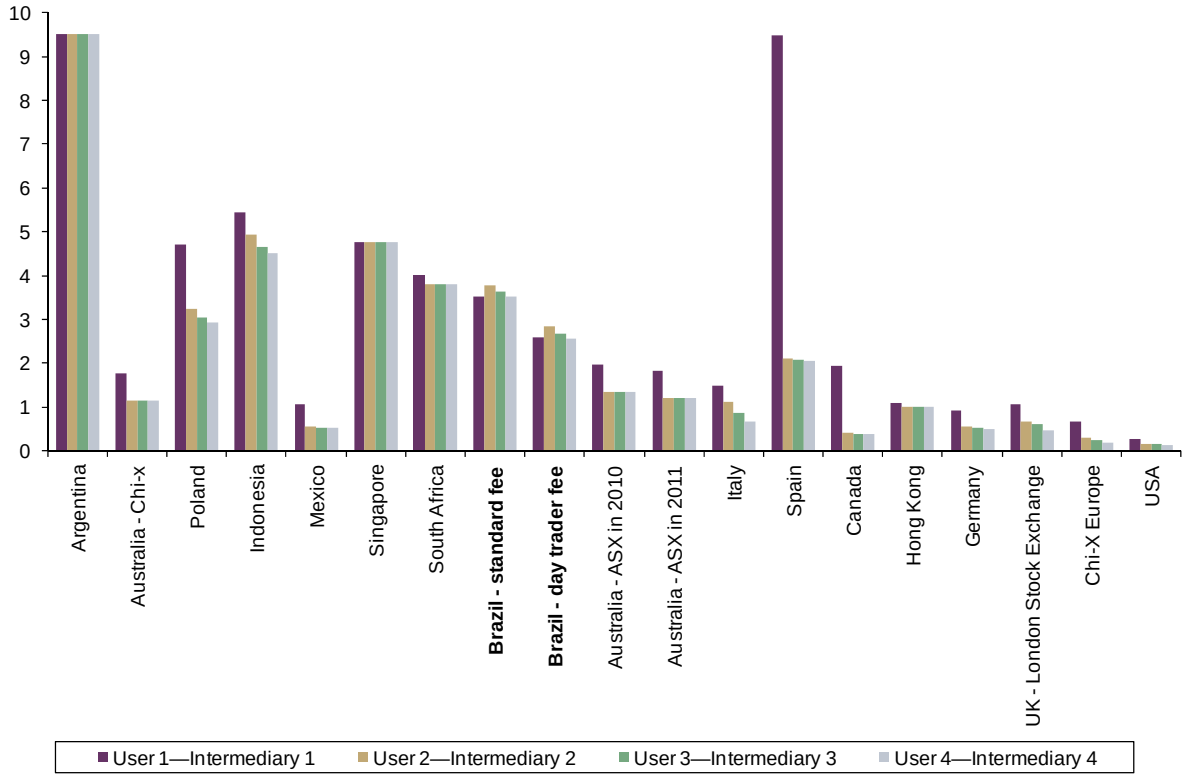
– those with costs in excess of 9bp;
– those with costs between 2bp and 6bp;
– those with costs below 2bp.

[77] In this section the term financial centre is used to refer to the full infrastructure value chain—ie, the exchange, the CCP and the CSD.

Bovespa falls within the middle group, with costs generally comparable to those in Poland, Indonesia, Singapore, South Africa and Spain. Compared with trading and post-trading in the USA on NYSE, the cost of trading and post-trading in Brazil on Bovespa is 13–27 times greater, while compared with trading and post-trading on the Buenos Aires Stock Exchange, the cost of trading and post-trading on Bovespa is less than half. Compared with trading on ASX in Australia, a market in which competition has recently been introduced, the cost of trading and post-trading at Bovespa is twice as high.

Figure 4.5 also shows the potential magnitude of volume discounts available in some financial centres. After incorporating post-trading services, volume discounts are available in more financial centres. In some cases, the total cost relative to the value of trading is greater for User 2 than User 1, which reflects the lower trading velocity of User 2 than User 1.

Figure 4.5 Cost of trading and post-trading services (bp)



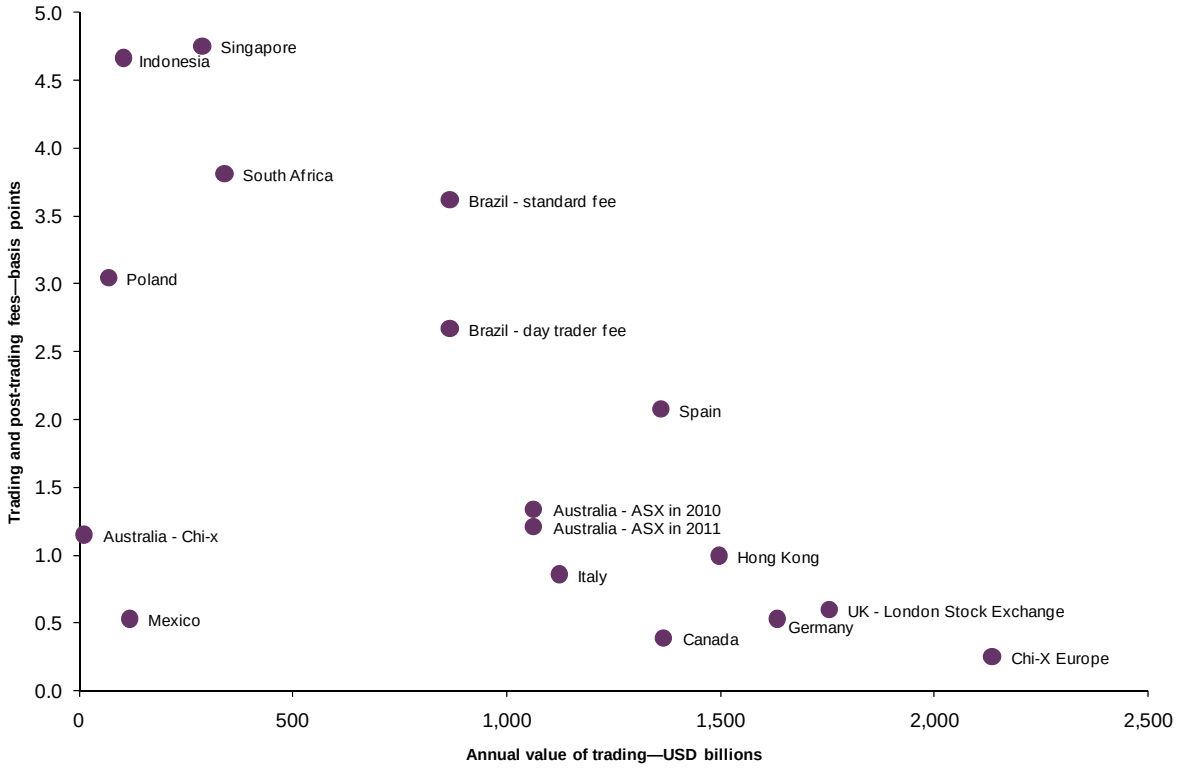
Source: Oxera analysis.

Figures 4.6 and 4.7 present the relationship between the total cost associated with infrastructure trading and post-trading services, and the value of trading at each stock exchange. Figure 4.6 considers the institutional investor profile (User 3, Intermediary 3) and Figure 4.7 considers the retail investor profile (User 1, Intermediary 1). In comparison to the trading cost-only analysis, when the costs of post-trading services are incorporated, the evidence of economies of scale is quite strong. This suggests that once the scale of trading in Brazil is taken into account, costs are not necessarily out of line with those observed in other international financial centres.

The difference in the results between Figures 4.3 and 4.4, and 4.6 and 4.7 is because in all of the smaller financial centres where trading costs are relatively low (ie, low given the size of these markets), post-trading costs are high (eg, in South Africa and Singapore). Similarly, where trading costs are high, post-trading costs can be relatively low (eg, in Poland). In financial centres where the exchange, CCP and CSD are vertically integrated, it may be more appropriate to consider the total trading and post-trading costs. Although the total fee may be cost-reflective, the fees for the individual components of trading and post-trading may not. For example, as explained by Bovespa, before the rebalancing of its fees in 2011,

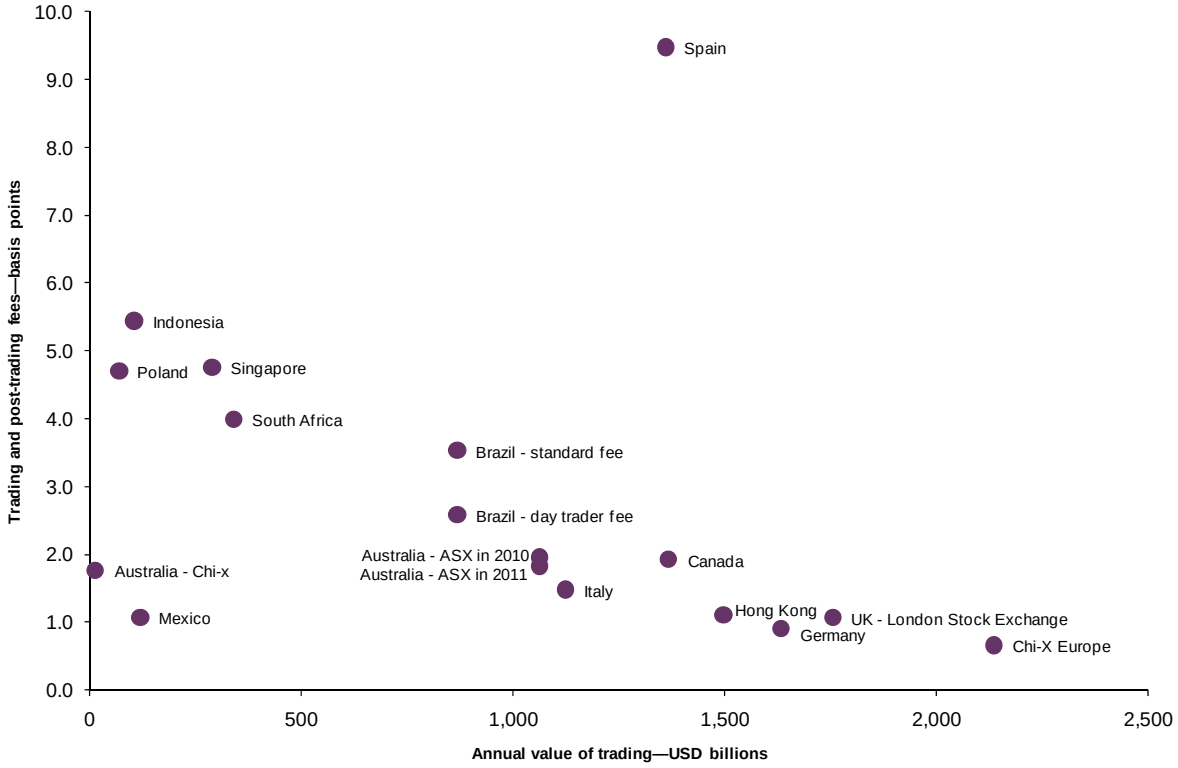
the individual fees for trading and post-trading were not cost-reflective. Of the 17 trading platforms considered, 11 are vertically integrated.

Figure 4.6 Relationship between the cost of trading and post-trading and the value of trading—institutional investors using large intermediaries



Note: For each of the financial centres considered, the value of EOB trading on the relevant trading venue in 2010 is reported. Argentina has been excluded because the costs of 9bp are much higher than the other financial centres considered. The USA has been excluded because the value of EOB trading on NYSE was much higher than the other financial centres considered.
Source: World Federation of Exchanges statistics and Oxera analysis.

Figure 4.7 Relationship between the cost of trading and post-trading and the value of trading—retail investors using small intermediaries



Note: For each of the financial centres considered, the value of EOB trading on the relevant trading venue in 2010 is reported. Argentina has been excluded because the costs of 9bp are much higher than the other financial centres considered. The USA has been excluded because the value of EOB trading on NYSE was much higher than the other financial centres considered.
Source: World Federation of Exchanges statistics and Oxera analysis.

4.7 Costs associated with trading and post-trading—delivering securities to the end-investor's account

In Brazil, the CSD holds accounts at the end-investor level, and therefore delivers the security directly into the end-investor's account. In other financial centres, omnibus accounts are held at the CSD, and securities are subsequently transferred between the clients in an omnibus account by custodians, rather than the CSD. To account for this, the cost of trading and post-trading is re-computed, including estimates of custodian settlement and custody charges for both Brazil and two of the comparator financial centres where omnibus accounts are held at the CSD: Germany and the UK.[78] To ensure a like-for-like comparison, it is appropriate to include custodian charges in the financial centres where omnibus accounts are held and in Brazil. This is because custodian charges in financial centres where omnibus accounts are held are likely to incorporate the cost of other trade-related services that are also provided by custodians in Brazil.

Fees paid by institutional investors to custodians in Europe can vary quite substantially. Factors that can have a significant effect on the fees paid include whether services are being provided for local or cross-border transactions, and the activity of the client and hence volume of services being purchased.

[78] Germany and the UK were chosen because, as large financial centres in Europe, the European data on custodian fees is most representative of custodian charges in these financial centres. The European custodian fees reported in this section are based on analysis in Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, May.

From the analysis of custodians' revenues, the typical fee charged by custodians in Europe for clearing and settlement services has declined over time, from around €9 in 2006 to around €5 in 2009.[79] Fees charged to institutional investors are higher than those charged to brokers and are likely to lie between €3 and €8 per transaction.

Custody fees charged by custodians in Europe remained relatively stable between 2006 and 2009, at around 1bp of the AuM.

Combining the settlement and custody fees into a per-settlement transaction charge suggests that €10 per settlement instruction would be a conservative estimate of the total custodian costs typically incurred by investors in the UK and Germany.

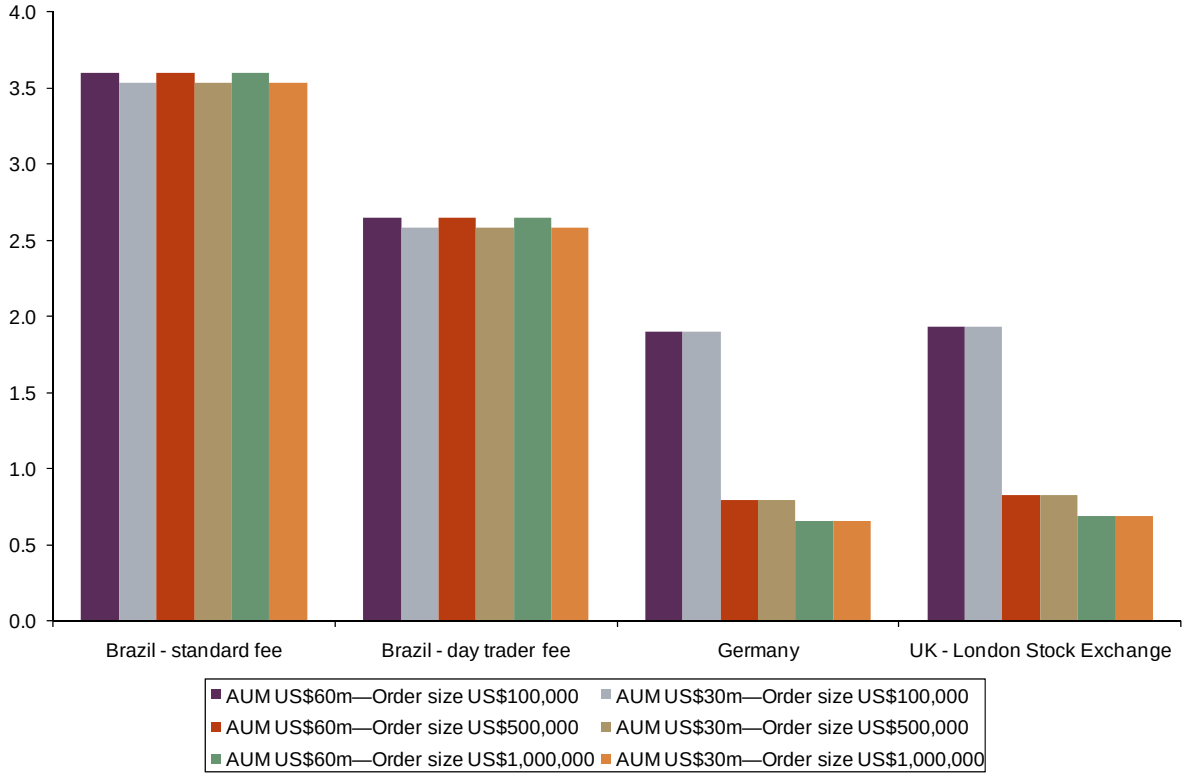
There can also be substantial variation in the fees paid by institutional investors to custodians in Brazil. During discussions with a number of clients, brokers and custodians, a range of settlement and safekeeping fees was discussed; in some cases, the custodian fee was considered to be part of the brokerage fee. Therefore, to be conservative, and amid the uncertainty arising from the lack of data on custodian fees in Brazil, no uplift has been made to account for custodian fees in Brazil.

Custodian fees are typically based on the value of AuM, and the number of orders made each day by the client, in each security. This means that an investor who undertakes relatively large transactions in each security will incur much lower custodian fees per value of transaction than one with the same average daily trading value, but who trades in a greater number of stocks, or has a larger average portfolio (lower AuM—ie, higher trading velocity). To take account of this, Figure 4.8 presents the total cost of trading and post-trading services, including the custodian adjustment, for the following broad range of investor profiles, all representative of trading by institutional investors in Brazil:

– AuM of US$30m, with a turnover of 400% and average order size in each security of US$100,000;[80]
– AuM of US$30m, with a turnover of 400% and average order size in each security of US$500,000;
– AuM of US$30m, with a turnover of 400% and average order size in each security of US$1,000,000;
– AuM of US$60m, with a turnover of 200% and average order size in each security of US$100,000;
– AuM of US$60m, with a turnover of 200% and average order size in each security of US$500,000;
– AuM of US$60m, with a turnover of 200% and average order size in each security of US$1,000,000.

[79] Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, May.
[80] Turnover is measured as total value of annual trading divided by average value of AuM in the year; as such, each side of a trade is counted.

Figure 4.8 Cost of trading and post-trading services including custodians (bp)



Source: Oxera analysis.

The impact of including the custodian fees is to narrow the difference between the cost of trading and post-trading in Brazil and in the UK and in Germany, particularly as the value of the client's order in a particular security falls. Discussions with brokers, investors and custodians in Brazil indicate that, for many institutional investors, orders are at least US$150,000 in value; therefore, the lower estimate of US$100,000 simulated in Figure 4.8 above can be considered conservative.

It is not relevant to include custodian fees for retail investors here because they rarely access custodians directly. Retail investors generally use their brokers as a custodian, and brokers typically charge a bundled fee for trading and post-trading. Table 4.4 presents examples of typical fees charged by retail brokers in Brazil and in the UK. This suggests that retail investors in Brazil and the UK face comparable fees.

Table 4.4 Retail brokerage fees in Brazil and the UK

Retail broker	Fee per trade (US$)
Brazil 1	6.64
Brazil 2	12.88
Brazil 3	10.23
Brazil 4	13.13
Brazil 5	10.73
Brazil 6	16.03
Brazil 7	13.57
Brazil 8	16.29
Brazil 9	34.09
Brazil 10	10.83
Min. of sample from Brazil	**6.64**
Max. of sample from Brazil	**34.09**
Mean of sample from Brazil	**14.44**
UK 1	8.88
UK 2	9.19
UK 3	9.19
UK 4	9.66
UK 5	10.74
UK 6	13.83
UK 7	13.83
UK 8	14.68
UK 9	15.07
UK 10	15.45
UK 11	15.45
UK 12	17.77
UK 13	18.46
UK 14	18.46
UK 15	19.31
UK 16	19.31
UK 17	19.31
UK 18	20.01
Min. of sample from the UK	**8.88**
Max. of sample from the UK	**20.01**
Mean of sample from the UK	**14.92**

Source: www.money.co.uk, a retail brokerage comparison website in the UK.

4.8 Main findings from the sensitivity analysis

Differences in the ways in which infrastructure providers charge for their services mean that, depending on how an investor trades, the relative cost of trading in each financial centre may change. For example, in financial centres where trading fees are per transaction, an investor that executes the same value of trade but over many more transactions may face a higher total cost per value of transaction than in financial centres (such as Brazil) where fees are per value of transaction. To account for this, the results presented in sections 4.3, 4.4 and 4.5 consider four types of investor: a retail investor; a (small) pension fund; a financial institution; and four intermediary channels. This section expands on the analysis to consider how the cost of trading and post-trading varies according to the average trade size, and, within each type of investor, the velocity of trading.

Sensitivity analysis has also been undertaken on the following aspects:

– the netting efficiency in each financial centre;
– the Brazilian exchange rate;
– the exclusion of fail management fees;
– the exclusion of custody fees.

This analysis, presented in Appendix 1, found no significant impact on the results on any of these aspects.

4.8.1 Sensitivity on the fragmentation of trades

The cost of trading in each financial centre can be affected by the extent to which a client's order is broken up into smaller trades. A greater number of smaller trades increases the cost in financial centres with per-transaction charges. However, if the average trading value is held constant, the cost of trading where fees are based on the value of trading (eg, as in Brazil) does not change.

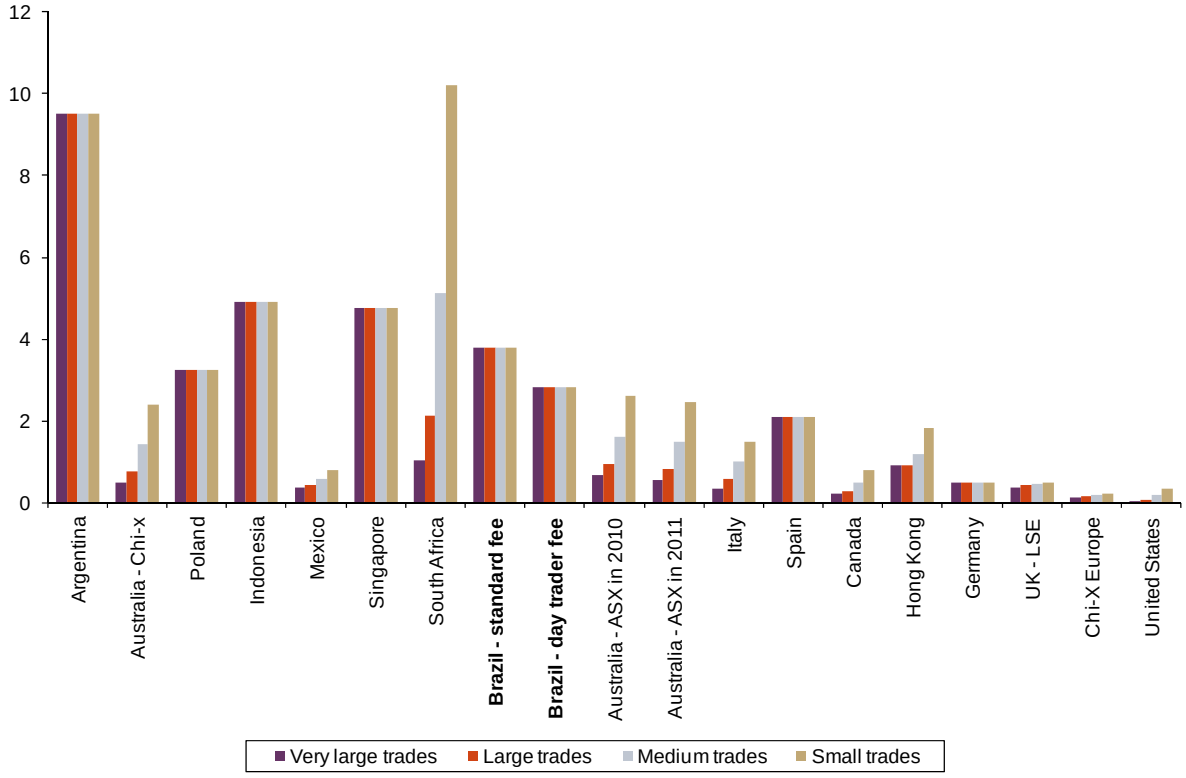
Figure 4.9 presents the variation in the cost of trading and post-trading in each financial centre for a wide range in the fragmentation of a client's order. The average total daily traded value by the intermediary is held constant, as is the average total daily traded value of the end-investor; however, the number and size of trades executed by the intermediary varies. (The assumptions are summarised in Table 4.5 for clarity.)

Table 4.5 Assumptions regarding the user and intermediary profiles for average trade size sensitivity analysis

	Trade size			
	Small	Medium	Large	Very large
Average order size of intermediary trade (US$)	4,033	8,067	24,200	121,000
Average daily number of intermediary transactions	300,000	150,000	50,000	10,000
Average daily value traded by the intermediary (US$)	1,210,000,000	1,210,000,000	1,210,000,000	1,210,000,000
Average daily value of trading by the end-investor (US$)	269,231	269,231	269,231	269,231

Source: Oxera.

Figure 4.9 Variation in total trading costs according to the average trade size (bp)



Source: Oxera analysis.

Figure 4.9 shows that, as expected, in financial centres where infrastructure providers charge per transaction, the cost of trading increases as the average trade size falls and the number of trades increases. The impact is most significant in South Africa and Australia, where a significant charge is applied to the number of pre-netting trades. In the most extreme scenario, in which the broker undertakes 300,000 trades a day, the cost for trading and post-trading in Brazil at the standard fee is 0.4 times the cost in South Africa and 1.6 times that in Australia, compared with 3.8 and 7.3 in the opposite extreme scenario respectively. If the day trader discount is awarded, the cost is comparable.

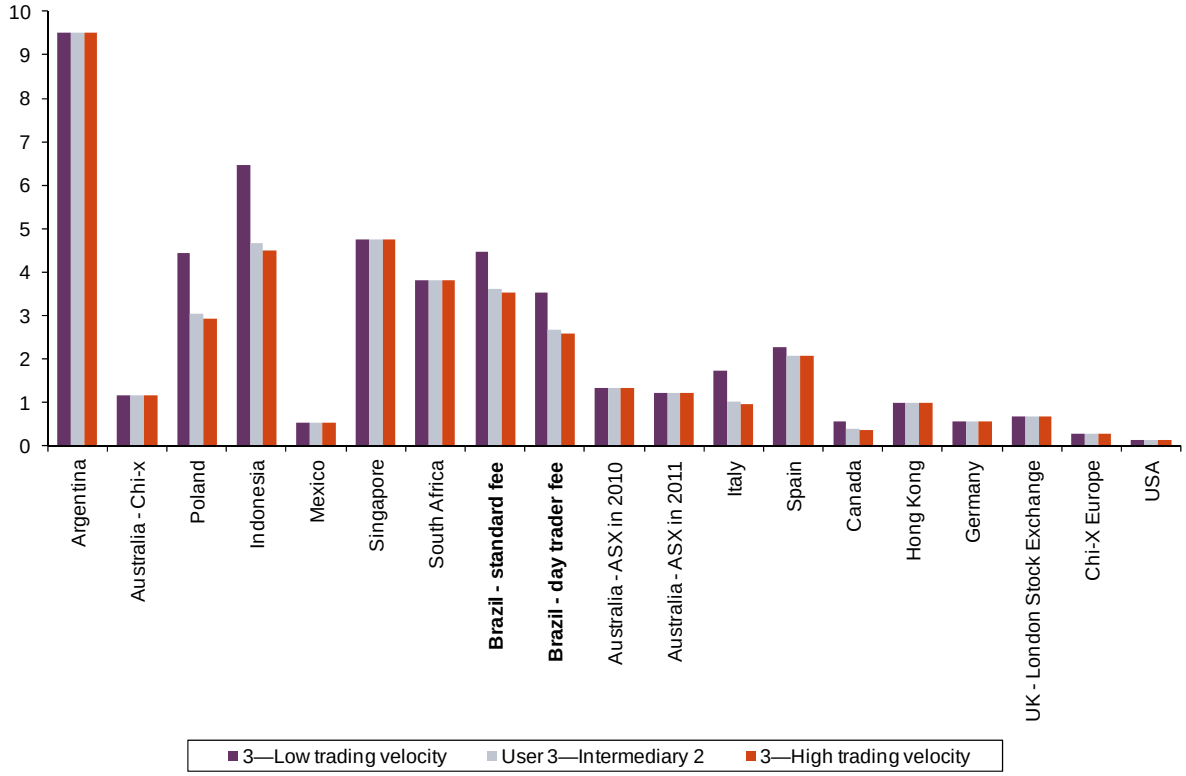
However, in general, the conclusions still hold. Excluding South Africa and Australia (where the sensitivity to the average trade size is driven by changes in the cost of post-trading services only, not trading services), the cost of trading and post-trading in Brazil relative to those in other financial centres is not sensitive to the average trade size.

4.8.2 Sensitivity on the velocity of trading

The cost of trading in each financial centre can be affected by the frequency with which the investor turns over its portfolio—the velocity of trading. Where a financial centre has a relatively high per-transaction fee, but relatively low custody fees, investors with a low velocity of trading will benefit. In the reverse case, those with high velocity of trading will tend to be better off. As a result, the relative costs of different financial centres will vary according to the investors' trading pattern. Figures 4.10 and 4.11 present the total costs of holding and trading expressed in basis points per value of trading, keeping the value of trading constant (ie, varying the total asset holdings as the velocity of trading changes). The velocity of trading is varied from 25% to 500% per annum of the portfolio value. Hence, a low trading velocity implies a larger portfolio. The other characteristics of the user and intermediary are held constant.

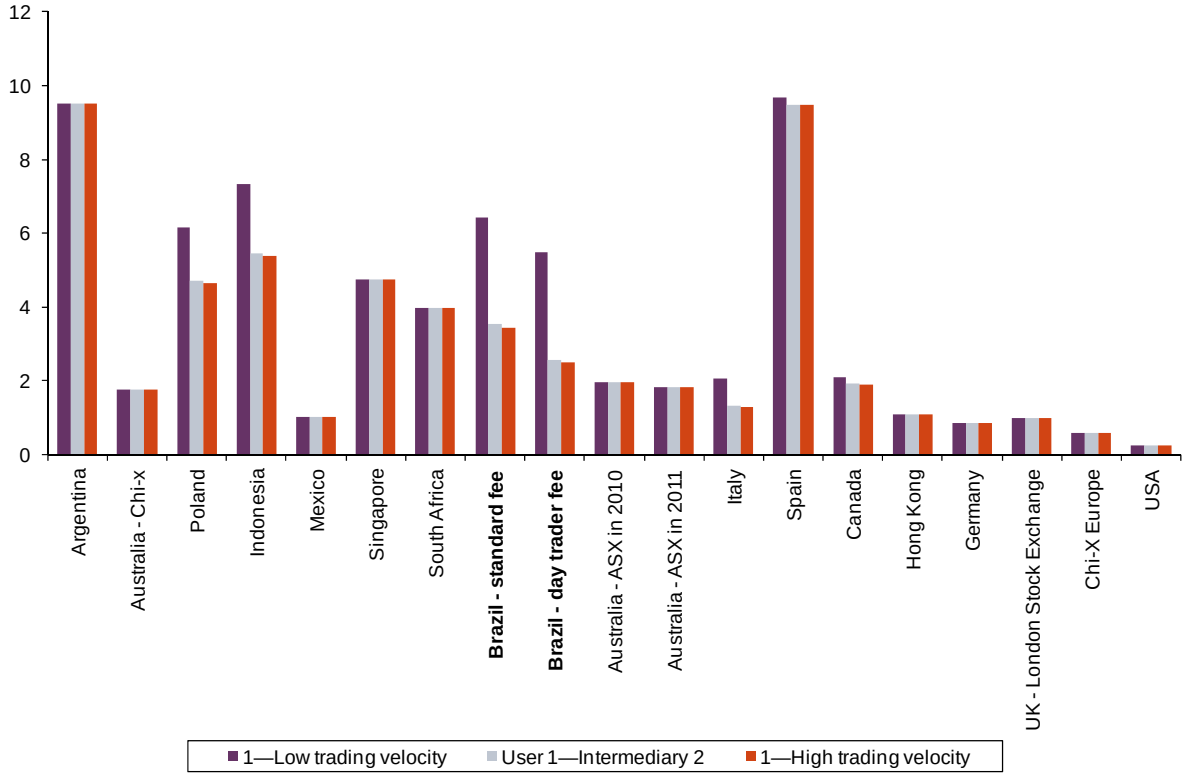
In Figure 4.10 the other characteristics are at the levels consistent with User 3, Intermediary 2, and therefore typical for an institutional investor. In Figure 4.11, the other characteristics are at the levels consistent with User 1, Intermediary 2, a retail investor.

Figure 4.10 Variation in trading and post-trading costs for an institutional investor according to the velocity of trading (bp)



Source: Oxera analysis.

Figure 4.11 Variation in trading and post-trading costs for a retail investor according to the velocity of trading (bp)



Source: Oxera analysis.

Figures 4.10 and Figure 4.11 show that the cost of trading in some financial centres is substantially affected by a change in the investor's velocity of trading, while in other financial centres, the velocity of trading has no impact. This reflects the variation in the use and significance of custody fees between different financial centres. For example, custody fees in Poland, Brazil and Indonesia can be quite significant, while many financial centres do not charge these fees, including the UK and Australia for example.

4.9 Review of cost comparisons published by BM&FBovespa

When introducing the new fee structure in 2011, BM&FBovespa published an analysis undertaken by Rosenblatt Securities comparing the cost of trading and post-trading in Brazil with those in Germany.[81] That analysis adopts a conceptual approach similar to the approach taken in this study. Having designed a profile for investors in Brazil, it applies this to the pricing schedules for trading and post-trading in Brazil and Germany, and includes a fee for custodian services in Germany.

Oxera's review suggests that the Rosenblatt Securities analysis is unlikely to be robust for two main reasons:

– in the Rosenblatt analysis, the total cost of clearing and settlement in Germany is estimated to be US$28.88 per settlement transaction. By comparing to the Clearstream and Eurex pricing schedules, this implies that an uplift of around $25 per settlement transaction has been made to account for services purchased from intermediaries in Germany.[82] This appears large (for example, compared with estimates in Oxera's studies for the European Commission) and is likely to overestimate the costs of post-trading in Germany;

– the Rosenblatt analysis also adjusts the safekeeping fee to account for the additional services provided by CBLC. Again, by comparing to the Clearstream pricing schedule, the uplift for the cost of intermediary services can be estimated, and is calculated to be around 2.5bp per value of securities held.[83] This also appears large and is likely to overestimate the costs of post-trading in Germany.

In discussions with Rosenblatt Securities, it became clear that the clearing and settlement and custodian fees in Germany were estimated using a small sample of global custodians and clearing agents based in the USA, rather than local German custodians. This may explain at least to some extent why the estimated fees look high. By collecting data from global custodians, Rosenblatt may have estimated the fees for cross-border transactions (where the investor and security are not in the same jurisdiction) rather than for domestic transactions. Empirical analysis by Oxera indicates that the costs for cross-border transactions are typically greater than for domestic transactions.[84]

Other reasons why the Rosenblatt analysis is unlikely to be robust include the fact that it does not provide a like-for-like analysis. For example, while custodian fees are included for Germany, the analysis does not include custodian fees in Brazil. To ensure a like-for-like comparison, it is appropriate to include custodian charges both in financial centres where

[81] BM&FBovespa (2011), 'New Fee Structure', August presentation available at http://ri.bmfbovespa.com.br//upload/portal_investidores/pt/informacoes_financeiras/apresentacoes_videoconferencias/Tarifação_versão%20e%20inglês_15.08.11.pdf

[82] Charges for settlement of domestic securities at Clearstream range between €0.02 and €2.25 per transaction (according to the volume of services purchased), and charges applied by Eurex for the CCP clearing of Deutsche Börse transactions range between €0–€0.03 per transaction and 0.05bp–0.1bp per value of transaction. Combining all these fees gives a total settlement fee of around US$3 per settlement transaction; therefore, the implied uplift for additional services provided by intermediaries can be calculated as US$28.88 – c. US$3 = US$25 per transaction.

[83] A safekeeping fee of 5bp per value of securities held is applied to estimate depositary costs in Germany. The headline rate for custody at Clearstream is 2.5bp; therefore, the implied uplift for additional services provided by intermediaries can be calculated as 5bp – 2.5bp = 2.5bp.

[84] Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, May.

omnibus accounts are held and in Brazil. This is because custodian charges in financial centres where omnibus accounts are held are likely to incorporate the cost of other trade-related services that are also provided by custodians in Brazil. Furthermore, in the Rosenblatt analysis, the costs of using custodians is divided by the value of transactions at the trading level, while more accurately it should be divided by the size of the order sent by the investor to the broker, which tends to be greater than the value of transactions at the trading level.

4.10 Implicit costs of trading

The difference between the price at which an investor can expect to trade if buying or selling stocks (the bid–ask spread) is often referred to as an implicit cost of trading. In a market with poor liquidity, there will be fewer sellers available for any given buyer (and vice versa); hence, an investor buying (or selling) stock is more likely to affect the market (and hence the trade price) through its trade order.

The bid–ask spread can also be exacerbated by certain trading strategies, some of which may break trading regulations. 'Front-running', for instance, occurs when a broker takes advantage of knowledge that a large block of shares is about to be traded and therefore expects a price change. For instance, if an investor is seeking to buy a large block of shares in a particular stock, a broker might expect the price to rise and therefore buy the stock before the large trade order is completed. As this results in an even larger proportion of the stock being bought, this can exacerbate the resultant price increase, and thus widen the bid–ask spread.

Data on bid–ask spreads for markets can involve complex calculations and is typically provided by specialist data providers.

As with all indicators of current stock market performance, such data is volatile over time and varies significantly between countries, for a wide variety of reasons including the following:

– the volume of trading varies considerably over time, affecting market liquidity;
– stock price volatility varies considerably over time, depending on confidence in financial markets;
– different markets have different proportions of small and large company stocks, with liquidity tending to be higher (and bid–ask spreads smaller) for the larger companies;
– variations in specific regulations, such as CVM Instruction No. 168 (see section 3) requiring auctions for given trade order sizes;
– differences in trading strategies, including the presence of high-frequency traders.

The limited data available does not indicate that the bid–ask spreads in Brazil are unusual in any way. These spreads appear to be consistent with those in markets in Europe and North America, once the lower levels of trading in the Brazilian market are taken into account.

As discussed in the academic literature in section 5, there is also little evidence to suggest that fragmentation due to the introduction of competition has in practice led to changes in the bid–ask spreads of other markets.

In the CBA (see sections 7–11), the impact on implicit costs as a result of introducing competition is therefore assumed to be neutral.

5 What are key findings from international experience in introducing competition?

International experience in introducing competition into the market for trading and post-trading services provides useful insight into the potential effects increasing introducing competition in Brazil. As set out in the conceptual framework in section 2, the direct implications of introducing competition into this market can be grouped according to the impact on the following:

- the explicit costs and quality of trading and post-trading services provided by infrastructure providers;
- market liquidity and the implicit costs of trading;
- the stability of the trading environment and the associated cost of regulating it;
- the cost of connecting and using multiple trading platforms.

This section gives an overview of the findings in each area, drawing on empirical literature prepared by academics and regulators considering mainly stock markets in Europe and North America, and supplemented by primary analysis and research.

The following conclusions can be drawn.

- **Impact of competition**: entry by alternative trading venues can create competitive pressure and drive cost savings, price reductions and service enhancements by the incumbent. The prices and services provided by the entrant may also be superior to those prevailing in the market. However, entry by alternative trading platforms does not always succeed, and, as in Japan, may not always drive significant efficiencies in the incumbent. Competition may be limited to the more liquid stocks, although its benefits may continue to flow through to the trading of other stocks owing to the use of standard trading costs for all stocks on an exchange.

- **Liquidity**: overall, competition has been found to have a neutral, or beneficial, impact on market liquidity, although this depends on the extent to which liquidity between different trading venues is linked.

- **Market stability**: fragmentation can increase the costs of market supervision. The need to supervise multiple markets may require regulators to enhance their regulatory infrastructure and/or increase the number of market supervision staff.

- **Brokers' costs**: the entry of additional trading platforms may create additional costs in relation to connectivity, IT and staff, among others. Brokers in Europe have been expected to incur additional costs in order to comply with best-execution rules.

Competition has not been the only factor contributing to the observed cost savings and price reductions in international stock markets. Other important factors include decimalisation and technological advance.

5.1 Explicit trading costs and quality of services

Except in the particular case of natural monopoly, economists typically expect prices to be higher in monopolistic markets than where there are multiple, competing suppliers. This is because, in the absence of competitive pressure, monopolists can exert their market power to increase the price charged above the cost, and they have weaker incentives to improve efficiency, innovate and reduce unit costs. The implication is that introducing competition into

monopolistic markets will lead to a reduction in both the cost and price of the products and services provided.

The potential exception is in the particular case of a natural monopoly where there are significant economies of scale. In such markets, these economies of scale are sufficiently high for the cost advantage of a monopolist from supplying all the market to be so large that even if the monopolist is inefficient and charges monopoly prices, these prices are still below the cost of an efficient competitor entering the market and obtaining a 50% market share. Under these conditions competitive entry would not be expected to benefit consumers.

In the past, stock exchanges may have been considered to be natural monopolies owing to the economies of scale that can arise by having a single network of traders. The case for natural monopoly in the provision of security trading services has, however, been substantially weakened by technological change. Indeed, in several international markets, regulators have taken steps to reduce the barriers to competition, in the expectation that competition will bring benefits to the domestic security markets.

The impact of regulatory changes to enhance competition between trading venues in Europe and the USA has been explored in some detail in various studies. The findings from some key papers are reviewed in more detail below—the general conclusion drawn is that the emergence of competition between trading venues has in many cases resulted in fee reductions and technical advances by incumbent exchanges.

For other markets, and for post-trading services such as CCP clearing, existing analysis of the impact of increasing competition is less developed. Regulatory efforts to increase competition in these markets have been less substantial. To supplement the existing analysis available, primary research has been undertaken for this study into the prices offered after the introduction of competition.

5.1.1 Competition between trading venues in the USA

Competition between trading venues is not a new phenomenon in the USA; there have been episodes of competition dating back to 1885. The degree of competition, however, has not remained constant over time. The academic findings in relation to the following four episodes of competition are reviewed here:

- cross-trading of NYSE-listed stocks on the Consolidated Stock Exchange, 1885–1926;
- SEC Order Handling Rules, 1997;
- repeal of NYSE Rule 390 allowing OTC trading of NYSE stocks, 2000;
- dual-listing of stocks on NYSE and NASDAQ, 2004.

Formed in 1884 from the merger of three smaller stock exchanges, the Consolidated Stock Exchange (the Consolidated) originally focused on offering trading in mining and petroleum associated products. Soon after its creation, however, it began to offer trading in more liquid NYSE-listed stocks, thereby competing head to head with the NYSE.

Brown, Mulherin and Weidenmier (2006) estimated the average market share for the Consolidated to be 23% across a 25-year period, reaching as high as 60% in some years (measured as the ratio of the number of Consolidated-traded shares, and of NYSE-listed stocks, to the number of NYSE-traded shares).[85] One way in which the Consolidated attracted trading in NYSE-listed shares was by offering lower commissions. Compared with the standard fixed minimum commission charged by the brokers of the NYSE, of one-eighth

[85] Brown, W.O. Jr., Mulherin, J.H. and Weidenmier, M.D. (2006), 'Competing with the NYSE', NBER Working Paper No. 12343, June, JEL No. G1, G2, N2; and Michie, R.C. (1986), 'The London and New York Stock Exchanges, 1850-1914', *Journal of Economic History*, **46**, pp.171–87.

on trades, the Consolidated charged a commission rate of one-sixteenth.[86] It also offered odd lot trading and earlier trading hours, and allowed a longer settlement period.

In response, the NYSE took measures to limit competition—for example, it mandated that members drop their affiliation with the Consolidated and banned dealing in differences between domestic exchanges.[87] However, neither rule was successfully upheld, and Brown et al. (2006) concluded that it was competitive pressure from the Consolidated that drove the 10% reduction in bid–ask spreads on NYSE-listed stocks traded on both exchanges.

Competition between the Consolidated and the NYSE ended in 1926, when, after a series of investigations, the Consolidated's reputation became irreparably damaged, and it no longer posed a competitive threat to NYSE. Thereafter, the NYSE regained much of its market power. This was potentially threatened by the creation of NASDAQ in 1971, although initially the extent to which NASDAQ imposed competitive pressure on NYSE was potentially very limited, owing to the self-regulatory rules imposed by NYSE (eg, Rule 390). Rule 390 prohibited NYSE member firms from executing any client order flow away from a national securities exchange, and therefore OTC or on NASDAQ, which only became a licensed national exchange in 2006.[88] Over time, Rule 390 was amended to restrict its scope—for example, Exchange Act Rule 19c-3 limited the application of Rule 390 to stocks listed on the NYSE as at April 26th 1979—but it is likely that Rule 390 restricted the degree of competition between NASDAQ and NYSE as well. Indeed, Kam, Panchapagesan and Weaver (2003) show that, after the repeal of NYSE Rule 390 in 2000, quoted spreads on NYSE declined by 18%—three times more than the reduction for stocks exempt from Rule 390—and average depth increased by 10%.[89] The authors conclude that NYSE specialists improved their market quality following the repeal, to remain competitive with trading away from the NYSE.

In 2004, NASDAQ launched a dual-listing programme, allowing companies to list on NASDAQ as well as being traded on the NYSE. Hedge, Lin and Varshey (2011) found that dual-listing increased competition for order flows, driving a reduction in spreads on both markets and an increase in trading volumes.[90] While trading volumes increased on both exchanges, the authors found that the NYSE attracted more trades of a similar size than it did before the introduction of dual-listing, but that the average trade size on NASDAQ increased significantly.

Both NYSE and NASDAQ have faced competitive pressure from alternative trading venues, commonly referred to in the USA as ECNs. These networks are the result of technological advances allowing computer-automated trading, but have presented a significant competitive threat to the NYSE and NASDAQ only since the 1997 SEC Order Handling Rules. These Rules were introduced following a study by Christie and Schultz (1994), which found evidence indicating that NASDAQ dealers may have been colluding.[91] The SEC Order Handling Rules required that public investors be allowed to supply liquidity by placing limit orders—an order to buy or sell a stock at a specific price or better—and thereby compete with NASDAQ market markets. In addition, they required market-makers posting orders on ECNs to make these orders available to the public as well, forcing dealers to provide greater access to ECNs for public investors.

[86] There was a loophole in the NYSE rule, allowing lower commissions for members buying and selling from each other. This discount pertained to all partners of a member firm, and thus is one reason for the growth of large brokerage firms. See Michie (1986), op. cit.
[87] Mulherin, J.H., Netter J.M. and Overdahl, J.A. (1991), 'Prices are property: the organization of financial exchanges from a transaction cost perspective', *Journal of Law and Economics*, **34**:2, pp. 591–644.
[88] SEC (2000), 'NYSE Rulemaking: Order Approving Proposed Rule Change to Rescinding Exchange Rule 390', Release No. 34-42758, May 5th.
[89] Kam, T., Panchagpgesan, V. and Weaver, D. (2003), 'Competition among markets: the repeal of Rule 390', *Journal of Banking and Finance*, **27**:9, pp. 1711–36.
[90] Hedge, S., Lin, H. and Varshney, S. (2011), 'Competitive Stock Markets: evidence from NASDAQ Dual listing', *Financial Analysts Journal*, **66**:1, pp. 77–87.
[91] Christie, W. and Schultz, P. (1994), 'Why do NASDAQ Market makers avoid odd-eighth quotes?', *Journal of Finance*, **XLIX**:5, December.

A number of papers investigating the impact of the SEC Order Handling Rules found that the reforms improved competition between trading venues and resulted in lower spreads. Barclay, Christie, Harris, Kandel and Schultz (1999) found that quoted and effective spreads fell substantially after implementation of the reform,[92] but found an even larger decline in the spread before the reform, and accounted for this as a consequence of the adverse publicity and investigations before the reform. The reduction in spreads on NASDAQ post-SEC reform was also found by Weston (2000) and Fink et al. (2004) to be a direct effect of increased competitive pressure.[93] Fink et al. (2004) found that ECNs offer lower transaction costs than were available on NASDAQ, and that the increase in ECN activity after 1997 was associated with lower spreads and greater market depths for stocks on NASDAQ.

5.1.2 Competition between trading venues in Europe

Before the implementation of MiFID in 2007, competition between trading venues in Europe was weak owing to the 'concentration rule' imposed by many EU members, which restricted trading to the market where the stock had been listed. As such, for many stocks there was no alternative trading venue to the national stock exchange.

The concentration rule was proposed by France, following effective competitive pressure from the London Stock Exchange. In the late 1980s, the London Stock Exchange began to quote the major European-listed stocks, and, by offering faster execution and at lower cost, successfully managed to divert a significant percentage of trades to its exchange.[94] This competitive pressure triggered Bourse de Paris to adopt a more efficient trading system, shifting from a call auction procedure to a faster, quote-driven, electronic trading system.

The relatively recent introduction of MiFID limits the extent of published research into the impact of the Directive on direct trading costs. The analysis presented in Oxera (2009) and Oxera (2011) found that, across Europe, per-transaction charges at trading platforms fell during the period 2006–09.[95]

The Committee of Securities Regulators (CESR) has drawn the preliminary conclusion that MiFID has reduced explicit trading costs at the infrastructure level. For example, in a 2009 report assessing the impact of MIFID, the CESR states:

> Although regulated markets initiated fee reductions prior to MiFID, competitive pressure from new MTFs charging significantly lower fees has led, and IT developments have permitted, incumbent exchanges to further move in that direction over the last twelve months. Some of them recently offered new 'fee packages' especially aimed at members with significant trading volume, acknowledging the key role of algorithmic trading in providing liquidity to the market. As an example, NASDAQ OMX Nordic has decreased fees by 20% on average since January 2008 (noting that, depending on the trading patterns of each member, this fee reduction may vary). Other regulated markets (e.g. Euronext) reconsidered their fee structure on the basis of order execution rather than on the number of partial fills to execute a single order. The revised fee structure aims to take into account the significant lowering of hit size at all regulated markets over the past few months.[96]

[92] Barclay, M., Christie, W., Harris, J., Kandel, E. and Schultz, P. (1999), 'The effects of market reform on the trading costs and depths of NASDAQ stocks', *Journal of Finance*, **54**, 1–34.
[93] Weston, J. (2000), 'Competition on the NASDAQ and the impact of recent market reforms', *Journal of Finance*, **LV**:6. Fink, J., Fink, K.E. and Weston, J.P. (2006), 'Competition on the NASDAQ and the growth of electronic communication networks', *Journal of Banking & Finance*, **30**:9, September, pp. 2537–559.
[94] Goldfinger, C. (2003), 'ISD II Debate about the Trading Venue Diversity: The Tree and the Forest', 13, Eur. Capital Mkt. Inst. Working Paper, available at http://www.ecmi.es/readmore/goldfinger.htm. Coffee, J. (2002), 'Racing towards the top?: The Impact of Cross-Listing and Stock Market Competition on International Corporate Governance', Columbia Law and Economics Working Paper No. 205, May 30th. Pagano, M. (1998), 'The changing microstructure of European Equity Markets', in G. Ferrarini (ed), *The European Securities Markets: The Investment Services Directive and Beyond*, Kluwer Law International.
[95] Oxera (2009), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, July; and Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, May.
[96] CESR (2009), 'Impact of MiFID on equity secondary markets functioning', June 10th.

5.1.3 Post-trading services

There are few examples of where competition has been introduced in the provision of post-trading services.

In the case of settlement, because each security is immobilised in only one CSD, that CSD has an effective monopoly over final settlement. International CSDs (ICSDs) and global custodians may provide foreign investors some choice over which agent to settle international transactions, but currently there are no examples of choice having been introduced at the CSD level.[97]

In the case of CCP clearing services, the 2006 Code of Conduct on Clearing and Settlement in Europe provides one example of where choice has been introduced. A self-regulatory initiative, the Code was signed by all major European exchanges, CCPs and CSDs. With a focus on equity markets, it commits all signatories to implement measures to create the conditions for freedom of choice and more competition between infrastructures on the basis of three building blocks: price transparency, interoperability, and service unbundling. Ultimately, the Code aims at establishing freedom of choice and competition between service providers in all parts of the value chain. Its impact on CCPs has been most significant, however, as the Code has helped to create an environment that allows participants in a particular CCP to access other CCPs through their existing clearing arrangements. The principles set out in the Code do not limit competition to being only between CCPs serving the same exchange; instead, it creates the potential for competition between all existing CCPs, regardless of the exchange for which they provide services.

To date, there has not been much academic research on the impact of introducing CCP clearing choice in Europe, although the UK Department for Business, Innovation and Skills (BIS) (2010) notes that:[98]

> as a result of the Code, clearing fees in Europe have considerably decreased. Several link requests have emanated from or have been directed towards CCPs, although few have actually become operational.

The Oxera (2011) study finds that CCP fees did indeed fall over the 2006–09 period.[99]

BIS (2010) focuses on the risk implications of the different market structures for CCP services, identifying and evaluating four market structures:

– vertical integration: where CCP services are provided by the same corporate group as trading and CSD services;
– horizontal integration: where CCPs expand horizontally to provide services for more than one product type, or geographical market;
– competition between CCPs: where multiple CCPs compete to serve a single exchange, where there is competition between different trading venues using different CCPs, or where CCPs are interoperable such that customers have full freedom of choice at both the trading and the CCP level;
– vertical specialisation: where different combinations of post-trading services are provided by niche service providers, many of which may not be traditional infrastructure providers. This market structure is most relevant for derivative markets.

BIS concludes that there is no evidence to suggest that one market structure is superior to another, in terms of either CCP risk management or wider systemic risk. Instead, BIS notes

[97] Where CSDs have accounts with each other, and where omnibus accounts are used, the settlement in the CSD may reflect the net changes in these omnibus accounts only. As a result, investors may perceive that they are settling outside the CSD in which the security is immobilised, especially if there is no change to the net positions in the omnibus accounts.
[98] Department for Business, Innovation and Skills (2010), 'Market structure developments in the clearing industry: implications for financial stability', Report of the Working Group on Post-trade Services, November.
[99] Oxera (2011), 'Monitoring prices, costs and volumes of trading and post-trading services', report prepared for European Commission DG Internal Market and Services, May.

that many risks occur in several types of structure. For example, risks associated with the interdependency of the CCP and other activities may arise in vertical and horizontal groups, as well as when a market is served by multiple interoperating CCPs.

EuroCCP is one of the new entrants in European CCP clearing. It currently provides clearing services for a number of MTFs in Europe, including Chi-X Europe, BATs Europe, Turquoise, and NYSE Arca Europe. It also has the mandate from NASDAQ OMX Nordic exchanges to provide competitive clearing. In 2008, it compared the cost of clearing at incumbent CCPs across Europe to the charges it levies, by looking at pricing schedules and adopting country-specific user profiles.[100] It concluded that, by switching to EuroCCP, users would save approximately €350m annually in the direct charges they pay. This is based on the estimated average cost of clearing for each financial centre, as presented in Table 5.1.

Table 5.1 Average cost of clearing, per side, 2008

Country	Exchange	CCP	Average clearing cost/side (€)
Austria	Wiener Börse	CCP.A	0.07
Belgium, France, Netherlands, Portugal	NYSE Euronext (Europe)	LCH.Clearnet SA	0.23
Denmark, Finland, Sweden and the Baltic States	NASDAQ OMX	Fortis EMCF (hypothetical)	0.14
Germany	Deutsche Börse	Eurex Clearing AG	0.55
Ireland	Irish Stock Exchange	Eurex Clearing AG	0.32
Italy	Borsa Italiana	CC&G	0.09
Norway	Oslo Børs	Fortis EMCF (hypothetical)	0.14
Switzerland	SWX Group	SIS x-clear	0.20
UK	London Stock Exchange	LCH.Clearnet Ltd.	0.19
Pan-Europe		**EuroCCP**	**0.03**

Source: EuroCCP (2008), 'The Clearing Industry in Europe: Cost Comparison'.

5.1.4 The costs of trading and post-trading services in other markets

Canada, Japan, and, most recently, Australia have also introduced competition in the provision of trading services. Table 5.2 summarises their experiences, with further information provided below.

[100] EuroCCP (2008), 'The Clearing Industry in Europe: Cost Comparison'.

Table 5.2 Summary of recent experiences of introducing competition

	Canada	Australia	Japan
Regulatory change	Regulation allowing ATS to operate alongside exchanges was introduced in 2001, but main entrants emerged from 2009	Allowed ATS to enter and transferred supervision of markets from the incumbent infrastructure provider to the regulator, Australian Securities & Investments Commission (ASIC), in 2009. Main entry occurred in late 2011	Competition between trading venues allowed since 1998 but entry occurs only after 2008
Form of new entry	Dark and lit markets[1]	Dark and lit markets	Dark and lit markets
Arrangement for CCP	Multiple clearing houses allowed to exist. Currently Canada operates ten clearing houses	New entrants were given access to the incumbent CCP, which is vertically integrated with the exchange	New entrants were giving access to the incumbent clearing house a decade after the introduction of competition
Response from incumbent	1) Merger between the two incumbent exchanges 2) Introduced a new electronic trading platform with lower trading fees in 2011 3) Expanded co-location services 4) Extended trading hours	Several pre-emptive decisions were made including: 1) reduction in fees and amendment of rebates 2) launch of a large-order execution service and high-speed system 3) adoption of an Smart Order Routing system 4) creation of a new data centre facility	The incumbent, TSE, managed to maintain its market share until 2010 without reducing its fees significantly. After 2010, when ATS were allowed to use the central clearing house, TSE, introduced its own ATS 'Arrowhead'
Traction of new entrants	Market share of incumbent TSX & TSX Venture is 72.7%, TMX Select captures 1.4%, the rest being other ATS providers (as at February 2012)	99% is accounted for by the incumbent to date, with the remainder accounted for by Chi-X Australia	TSE plus ToSTNet-1 held 95% of market share, with the remaining 5% held by Chi-X Japan and SBI Japannext (as at February 2012)
Lessons to learn	1) Consolidation of data across trading venues was introduced a few years after the regulatory change. This might have led to greater market fragmentation in the first few years 2) Single-stock circuit breakers applied following the 'flash crash' in the USA	Too early to assess. Australia learnt lessons from the experiences in the USA, Europe and other countries where competition had already been introduced. For example, access to the CCP was achieved and introduction of consolidated market tape was a priority	Slow take-up of ATS owing to uncertainty about how regulator would interpret (principles-based) best-execution rules, plus inaccessibility of ATS to clearing house, thereby increasing counterparty risk when traded through ATS

Note: [1] Dark trading refers to trading venues in which either the price or the identity of the trading company is not displayed.
Source: Oxera. The sources for this information are referred to in the main text in this section.

Canada

Before any regulatory change, the primary stock exchanges in Canada were the Toronto Stock Exchange (TSX) and Montreal Exchange (MX), both owned by the TMX Group. TMX Group also owned the TSX Venture Exchange, which was formed as a result of a merger between the Vancouver Stock Exchange and Alberta Stock Exchange. TSX Venture Exchange focused on smaller companies, while TSX and MX focused on larger companies. Since 1982, MX has concentrated on derivatives—primarily options and futures—while TSX has focused on equities. These exchanges were regulated on a regional basis.

Liquidity of stocks was spread across the main transparent stock exchanges, TSX and MX, or in the 'upstairs market': larger blocks of shares were matched by dealers with other client orders, or taken by them on a proprietary basis (they traded with their own proprietary book); thereafter, the trades would be executed on the exchange. Given this structure, some market fragmentation was already present before the introduction of competition.[101]

In 1999, TSX and MX entered a ten-year 'specialisation agreement', whereby TSX would be responsible for the trading of senior equity listings, MX would be responsible for derivatives, and TSX Venture Exchange for junior equity listings. Before the expiry of the agreement, in 2007 TSX and MX announced their intent to merge, which was passed by the Competition Bureau in 2009.[102]

The regulatory change in the exchange market was brought about in 2001 when ATS were allowed to operate alongside other exchanges. Until 2009, less than 5% of the market share was traded away from the incumbent. Since 2009, several ATS (including MATCH Now, Pure Trading, Omega ATS, Chi-X and Alpha ATS) have gained market share, in both the dark and lit markets (see Table 5.3 below).

Following market structure changes, the incumbent adopted several strategies to respond to the increased competition.

1) **Expansion of co-location services (2009)**: co-location involves physically locating the trading systems and algorithms near the exchange's data centre in order to cut significantly the time it takes for orders to reach the exchange and for information from the exchange to reach the trader. This is particularly appealing to high-frequency traders because it helps to reduce the time it takes them to respond to (often very small) changes in market conditions. TMX Group announced the construction of 200 co-location spaces available to traders on TSX, MX and TSX Venture Exchange.[103]

2) **Launch of its own ATS (2010)**: TMX Group announced in 2010 its intention to launch its own ATS, TMX Select, which received regulatory approval in June 2011. The fees at launch were C$0.0002/share for stocks priced C$1 and above, and C$0.0001/share for stocks priced below C$1. TMX claimed that this was significantly different from the market standard at that time, when liquidity providers and seekers were charged differently.[104]

3) **Extended trading hours (2010)**: the incumbent also extended trading hours for all stocks listed on the TSX and TSX Venture Exchange.[105]

As at February 13th 2002, the equities market share measured by turnover of the TSX and TSX Venture exchanges was 72.7%, with the rest coming from ATS. TMX Select captures 1.4% of the ATS market.[106]

[101] Joint Canadian Securities Administrators/Investment Industry Regulatory Organization of Canada (2009), 'Dark Pools, Dark Orders, and Other Developments in Market Structure in Canada', Consultation Paper 23-404, October 2nd, available at http://www.osc.gov.on.ca/documents/en/Securities-Category2/csa_20091002_23-404_consultation-paper.pdf
[102] Competition Bureau Canada (2009), 'Merger of TSX Group Inc. and Bourse de Montréal Inc: Technical Backgrounder', February 29th, available at http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/02993.html
[103] Simon, B. (2009), 'TMX to expand co-location services', *Financial Times*, September 15th, available at http://www.ft.com/cms/s/0/893f8c62-a21b-11de-81a6-00144feabdc0.html#axzz1lus7oYtC.
[104] Reuters (2011), 'TMX Group launches alternative trading platform', July 11th, available at http://www.reuters.com/article/2011/07/11/tmx-select-idUSN1E76A0OT20110711.
[105] Ibid.
[106] FT.com Trading Room.

Table 5.3 Fragmentation of Canadian equity market—percentage of trading in TSX listed stocks, by volume

Volume		Q2 2010	Q42009	Q2 2009	Q4 2008
TSX		**66.85**	**73.41**	**86.61**	**96.52**
Lit markets		**32.06**	**25.70**	**12.53**	**2.91**
	Alpha	23.79	19.24	7.78	0.53
	Chi-X	6.77	4.80	3.04	0.71
	Omega	0.45	0.07	0.09	0.08
	Pure	1.05	1.60	1.63	1.57
Dark markets		**1.10**	**0.88**	**0.86**	**0.57**
	MATCH Now	1.10	0.88	0.86	0.57

Note: Excludes trades in TSX Venture-listed names, debentures, warrants, notes and preferred shares.
Source: ITG (2010), 'Canadian Market Microstructure Review, Second Quarter, 2010', July.

Australia

The primary stock exchange in Australia, the Australian Securities Exchange (ASX), was created in 2006 through a merger between the Australian Stock Exchange (which traded equities) and the Sydney Futures Exchange (which traded equity-linked products). Several venues were operated by ASX, including CentrePoint. Other market participants and third parties operated a number of dark crossing systems.

The regulatory change came about in August 2009 when the Australian government announced that the Australian Securities & Investments Commission (ASIC) would take over market supervision.[107] The government's support in introducing competition was highlighted in a statement of March 31st 2010, along with its approval of Chi-X Australia's licence.[108] Support for the introduction of ATS in the Australian exchange market was noted with the intent to promote innovation and efficiency in the financial markets. It was understood that competition would begin towards the latter half of 2011. Chi-X was eventually launched in October 2011.[109]

The incumbent exchange, ASX, announced several pre-emptive decisions to tackle the expected competition as a result of the announced regulatory change. For example, in a market announcement in June 2010, ASX noted that its new fee and rebate schedule would begin on July 1st 2010. Trade execution fees were cut from 0.28bp to 0.15bp.[110] On- and off-order book crossing fees were also reduced.

In June 2010, ASX launched VolumeMatch, a large order execution service that allowed large orders to be executed with limited market impact.[111] The products offered by ASX were added to with the introduction of PureMatch, a high-speed system targeted at high-frequency traders.[112] In the run-up to competition from ATS, the incumbent enhanced its technological ability by signing a deal with Fidessa to adopt its Smart Order Routing (SOR) system. This

[107] Bowen, C. (2009), 'Reforms to the supervision of Australia's financial markets', August 24th, Joint Media Release with the Hon Wayne Swan Treasurer, available at http://ministers.treasury.gov.au/DisplayDocs.aspx?doc=pressreleases/2009/013.htm&pageID=003&min=ceba&Year=&DocType.
[108] Bowen, C. (2010), 'Government Announces Competition in Financial Markets', March 31st, available at http://www.treasurer.gov.au/DisplayDocs.aspx?doc=pressreleases/2010/032.htm&pageID=003&min=ceba&Year=&DocType=.
[109] Mishkin, S. (2011), 'Chi-X Australia moves to undercut ASX', *Financial Times*, October 11th, available at http://www.ft.com/cms/s/0/a5d1c2d6-f41d-11e0-8694-00144feab49a.html#axzz1lyQusUDl.
[110] ASX (2010), 'ASX Fees and Activity Rebates', Market Announcement, June 3rd, available at http://www.asxgroup.com.au/media/PDFs/20100603_asx_fees_and_rebates.pdf.
[111] ASX (2010), 'VolumeMatch to go live on 28 June 2010', Media Release, June 25th, available at http://www.asxgroup.com.au/media/PDFs/20100625_volumematch_to_go_live_28_june_2010.pdf.
[112] Smith, P. and Grant, J. (2011), 'ASX on the offensive to fend off Chi-X', *Financial Times*, August 15th, available at http://www.ft.com/cms/s/0/59fe8156-c4c9-11e0-9c4d-00144feabdc0.html#axzz1mORJSVWy.

strategy ensures market participants that they will always receive the best price when trading through ASX—orders will be routed to the trading venue where the best price is available.[113]

Lastly, ASX announced the building of a new data centre facility to meet the demand for co-location services. At a cost of A$32m, this new facility is expected to go live in April 2012.[114]

The development of competition in the Australian stock market is still at an early stage, although, importantly, the new entrants—most notably Chi-X—have been given access to the incumbent CCP.

Japan

The Tokyo Stock Exchange was the sole exchange operating in Japan until proprietary trading systems (PTSs) were allowed to operate in 1998. The regulatory change had little impact on the market structure in Japan until a decade later. In 2008, the existing nine PTSs accounted for only about 0.2% of the market, according to Japan's Financial Services Agency.[115]

There were several explanations for why the alternative trading platforms had not made their mark in Japan as they had in other countries. First, the PTSs mainly operated after-hours trading, catering for retail investors. Second, funds were reluctant to be involved in PTSs: a market participant, Punit Mittal, pointed out that 'most pension funds and trust banks have mandated their asset managers and investment advisers to do exchange trades only—for reasons ranging from a lack of understanding about benefits of using alternative execution venues to obscure regulatory requirements.'[116]

Commentators have noted that TSE's trading fees are internationally competitive, which made it harder for PTSs to create space for themselves.[117] Moreover, the PTSs were not given access to JSCC, the Japanese clearing house, implying that any trades through the PTSs bore counterparty risk. An uplift in the activity of ATS was observed after 2009, when JSCC allowed access to its clearing facilities.[118] Chi-X entered Japan in 2010 following its success in western markets. After the creation of these extra regulatory rules, market fragmentation increased, but still remained much lower than the levels seen in Europe and the USA.[119]

In 2010, the incumbent launched Arrowhead, a super-fast system aimed at boosting automated trading.[120] On February 10th 2012, TSE and ToSTNet-1 (owned by TSE) held 95.25% of market share, with the remainder being held between Chi-X Japan and SBI Japannext.

5.2 Liquidity and fragmentation

As described in the conceptual framework set out in section 2, introducing competition into stock markets results in trading fragmentation as new trading venues enter and attract some

[113] Grant, J. (2011), 'ASX in Fidessa smart order router deal', *Financial Times*, July 13th, available at http://www.ft.com/cms/s/0/ab83f700-ad3a-11e0-a24e-00144feabdc0.html#axzz1mORJSVWy.
[114] ASX (2010), 'New Data Centre for ASX', Market Announcement, June 10th, available at http://www.asxgroup.com.au/media/PDFs/20100610_new_data_centre_for_asx.pdf; and Tay, L. (2012), 'New ASX data centre goes live', *ITNews*, February 6th,available at http://www.itnews.com.au/News/289358,new-asx-data-centre-goes-live.aspx.
[115] Whipp, L. (2008), 'TSE tightens its defences as new era of trading looms', *Financial times*, August 29th, available at http://www.ft.com/cms/s/0/45100d2e-7561-11dd-ab30-0000779fd18c.html#axzz1lyQusUDl.
[116] Ibid.
[117] Ibid.
[118] Whipp, L. (2009), 'TSE faces competition as clearing house supports smaller platforms', *Financial times*, October 5th, available at http://www.ft.com/cms/s/0/75ad418c-b15a-11de-b06b-00144feabdc0.html#axzz1mMLmKWrm.
[119] With Chi-X and SBI Japannext increasing their market share from 1% to nearly 2.5% in just five months. See Fidessa FragINSIGHT (2011), 'Analysing the global trading landscape', September, available at http://fragmentation.fidessa.com/wp-content/uploads/FragINSIGHT_September-2011.pdf.
[120] Reuters (2010), 'TSE launches new trading system', January 4th, available at http://www.reuters.com/article/2010/01/04/tse-idUSTOE60309M20100104.

trading from the traditional stock market. However, it is unclear how such fragmentation would affect the costs of trading, which depend on many factors. This important issue has been explored in depth in the academic literature, based on the recent experiences of Europe and North America where competition has been introduced. This section discusses the main findings from this literature and sets out some important lessons for Brazil.

Three types of market fragmentation can arise following the introduction of competition:

- **volume fragmentation**—a security is traded on more than one exchange at any given time;
- **liquidity fragmentation**—orders placed on different trading venues do not interact with each other, or only to a limited extent;
- **data fragmentation**—the pre- and post-trade transaction data across all trading venues is not consolidated.

Volume fragmentation is inevitable as long as new trading venues take away some trading from the traditional stock market. While such fragmentation necessarily implies duplication of infrastructures, the increased competition among trading venues may also lead to greater innovation, which may bring down the direct costs of trading (as explained in section 5.1).

Whether volume fragmentation leads to liquidity fragmentation is less clear-cut, and the empirical evidence on this is somewhat mixed. However, more recent studies that use transaction-level data on individual stocks suggest that volume fragmentation is associated with greater market liquidity and, therefore, lower indirect costs of trading.[121]

Data fragmentation increases the cost of data collection for market participants, impairs price discovery, and reduces market efficiency. However, such fragmentation following the introduction of competition can be prevented if there is sufficient coordination between trading venues, including data consolidation rules and other forms of transparency in the trading process.

Table 5.4 summarises the empirical findings on these three types of fragmentation, followed by a more detailed discussion of each type.

Table 5.4 Summary of the impact of different types of fragmentation

	Impact	Relationship to competition
Volume fragmentation	Duplication of infrastructure May result in barriers for smaller investors to access multiple trading venues Increases requirements for supervision	Duplication of fixed costs can be outweighed by reduction in direct costs due to competition Need to ensure that markets for brokerage services are competitive so that the benefits of competition are being passed through to end-investors
Liquidity fragmentation	Liquidity directly affects the costs of trading Leads to higher searching costs to locate the most beneficial trading venue and higher missed-trading opportunity costs	Latest studies using transaction data for individual stocks show that competition leads to greater global liquidity Problem of liquidity fragmentation can be addressed through interoperability
Data fragmentation	Increases the costs of data collection for market participants Lower data quality may impair price discovery and reduce market efficiency	Data fragmentation is a risk when introducing competition, although this can be mitigated with appropriate data consolidation rules and transparency in other parts of the trading process

Source: Oxera analysis.

[121] For example, O'Hara and Ye (2011), examining a sample of NASDAQ and NYSE stocks between January and June 2008, found that volume fragmentation generally reduces bid–ask spreads, improves execution speeds, and results in more efficient prices. O'Hara, M. and Ye, M. (2011), 'Is market fragmentation harming market quality?', *Journal of Financial Economics*, **100**:3, pp. 459–74.

5.2.1 Volume fragmentation

Fragmentation of trading volume in a security occurs naturally following the introduction of competition, provided that new trading venues enter the market and attract some proportion of the existing order flow.

Replacing a monopolistic exchange with multiple trading venues is likely to result in a duplication of certain costs. For example, the costs of initial set-up and making technology investments would need to be incurred by all trading venues. If the total volume of trading remains the same, replacing a monopolistic exchange with multiple trading venues could also result in a loss of economies of scale. As a result, there may be too many new trading venues entering the market following the introduction of competition, not all of which may capture a sufficient amount of trading to be sustainable in the market. For example, NASDAQ OMX, a pan-European equity MTF that entered the market in October 2008, ceased operating in May 2010 because it failed to meet its targeted scale of operations.[122] In the same year Turquoise, another new entrant, was acquired by the London Stock Exchange after struggling to compete successfully with rival MTFs.[123]

On the other hand, the competition among different trading venues is likely to encourage innovation and cost efficiencies, which could result in lower direct trading costs for investors. Indeed, the empirical evidence presented in section 5.1 suggests that transaction costs in the USA and Europe declined after the introduction and intensification of competition.

From the perspective of the end-users (buy-side investors), the extra costs of investing via multiple trading platforms[124] may make trading directly in the market prohibitively expensive. As a result, they may be forced to rely more on intermediaries such as brokers and/or dealers to carry out their trades. Indeed, Gomber and Pierron (2010) found that market fragmentation appears to have increased the role of broker-dealers in Europe, with only 12% of European buy-side firms continuing to execute their own trades.[125] In contrast, 50% buy-side firms continue to execute their own trades in the USA, where access to data and post-trading services is more harmonised.[126] The consolidation of order flow towards a small group of broker-dealers that can afford the costs to access multiple trading venues may reduce the benefits of competition to the end-investors (as opposed to being captured by the intermediaries.) There are some concerns that cost savings in Europe at the infrastructure level have not been passed through in full to end-investors.[127]

Finally, volume fragmentation may make market monitoring more difficult for regulators. For example, the UK Financial Services Authority (FSA) has commented that it has been a challenge to maintain market quality and integrity in the fragmented post-MiFID environment. Although the FSA requires each trading venue to undertake real-time trade monitoring, it noted that 'however good an entity's monitoring of trading on its own platform, it will not have a full picture of activity of the market as a whole [in a fragmented market].'[128]

5.2.2 Liquidity fragmentation

If order flows to a trading venue are not automatically matched with the best available price across all trading venues, volume fragmentation may also result in intermediaries (or end-investors) incurring higher searching costs to locate the most beneficial venue for a particular

[122] The NASDAQ OMX Group, Inc (2010), 'NASDAQ OMX to Close Its Pan-European Equity MTF NASDAQ OMX Europe', news release, April 28th, available at http://ir.nasdaqomx.com/releasedetail.cfm?ReleaseID=464105.
[123] Jeffs, R. (2010), 'Turquoise acquisition gives LSE the green light for growth', *Financial News*, February 22nd, available at http://www.efinancialnews.com/story/2010-02-22/turquoise-allows-lse-growth.
[124] These include the costs of accessing different platform, potentially limited interoperability between post-trade infrastructures, as well as the additional costs of accessing trade data from multiple venues. For more discussions, see Degryse, H., de Jongy, F. and van Kervel, V. (2011), 'Equity market fragmentation and liquidity: the impact of MiFID', Conference Paper, 1st European Retail Investment Conference, Stuttgart, February 23rd–24th.
[125] Gomber, P. and Pierron, A. (2010), 'MiFID Spirit and Reality of a European Financial Markets Directive', Celent.
[126] The USA has consolidated tape and quote arrangements.
[127] CESR (2009), 'Impact of MiFID on equity secondary markets functioning', June 10th.
[128] See Financial Services Authority (2010), 'The FSA's markets regulatory agenda', May, available at http://www.fsa.gov.uk/pubs/other/markets.pdf.

transaction, as well as missed-trading opportunity costs for end-investors. This is referred to as 'liquidity fragmentation'.

Without interoperability among trading venues, volume fragmentation resulting from trading in multiple venues disaggregates the total liquidity into smaller trading pools, with reduced liquidity in each pool. As successful matching of order flows becomes less likely in each trading venue than is the case where all the orders are concentrated in one trading platform, aggregate demand for trading may also decline after competition is introduced.[129] However, modern technology makes it possible for multiple trading venues to co-exist without causing fragmentation in market liquidity. For example, if a large number of brokers are active on all the trading venues and if the trading environments are sufficiently similar across different trading venues, liquidity on individual trading venue will, in practice, be part of the aggregate liquidity—that is, provided that the different trading platforms are interlinked (directly or indirectly), the externalities of liquidity in a concentrated market can also be realised by a fragmented trading arrangement.[130] Indeed, a recent study found considerable market integration in the FTSE 100 index, with at least two venues quoting the best available price 85% of the time in spring 2010.[131] This suggests that volume fragmentation and liquidity fragmentation are separate, but related, concepts.

Until a few years ago, academic studies focused on the experience of the USA and examined how the appearance of ECNs as an alternative to the incumbent NYSE and NASDAQ exchanges had affected market quality. Degryse (2009) noted that these studies generally find that competition has beneficial effects on market liquidity, efficiency and transaction costs:[132]

> more trading on ECNs leads to tighter bid–ask spreads and greater depth on NASDAQ, (2) ECNs allow for lower transaction costs and this does not stem from attracting only the 'easier' trades, (3) ECNs contribute to price discovery, and (4) ECNs may induce higher adverse selection costs.

Other studies, however, show that fragmentation in a market (such as NASDAQ) can have a detrimental impact on market quality. For example, Bennett and Wei (2006) found that stocks that voluntarily moved from the more fragmented market, NASDAQ, to the more consolidated market, NYSE, benefited from a reduction in transaction costs.[133] However, the authors point out that the stocks examined in their paper are not the most liquid and actively traded securities. This finding highlights that the trade-off between order-flow consolidation and competition among different trading venues crucially depends on the level of liquidity of the individual stocks.

A drawback of the earlier studies (those focusing on the introduction of ECNs in the USA) is that they are often based on data of aggregate variables, and their measures for market liquidity and fragmentation are often imprecise. In contrast, more recent empirical studies seek to address these shortcomings by using transaction-level data from the order book and employ more robust methodologies. They tend to find that the competitive pressures arising with liquidity fragmentation have a positive, or at worst, neutral impact on market quality. For example, O'Hara and Ye (2011) examined a sample of NASDAQ and NYSE stocks between January and June 2008.[134] They found considerable variation in volume fragmentation across stocks and over time. More importantly, they found that volume fragmentation generally reduces bid–ask spreads, improves execution speeds, and results in more efficient

[129] The USA avoids this problem by mandating automatic order re-routing towards the venue with the best price. In contrast, best execution in Europe is evaluated according to various factors, including best price.
[130] Stoll, H. (2006), 'Electronic trading in stock markets', *Journal of Economic Perspectives*, **20**:1, pp. 153–74.
[131] Storkenmaier, A., Wagener, M. and Riordan, R. (2011), 'Public information arrival: Price discovery and liquidity in electronic limit order markets', Conference Paper, Northern Finance Association Conference 2010, Asper School of Business, Winnipeg, September 24th–26th.
[132] Degryse, H. (2009), 'Competition between financial markets in Europe: what can be expected from MiFID?', *Financial Markets and Portfolio Management*, **23**:1, pp. 93–103.
[133] Bennett, P. and Wei, L. (2006), 'Market structure, fragmentation, and market quality', *Journal of Financial Markets*, **9**:1, pp. 49–78.
[134] O'Hara and Ye (2011), op. cit.

prices.[135] Although fragmentation does increase short-term volatility, the authors conclude that it does not harm market quality overall.

In Europe, the introduction of MiFID also provided fertile ground for examining the impact of trading fragmentation on market liquidity.[136] Degryse et al. (2011) looked at the impact of volume fragmentation on liquidity using data on 52 Dutch stocks over the period of 2006–09, differentiating between the effects on local and global liquidity. Global liquidity refers to the total liquidity of a stock aggregated over all the trading venues, while local liquidity represents the liquidity on the traditional trading stock exchange. They found the effect on global liquidity of volume fragmentation in the visible market (as opposed to dark trading) to be generally positive—ie, more fragmentation leads to greater market depth and a lower bid–ask spread.[137] They also found that the increase in liquidity occurs mostly around trading close to the midpoint of the bid and ask prices. Furthermore, they found that trading in large stocks is more fragmented and, in terms of increased market depth and lower spreads, brings greater benefits.

While global liquidity benefits from fragmentation, the authors found the quality at the traditional stock exchange (ie, local liquidity) to be reduced, and therefore concluded that investors without access to *all* liquidity pools in the market are worse off in a fragmented market.

Gresse (2011) used high-frequency data on a sample of stocks listed on the London Stock Exchange and Euronext.[138] Based on a comparison of the pre-MiFID period when there was virtually no fragmentation in the market and the post-MiFID era when there is a high degree of volume fragmentation, Gresse found that both global and local liquidity improved following the introduction of the competition. Moreover, the improvement of market liquidity is greater for larger and more liquid stocks. Lastly, using panel analysis of daily data covering 2009, Gresse found that, even in an already fragmented market, there were still gains to market liquidity from increasing fragmentation, with the exception of small stocks.

In general, these findings are consistent with the premise that volume fragmentation need not reduce market quality for investors with access to all the trading in the market (ie, to the non-fragmented liquidity pool). However, the liquidity conditions can deteriorate for market participants that can access only a subset of the market. That said, the increase in market fragmentation in the USA and Europe over recent years has coincided with several other major changes in the market place. For example, a large number of additional market microstructure reforms were included in MiFID; the market had experienced large volatility in the previous few years, partly due to the global financial crisis, the recent eurozone debt crisis, and the rise of high-frequency trading. Although recent academic studies take significant steps to isolate the impact of these factors, some of the effects attributed to fragmentation by these studies may still be caused by other factors.

5.2.3 Data fragmentation

Market participants need to access and aggregate pre- and post-trade data from different trading venues in order to form an accurate view of the market-wide trading conditions. The fragmentation of information across multiple sources is inevitable as long as new trading venues take away some trading from traditional stock markets. However, it is when consolidating pre- and post-trade transaction data is expensive/time-consuming to assemble, or even not possible, that data fragmentation becomes a problem.

[135] More efficient prices are defined as prices that resemble more closely random walk series.
[136] The most recent relevant studies include Degryse, H., de Jongy, F. and van Kervel, V. (2011), 'Equity market fragmentation and liquidity: the impact of MiFID', Conference Paper, 1st European Retail Investment Conference, Stuttgart, February 23rd–24th; and Gresse, C. (2011), 'Effects of the competition between multiple trading platforms on market liquidity: evidence from the MiFID experience', working paper, August 28th.
[137] The paper also studied the effect on market liquidity of the increased dark trading (ie, trades at dark pools, broker–dealer crossing networks, internalised and OTC) and found that: 'An increase in dark trading of one standard deviation lowers global liquidity by 9%.'
[138] Gresse (2011), op. cit.

Data consolidation becomes impossible when trading fragments to, for example, dark trading venues. Such venues do not disclose the demand or supply of liquidity; as such, concerns have been raised that the emergence of dark trading venues has an adverse effect on the price discovery process.[139] Economic research provides mixed results on the extent to which this concern is justified. For example, Zhu (forthcoming) finds that dark trading can improve the price discovery process,[140] while Ye (forthcoming) finds that dark trading can have an adverse effect.[141] Given current regulation (such as CVM Instruction No. 461) on the development of dark trading pools in Brazil, this potential concern is not relevant to the assessment of the impact of introducing competition within this study.

The cost and time required to consolidate data fragmented across lit markets may increase if/where trading venues bundle the provision of data with other services (and therefore data is provided only at a significant fee) and if/where trading venues adopt different formats and identifiers.

Similar to the additional platform access costs required under a fragmented trading arrangement, the extra costs required to obtain market-wide information about prices and volumes in a market with data fragmentation can be prohibitive for some market participants, especially smaller retail investors or funds. A survey of more than 20,000 Chartered Financial Analyst (CFA) Institute members involved in European equity markets found that over 64% of respondents believed that fragmentation had increased the cost of accessing data.[142]

A potential consequence of data fragmentation is that more order flows are channelled through large brokers because retail/small investors are unable to afford the costs of accessing data from different trading platforms. This may lead to greater concentration in the market for brokerage services. However, there is no evidence to date that this has resulted in higher fees for trading services.

Data fragmentation is not a necessary consequence of allowing multiple trading venues to compete for order flow. For example, in the USA, liberalisation of the market was accompanied by the introduction of a consolidated quote system (pre-trade data) and a consolidated tape (post-trade data), which ensures that data across trading venues is aggregated and disseminated to all market participants.

Currently, the European Commission is engaged in an impact assessment of MiFID and is evaluating policy options to improve the transparency of equity markets. Specific options being considered include reducing data costs by requiring the unbundling of pre- and post-trade data, providing guidance on the reasonable costs of data, and improving the consolidation of post-trade data for equity markets through the establishment of a consolidated tape system operated by one or several commercial providers.[143]

5.3 The cost of regulation

The introduction of competition into the market for trading and post-trading tends to increase the cost of regulation. The changes in regulatory function experienced in Australia and Canada are explored in this section, with a focus on quantifying the incremental costs. At least within these financial centres, the introduction of competition has increased regulatory costs in three ways.

[139] See, for example, International Organization of Securities Commissions (2011), 'Principles for Dark Liquidity: Final report', prepared by Technical Committee of the International Organization of Securities Commissions, May.
[140] Zhu, H. (forthcoming), 'Do dark pools harm price discovery?', available at http://ssrn.com/abstract=1712173 or http://dx.doi.org/10.2139/ssrn.1712173.
[141] Ye, M. (forthcoming), 'A Glimpse into the Dark: Price Formation, Transaction Cost and Market Share of the Crossing Network', available at http://ssrn.com/abstract=1521494 or http://dx.doi.org/10.2139/ssrn.1521494.
[142] See CFA Institute (2009), 'Market Microstructure: The Impact of Fragmentation under the Markets in Financial Instruments Directive', technical report.
[143] See European Commission (2011), 'Commission staff working paper: Impact Assessment', October 20th, available at available at http://ec.europa.eu/internal_market/securities/docs/isd/mifid/SEC_2011_1226_en.pdf.

– As markets fragment, regulatory bodies have generally been required to enhance their market surveillance activities. Competition, and the associated increase in the number of trading venues, has led to a dispersion of trades. In order to maintain an efficient price discovery process, regulators have needed to consolidate information from multiple trading venues. This has led to technological arrangements being upgraded and the hiring and training of staff.

– The introduction of competition also leads to the need to supervise multiple markets, and regulators are required to identify, investigate and take action against any new forms of market misconduct, all of which impose additional costs. In Australia, ASIC enhanced its regulatory infrastructure by upgrading its real-time integrated market surveillance system (IMSS) and increasing the number of its market supervision staff.[144]

– As the number of market participants, trading venues and clearing houses grows, regulators are required to enhance their regulatory framework to oversee the compliance of these firms to the new rules. In certain countries (eg, Australia), competition has been introduced primarily on the trading side, with the incumbent exchange holding the clearing/settlement functions. In other regions (eg, Europe), competition in clearing and settlement is also allowed. This imposes additional costs on the regulator, as the rules for the multiple CCPs must be enforced and monitored.

The move from a single supplier of specific services to multiple suppliers may also require some regulatory functions, or market supervision, to be transferred from the monopolist to the regulator. (See, for example, the example of Australia set out below.) Absent this transfer, something like whole-market supervision would result in one supplier being responsible for regulatory activity relating to its competitor—an outcome that would be likely to be seen as unsatisfactory and could even be perceived as potentially anti-competitive. Where a *transfer* of activities takes place, it may be appropriate to include a reduction in activity (and hence costs) for the entity being regulated, as well as including additional costs for the regulator.

5.3.1 Australia

There have been two significant changes to regulation of the Australian markets. In August 2009, the Australian government announced the transfer of market supervision from each individual market operator to ASIC, which would act as a centralised regulator. Subsequently, the government's support for market competition was announced in March 2010 and implemented in November 2011. The transfer of supervision and the allowance for increased competition were expected to raise ASIC's costs, as the regulatory framework had to be amended to encompass Chi-X Australia's entry into the market. As a result, the government approved that any additional costs would be recovered from the industry through fees imposed on market operators and market participants.

Table 5.5 shows the split of the total estimated costs for the transfer of market supervision to ASIC and the introduction of competition. The total estimated costs arising due to introduction of competition over a period of 3.5 years, from January 1st 2012 to June 30th 2015, is estimated at A$28.2m.[145] In a document published in November 2011, ASIC outlined that the cost-recovery process between January 1st 2012 and June 30th 2013 would involve fees for market operators (ie, infrastructure providers) and market participants. To recover the costs relating to the equity market, they would be charged fixed and activity-based fees, which in turn depend on the number of transactions and the number of messages. Additional costs attributing to the futures market and small financial markets will be recovered from the operators only.

[144] Australian Government Department of the Treasury (2011), 'Proposed financial market supervision cost recovery model', August, Consultation Paper, p. 3.
[145] Ibid, Section 4.1, p. 17.

Table 5.5 Total estimated additional cost for ASIC, January 1st 2012 to June 30th 2015

	2nd half FY 2012	FY 2013	FY 2014	FY 2015	Total
Transfer of supervision (A$m)	4.7	9.9	9.9	9.9	34.4
Introduction of competition (A$m)	6.2	9.0	6.7	6.3	28.2
Total (A$m)	**10.9**	**18.9**	**16.6**	**16.2**	**62.6**
Cost impact as a % of total trade cash market value:					
bp per side of trade	0.0794	0.0687	0.0605	0.0590	–
excluding transfer of supervision functions	0.0449	0.0327	0.0245	0.0230	–

Source: Australian Government Department of the Treasury (2011), 'Proposed financial market supervision cost recovery model', August, Consultation Paper, pp. 17 and 31.

Table 5.6 summarises the total fees charged for the 18 months up to June 30th 2013, of which 23.3% are expected to be collected from market operators, with the remainder collected from the market participants.

Table 5.6 Summary of ASIC's forecast total cost-recovery revenue from the industry, January 1st 2012 to June 30th 2013

Market segment	Group	Fee arrangement	Total cost-recovery revenue (A$m)
Cash equities	Market operators	Fixed fees (ASX and Chi-X)	0.70
		Activity-based fees	3.72
	Market participants	Activity-based fees	22.81
Futures markets	Market operators	Fixed fees	2.31
Small financial markets	Market operators	Fixed fees	0.23
Total			**29.77**

Source: ASIC (2011), 'Market Supervision Cost Recovery Impact Statement', p. 20.

To get a better idea of the significance of these costs, ASIC compares them to the projections of total traded cash market value. Using a conservative assumption of 0% growth in trading value, it can be seen from Table 5.5 that the cost impact is front-loaded, with the highest cost being 0.0794bp per side of transaction in the second half of FY 2012.

5.3.2 Canada

In 2008, the Investment Industry Regulatory Organization of Canada (IIROC) was created as an independent regulator to oversee trading in exchanges and market places, and to undertake market surveillance. A set of Universal Market Integrity Rules (UMIR), introduced prior to the inception of IIROC, consolidated the supervision of all regional exchanges and allowed competition in Canada. These rules have since been reviewed by IIROC.

In a presentation in August 2009, IIROC identified the strategic changes it undertook as a result of changing market conditions.[146] First, it expected an update in its real-time market surveillance programme, with challenges emerging as a result of increased order-to-trade ratios, new market structures, the evolution of alternative markets, and market volume and volatility restraining technology, among other changes. In 2010, it launched its Surveillance Technology Enhancement Platform (STEP), which allows for more effective cross-market

[146] IIROC (2009). 'The new IIROC: CSTA Presentation', August.

surveillance and consolidates different market regulatory data feeds.[147] This technological upgrade led to more effective monitoring during the May 6th 'flash crash'. Second, its Trading Conduct Compliance Program oversees the compliance of trading desks with the UMIR. With increased electronic trading, the launch of new markets and a higher number of accounts with direct access to the markets, this programme faces additional challenges. IIROC also identified that it was developing a new ATS oversight programme.

As a result of the increased complexity in market regulation, a cost-recovery model similar to that in Australia is in place in Canada. Currently, IIROC charges each ATS and each market participant a fixed annual fee, plus an activity-based fee proportional to the share of volume, as defined in UMIR. In FY 2009/10, the total UMIR fees collected amounted to C$23.1m.[148] When compared with the total traded value in the same time period, the impact cost was 0.0625bp per side of transaction.[149]

In 2010, IIROC proposed a new fee model, which was approved in February 2012 for implementation on April 1st 2012. Four principles—fairness, transparency, industry competitiveness, and cost recovery of regulatory services—have guided the Integrated Fee Model, which includes a separate Dealer Fee Regulation Model and a Market Fee Regulation Model.[150]

5.4 Additional costs to brokers

Brokers act as intermediaries by connecting the market participant to the exchange and executing orders on behalf of the client in return for a commission fee. As such, they play an integral part in the trade process. Their business model requires them to incur several costs, covering order-routing systems, connectivity to the exchange, back-office staff, compliance with regulation, and data collection systems. In addition, brokers (or at least those that are clearing agents) incur a cost in relation to their requirement to post collateral with the CCP (also known as a margin requirement).

The introduction of competition is likely to lead to additional costs to brokers as a result of adjustments to internal systems and additional staff, among others. This section describes in detail the reason for the increase in brokers' costs, and estimates what this increase is likely to be, based on international experience.

5.4.1 Additional costs incurred by brokers

The entry of a new exchange into the market and the resulting liquidity fragmentation leads to more choice for the market participant on which venue to execute orders. MiFID in Europe and Regulation National Market System (Reg NMS) in the USA have mandated 'best-execution rules', implying that a broker must be able to prove that its service is giving the client the best-quality execution. Best execution includes a combination of the best price, the cost of sending orders, and the order's effect on market price. In certain scenarios, best execution would involve trading on the new exchange, while in others it would involve trading on the incumbent exchange. As a result, it becomes important for the brokers to connect to these multiple exchanges (either directly or indirectly) in order to be able to access the new trading venues and allow their customer to trade on them. As a result, brokers need some mechanism that consolidates liquidity from the different venues and to develop (or have access to) systems that choose between the two venues and route trades appropriately.

The process of connecting to multiple exchanges and abiding by the best-execution rules leads to several costs to the brokers, which may be divided into connectivity costs and

[147] Wolburgh, S. (2010), 'IIROC's Regulatory Agenda for Canadian Equity Marketplaces', speech to Trade Tech Canada Conference, December 7th.
[148] IIROC (2009), 'Annual report 2009-10', p. 17.
[149] This calculation is based on a total traded value of C$1,845.2 billion yielding 0.125bp for both sides, and therefore 0.0625bp per side.
[150] For more detail, see IIROC (2012), 'Approval of Integrated Fee Mode', February 3rd, available at http://docs.iiroc.ca/DisplayDocument.aspx?DocumentID=BC72EB54474A43A39600E8BD2B0114B0&Language=en

internal costs. Connectivity costs include the telecommunications costs of establishing a connection to the exchange, fees (potentially) charged by the exchange in order to allow a broker to trade on it, including access to their physical wiring, access to market data and membership fees. Internal costs include technological enhancements such as investment in SOR systems and any additional staff required to manage order flow on multiple exchanges.

– **Connectivity costs**: in general, there are two ways in which a broker may connect to the new exchange. The direct method involves registering as a 'trading participant' of the exchange and hence obtaining the rights to trade on behalf of clients directly at the exchange. The indirect method involves connecting to third-party providers that have a connection with the exchange, and using that to execute orders for clients. Using this method, brokers are not required to pay connectivity costs to the exchange, but instead pay a fee to the provider whose connection it uses. However, they may still have to pay membership fees to the exchange. Given the high costs of connecting to the exchange directly, some brokers typically decide to use the indirect route. This results in a fraction of the total brokers incurring the additional connectivity cost. In Australia it was observed that, of the 41 brokers that connected to the incumbent exchange, ASX, only 24 connected to the new exchange, Chi-X Australia.[151] The numbers were even lower in the UK, with 44 out of 401 brokers connecting to BATS Chi-X.[152]

– **Internal costs**: SOR systems have gained importance since the fragmentation of markets, and assist in capturing liquidity for a broker's client and consolidating market data across the various exchanges, giving a clearer view of the market. Orders are routed to the venue where the 'best execution' is expected to be achieved and the liquidity-seeking algorithms are designed to help address challenges of over-execution, missing liquidity, etc. It is observed that these SORs are provided either by technology providers or by larger brokers that build these systems in-house. Given the investment already made in the development of an SOR, leveraging it to another geographical location may be cost-efficient. In relation to staff, additional back-office staff and developers are needed to facilitate the increased market activity and complex systems. This is expected to lead to increased labour costs.

In order to estimate the incremental cost to brokers, data from MiFID's CBA has been extrapolated.[153] The total one-off costs for medium-sized firms, estimated to be £250,000 (US$395,000),[154] cover the adoption of technological upgrades (including SOR systems), one-off staff training costs, and physical connectivity to the new exchange. The ongoing costs include costs relating to continuous staff training and additional headcount, along with membership fees for the new exchange and any annual fees payable to technology providers. LECG (2005) estimated that the ongoing costs are roughly one-tenth of one-off costs, thereby giving an estimate of US$39,500 per annum.[155]

Apart from the connectivity costs and internal costs, brokers may incur additional margin requirement costs if competition is introduced at the post-trading level. Margins are posted as collateral by a broker at the clearing house (CCP). In general, buy and sell positions in the same financial instruments offset each other, leading to a margin offset for brokers. In the presence of multiple CCPs, margin requirements need to be posted to each clearing house according to the separate outstanding position. This may lead to increasing margin requirements by brokers—for example, if a positive net position is prevalent at one CCP and a negative net position at another CCP.

[151] Data available on Chi-X Australia and ASX's websites.
[152] Data available on LSE and BAT Chi-X Europe's websites.
[153] FSA (2006), 'The overall impact of MiFID', November.
[154] An exchange rate of £1 = US$1.58 is used.
[155] LECG (2005), 'MiFID Implementation: Cost Survey of the UK Investment Industry', October 31st, p. 85.

6 What lessons are there for effective regulation?

Stock market regulation covers a broad range of complicated issues, and international experience can provide some useful lessons. This section considers a number of these issues which, in general, either arise as a result of introducing competition, or for which the introduction of competition can have an important effect on the optimal regulatory solution.

The areas considered and overall lessons that can be drawn from international experience can be summarised as follows:

– **data fragmentation**: introducing competition can result in the fragmentation of price information, which can significantly increase costs to investors. In the USA, Europe and Canada, market participants were originally left to consolidate the information themselves. More recently, regulation in these markets has begun to introduce a framework for centralising the consolidation of trading data;

– **extreme price movements**: introducing competition requires careful coordination of regulatory remedies intended to control price volatility, particularly in the case of automated controls such as circuit breakers;

– **best-execution rules**: to ensure effective competition when there are multiple trading venues, these rules generally need to be adapted;

– **high-frequency trading**: introducing competition may increase the prevalence of high-frequency trading and therefore its regulatory focus. As is the case with regulation intended to control extreme price movements, it is important to ensure a coordinated and consistent regulatory approach for high-frequency trading when trading is fragmented;

– **access to services provided by the incumbent**: when introducing competition, the regulator needs to consider whether it is appropriate to intervene to regulate access to the incumbent. For example, when the incumbent CCP or CSD is vertically integrated with the incumbent stock exchange, in the absence of regulatory intervention access to the new entrant may not be provided on terms that are conducive with effective competition. When competition is introduced at the CCP level, the regulator also needs to consider how to regulate interoperability arrangements from a market stability objective.

6.1 Data fragmentation

As noted in section 5.2, introducing competition can result in the fragmentation of price information across trading venues. In this case, market participants could be left to consolidate the information from multiple venues themselves, but, particularly when coupled with the non-standardisation of formats and identifiers, this can be inefficient and relatively expensive for some traders. If price information is not consolidated centrally, inefficiency in price formation and increased discrepancy in prices between venues may arise. As a result, some investors may trade at less advantageous prices because they have incomplete information. For this reason, regulators of financial markets where competition has been introduced have addressed the issue of data fragmentation and sought to encourage consolidated market information. The experiences of Australia, Canada and the USA, outlined below, suggest that best practice requires regulators to monitor the impact of entry into the market on the cost of price discovery and to enforce data consolidation procedures as required.

6.1.1 Australia

In its proposals to introduce competition, ASIC noted its intention to make available a consolidated source of trade information in order to create a 'fair, orderly and transparent market'.[156] Three options to deliver consolidated pre- and post-trade information were proposed, with a preference for the first two: multiple providers approved by ASIC; a single provider established by ASIC tender process; and a government or industry utility.[157]

It was understood that private data vendors might still obtain information directly from the exchanges and provide consolidated information; however, it was considered that having a clear mechanism of consolidation at a reasonable price helps to ensure 'fair and efficient price formation'.[158]

Reflecting the views expressed in the responses to the consultation, ASIC has not mandated a consolidated tape,[159] based on the industry expectation that existing data services can produce the most efficient outcome for users. ASIC has provided additional guidance and recommendations for data consolidators and has stated that it will revisit the issue of a consolidated tape in the future.

6.1.2 Canada

In Canada, although competition has been allowed since 1999, with increased ATS activity from 2008, no single consolidated source of pre- and post-trade information was present. Individual data vendors built their own consolidated feeds. In 2009, the Canadian Standards Association announced that, in order to address information fragmentation, it would grant TSX, the incumbent exchange, a licence (to run from July 2009 to June 2014) to provide the consolidated information.[160] It was expected that this service would benefit users as well as regulators in their surveillance activities.

6.1.3 USA

In the USA, it was identified that events of extreme volatility, such as the flash crash of May 6th 2010, might have been magnified by slow price discovery. Due to multiple trading venues, market participants were unable to process information and make informed trading decisions. As a result, the US Securities and Exchange Commission recognised the importance of regulating data centres, stating its aim to 'identify any unintentional or potentially abusive of manipulative conduct that may cause system delays that inhibit the ability of market participants to engage in a fair and orderly process of price discovery.'[161]

6.1.4 Europe

MiFID II acknowledges that, without regulatory intervention, market forces may not deliver consolidated pre- and post-trade data of sufficient quality. In Europe, most ex post reviews of the impact of MiFID observe that it resulted in considerable fragmentation of data sources and deterioration in the quality of the available data.[162] As a result, many commentators have called for the introduction of a regulatory consolidated tape in European equity markets.[163] MiFID II now incorporates this.

[156] Australian Securities and Investments Commission (2010), 'Australian equity market structure: Proposals', November. Consultation Paper 145, p. 133, para 378.
[157] Ibid.
[158] Ibid., p. 32, Table 5.
[159] ASIC (2011), 'Guidance on ASIC market integrity rules for competition in exchange markets', April, p. 70.
[160] Canadian Standards Association (2009), 'Information Processor for Exchange-Traded Securities other than Options', June 5th, CSA Staff Notice 21-309, available at http://www.osc.gov.on.ca/documents/en/Securities-Category2/csa_20090605_21-309_processor-exchange.pdf.
[161] US Commodity Futures Trading Commission and the US Securities and Exchange Commission (2010), 'Findings Regarding the Market Events of May 6, 2010', September 30th, Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee, p. 8, available at http://www.sec.gov/news/studies/2010/marketevents-report.pdf.
[162] See ECMI-CEPS Task Force, 2011–12, http://www.eurocapitalmarkets.org/taxonomy/term/15. See also Gomber and Pierron (2010), op. cit.
[163] See CFA Institute (2009), op. cit.

As a result of different venues trading the same stock, European regulators believe that it is important to ensure that the data is unbundled to allow users to access the data they want. For example, MiFID II requires that data be unbundled into pre- and post-trade information.

6.2 Extreme price movements

The importance of containing erratic volatility in stock prices was amplified after the flash crash in the USA. As summarised by SEC (2010), the flash crash was initiated by a large order from a mutual fund to sell $4.1 billion of E-Mini S&P 500 futures contracts in order to hedge an existing equity position.[164] The order was executed through automated execution, which targets an execution rate of 9% of turnover, irrespective of the price or time. As a result of increased trading volumes, this execution happened quickly, multiplying trading activity in the market, including that by high-frequency traders. Eventually, the severely reduced price of the futures contract spread across to the individual constituent stocks, and more than 20,000 trades were executed at prices 60% or more away from their values a few minutes previously. By the end of the day, major indices and equities had recovered, to close down 3%.

As set out below, many regulators responded to the flash crash by introducing automated volatility controls such as circuit breakers. Such controls need to be carefully coordinated when trading is fragmented across multiple trading venues. In addition, to the extent that having competing trading venues results in lower trading costs and/or reductions in the latency of executing orders, it may also encourage trading strategies that are more likely to generate extreme price movements. If this is the case, regulation that is effective in controlling extreme price movements may become more necessary after the introduction of competition.

6.2.1 Australia

ASIC has proposed several new rules and expanded on existing controls to limit extreme price movements and prevent trades from occurring outside a specified price band. These proposals include a range of measures, from market participant-level controls to automated trading controls and halts imposed by the trading venues, as set out in Figure 6.1 below. More detail on the automated volatility controls proposed is provided below the figure, but, most importantly from the perspective of this study, both ASX and Chi-X have sought to put these automated controls in place.[165]

[164] US Commodity Futures Trading Commission and the US Securities and Exchange Commission (2010), op. cit.
[165] Australian Securities & Investments Commission (2011), 'Market supervision update', Issue 13, August, available at http://www.asic.gov.au/asic/asic.nsf/byheadline/ASIC-Market-Supervision-Update-issue-13?openDocument. Chi-X Australia (2011), 'Market Operations Notice', July 29th, available at http://www.chi-x.com/resources/au/Market%20Operations%20Notice%200002-11.pdf.

Figure 6.1 Current controls of extreme price movements

Source: Australian Securities & Investments Commission (2011), 'Australian equity market structure: Further proposals', Consultation Paper 168, October, Figure 2.

Automated volatility controls can take several forms, as summarised in Table 6.1. After a comprehensive review of the advantages and disadvantages of a 'limit up-limit down' approach versus a circuit breaker, ASIC concluded that the former was preferable for Australia since it 'enables trading to continue during the limit state', and is therefore less disruptive.[166]

Table 6.1 Types of volatility control

Type of volatility control	Common automated volatility
Collars	Collars typically set price limits at which a 'limit down' is triggered, whereby the securities can trade only at or above that level for a period of time. Collars can limit the disruptive effect of anomalous trades. CME's collar operates for ten minutes and, if the futures contract is still trading down after this period, there is a two-minute halt and then it is free to trade until the next limit down
Go-slow mechanisms	Go-slow mechanisms, such as NYSE's Liquidity Replenishment Points, trigger manual auctions in place of automated trading when particular securities suffer extreme price declines
Circuit breakers	Circuit breakers, such as the single stock circuit breaker rules in the USA, halt trading in particular securities for a specified period when the price of the securities varies outside a predetermined range of volatility. This is designed to give markets the opportunity to attract new trading interest or liquidity in a stock, establish a reasonable market price, and resume trading in a fair and orderly fashion

Source: Australian Securities & Investments Commission (2010), 'Australian equity market structure: Report 215', Consultation Paper 145, November, Table 8.

[166] Australian Securities & Investments Commission (2011), 'Australian equity market structure: Further proposals', Consultation Paper 168, p. 65, para 169.

6.2.2 USA

In response to the flash crash, the US Securities and Exchange Commission and the Financial Industry Regulatory Authority agreed to run a circuit breaker pilot programme, wherein trading in a security across ***all*** US markets would be paused for five minutes if its price changes by more than 10% in the preceding five minutes. A circuit breaker would allow market participants to reassess their trading strategies and adjust algorithms before resuming normal market functioning.[167]

Since the introduction of the single stock circuit breaker programme, Financial Industry Regulatory Authority has submitted a proposal to the Securities and Exchange Commission to adopt a limit up/limit down approach, which would allow a stock to trade within a specified range/band of price determined by its current price. As the price moves outside this band, trading is paused and eventually halted if no trading occurs for 15 seconds. If approved, this would replace the single stock circuit breaker programme. The Securities and Exchange Commission had not approved this methodology as at the time of writing.

6.2.3 Canada

IIROC and the Canadian Standards Association have also introduced mechanisms to mitigate extreme price movements. In a public notice in February 2012, IIROC confirmed its intention to operate single stock circuit breakers to halt trading in the absence of a 'fair and orderly market'.[168] The circuit breaker is activated if there is a price change of at least 10% in a five-minute period. The initial halt is for five minutes, which may be extended for another five minutes.[169] A 'multi-tiered approach to controlling short term, unexplained price volatility' is proposed. As a last resort, ***market-wide*** circuit breakers are imposed.[170]

6.2.4 Europe

MiFID II deals with dampening excessive price movements by the introduction of circuit breakers, systems resilience and regulations on electronic trading. As per its consultation document, the European Commission has set out a few main points that it will adopt, including:

- to ensure that trading systems of regulated markets are resilient and have adequate capacity;
- to set out conditions under which trading should be halted if there is a significant price movement in a financial instrument on that market or a related market during a short period;
- to set out the maximum and minimum ratios of unexecuted orders to transactions that may be adopted by regulated markets, and minimum tick sizes that should be adopted;
- to establish controls concerning direct electronic access;
- to ensure that co-location services and fee structures are fair and non-discriminatory.[171]

In relation to the coordination of automated rules between trading platforms trading the same instruments, the European Commission recognises the risk and states that it is necessary to formalise and further harmonise the processes, should one trading venue decide to suspend or remove a financial instrument from trading.[172]

[167] US Securities and Exchange Commission (2011), 'SEC to Publish for Public Comment Updated Market-Wide Circuit Breaker Proposals to Address Extraordinary Market Volatility', news release, September 27th, available at http://www.sec.gov/news/press/2011/2011-190.htm.
[168] Investment Industry Regulatory Organization of Canada (2012), 'Rules Notice Guidance Note: Guidance Respecting the Implementation of Single-Stock Circuit Breakers', February 2nd, available at http://docs.iiroc.ca/DisplayDocument.aspx?DocumentID=7CF90CCE57AE4760822A46B1525E2051&Language=en.
[169] Ibid.
[170] The first set of controls is at the participant level, the second at the marketplace level, the third are the single stock circuit breakers, and the fourth the market-wide circuit breakers.
[171] European Commission (2011), 'Proposal for a Directive of the European Parliament and of the Council: on markets in financial instruments repealing Directive 2004/39/EC of the European Parliament and of the Council', October 20th, p. 116, Article 51, available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0656:FIN:EN:PDF.
[172] European Commission (2011), 'Proposal for a Directive of the European Parliament and of the Council: on markets in financial instruments repealing Directive 2004/39/EC of the European Parliament and of the Council', October 20th, p. 50.

6.3 Best-execution rules

Within a single stock exchange, rules on how brokers should execute trades for investors—best-execution rules—tend to be straightforward, as there is only one choice of trading venue. With multiple venues, however, these rules become more complex and there is an increased requirement for the regulator to monitor brokers' compliance with them.

Best-execution rules with multiple exchanges typically require brokers to have access to all the exchanges that would be appropriate for the trading activities of their clients, so that they can offer their clients the best price available, irrespective of the trading venue within which that counterparty is available. For small brokers, however, as the infrastructure and communication costs of trading on new platforms can be significant, it may be appropriate to phase in requirements for best execution during the introduction of competition. This was the policy in Australia, where ASIC delayed the introduction of the requirement for brokers to trade on the new platforms.

6.4 High-frequency trading

Increased competition among trading venues, or even just the threat of competition, can encourage trading venues to innovate in terms of speed of trading and the range of services in order to attract new types of trading, such as high-frequency trading. Recent experience in Australia and a number of European countries (see section 5) has shown that incumbent exchanges have developed their technological processes to maintain market share in response to the threat of competition. New entrants, primarily ATS, bring innovative data and trading methods, which overall enhances the speed with which orders are processed in the markets.

In addition, multiple venues trading the same securities may create the opportunity for additional high-frequency trading strategies. For example, if market participants move quickly enough, they may be able to make a profit from arbitrage over any arising price differences, for a security, between the venues. Moreover, many other high-frequency trading strategies will still be available even where there is only one trading venue for a specific security (for example, statistical arbitrage, arbitrage between underlying securities and their derivatives, and trading strategies based on (short-term) predicted price movements). As a result, competition between trading venues is unlikely to determine the ability of high-frequency trading techniques to be used successfully in a particular capital market.

There has been considerable academic and regulatory research into the impact of high-frequency trading on financial markets. For example, the International Organization of Securities Commissions (IOSCO) has developed eight principles for direct electronic access to markets and a consultation report on market integrity and efficiency.[173] High-frequency trading can bring benefits such as reduced spreads, but regulators also recognise that it can create new risks.

The optimal approach to the regulation of high-frequency trading in response to the introduction of competition has yet to be determined. However, it seems clear that regulators need to monitor new developments as they emerge in response to multiple trading platforms. Regulators need to be aware of developments in other markets that could shift to the domestic market and the new types of investor and trading strategies that could develop.

Some more specific regulatory actions introduced in Australia, Canada and Europe are discussed below.

[173] OICU-IOSCO (2010), 'Principles for Direct Electronic Access to Markets', final report, August, available at http://www.iosco.org/library/pubdocs/pdf/IOSCOPD332.pdf; and OICU-IOSCO (2011), 'Regulatory Issues Raised by the Impact of Technological Changes on Market Integrity and Efficiency', consultation report, July, available at http://markets.theasianbanker.com/assets/media/dl/whitepaper/IOSCO.pdf.

6.4.1 Australia

Before the introduction of competition, a set of rules was already in place to deal with high-frequency trading activity in Australia. The Competition Market Integrity Rules add two aspects: controls on order entry, to avoid anomalous orders entering the order book; and harmonised tick sizes across markets.[174] Also proposed alongside these are testing of systems, direct and immediate control over market participant trading messages, minimum standards for relationships between market participants and direct electronic access clients, and management of capacity requirements.[175]

6.4.2 Canada

Canada has also issued a notice including provisions that govern electronic trading by market participants and clients. The rules focus on ensuring that the risks associated with electronic trading are managed sufficiently. Market participants must have proper risk management and supervisory controls, undertake due diligence of their clients, monitor all order flows, have a good understanding of the automated order systems, and test the systems.[176]

6.4.3 Europe

In the MiFID II proposals, the European Commission has included rules surrounding algorithmic trading (including high-frequency trading), set out below.[177] The first applies to the investment firm that engages in the algorithmic trading, and relates to the resilience of systems in place; the others relate to rules for market operators.

> 1) A series of new specific organisational requirements for market participants would be introduced with the possibility of further specification in implementing acts on each of the issues below:
>
> - authorised firms involved in automated trading would have in place robust risk controls to mitigate potential trading system errors;
> - firms involved in automated trading would notify their competent authority of the computer algorithm(s) they employ, including an explanation of its design, purpose and functioning;
> - firms who provide 'sponsored access' to automated traders would have in place robust risk controls and filters to detect errors or attempts to misuse facilities;
> - operators of trading venues would have in place proper risk controls and arrangements to mitigate the risk of errors generated by automated trading leading to disorderly trading (e.g. circuit breakers) or the breakdown of their trading systems (e.g. by stress testing to ensure resilience);
> - operators of trading venues would give equal and fair access to market participants to co-location services.
>
> 2) Implementing measures could further specify minimum tick sizes;
>
> 3) Market operators would be required to ensure that if a high frequency trader executes significant numbers of trades in financial instruments on the market then it would continue providing liquidity in that financial instrument on an ongoing basis subject to similar conditions that apply to market-makers; and
>
> 4) Market operators would be required to ensure that orders would rest on an order book for a minimum period before being cancelled. Alternatively they would be required to ensure that the ratio of orders to transactions executed by any given participant

[174] Australian Securities & Investments Commission (2011), 'Background Paper: ASIC'S Regulatory Framework on Competition in Exchange Markets', April 29th, available at http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/11-87MR-backgrounder.pdf/$file/11-87MR-backgrounder.pdf.

[175] For more detail, see Australian Securities & Investments Commission (2011), 'Australian equity market structure: Further proposals', Consultation Paper 168, Section C.

[176] Ontario Securities Commission (2011), 'Notice of proposed National Instrument 23-103 Electronic Trading and Direct Electronic Access to Marketplace', Chapter 6, April 8th, available at http://www.osc.gov.on.ca/documents/en/Securities-Category2/ni_20110408_23-103_pro-electronic-trading.pdf.

[177] European Commission (2010), 'Public Consultation: Review of the Markets in Financial Instruments Directive (MiFID)', Consultation Document, December 8th. European Commission (2011), 'Proposal for a Directive of the European Parliament and of the Council on markets in financial instruments repealing Directive 2004/39/EC of the European Parliament and the Council', European Commission, October 20th.

would not exceed a specified level. In either case, further specification would be needed on the specific period or level.

6.5 Access to the incumbent infrastructure

When introducing competition the regulator needs to consider whether it is appropriate to regulate access to services provided by the incumbent—ie, CCP clearing services and/or CSD services. In some situations, regulation has been justified on competition or market stability grounds.

If competition occurs at the trading platform level only—ie, a new CCP does not enter the market—in order to provide a comparable offering to the incumbent, the new entrant will need to be able to pass on their trades to the incumbent CCP. When the incumbent CCP is vertically integrated with the incumbent stock exchange, the incumbent may not provide access on terms that can result in effective competition. For example, the incumbent may charge a higher CCP clearing fee for trades executed on the new exchange than for trades executed on the incumbent exchange. Such price discrimination could prevent an equally efficient (or, if the price differential is large enough, a more efficient) trading venue from being able to offer a competitive offering. Alternatively, the incumbent may impose an excessive fixed access fee on the incumbent in return for the CCP clearing its trades. Similarly, the incumbent may not provide access to CSD services on fair, non-discriminatory terms.

These are all examples of margin squeeze and, if observed in the EU, they would fall into the category of an exclusionary abuse under Article 102 of the Treaty on the Functioning of the European Union (TfEU), and would be likely to result in an investigation by the European Commission or a national EU competition authority.

In Australia, ASX provided access to Chi-X Australia without any apparent explicit regulatory intervention. However, it is notable that Chi-X Australia has publicly supported LCH.Clearnet's application for a licence to trade in Australia, and, should the application be successful, expects to see lower CCP clearing fees for Chi-X Australia's clients.[178]

In Japan, the incumbent CCP did not give access to the ATS until a decade after competition was introduced. This may have contributed to the lack of traction that the new ATS achieved. In 2008, ten years after competition in trading was allowed, the existing nine ATS accounted for only about 0.2% of the market.[179]

When competition is introduced at the CCP and trading level, the regulator may still need to consider regulating access to the incumbent CCP. The new CCP may request access to the incumbent CCP in order to provide margin offsets to its users. In this case, the reasons the regulator may wish to regulate access are related not just to competition (ie, whether access is provided on terms that facilitate competition between the CCPs and/or trading platforms), but also market stability concerns.

In Europe, there appears to have been some shift in the regulatory view in relation to interoperability. For example, in October 2009 the regulators of EuroCCP and LCH.Clearnet (the FSA), the regulators of SIX x-clear (FINMA and the Swiss National Bank) and the regulators of EMCF (AFM and the Dutch National Bank) released a joint statement, advising these CCPs to suspend work on interoperability pending their review of the inter-CCP risk management arrangements. However, during the course of 2010, progress in implementing interoperability began, and, in December 2010, the FSA advised EuroCCP that the aforementioned regulators approved the proposed inter-CCP risk management arrangements. During the course of 2011 and 2012, BATS Europe, Chi-X and Turquoise facilitated interoperability and competitive clearing arrangements for their traders.

[178] Henshaw. C. (2012), 'Interview: Chi-X Chief Supports LCH Clearnet's Australian Ambitions', May 10th, written for *Wall Street Journal*, available at http://online.wsj.com/article/BT-CO-20120510-726456.html
[179] Whipp (2008), op. cit.

7 Cost–benefit analysis

Cost–benefit analysis (CBA) is a systematic process for calculating and comparing the costs and benefits of a particular state of the world with the status quo. It provides a conceptual framework in which estimates of the costs and benefits—including both quantitative and qualitative estimates—can be compared in terms of their magnitudes, different effects, and impacts on different stakeholders.

In this study a CBA is undertaken to evaluate the potential costs and benefits for producers and consumers of a number of different potential market outcomes and structures—ie, market structures that allow for competition in trading and post-trading at the infrastructure level.

There is usually considerable uncertainty surrounding the potential costs and benefits of a change in a market structure, such as from the introduction of more competition, but CBA provides a helpful and commonly used framework for considering the often highly uncertain estimates of impacts. This section explains the approach to CBA. Sections 8 to 11 set out in detail the assumptions and results of the CBA, while section 12 discusses the implications of the different market structures for the regulator.

7.1 Conceptual approach

The approach to CBA used in this study is consistent with standard practice adopted by regulators around the world, and can be broken down into a number of steps.

1. Identify the scenarios for the affected markets to be compared in the analysis—in this case, this includes a 'baseline' scenario reflecting the status quo and two 'counterfactual' scenarios for increased competition in the market for trading and post-trading services.

2. Select a suitable timeframe for the CBA.

3. Identify the affected stakeholders to be considered in the analysis.

4. Define the dimensions of cost and benefit for analysis—in this case, these include direct costs, implicit costs, transparency, etc.

5. Develop detailed methodologies and assumptions for each element of the CBA, identifying where results will be quantitative or qualitative in nature.

6. Estimate quantitative values for the dimensions of identified costs and benefits where possible.

7. Where direct quantification is not possible, provide a more qualitative ordering of relative magnitudes (consistent with a standard CBA approach).

8. Bring together the estimates of the costs and benefits to give an overall assessment of the impact—in this case, of increasing competition.

The baseline and counterfactual scenarios are described in section 7.2 below.

The timeframe chosen for the CBA in this study is the current period in steady state. This means that the baseline scenario (the status quo) is the current state of the market in Brazil,

while the counterfactual scenarios consider what the Brazilian stock market might look like now if additional competition had been introduced in the past.

Basing the analysis on the current state of the market in Brazil avoids the inevitable uncertainty associated with forecasting growth in any market. Continued growth in the Brazilian financial market would increase the benefits accruing to investors from cost savings arising from the introduction of competition and the revenue that the new entrant could expect to secure.

As the analysis is conducted for the steady state, it does not consider how the introduction of competition affects the market in the short term, but rather in the medium to long term. For the purposes of this study, this means that the market is considered as though competition had been introduced around 3 to 5 years ago.[180] This is why the alternative scenarios are 'counterfactual'.

There are many potentially affected stakeholders, but, for the purposes of this study, the focus is on three main categories:

– the investors and intermediaries that use the market for trading and post-trading services, which in this context are the 'consumers' of the services;
– the infrastructure providers that provide the trading and post-trading services, which in this context include Bovespa and new entrants;
– the wider economy, including the regulator and companies seeking to raise funds through the capital market.

It is important to note that the purpose of this analysis is to help inform what could be the potential implications under different scenarios of entry. There are many uncertainties associated with modelling potential forms of entry and its implications, and this study takes the approach of using information from experiences in other international markets, as well as the market evidence from Brazil, to draw potential insights into the effects on producers and consumers of trading and post-trading services.

The dimensions of the CBA were first described in section 2, and are explored in more detail in sections 8 to 10 below, which set out the key assumptions and methodologies used for each category of cost and benefit. In summary, they include the following.

– The impact on the demand side (section 8):
    – the direct costs of trading and post-trading (ie, prices charged for the provision of these services);
    – additional costs to brokers using additional exchanges;
    – the implicit costs of trading;
    – changes in the volume of trading due to changes in the cost of trading and post-trading.
– The impact on the supply side (section 9):
    – changes in revenues for producers (ie, infrastructure providers);
    – changes in costs for producers (ie, infrastructure providers).
– the impact on the wider economy (section 10):
    – the cost of regulation;
    – the impact on the cost of capital;
    – the impact on market stability.

[180] Following conversations with infrastructure providers, a period of 3–5 years was chosen because this was broadly consistent with the timeframe within which a new entrant would expect to be able to become fully set up in a new market.

7.2 Counterfactual scenarios for the competitive environment

The CBA approach is based on comparing counterfactual scenarios with the baseline scenario. These scenarios are defined as follows.

7.2.1 The baseline scenario

The baseline scenario represents the status quo—the state of the world that can be expected if there were no further increase in competition in the market for trading and post-trading services in Brazil. As the timeline for the analysis is the current timeframe, the baseline scenario is the current state of the world for the Brazilian market for trading and post-trading services.

7.2.2 Counterfactual scenario 1: entry of a new trading platform only

The first counterfactual scenario considers the situation where a single ATS decides to enter the Brazilian market, choosing to rely on the CCP and CSD services of the incumbent.

In this scenario, the incumbent is assumed to charge the same fees for settlement and other post-trading services as it currently charges, without any alteration to reflect the provision of services to trades carried out on another trading platform. As such, in this scenario increased competition affects the price of trading only, not post-trading.

The incumbent is assumed to respond by changing its price for trading services. Such changes are also assumed to have an impact on the quantity of trading, which has further implications. There would be additional costs for brokers that use the new trading platform (eg, additional connectivity and back-office costs) and for the regulator (eg, in terms of market supervision). Providing the new entrant access to the CCP and CSD services of CBLC is expected to create additional costs to the incumbent. This analysis assumes that the incumbent recovers these costs from the new entrant through an access charge, in a similar way as is done in Australia.

7.2.3 Counterfactual scenario 2: entry of a trading platform and CCP

The second counterfactual scenario considers the situation where a single alternative trading platform enters the Brazilian market with a new CCP. The new entrant can therefore provide both trading and post-trading services independently of Bovespa, and there is an increase in competition for both. The new trading platform and the new CCP may be provided by the same corporate entity or by different companies, but competition is assumed to be between the two 'vertical silos'—ie, the new CCP is assumed not to have access to offer clearing services for trades executed on Bovespa; similarly, CBLC is assumed not to have access to the new trading platform, to provide clearing here.

The incumbent is assumed to respond by changing its price for both trading and post-trading services. Such changes are also assumed to have an impact on the quantity of trading, which has further implications. There would be increased costs for brokers that use the new trading platform (and CCP) and for the regulator, which in both cases would be likely to be greater in counterfactual scenario 2 than in counterfactual scenario 1 owing to the complexity of using multiple CCPs.

In sections 8 to 10, the costs and benefits for the stakeholders are examined in detail, before being summarised in section 11.

7.2.4 Range of estimates

Under each of the entry scenarios described above, a range of parameters is considered, reflecting the international variation in the impact from introducing competition. The parameters have been grouped into three categories:

– conservative—this scenario considers parameters that will lead to a conservative, overall estimate of the benefit of introducing competition. For example, the reduction in charges by Bovespa and the market share of the new entrant is smaller in this scenario

than in the others; while estimates of the costs to brokers and the new entrant in implementing competition (eg, the fixed costs of providing trading services) are higher;

– central—this scenario considers the impact on competition under the best point estimates of each parameter;

– high—this scenario considers parameters that will lead to a high, overall estimate of the benefit of introducing competition. For example, the reduction in Bovespa's charges and the market share of the new entrant is highest in this scenario, while estimates of the costs to brokers and the new entrant in implementing competition (eg, the fixed costs of providing trading services) are lower than in the other scenarios.

8 Costs and benefits for investors

Introducing competition for the provision of trading and post-trading services in Brazil may be expected to have a significant effect on the users of the Brazilian equity market. This section focuses on how investors might be affected. As the impact on investors is only one part of the overall impact on the Brazilian equity market, this section should be interpreted in the context of sections 9 and 10 as well, which consider the impact on infrastructure providers (both Bovespa and the potential new entrant) and on market stability and the cost of capital for Brazilian-listed companies respectively.

8.1 Conceptual framework for measuring impact on investors

Trading and post-trading services are intermediate services purchased by investors wishing to establish a position in a particular stock and to earn a return. Trading costs (explicit charges and implicit costs) and taxes create a wedge between the return that the investor receives and the profits earned by the company. Therefore, all else being equal, a reduction in trading costs benefits investors by increasing the net return on positions held.

As documented in section 6, international experience has found that introducing competition for the provision of trading and post-trading services can result in significant reductions in the costs of these services. Such cost reductions arise both because the new entrant generally offers lower prices than those prevailing in the market, and because, in many cases, the incumbent provider responds and lowers its prices as well. The magnitude of the benefit to investors arising from these cost reductions, holding trading volumes constant, is analysed in section 8.2.

In response to a decrease in the cost of trading, the expected net return of additional investment opportunities may now become positive, and therefore the benefit accruing to investors through reductions in infrastructure charges could increase further. The magnitude of this additional benefit to investors is considered in section 8.5.

Infrastructure charges are only one component of trading costs incurred by investors. Trading costs also include explicit fees paid to intermediaries such as brokers and custodians and the implicit cost of trading—the difference in the price at which an investor can expect to buy and sell, at any moment in time.

Bovespa has compared typical brokerage fees in Brazil to the fees that it charges, and finds that infrastructure costs account for between 20% and 70% of total explicit trading costs.[181] While this comparison excludes taxes and implicit trading costs, it does suggest that, at present, infrastructure charges make up a significant component of trading costs in Brazil, and therefore reductions in infrastructure charges could have a significant effect on investors' net returns.

Fees paid to intermediaries and implicit trading costs may also change as a consequence of introducing competition. For example, the cost to brokers of connecting and routing orders to multiple trading platforms may result in higher brokerage fees for investors. The impact on brokers' costs as a result of the introduction of competition and the extent to which this will increase costs to investors are analysed in section 8.3. How competition may affect implicit trading costs is considered in section 8.4.

[181] BM&FBovespa (2011), 'New Fee Structure', presentation available online, dated August.

Taxes on financial transactions can further establish a wedge between the return to the investor and profits earned by the company. However, introducing competition is not expected to have an effect on such taxes, and therefore taxation is assumed to be constant across all three scenarios considered.

8.2 Infrastructure charges for trading and post-trading services

International experience finds that introducing competition for the provision of trading services can result in significant reductions in the cost of trading and post-trading services. The magnitude of the benefit to investors arising from these cost reductions depends on the value of trading undertaken, and the expected decline in infrastructure charges, which, in turn, depends on:

– the market share of the new entrant;
– the prices charged by the new entrant;
– the change in fees charged by Bovespa.

The CBA focuses on how the introduction of competition will affect the market in the medium to long term—ie, once the market has reached a new steady state. The range of expected values for each of these parameters at steady state is set out in sections 8.2.1 to 8.2.3, and the estimated total benefits from a reduction in infrastructure charges are presented in section 8.2.4.

8.2.1 Market share of the new entrant

Under both counterfactual scenarios, the new entrant is assumed to achieve sufficient liquidity to hold a sustainable position in the market—ie, to trade a sufficient proportion of liquidity in at least some Brazilian stocks in order to offer bid–ask spreads in such stocks that are comparable (or competitive) to those offered by Bovespa. The analysis does not assume, however, that the new entrant has *necessarily* fully recovered the set-up costs of entry and is making a profit. This is because analysis of the annual reports of new trading platforms and CCPs in various financial centres shows that many incur losses for a number of years after entry, despite achieving substantial market shares.

The broad variation in market shares of the new trading venues in other international equity markets suggests that there is a wide range of market shares that is consistent with persistent/successful entry. This suggests that it is appropriate to model the effects of a range of market shares.

As shown in Table 8.1 below, several new trading venues and smaller (incumbent) stock exchanges in Europe have a value of trading of less than 8% of that at Bovespa. This relatively low volume of trading may be sustainable because these venues specialise in certain stocks, for which they attract a higher market share, or because, as could be the case in Brazil, the new entrant already competes in other international markets and this reduces the fixed costs associated with entering an additional market. In addition, some new entrants may be specialising in providing services to specific market segments (eg, retail investors) or particular types of trade (eg, large value block trades).

Table 8.1 Value of trading across a range of European trading venues as a percentage of the current value of trading on Bovespa

Trading venue	Hypothetical Brazilian market share (%)
BATS Chi-X Europe	250
Turquoise	75
UBS MTF	8
Warsaw (incumbent)	8
POSIT	8
SIGMA X MTF	7
Tradegate	7
Burgundy	6
Equiduct	5
Vienna (incumbent)	4
Liquidnet	3
Irish stock exchange	3
Budapest (incumbent)	3
Nomura NX	2
Athens (incumbent)	2
Prague (incumbent)	2
Smartpool	2
Instinet BlockMatch	2

Note: The hypothetical Brazilian market share considers the current value of trading in European equities on each trading venue relative to the current value of trading on Bovespa.
Source: Analysis of statistics in Thomson Reuters (2012), 'European market share reports by index, 2012', February; and World Federation of Exchanges statistics.

Other trading venues that have entered Europe have achieved large volumes of trading. For example, the value of trading on Turquoise and BATS Chi-X Europe as a proportion of that at Bovespa is around 75% and 250% respectively.

As presented in Table 8.2, the share of trading in the underlying equities of the FTSE 100 index accounted for by BATS Chi-X Europe and Turquoise (in January and February 2012) was 33% and 4% respectively.

Table 8.2 Overview of European MTF market shares (% of value of trading)

	BATS Chi-X Europe	Turquoise
CAC 40—all trades	**18**	**4**
CAC 40—lit trades (c. 50% of total trading)	33	7
Eurostoxx 600—all trades	**15**	**3**
Eurostoxx 600—lit trades (c. 45% of total trading)	30	6
FTSE 100—all trades	**33**	**4**
FTSE 100—lit trades (c. 45% of total trading)	40	8

Note: The market shares presented are based on the value of trading. Lit trades refer to trading undertaken only on an open limit EOB—excluding trades executed during an auction period or resulting from orders that were not visible on the book. Lit trades also exclude all trades executed off-exchange.
Source: Thomson Reuters (2012), 'European market share reports by index, 2012', February.

A similarly wide range of market shares is observed in Canada (see Table 5.3). For example, Alpha accounts for around 20–25% of total trading in TSX-listed stocks, while Chi-X accounts for around 7%, and other venues, such as Pure and Omega, 1% or less.

Overall, this analysis suggests that a market share of 5% could be taken as a lower estimate, consistent with successful entry. This is in line with Chi-X Australia's stated target of 5–10% for market share.[182]

Given the significance of trading on BATS Chi-X Europe and Alpha, it is appropriate to model the effects of the new entrant achieving a higher market share: 10% and 15% appear to be sensible scenarios.

Counterfactual scenario 1 considers the impact of entry at the trading venue only, while counterfactual scenario 2 considers both the trading and CCP level.

Entry at the CCP level as well would reduce the extent to which the new entrant relies on services provided by Bovespa. This increase in independence may result in a greater market share for the new entrant. However, open access to the incumbent's CCP is expected to lower the set-up costs to brokers wishing to trade through the new exchange, and avoids the potential cost of a reduction in margin offsets, which might be incurred by brokers clearing through two separate clearing houses.

There is less precedent of entry in the market for CCP services to consider which of these two opposing forces will dominate; however, the data that is available suggests that market shares achieved by new CCPs in Europe are within the current range under consideration. For example, EMCF clears around 40% of all on-exchange European equity trades,[183] while EuroCCP appears to clear around 10% of all such trades.[184]

However, some care is needed when looking at market share, absolute size and successful entry. In Europe CHI-X, EMCF and EuroCCP have entered by offering services in relation to trading securities across multiple European countries. Their market position has generally been built up by taking market share from several incumbent exchanges or CCPs, rather than a simple displacement in relation to only one incumbent. If entry at either the trading platform or CCP level in Brazil is confined to offering services with respect to Brazilian securities only, the implied market shares to reach the same operational size is high. For example, in the case of EuroCCP, a 10% share of the European market would represent more than the total value of the current trading in Brazil.

In this context, the approach taken here is to use the same market share assumptions under both counterfactual scenarios, and to look at a wide range of the market shares.

8.2.2 Fees charged by a new trading venue

In order to attract trading away from Bovespa and overcome the network externalities, a new trading venue will need to provide a competitive offering (in terms of both explicit and implicit costs) to investors and/or traders. International experience has found that this has typically resulted in the new entrant undercutting the incumbent's fees substantially. For example, Chi-X Australia charges 0.06bp for passive trades and 0.12bp for aggressive trades.[185] For the average trade, this represents a 68% discount to the 2010 ASX headline trading fee of 0.28bp (each side), and a 40% discount to the 2011 ASX headline trading fee of 0.15bp (each side).

[182] Market Watch (2011), 'Chi-X looks to crack Australia', November 29th, Dan Barnes, available at http://www.marketwatch.com/story/chi-x-looks-to-crack-australia-2011-11-29
[183] EMCF (2010), 'Clearing solutions for all to see', Annual report 2010.
[184] EuroCCP claims to clear 40% of trades on BATS Chi-X, which has a market share of around 25–30% of European on-exchange transactions; therefore EuroCCP's market share can be estimate to be around 10%. EuroCCP clears trades in a further 18 markets, so 10% could represent a lower bound of its market share.
[185] Chi-X Australia (2011), 'Trading Fees', market operations notice, October11th 2011.

The steady-state fee that a new trading venue charges also needs to be sufficient to cover the costs of operating, although, as discussed in section 8.2.1, this CBA does not assume that the fee is sufficient for all the sunk entry costs to have already been recovered. The new entrant's likely trading fee can also be informed by looking at the analysis in section 4.4 on the costs (ie, prices) for trading services in different financial centres. The results are repeated in Table 8.3, complemented with the value of trading undertaken at each exchange in 2010.

Table 8.3 Trading costs and value of trading for a range of trading venues

Trading venue	Trading costs in 2011 (bp)	Total value of trading in 2010 (US$m)
BATS Europe	0.05	666
Chi-X Australia	0.09	0
NYSE	0.11	17,796
Toronto SE	0.13	1,369
ASX (current)	0.15	1,063
ASX (in 2010)	0.28	1,063
Frankfurt SE	0.41	1,628
London Stock Exchange	0.43	1,556
Hong Kong SE	0.51	1,496
Borsa Italiana	0.69	997
BM&FBovespa	**0.72**	**869**
SGX	0.75	289
BME	1.55	1,361
Warsaw SE	2.74	69

Note: The costs are representative of the costs incurred by an institutional investor (User 2, Intermediary 2, as defined in section 4). Data on the value of trading in 2011 is not consistently available for all trading venues listed, so 2010 data is reported.
Source: Oxera and World Federation of Exchanges.

After the rebalancing of fees at Bovespa in 2011, when the trading fee was reduced from between 1.90 and 2.85bp according to the type of investor to a common 0.7bp charge, trading costs are now comparable to those charged by some stock exchanges (eg, Borsa Italiana and SGX), but are still higher than in others, particularly the new trading venues. For example, trading costs in Brazil are 14 times those of BATS Europe, 8 times those of Chi-X Australia, and more than twice those of ASX, even before the cost reduction in 2011.

The remaining differential between Bovespa's trading fees and those in other markets suggests that there is potential for both a new entrant in Brazil and Bovespa to offer lower prices to investors. An appropriate range of possible fees for a new trading venue may lie between 0.10bp (based on the entry price of Chi-X Australia) and 0.45bp (based on a percentage discount similar to that offered by Chi-X Australia to ASX 2011 trading fees).[186] On this basis, this CBA considers the effect of introducing competition, assuming that the new entrant offers trading fees of 0.10bp, 0.30bp and 0.45bp. The trading fees that the new entrant is assumed to offer are held constant under both counterfactual scenarios; however, under counterfactual scenario 2 (when there is entry at the CCP level as well), post-trading

[186] The average of Chi-X Australia's aggressive and passive trading fees is 0.09bp, which offers a 40% discount over ASX's headline trading fee. 40% of Bovespa's headline trading fee (of 0.70bp) is 0.42bp. As a lower trading fee increases the benefits of introducing competition, in order to be conservative, 0.42bp has been rounded to 0.45bp.

fees of the new entrant also need to be considered. These are assessed in the following sub-section.

8.2.3 Clearing fees charged by a new CCP

As presented in Table 5.1, the new CCPs that entered the European equity market also offered substantially lower fees to investors than the prevailing charges set by the incumbent CCPs. For example, in 2008, EuroCCP's average clearing charges offered a 75% reduction over the LCH.Clearnet equivalent.

New CCPs would need to offer substantial discounts on the incumbent's prices. Explicit fees are only one component of the total cost of clearing— the cost of posting collateral at a CCP is also often an important consideration for the broker when choosing where to execute, and for the CCP in relation to where to clear trades. Until the new CCP has established a significant market share and pool of margin, it will not be able to offer margin offsets comparable to those of the incumbent, and as such would need to offer low fees to compensate for the higher margin requirements.

The approach adopted here is therefore first to estimate CCP clearing fees assuming that, in relative terms, the price reduction offered by the new entrant in Brazil for CCP clearing would be of a magnitude similar to that offered for trading services. The next step is to check that once the higher cost of meeting the new entrant's margin requirements is taken into account, the total cost of using the new entrant is, on average, at least no greater than that at Bovespa.

As Bovespa does not currently have an explicit charge for CCP clearing, in order to inform the estimate of the new entrant's CCP clearing fee, the prevailing, implicit, CCP clearing fee at Bovespa must first be estimated. This can be assessed by considering the breakdown of the other variable fees at Bovespa.

Bovespa charges a trading fee of 0.7bp, a settlement fee of 1.80bp (for day traders and local funds) or 2.75bp (for other investors) and a custody fee ranging from 0.05bp to 1.3bp according to the value of assets held under management at CBLC as at May 2012. As CCP clearing is a post-trading service, it is predominately likely to use the physical and human infrastructure of CBLC, rather than of the trading part of Bovespa. The cost of providing CCP clearing relates to the volume of trading activity, as opposed to the volume of AuM. On this basis, the assumption here is that the prevailing settlement fee charged by Bovespa incorporates the implicit CCP clearing fee, and, in the absence of any evidence to the contrary, the split between the CCP clearing fee and the CSD settlement fee is assumed to be 50:50.[187] As summarised in Table 8.4, this implies an estimate of 0.9bp to 1.375bp for the implicit CCP clearing fee at Bovespa.

[187] Assuming that CCP clearing costs are 50% of total post-trading costs is in line with what is generally observed in the financial centres considered in section 4, although there is some variation between and within financial centres. For example, the cost of CCP clearing services relative to total post-trading costs ranges from around 25% in Australia to around 80% in Mexico, and relative to total post-trading costs is lower for investors with a high value of AuM, or large trade sizes.

Table 8.4 Summary of prevailing variable fees at Bovespa

	Day trader or local funds	Other investors	Basis
Trading fee (bp)	0.7	0.7	As stated in 2011 pricing schedule
Implicit CCP clearing fee (bp)	0.9	1.375	50% of prevailing settlement fee as stated in 2011 pricing schedule
Implicit CSD settlement fee (bp)	0.9	1.375	50% of prevailing settlement fee as stated in 2011 pricing schedule
Custody fee (bp)	0.05–1.3	0.05–1.3, with exemptions for holdings by non-resident investors and for those with a value under R300,000	As stated in 2011 pricing schedule

Note: Trading and settlement fees at Bovespa depend on the value of transactions; custody and safekeeping fees depend on the value of AuM.
Source: BM&FBovespa 2011 price schedule.

Assuming the same relative price reductions for CCP clearing services as estimated for trading services indicates that an appropriate lower estimate of the CCP clearing fees offered by the new entrant would be 0.13bp—ie, an 85% reduction to the estimated prevailing implicit CCP clearing fee at Bovespa, equivalent to the discount offered at the trading level when the new entrant charges a trading fee of 0.10bp. A more conservative estimate of the CCP clearing fee offered by the new entrant would be 0.60bp—ie, a 35% reduction to the estimated prevailing implicit CCP clearing fee at Bovespa. At these CCP clearing fees and the trading fees set out above, if the cost to the broker of holding collateral at the CCP is relatively low (say around 1%), the new entrant offers a discount to the prevailing cost of trading and post-trading at Bovespa.[188] The new entrant is also no more expensive than Bovespa after taking into account the assumed price responses of Bovespa, as set out in the following section.

To avoid unnecessary complexity, the new entrant is assumed to charge a common fee to all types of investor. In practice, should this not be the case and the new entrant charges different prices for different types of investor, the distribution of the impact of introducing competition on investors may be asymmetric. However, in terms of the overall net impact on the Brazilian capital market, this is unlikely to be affected significantly.

8.2.4 Change in fees charged by Bovespa

International evidence suggests that, in order to maintain its position in the Brazilian equity market, Bovespa would be likely to respond to the competitive pressure from the new entrant by lowering its prices. The extent to which it could do this depends on the scope of cost efficiencies available to it, and its ability to reduce prices while still recovering its costs in full.

Many exchanges maintain substantially higher charges than new entrants. Although differences in pricing structure mean that the relative cost will depend on the characteristics of the user, the London Stock Exchange and NYSE maintain trading fees up to 8 times higher than offered by other trading venues in the same financial centre. However, not all incumbents have been able to maintain such differential prices. TSX and ASX offer fees much more comparable to those of the alternative trading venues (see Table 8.5 below).

[188] This estimate of 1% per annum assumes that the CCP returns to the broker any interest earned on the collateral posted.

Table 8.5 Comparison of trading fees within a financial centre

	Passive trading fee	Active trading fee
UK trading venues (bp)		
London Stock Exchange	0.20–0.45	0.20–0.45
BATS Chi-X	–0.20	0.30
London Stock Exchange:BATS ratio	**400% to 900%**	
US trading venues (US$ per share)		
NYSE	–0.0015	0.0023
Direct Edge—EDGA	–0.0004	0.0007
Direct Edge—EDGX	–0.0023	0.0029
BATS US—BZX	–0.0025	0.0029
BATS US—BYX	0.0003	–0.0002
NYSE:alternatives ratio	**133% to 800%**	
Canadian trading venues (C$ per share)		
TSX	–0.0031	0.0035
Alpha trading	–0.0021	0.0025
Omega	0.0006	No charge
Pure trading	–0.0020	0.0025
Chi-X Canada	–0.0025	0.0029
TSX:alternatives ratio	**100% to 150%**	
Australian trading venues (bp)		
ASX	0.15	0.15
Chi-X Australia	0.06	0.12
ASX: Chi-X Australia ratio	**166%**	

Note: Trading fees are based on the standard fees available to all trading participants—ie, they exclude high-volume-user discounts. For the USA and Canada, trading fees differ according to the price per share of the securities. The fees presented here for the USA are for trading securities with a price per share of at least US$1, and, for Canada, for trading securities with a price of at least C$1, and in the case of Alpha trading, securities priced between C$1 and C$5. Where a negative fee has been reported, this indicates that the trading platform provides a rebate to the investor. Passive trades provide liquidity to the market; active trades remove liquidity. At the aggregate level, by definition the ratio of active to passive trades is 50:50. This means that the 'average' fee for a trade can be computed as the average of the passive and active trading fees. For example, the average fee at BATS Chi-X is 0.05bp. The lower bound of each ratio presented is calculated by comparing the lowest (average) fee offered by the incumbent with the highest (average) fee charged by a new entrant. For example, for the London Stock Exchange:BATS ratio, this is 0.2bp divided by 0,05bp = 400%.
Source: Oxera analysis of the prevailing pricing schedules at each trading venue.

The above analysis suggests that a conservative estimate of the price differential that Bovespa could maintain is 200%. However, given the price differential between the London Stock Exchange, BATS, NYSE and some of the alternative trading venues, it is also appropriate to estimate the impact of a smaller response by Bovespa. International experience suggests that Bovespa is likely to cut prices to at least some degree; an estimate of a more ambitious price differential that Bovespa could maintain can therefore be based on the extent to which it could be expected to cut its prevailing fees. ASX cut trading charges by 46% from 0.28bp to 0.15bp; so, assuming a 15% price reduction by Bovespa could be considered quite conservative.

In counterfactual scenario 1, the price differential between Bovespa would apply to the trading fee only, while in counterfactual scenario 2 it is assumed to be spread evenly across the trading and CCP clearing fees, although CSD fees (for settlement and custody services)

would remain unchanged as these would not face competitive pressure. The assumed trading, CCP clearing and CSD settlement fees at Bovespa under counterfactual scenario 2 are summarised in Table 8.6.

Table 8.6 Summary of variable fees at Bovespa

	Trading fee (bp)	Implicit CCP clearing (bp) [1]	Implicit CSD settlement (bp) [1]
Prevailing	0.70	0.90 for day traders and local funds 1.375 for other investors	0.90 for day traders and local funds 1.375 for other investors
Conservative estimate	0.60	0.75 for day traders and local funds 1.15 for other investors	No change: 0.90 and 1.375
Best estimate	0.40	0.50 for day traders and local funds 0.80 for other investors	No change: 0.90 and 1.375
High estimate	0.20	0.25 for day traders and local funds 0.40 for other investors	No change: 0.90 and 1.375

Note: [1] Bovespa currently charges two settlement fees according to the type of investor: 1.8bp for day traders and investment clubs, and 2.45bp for other investors. In scenarios where this differential settlement charge is assumed to be continued, the basis for the discount (the investor characteristics) is the same as the prevailing criteria used by Bovespa.
Source: Oxera analysis.

8.2.5 Change in the trading and post-trading fees paid by investors

The scenario assumptions for the market share of the new entrant and the new prices charged by the new entrant and Bovespa allow for the change to the trading and post-trading fees paid by traders to be estimated. At present in Brazil, brokers explicitly pass Bovespa's charges through in full to end-investors. Therefore, it can be expected that any reduction in infrastructure charges would also be passed through to end-investors.

For clarity, Tables 8.7 and 8.8 summarise the parameters behind each of the scenarios based on the analysis set out above. The change in trading fees arising under each scenario—and therefore the gross benefit accruing to investors in terms of the annual cost savings (assuming that no additional trading or investment is undertaken)—is presented in Table 8.7.

Table 8.7 Summary of scenarios—counterfactual scenario 1: entry at the trading level only

	Market share (%)	Trading fee (bp)	CCP clearing fee (bp)	CSD settlement fee (bp)	CSD custody fee (bp)
New entrant					
Conservative estimate	5	0.45	n/a[1]	n/a[1]	n/a[1]
Central estimate	10	0.30	n/a[1]	n/a[1]	n/a[1]
High estimate	15	0.10	n/a[1]	n/a[1]	n/a[1]
Bovespa					
Conservative estimate	95	0.60	No change: bundled CCP clearing and settlement fee of 1.8 for day traders and local funds and 2.75 for other investors		No change: ranges from 0.05 to 1.3
Central estimate	90	0.40			
High estimate	85	0.20			

Note: [1] In counterfactual scenario 1, the new entrant does not provide CCP clearing, settlement or custody services and competes at the trading level only. All post-trading services for transactions executed at the new entrant are processed at CBLC, at the same fee as for transactions executed on Bovespa.
Source: Oxera analysis.

Table 8.8 Summary of scenarios—counterfactual scenario 2: entry at the trading and CCP clearing level

	Market share (%)	Trading fee (bp)	CCP clearing fee (bp)[1]	CSD settlement fee (bp)[1]	CSD custody fee (bp)
New entrant					
Conservative estimate	5	0.45	0.60	n/a[2]	n/a[2]
Central estimate	10	0.30	0.35	n/a[2]	n/a[2]
High estimate	15	0.10	0.20	n/a[2]	n/a[2]
Bovespa					
Conservative estimate	95	0.60	0.75 and 1.15	No change: 0.90 and 1.375	No change: ranges from 0.05 to 1.3
Central estimate	90	0.40	0.50 and 0.80		
High estimate	85	0.20	0.25 and 0.40		

Note: [1] Bovespa currently charges two settlement fees according to the type of investor: 1.8bp for day traders and investment clubs, and 2.45bp for other investors. In scenarios where this differential settlement charge is assumed to be continued, the basis for the discount (the investor characteristics) is the same as the prevailing criteria used by Bovespa. [2] In counterfactual scenario 2, the new entrant does not provide settlement or custody services, and competes only at the trading and CCP clearing level. Settlement and custodial services for transactions executed at the new entrant are processed at CBLC, at the same fee as for transactions executed on Bovespa.
Source: Oxera analysis.

Table 8.9 Changes in the trading and post-trading fees

	Weighted average infrastructure prices (bp)	Reduction in infrastructure prices (%)	Annual gross cost savings to investors ($m)
Counterfactual scenario 1: entry at the trading level only			
Conservative estimate	3.76	–3	18.6
Central estimate	3.56	–8	53.8
High estimate	3.35	–13	89.3
Counterfactual scenario 2: entry at the trading and CCP level			
Conservative estimate	3.40	–12	80.9
Central estimate	2.87	–26	174.0
High estimate	2.32	–40	268.9

Note: The total infrastructure charge for trading and post-trading services *in the absence of competition* is estimated to be 3.87bp. The weighted average infrastructure prices include custody fees paid to Bovespa.
Source: Oxera analysis.

Despite relatively modest percentage reductions in the costs of trading, the annual gross cost savings to investors—ie, the total cost savings possible before accounting for any incremental costs associated with entry, such as the cost of using multiple trading venues—could be substantial.

The central estimate of the impact under counterfactual scenario 1 (entry at the trading level only) is for an 8% reduction in infrastructure costs as paid by investors. This is estimated to result in an annual gross cost savings to investors of over US$50m. The central estimate of the impact under counterfactual scenario 2 (entry at both the trading platform and CCP levels) is for a 26% reduction in infrastructure costs. This is estimated to more than triple the annual gross cost savings to investors, resulting in gross annual cost savings of around

US$174m. This larger benefit is driven by the expected reduction in post-trading costs as well as trading costs, when entry occurs at the CCP level as well, and will be partly offset by the higher costs associated with this entry model.

The inherent uncertainty involved in modelling the impact of introducing competition into any market suggests that it is useful to consider a range of scenarios. Under the most conservative scenario, competition at the trading level results in a small reduction in infrastructure prices, of around 3%, but the annual gross cost savings to investors are still significant, at around US$20m. Under the most ambitious scenario considered, competition at both the trading and CCP clearing level results in a 40% price reduction and annual gross cost savings to investors of around US$270m.

To achieve these price reductions, additional costs may be incurred by non-infrastructure intermediaries, such as connectivity costs to brokers. In a competitive market, such additional costs would be expected to be passed on to end-investors. The additional costs to intermediaries associated with introducing competition are examined below. The additional costs incurred by the new entrant and by the regulator are considered in sections 9 and 10 respectively.

8.3 Brokers' costs

It was observed in section 5.4 that brokers incur several costs as part of their business model. With the introduction of competition in Brazil, they are likely to face additional costs as a result of investment in new technology, staff and the connection to the new exchange.

In the CBA, two scenarios are considered, the 'open access' model (counterfactual scenario 1) and the 'vertical model' entrant (counterfactual scenario 2). The costs to brokers connecting to the new trading platform are likely to be higher in counterfactual scenario 2 than in counterfactual scenario 1.

In counterfactual scenario 1 there is no additional CCP, so the costs of collateral (ie, margining costs) are unlikely to change. In counterfactual scenario 2, the new entrant into Brazil sets up its own clearing house, implying that brokers will have to deal with multiple clearing systems. This requires additional modifications to back-office systems, as well as leading to the inability to offset (net) the positions at the different clearing houses, which may lead to higher overall margin requirements (unless interoperability is introduced). The cost to brokers under the vertical model may therefore be higher than under the open access model.

In Brazil, many of the same players provide both custodian and brokerage services, and the introduction of competition is not expected to have a significant impact on the cost of providing custodian services incrementally to the cost of providing brokerage services. This is because the same infrastructure used to provide brokerage services may be used to provide custodian services. Therefore, by considering the impact on brokerage costs, the impact on custodian costs may have already been assessed.

The additional cost to investors due to additional costs to brokers may be characterised as a function of the following, each of which is dealt with in this section:

– the additional cost incurred by those brokers;
– the increase, if any, in average margin requirements (mainly under counterfactual scenario 2);
– the number of brokers who connect to the new trading platform;
– the extent to which additional costs are passed on to investors.

8.3.1 Additional cost to brokers under counterfactual scenario 1

Section 5.4 showed the additional costs to brokers using estimates from MiFID's CBA. The ongoing costs were US$39,500 and one-off costs were US$395,000. To estimate a comparable number for Brazilian brokers, in this CBA Oxera attributes a fraction of the one-

off costs to the current steady state (consistent with the assumption for the cost of the new entrant).[189] Adding the one-off and ongoing costs for the current steady state gives a potential estimate of US$118,500 for the incremental costs to brokers.

As part of this study, Oxera also spoke to several technology providers and large brokers, both global and Brazil-specific, in order to get a more robust estimate for the incremental costs to brokers under the hypothetical scenario that a new exchange entered Brazil and the existing brokers would need access to the new exchange and invest in SORs. A local technology provider noted that it would need to upgrade its current infrastructure to provide access to the second exchange, and the cost to a broker for the SOR which includes connectivity would approximate US$10,000 per month—ie, US$120,000 incremental cost per broker per annum.

Another global technology provider mentioned that the systems necessary for the SOR in Brazil are already in place in other countries and the addition of a new exchange would only involve an extra 'adapter' being added to the current system. For a new broker looking to connect to multiple exchanges via the technology provider, it would need to obtain the necessary software and pay for any additional plug-ins. An estimate for a medium-sized dealer was approximated at US$100,000, while for a large dealer it was expected to be US$100,000s.[190] Given that, by international standards, the average Brazilian broker could be described as being of 'medium' size, this would suggest an estimate of US$100,000.

Combining the estimates from Oxera's research and MiFID's CBA suggests an appropriate estimate of the cost to brokers of US$100,000 to US$120,000 per annum, although there would be considerable uncertainty surrounding this estimate, not least in terms of the number of brokers that would incur such a cost. Moreover, the above costs are only very approximate estimates for a typical broker. The costs to brokers may differ across brokers for a variety of reasons. For example, a broker requiring a higher-speed connection to the exchange will be charged more, and one with higher volumes will pay higher fees. Depending on the broker's execution policy, the costs may differ. For example, if the broker requires all retail client orders to be executed in a certain manner while other clients in another manner, the cost would be higher.

Under counterfactual scenario 2, the operation of multiple CCPs may require more changes in brokers' back-office systems and staff capacity than the changes required under counterfactual 1. As this may increase costs, the average incremental cost per broker would be expected to be at the higher end of the range estimated, closer to $120,000 than $100,000.

8.3.2 Increase in margin requirements

Oxera developed a theoretical model which provides an estimate for the additional margin requirement that brokers may need to face under counterfactual scenario 2. The model has been constructed on the basis that the margin requirement for a clearing agent is proportional to the net position they hold in any specific security. This net position is built up by the sequence of buys and sells that the agent undertakes throughout the day. For any specific security the buys and sells are offset against each other, leaving a net position at the end of the day.

As the number of transactions increases, the average net position increases, but at a slower rate than the increase in transactions. Simulations of this effect show that a doubling of the number of transactions results in an increase in the average net position of around 40%. Put the other way, halving the number of transactions results in a decline of the average margin requirement to 70% of its former level. This result drives the conclusion that splitting

[189] 20% of the total one-off costs is attributed to the annual figure, giving a one-off cost estimate of US$79,000.
[190] Estimates provided by technological providers interviewed during the course of this study.

transactions between CCPs would be likely to result in an overall increase in margin requirements in order to undertake the same total number of securities.

The theoretical estimate suggests that total margin requirements could increase by a maximum of around 40% if each CCP has a 50% market share, and by around 20% if the new entrant has a market share of 5%. Because the average margin per value of transaction falls as the number of transactions in that security, in the same CCP, rises, where the CCPs have unequal market shares, nearly all the additional margin required attaches to the transactions using the smaller CCP. This can result in relatively large differences in the margin requirement facing a broker for the same transaction, depending on the CCP used.[191]

Other splits of the total number of securities lead to other levels of overall increase. For example, a 95%:5% split results in an increase in total margin requirement of around 20%, 90%:10% an increase of around 27%, and 85%:15% around 32%.

This increase in margin requirement is driven by the split of trading at the agent level, not the global level. If individual agents transfer all their trading to a different CCP, their net position at the end of the day will remain the same. As a result, if the CCPs use the same margin calculations, the margin requirement for that agent will not change. This model therefore calculates the upper bound of the increase in margin unless agents systematically biased their trades so that all sells in a security used one CCP and all buys in that security used the other CCP. This behaviour seems unlikely.

Data provided by Bovespa suggests that the total margin currently posted is around US$1 billion. An increase of 20% would imply an additional margin requirement of around US$200m in total. The cost to brokers of supplying this additional margin to the CCPs will in turn depend on any differential that they would earn on that capital if they did not have to deploy it as margin at the CCPs. If this differential is a return of 2 percentage points, the difference in costs to the brokers is around US$4m in total. With the overall level of trading at around $900 billion, the additional $4m would add around 0.04bp to the cost of each transaction. However, since nearly all of this cost arises in using the smaller CCP (because there is less margin efficiency on smaller numbers of transactions in each security), the cost differential facing a broker in choosing which CCP to use (if such a choice is available) may be significantly more than this. The precise difference in the cost facing the broker will depend on how its trades are split between the CCPs. If each broker can concentrate its trades in one or the other CCP, its own cost increase is reduced (as is the total across the industry if all brokers achieve this concentration.)

8.3.3 The number of brokers connecting to the new platform

It was demonstrated in section 5.4 that only some of the total number of brokers have been observed to connect to new trading platforms in Australia and the UK.[192] Based on these numbers, it may be a reasonable assumption that, of the approximately 100 brokers connecting to Bovespa, only a certain proportion will connect to the new entrant directly.[193] Using Australian and European figures, a minimum of 24 and maximum of 44 brokers is assumed in the CBA.[194]

[191] The theoretical modelling assumes that the transactions are randomly allocated to each CCP in proportion to the total market share of each. If trades are systematically allocated, the additional margin required could be lower (eg, if specific securities use one CCP and other securities use the other, which results in the same netting as using a single CCP) or higher (eg, a broker sends all its sells to one CCP and all its buys to another, resulting in no netting).
[192] 24 out of 41 in Australia and 44 out of 401 in the UK.
[193] The total number of brokers in Brazil is approximately 100, taken from BM&FBovespa's website.
[194] This is based on the Australian experience where 24 brokers (58% of total brokers) have connected to the new entrant and the experience in the UK where 44 brokers (11% of total brokers) are connected to BATS Chi-X Europe. Applying 11% to the total number of brokers in Brazil would result in a low number of brokers (10) connecting. Applying 58% would result in 55 brokers connecting. This seems high given the number of brokers that are connected in the UK and Australia. Furthermore, as explained in section 3, some consolidation can be expected in Brazilian broker sector.

8.3.4 Pass-on of costs to investors

Oxera has been informed by those interviewed for the study that in Brazil trading and settlement fees are passed on directly to investors. This indicates that any additional cost incurred by brokers is also likely to be passed on. Consequently, an assumption is made that brokers pass on their cost increase in full to the investors.

8.3.5 Additional costs borne by investors

The total incremental costs to brokers in Brazil can be estimated using the additional cost per broker multiplied by the number of brokers connecting to the new exchange. It was estimated above that the incremental cost to brokers is likely to be in the range of US$100,000 to US$120,000.

All increased costs for brokers are assumed to be passed on to investors. These costs will equal the number of brokers connecting to the new trading platform multiplied by the assumed cost of doing so (see Table 8.10).

Table 8.10 Total additional cost to brokers under counterfactual scenario 1

Total incremental cost per broker per annum (US$)	100,000–120,000
Number of brokers who obtain direct connection	24–44
Total cost to industry under counterfactual scenario 1 (US$)	2.40m–5.28m

Source: Oxera calculations.

Under counterfactual scenario 2, as estimated in section 8.3.2, additional margin requirements by brokers may be expected. Apart from this, the operation of multiple CCPs may require more changes in brokers' back-office systems and staff capacity. As this may require additional costs, the total incremental cost per broker would be expected to be at the higher end of the range specified in Table 8.10.

8.4 Implicit costs

The scenarios for the introduction of competition considered in the CBA could affect the implicit costs of trading as well as the explicit costs considered in sections 8.1 and 8.2 above. The implicit cost of trading arises primarily from the bid–ask spread and the average market impact of (larger) trades.

As discussed in section 4.10, the bid–ask spread is a reflection of the liquidity of the market. In a more liquid market, buyers are able to attract the required volume of stock without having much effect on the price, and therefore the difference between the buyer's price and the seller's price is minimised.

However, as discussed in section 5, the potential impact on market liquidity of introducing more competition is uncertain and mixed. While recent evidence suggests that the introduction of competition into other markets has tended to increase liquidity somewhat, the evidence is not sufficiently clear-cut to predict to what extent liquidity would improve in Brazil as a result of introducing competition.

Furthermore, the limited and volatile data available on implicit costs of trading in Brazil does not indicate that the current bid–ask spreads in Brazil are out of line with those in Europe and North America, once the lower levels of trading are taken into account. Therefore, this data does not suggest that there is considerable room for reductions in implicit costs as a result of increasing competition.

Overall, it is expected that introducing competition in Brazil will have a neutral or positive impact on implicit trading costs. However, given that current bid-ask spreads in Brazil do not appear excessive, once the size of the market has been taken into account, and to be

conservative, this CBA assumes that introducing competition will have no effect on bid–ask spreads.

8.5 Change in volumes of trading

8.5.1 Literature review

It has been well-documented in several empirical studies that transaction costs affect the overall level of trading activity in an economy. Intuitively, as a result of reduced transaction costs, trading becomes cheaper, and trades that were not profitable earlier may now be profitable, encouraging market participants to trade more. This may in turn have an impact on liquidity.

The elasticity of trading volume to transaction taxes has been studied by several academics.[195] Looking at the impact on 23 stock exchanges from 1980 to 1989, Ericcson and Lindgren (1992) found the elasticity of trading volume to transaction costs to be between –1.2 and –1.5.[196] Jackson and O'Donnell (1985) examined the impact of total transaction costs on trading volume in the UK and found the short-run elasticity to be –0.5 and the long-run elasticity to be –1.7.[197] Lindgren and Westlund (1990) considered the impact of transaction costs on the Stockholm Stock Exchange and found elasticity ranges from –0.9 to –1.4.[198]

8.5.2 Impact on consumer surplus in Brazil

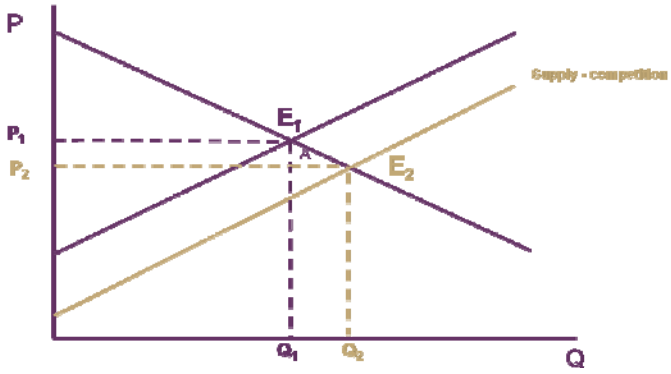
Elasticity of trading to transaction costs analyses (including those cited above) show that there is a non-negligible impact of transaction costs on trading volumes. Assuming that increased competition leads to a 0.44–2.64% decrease in transaction costs (ie, prices) in Brazil, using a long-run elasticity of –1.5, trading volume may be expected to increase by 0.66–3.96%.

In the case of a primary good, higher volumes are likely to result in increased utility for consumers, and hence to benefit the wider economy. Since trading in equities is an intermediate good (see section 8.1), it may be argued that increased trading volume does not necessarily translate into an increase in total consumer surplus. Trading helps investors to better match their investments to the perceived opportunities available, but there is evidence of 'excessive trading' among investors where investors (as a group) would be better off if, collectively, they traded less.

Putting aside the issues surrounding trading as a 'good', the basic demand–supply diagram suggests that there is consumer surplus arising from an increase in trading due to a lower price, equal to the area of triangle 'A' in Figure 8.1 below. As a result of increased competition, the supply curve shifts right, attaining new equilibrium at E_2. The prices of trades fall and the quantity rises.

[195] For an overview, see for example, Matheson, T. (2011), 'Taxing financial transactions: issues and evidence', WP/11/54, IMF Working Paper, March 1st.
[196] Ericsson, J. and Lindgren, R. (1992), 'Transaction taxes and trading volume on stock exchanges – an international comparison', Working paper no. 39.
[197] Jackson, P. and O'Donnell, A. (1985) 'The effects of stamp duty on equity transactions and prices in the UK Stock Exchange', Bank of England, Discussion Paper no. 25.
[198] Lindgren, R. and Westlund, A. (1990), 'How did the transaction costs on the Stockholm Stock Exchange influence trading volume and price volatility?', *Skandinaviska Enskilda Banken Quarterly Review*, **2**, pp. 30–35.

Figure 8.1 Simple demand and supply diagram



Source: Oxera.

The area of triangle A can be estimated to be equal to be half of the reduction in transaction costs (the price of trading) multiplied by the increase in trading volume (the quantity of trading). Given the assumptions described above, this would lead to an increase in consumer surplus of between US$39,000 and US$1,648,000 (under counterfactual scenario 1) and US$1.3m and US$16m (under counterfactual scenario 2) depending on the scale of the reduction in trading costs achieved (see Tables 8.11 and Table 8.12 below).

Table 8.11 Total effect on transaction costs

	Change in infrastructure fees (US$m)	Change in broker costs (US$m)	Total effect on transaction costs (US$m)[1]	Change in transaction costs (%)[2]
Counterfactual scenario 1				
Conservative estimate	–18.6	5.28	–13.3	–0.4
Best estimate	–53.8	3.84	–50.0	–1.5
High estimate	–89.3	2.85	–86.5	–2.6
Counterfactual scenario 2				
Conservative estimate	–80.9	5.28	–75.6	–2.3
Best estimate	–174.0	3.84	–170.2	–5.2
High estimate	–268.9	2.85	–266.1	–8.1

Note: The midpoint for broker costs is calculated as an average of the range. [1] The total effect on transaction costs combines the reduction in infrastructure costs and the increase in broker costs. [2] Current charges for trading and post-trading services provided by Bovespa are estimated to be around US$680m. This is in line with the 2010 revenues of Bovespa reported to be around R$1 billion, equivalent to US$570m. Bovespa estimates that infrastructure costs represent 20% of total transaction costs for investors, such that current total transaction costs can be estimated to be around US$3,400m or approximately 20bp (per side of a trade).
Source: Oxera analysis.

Table 8.12 Value of consumer surplus arising from additional trading (estimate)

Counterfactual scenario 1	
Change in cost per transaction (US$)	–0.17 to –1.10
Change in the number of transactions	463,000 to 3,006,000
Change in consumer surplus (US$)	39,000 to 1,648,000
Counterfactual scenario 2	
Change in cost per transaction (US$)	–0.96 to –3.37
Change in the number of transactions	2,630,000 to 9,252,000
Change in consumer surplus (US$)	1,261,000 to 15,612,000

Note: The change in cost per transaction (US$) is calculated according to the percentage change in transaction costs multiplied by the current transaction cost of around US$22. This is based on an average transaction size of US$11,000 and is equivalent to a 20bp charge.
Source: Oxera analysis.

The extent to which trading, an intermediate good, brings benefits to investors is uncertain, as evidence from behavioural finance suggests that overconfidence can produce too much trading.[199] In other circumstances, however, investors may trade less than might be considered optimal. In this context, it is difficult to ascertain the extent to which the area 'A' in the demand and supply diagram (see Figure 8.1 above) really represents an increase in investor surplus from trading.

Table 8.13 summarises the impact on investors under the central estimate assumptions. Overall, including the impact of increased broker costs (except for margin costs), introducing competition at the trading platform level only is expected to generate annual cost savings to investors of around US$61m, equivalent to a reduction in the cost of trading by 0.20bp. Introducing competition at the CCP clearing level as well is estimated to bring overall benefits to investors of around US$177m, equivalent to a reduction in the cost of trading by 0.95bp.

Table 8.13 Summary of impact on investors

	Change in: annual costs (US$m)	Change in: costs per value of trading (bp)[1]
Counterfactual scenario 1—central estimate		
Reduction in trading prices	53.8	0.31
Increase in consumer surplus from increase in transactions	0.6	0.00
Increase in costs for brokers (eg, connectivity)	3.8	0.02
Net reduction in costs for investors	**50.6**	**0.29**
Counterfactual scenario 2—central estimate		
Reduction in trading prices	174.0	0.93
Increase in consumer surplus from increase in transactions	6.4	0.03
Increase in costs for brokers (eg, connectivity)	3.8	0.02
Increase in margin requirement	unclear	unclear
Net reduction in costs for investors (excluding impact on margins)	**176.6**	**0.95**

Note: [1] The change in costs per value of trading takes into account the estimated growth in volumes of trading in Brazil arising from the reduction in trading fees. Under counterfactual scenario 1 and the central estimate

[199] See Shefrin, H. (2000), *Beyond Greed and Fear: Understanding Behavioural Finance and the Psychology of Investing, Overconfidence: Too Much Trading*, Harvard Business School Press.

assumptions, volumes are expected to grow by 2.2%; under counterfactual scenario 2 and the central estimate assumptions, volumes are expected to grow by 7.5%.[2] The net impact may not exactly equal the sum of the components owing to rounding.
Source: Oxera analysis.

9 Costs and benefits for infrastructure providers

Section 8 analysed the impact of introducing competition for investors. This section considers the impact on the infrastructure providers: Bovespa and the potential new entrants. The costs incurred by the new entrant in setting up and operating trading and clearing services are incremental costs that would not be incurred if entry had not occurred. Therefore, from an economy-wide perspective, these costs should be offset against the benefits that accrue to investors from price changes, taking into account any cost reductions for the incumbent arising from the lower volumes of services being produced.

Introducing competition for the provision of trading services in Brazil is also likely to have a significant effect on Bovespa. Depending on the market share of the new entrant, and the extent to which this market share represents a shift in trading from Bovespa or an increase in total equity market trading in Brazil, trading volumes at Bovespa would change. This would have an impact on revenue arising from both trading and post-trading services provided by Bovespa, from both any price changes it introduces and from any volume reductions as some proportion of the market moves to the entrant. Competition may also affect the unit costs (efficiency), margins and revenues at Bovespa, as discussed below.

The estimates presented in this section are subject to quite wide margins of error. Information from annual accounts has informed the estimation process, although the numbers presented below should be treated with caution.

9.1 Change in revenues

The reduction in the cost to investors of trading in the counterfactual scenarios will have a direct impact on the revenues received by infrastructure providers, as this reduction comes mainly from the lower prices charged by the incumbent. Entering the Brazilian equity market will generate new revenue for the entrant. For Bovespa, entry is expected to have a largely negative effect on revenues, although, if the total value of trading increases, particularly under counterfactual scenario 1, Bovespa will benefit from increased revenues from the supply of post-trading services. Under counterfactual scenario 2, it will still provide settlement and possibly some other CSD services for transactions executed on the new entrant's platform. Therefore, even under counterfactual scenario 2, Bovepsa will still derive some benefit from increased volumes.

These changes in revenue are shown in Table 9.1 for each of the scenarios set out in section 8, which can be summarised as follows.

– Under the conservative estimate, the new entrant secures a market share of 5%, offers a trading fee of 0.45bp and, when CCP services are also provided (under counterfactual scenario 2), a CCP clearing fee of 0.60bp. Bovespa offers a trading fee of 0.6bp and, when entry is at the trading level only, CCP clearing and settlement fees remain bundled at the current levels of 1.80bp to 2.75bp. When Bovespa faces competition at the CCP clearing level as well (counterfactual scenario 2), the settlement fee remains constant at the estimated implicit fees of 0.90bp and 1.375bp (half the current bundled fee), but the CCP clearing fee is reduced to 1.15bp.

– Under the central estimate, the new entrant secures a market share of 10%, offers a trading fee of 0.30bp and, when CCP services are also provided (under counterfactual scenario 2), a CCP clearing fee of 0.35bp. Bovespa offers a trading fee of 0.5bp and, when entry is at the trading level only, CCP clearing and settlement fees remain bundled at the current levels of 1.80bp to 2.75bp. When Bovespa faces competition at the CCP

clearing level as well (counterfactual scenario 2), the settlement fee remains constant at the estimated implicit fees of 0.90bp and 1.375bp (half the current bundled fee), but the CCP clearing fee is reduced to 0.80bp.

– Under the high estimate, the new entrant secures a market share of 15%, offers a trading fee of 0.10bp and, when CCP services are also provided (under counterfactual scenario 2), a CCP clearing fee of 0.20bp is charged. Bovespa offers a trading fee of 0.2bp and, when entry is at the trading level only, settlement fees remain bundled at the current levels of 1.80bp to 2.75bp. When Bovespa faces competition at the CCP clearing level as well (counterfactual scenario 2), the settlement fee remains constant at the estimated implicit fees of 0.90bp and 1.375bp (half the current bundled fee), but the CCP clearing fee is reduced to 0.40bp.

Under counterfactual scenario 1, the revenue earned by the new entrant is lower in the high estimate than in the best or conservative estimate. This is because, despite a higher market share, the assumed trading fee offered by the new entrant is low relative to the other estimates: 0.20bp compared with 0.30bp and 0.45bp.

Table 9.1 Changes in annual revenues (US$m)

	Net change in revenue to Bovespa	New revenue to new entrant	Total change in revenue
Counterfactual scenario 1: entry at the trading level only			
Conservative estimate	–15.1	3.9	–11.2
Central estimate	–47.7	5.3	–42.4
High estimate	–74.6	2.7	–71.9
Counterfactual scenario 2: entry at the trading and CCP level			
Conservative estimate	–77.3	17.6	–59.7
Central estimate	–173.0	29.1	–143.9
High estimate	–273.2	35.2	–238.0

Source: Oxera analysis.

Fixed charges, such as access and data charges, have not been considered in this analysis, but do not contribute a significant proportion of revenue to Bovespa.[200]

9.2 Change in costs

Entry into the market for trading and post-trading services will affect the costs incurred by infrastructure providers primarily due to the additional costs incurred by the new entrant. In addition, there may be changes in the costs for Bovespa.

9.2.1 Costs of the new trading venue

The new entrant will incur a variety of costs which need to be considered in order to assess the impact on the total costs of infrastructure providers, including:

– one-off set-up costs incurred upon entry (which include capital expenditure will then be depreciated over time);

– ongoing fixed costs of operations, unrelated to the volume of trading (which include costs such as rent, technology development and some staff costs, etc);

[200] Trading and clearing fees accounted for 91% of Bovespa's revenues in 2010. See BM&FBovespa 2010 Annual report.

– variable costs of operation, which vary according to the volume of trading on the platform.

One infrastructure provider offered a rough estimate of the potential one-off entry costs for a trading platform (counterfactual scenario 1) to be in the order of magnitude of US$10–US$15m. This order of magnitude is consistent with the costs of entry that can be estimated from financial statements, for trading venues for which such information is available. For example, at Turquoise total CAPEX in the initial years of setting up (between 2007 and 2009) amounted to around US$14m (in 2010 prices), while at Chi-X, over the same period, it amounted to US$4.4m (in 2010 prices).[201] Computer and office equipment is typically depreciated over a 3–5-year period, indicating an annual cost of US$2 to US$5m.

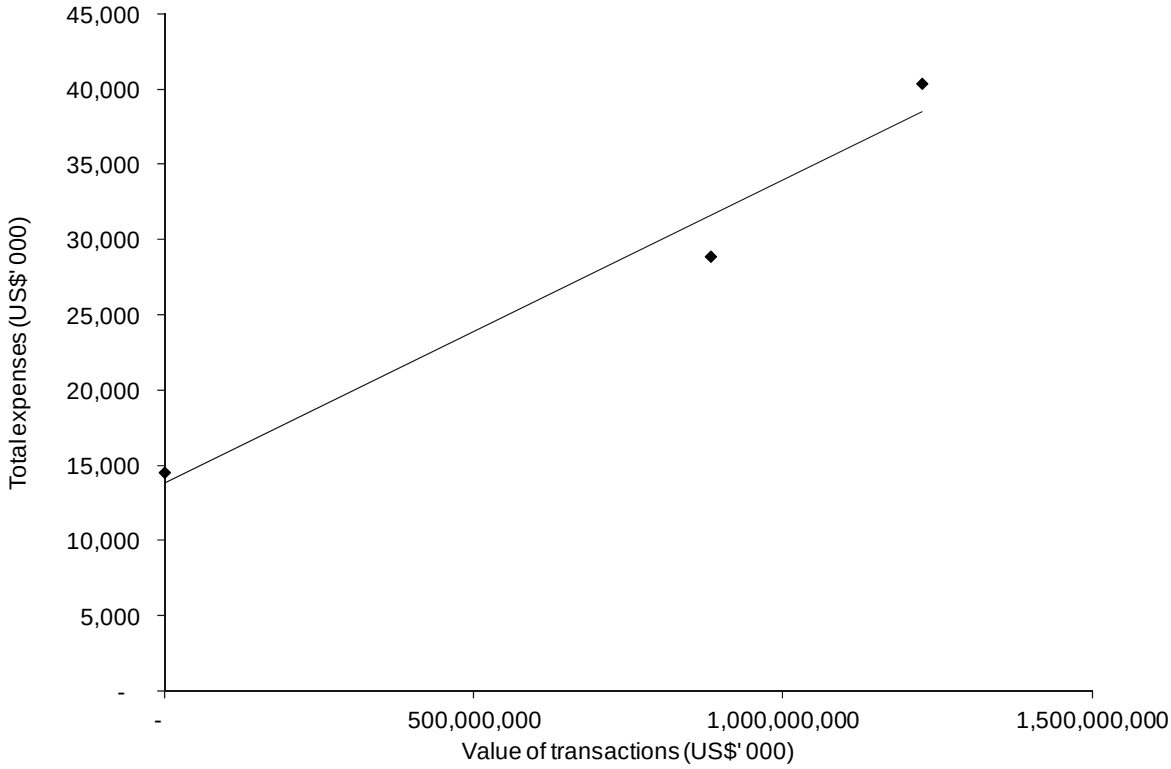
The ongoing fixed costs of operating may also include some staff costs, rent, continued technology development, and, in the case of entry at the trading level only, an access fee to CBLC. This fee can be informed by the access fees offered by ASX to Chi-X Australia, which ranged from A$1.25m for a one-year contract to A£1.375m for a five-year contract (ie, A$275,000 per year). This suggests that US$1.25m is an appropriate estimate of the one-off costs of setting up third-party access for a new entrant in Brazil.[202]

In relation to the other ongoing fixed costs of operating, a useful benchmark is provided by NYSE Euronext in its response to MiFID, in which NYSE Euronext hypothesises that a reasonable estimate of the cost base of an MTF lies between €10 and €20m (US$13 and US$26m).[203]

The ongoing costs of operation can also be estimated from analysis of the available financial statements. Comparing the average value of transactions to the total costs incurred by Turquoise and Chi-X suggests ongoing fixed costs between US$13m and US$16m,and marginal costs (at low volumes) between 0.07bp and 0.05bp (see Figures 9.1 and 9.2 below), resulting in a total cost base consistent with the hypothesis by Euronext.

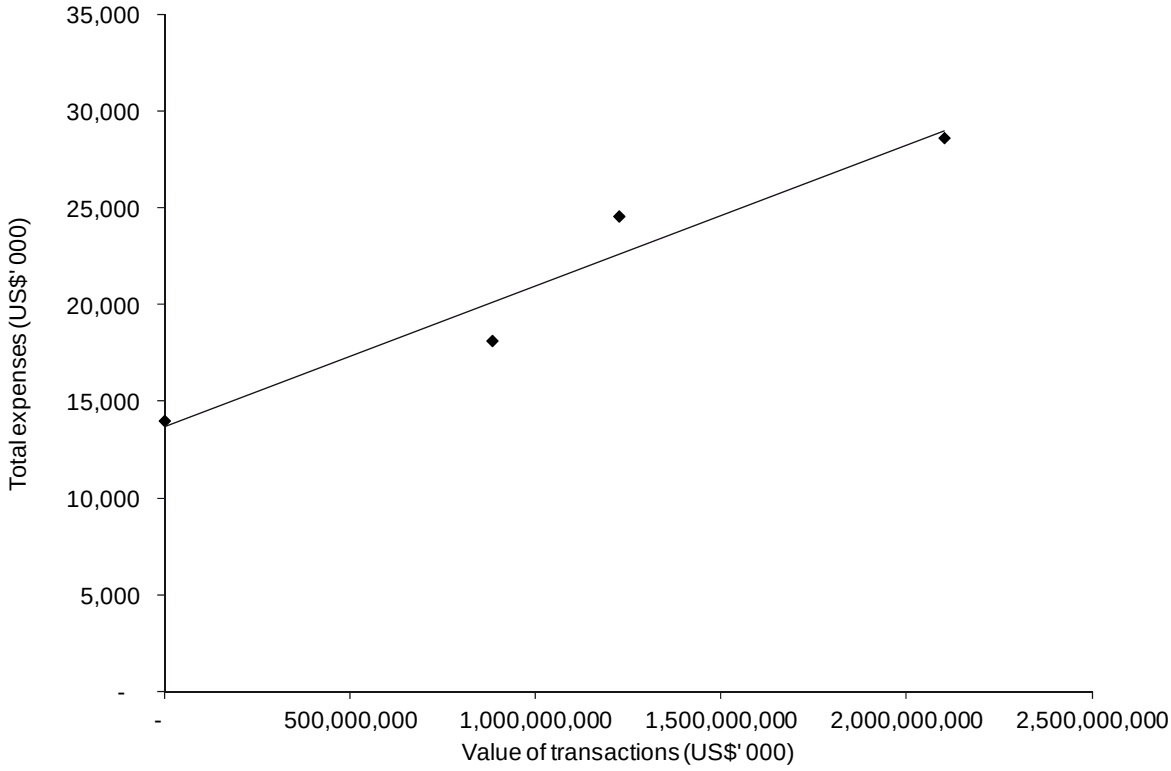
[201] Based on analysis of the financial statements of Chi-X Europe and Turquoise Trading Limited between 2007 and 2011.
[202] ASX Clear Pty Limited and ASX Settlement Pty Limited (2011), 'Provision of a trade acceptance service to Australian financial market licensees in respect of CHESS-eligible ASX-quoted financial products: Pricing and Service term options', May 3rd.
[203] NYSE Euronext (2011), 'Response to the public consultation of the European Commission Review of the MiFID', February 2nd.

Figure 9.1 Total costs and value of transactions for a European MTF, 2010 prices



Source: Oxera analysis of the financial statements of Turquoise Trading Limited between 2007 and 2011.

Figure 9.2 Total costs and value of transactions for a European MTF, 2010 prices



Source: Oxera analysis of the financial statements of Chi-X Europe between 2007 and 2011.

On the basis of this analysis, it is appropriate to take a range of values for the new entrant costs, in particular in relation to the ongoing fixed costs. Under the conservative scenario

(where conservative refers to the overall benefits of introducing competition, as explained in section 7), the annual ongoing fixed costs are assumed to be US$17m; under the central scenario, US$15m, and under the high scenario, US$10m. The marginal cost is kept constant at 0.1bp in each scenario.

9.2.2 Costs to the new CCP

A new CCP will incur the same types of cost as a new trading venue. These include set-up costs, and ongoing fixed and variable costs of operations.

As there are few examples of new entry at the CCP level, there is little data on which the costs associated with setting up and running a new CCP can be estimated. Furthermore, one of the European new entrants, EMCF, achieved a scale larger than CBLC in 2008, within two years of operating, and therefore its costs may not be reflective of a new entrant at the scale that would be likely in Brazil.[204]

With these caveats in mind, the costs associated with the new CCP in this CBA are assumed to be as follows:

– ongoing fixed costs: around US$10m;
– marginal costs: 0.05bp in each scenario.

Table 9.2 Assumed costs of the new entrant

	Ongoing annual fixed costs (US$m)	Marginal cost for trading (bp)	Marginal cost for CCP clearing (bp)	Total annualised costs (US$m)
Counterfactual scenario 1: entry at the trading level only				
Conservative estimate	17	0.1	n/a	17.4
Central estimate	15	0.1	n/a	15.9
High estimate	10	0.1	n/a	11.4
Counterfactual scenario 2: entry at the trading and CCP level				
Conservative estimate	27	0.1	0.05	27.7
Central estimate	25	0.1	0.05	26.4
High estimate	20	0.1	0.05	22.2

Source: Oxera analysis.

9.2.3 Costs to Bovespa

The introduction of competition could affect costs at Bovespa in three ways:

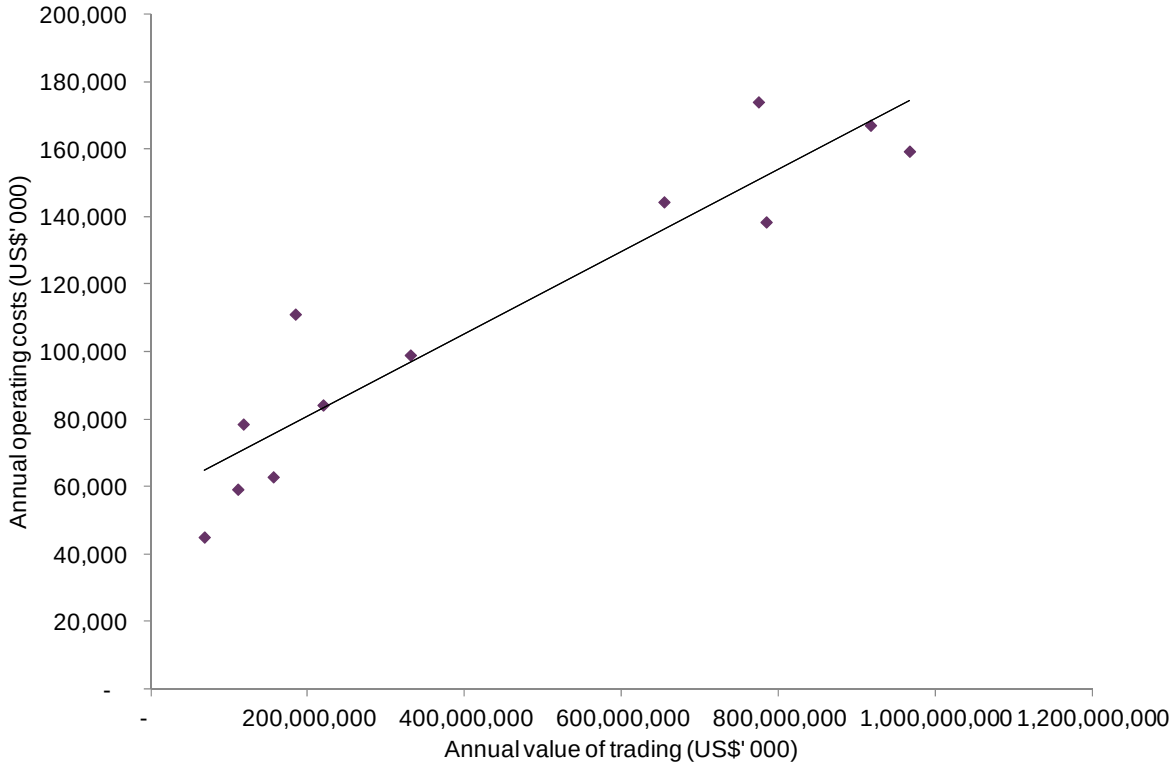
– total operational costs would change, should trading volumes at Bovespa change;
– increased competitive pressure may result in additional cost efficiencies at Bovespa;
– interacting with the new entrant may result in additional costs at Bovespa (eg, providing the new entrant access to the clearing and/or settlement infrastructure).

As a listed company, Bovespa is already seeking profit-maximisation; therefore, the extent of additional efficiency gains arising from competition may be questioned. At this stage, without further evidence, no adjustments for assumed efficiency gains are made. Similarly, owing to the ambiguity surrounding the extent to which Bovespa will need to interact with the new entrant, no adjustment has been made for the additional costs that it may need to incur over and above the cost of providing access to the CCP. This latter cost is assumed to be recovered from the new entrant through the access fee.

[204] Analysis of EMCF 2008 annual report.

From the analysis of Bovespa and, before 2008, Bovespa Holding's annual reports, it is possible to estimate the approximate relationship between the value of transactions and the costs incurred at Bovespa. This analysis indicates that the ongoing fixed cost of equity operations at Bovespa is around US$60m, and the marginal cost is 1bp (see Figure 9.3).

Figure 9.3 Total costs to Bolsa de Valores de São Paulo SA and CBLC relative to the value of trading



Source: Oxera analysis of BM&FBovespa and Bovespa annual reports and World Federation of Exchanges statistics.

As to be expected, the ongoing fixed cost at Bovespa is higher than for the new entrants, but the marginal cost is also higher. The fixed costs can be expected to be higher because Bovespa can be expected to operate at a large scale than the new entrant. However, this would suggest lower marginal costs. The higher marginal costs at Bovespa compared with the new entrant could reflect differences in either the types of service provided (as suggested by NYSE Euronext), or the efficiency of operations.[205] These cost estimates have been cross-checked against the reported growth in EBIDTA[206] and the costs of Bovespa and found to be consistent.

Prior to the demutualisation in 2008, Bovespa provided a breakdown of revenues, costs and assets between Bolsa de Valores de São Paulo SA, the exchange holding company, and CBLC, for 11 months of the year. A summary of this breakdown is presented in Table 9.3 below.

[205] NYSE Euronext (2011), 'Response to the public consultation of the European Commission Review of the MiFID', February 2nd.
[206] EBIDTA is an acronym for earnings before interest, depreciation, taxation and amortisation. It is a common measure of cash flow used to assess the value of a company.

Table 9.3 Breakdown of income, costs and assets between Bolsa de Valores de São Paulo SA and CBLC in 2007 (R$ '000)

	Bolsa de Valores de São Paulo S.A.	CBLC
Net operating revenue	307,213 (50%)	311,676 (50%)
General and administrative expenses	93,439 (53%)	84,056 (47%)
Value of property and equipment assets (net of depreciation)	76,952 (81%)	17,721 (19%)
Value of software (net of depreciation)	8,793 (96%)	389 (4%)

Source: Oxera analysis of Bovespa Holding 2007 annual report.

On this basis, it is reasonable to assume that 50% of the costs are for trading and 50% for post-trading. In the absence of any more detailed information on the allocation of costs between the post-trading services—CCP clearing, settlement and custody—it is also reasonable to assume that settlement and custody accounts for 50% of post-trading costs, with CCP clearing accounting for the other 50%, in line with the assumption in relation to the implicit CCP clearing fee.

Given a marginal cost for the vertical structure of 1bp, this suggests that the marginal cost of providing settlement and custody services at CBLC is 0.25bp. This is in line with the settlement fees at Euroclear UK and Ireland, which are £0.22 per pre-netted transaction, given that the average size of a trade on the London Stock Exchange is around £7,000.[207]

The assumptions on the resulting cost changes for Bovespa are summarised in Table 9.4.

Under counterfactual scenario 2, there is competition at both the trading and CCP clearing level. This is expected to result in an overall greater price reduction because, in addition to competition putting downward pressure on the cost of trading, the cost of CCP clearing is also expected to fall. This greater reduction in transaction costs can be expected to have a greater impact on the volume of trading, and therefore the costs at Bovespa fall by less under counterfactual scenario 2 than under counterfactual scenario 1. This effect is compensated slightly because, under counterfactual scenario 1, Bovespa continues to provide clearing services for trades executed on the alternative trading platform, while, under counterfactual scenario 2, these are provided by the new entrant.

The differences in cost reductions between the conservative, central and high estimates within each counterfactual scenario are driven by different assumptions about Bovespa and the new entrant's relative market shares. In the high estimate, the entrant achieves a 15% market share, compared with 5% under the conservative estimate.

[207] £0.22 divided by £7,000 gives 0.314bp.

Table 9.4 Assumed changes in cost for Bovespa

	Counterfactual scenario 1	Counterfactual scenario 2
One-off set-up costs	No change	
Ongoing fixed costs	No change: additional cost of providing access fully passed on to new entrant through access fees	
Marginal cost for trading services (bp)	0.50bp	0.50bp
Marginal cost for CCP clearing services (bp)	0.25bp	0.25bp
Marginal cost for settlement and custody services (bp)	0.25bp	0.25bp
Total change in annual costs (US$m):		
conservative	–1.6	–0.4
central	–2.5	–0.5
high	–3.4	–0.7

Source: Oxera analysis.

9.3 Change in profits

By combining the estimated impact on the costs and revenues of the new entrant and Bovespa, the overall impact on producer surplus can be estimated, as shown in the column on the far right in Table 9.5.

Table 9.5 Indication of the change in annual producer surplus, 2010 prices (US$)

	Net change in profits to Bovespa	New revenue to new entrant	New costs to new entrant	Total change in producer surplus
Counterfactual scenario 1: entry at the trading level only				
Conservative estimate	–13.5	3.93	–17.4	–26.9
Central estimate	–45.2	5.32	–15.9	–55.8
High estimate	–74.6	2.70	–11.4	–83.3
Counterfactual scenario 2: entry at the trading and CCP level				
Conservative estimate	–77.3	17.6	–27.7	– 87.4
Central estimate	–173.0	26.4	–26.4	–173.0
High estimate	–273.2	35.2	–22.2	– 260.2

Source: Oxera analysis.

When there is entry at the trading platform level only, the impact on producer surplus is likely to be less than when there is entry at both the trading and CCP clearing levels. This is driven by the assumption that, in counterfactual scenario 2, competition will result in price reductions at Bovespa for post-trading services as well as for trading services.

Similarly, when the new entrant is assumed to have a greater impact on the market (high estimate) and offer lower fees, establish a larger market share and encourage greater price reductions by Bovespa, the decrease in producer surplus is expected to be greater than when the new entrant is assumed to have a smaller impact on the market (conservative estimate). The greater reduction in producer surplus will correspond to greater benefits in terms of cost savings to investors.

Table 9.5 also summarises the new revenue and costs to the new entrant. Under counterfactual scenario 1, the estimated costs of operating in Brazil are relatively high and suggest that the new entrant may not be able to make a profit at the trading fees (0.20bp–0.45bp) and market shares (5–15%) considered. Should the Brazilian market grow substantially over and above the expected growth arising from lower transaction costs—which has already been incorporated into the model—the revenues that the new entrant could expect to earn could be sufficient to make entry possible.

Under counterfactual 2, the potential for entry to be profitable is greater. This is because, under the prevailing settlement fees charged by Bovespa, there may be more scope for the new entrant to offer cost savings to investors for CCP clearing, while still recovering the costs of operating. The extent to which this is possible also depends on the incremental cost to brokers of using two CCPs, as opposed to one. If the reduction in margin offsets is substantial, the new entrant would have to offer lower CCP clearing fees and, again, revenues might be insufficient to recover the costs of operating.

The high level of uncertainty in relation to the costs of the new entrant and how costs will change at Bovespa should volumes change mean that these estimates can be considered indicative only. The order of magnitude is, however, comparable to the estimated cost savings to investors. If producer and consumer surplus are considered of equal importance, this would mean that the direct net gain to the economy overall of introducing competition could be quite small because, under the scenarios considered, the lower trading and post-trading fees that investors are expected to benefit from after the introduction of competition are driven to a large extent by a reduction in profits at Bovespa. Indeed, if Bovespa is operating efficiently, and there are significant economies of scale, the sum of consumer and producer surplus is likely to be negative where there is new entry, unless there is a significant increase in consumer surplus as a result of greater consumption of services as prices fall from a monopoly pricing level.[208]

From the perspective of investors in the wider Brazilian economy, a reduction in the fees they have to pay for trading and post-trading services is in their interests, and the experience in other financial markets is that, where competition emerges, these fees generally fall. Given the cost structures of capital market infrastructures, this entry, and the response of the incumbents, suggests that the fees being charged before entry were above the level of forward-looking efficient costs. There is nothing in the analysis undertaken for this report to suggest that this outcome would be fundamentally different if new entry were to occur in Brazil. Therefore, from a public policy perspective, a critical factor is the relative weight given to the increase in consumer (ie, investors in the general economy) surplus compared with the reduction in producer (ie, investors in, or employees of, Bovespa and possibly investors in the new infrastructure) surplus.[209] If the primary concern is in relation to investors in the wider Brazilian economy then more attention should be given to the impact on consumer surplus.

[208] If prices are already set at a competitive level, this effect will not arise, but, under these circumstances, entry would not be economic for the entrant.

[209] For the new entrant, a case can be made that, since they choose to invest and enter knowing the economic circumstances under which they will operate, public policy should not be concerned about any negative impact to their producer surplus resulting from such entry.

Box 9.1 Producer and consumer surplus

Based on the analysis presented in this report, the introduction of competition in the provision of trading venues or CCP services is likely to result in an increase in consumer surplus and a decrease in producer surplus in the provision of these services within the Brazilian economy. An economic issue arises as to whether these two changes can simply be added together to get an overall indication of the change in surplus in the economy.

This is an issue that regulators and competition authorities often face. In a simple, static, case where a supplier has market power and is overcharging for a service (for example, setting monopoly prices) and a regulator steps in to cap prices at the cost of the supplier (including a normal return on any capital employed), in the absence of any benefit from increased consumption, the increase in consumer surplus will be exactly balanced by the decrease in producer surplus. Where there are additional costs of intervention, this would itself reduce the overall surplus, and hence intervention would reduce total surplus, even if consumer surplus still increased.

Increases in total surplus would have to arise only from that part of the additional consumption induced by the reduction in prices, rather than any price reduction with respect to the existing consumption. If consumption is inelastic, there will be minimal overall benefits from reducing monopoly pricing. However, it is precisely where demand is inelastic that monopoly prices will be set high.

Looked at from a dynamic perspective, the *process* of competition can be seen as delivering additional benefits to put into this type of analysis. In particular, where competition leads to innovation in services and/or increases in productive efficiency, there can be net gains to consumer or producer surplus without counterbalancing reductions in the other category. In addition, from a *political* perspective, it may be considered that monopolists adopting long-term pricing above cost is just wrong per se, irrespective of its economic impact.

As a result, there has been some debate as to whether regulatory and competition authorities should apply a total welfare (surplus) analysis or just a consumer welfare analysis when evaluating interventions (in the latter case, with the proviso that intervention does not bring prices below costs).[210]

In the particular case being analysed, the major changes in consumer surplus are driven by reductions in Bovespa's producer surplus. From a pure consumer welfare perspective, there are therefore considerable gains. However, from a total surplus perspective, the gains are much less obvious. In particular, the (static) rise in total costs incurred by the combination of the additional costs of the entrant, the additional costs of regulation and the additional costs that brokers may face to connect to two trading platforms (and a potential loss of margining offsetting if CCPs are duplicated) would need to be offset by increases in the efficiency of the suppliers and/or the provision of services that are more attuned to the needs of users.

[210] For a pragmatic description of how competition authorities actually behave, see, for example, the speech made by John Fingleton, Chief Executive of the OFT in 2011, 'The future of the competition regime: increasing consumer welfare and economic growth', available at http://www.oft.gov.uk/shared_oft/speeches/2011/1011.pdf.

10 Costs and benefits for the wider economy

10.1 Costs of regulation

The objective of this section is to estimate the extra cost to the regulatory authorities (eg, CVM and the Banco Central do Brasil, BCB) as a result of introducing competition. Increased fragmentation may have negative repercussions on the price discovery formation in the market. Regulators may need to monitor this and enforce the unbundling of data provision from other services provided by trading venues, to allow users to access the data they want and consolidate data from different trading venues. Market surveillance activities become more complex in the presence of multiple trading venues, leading to the costs of technological upgrades and increased headcount. Regulatory infrastructure may also need to be modified to monitor best-execution policies. All these factors lead to higher costs to regulators in the presence of competition in markets.

Some of these costs will represent a transfer of activities from the self-regulatory function of Bovespa, BSM, to the fully independent regulators, CVM and BCB. In this way, the total cost to the Brazilian market will be less than the total additional cost to the regulators. For example, in Australia, the number of staff within the self-regulatory part of ASX, ASX Compliance, was reduced from 104 to 68 in 2011, with 23 of these staff transferring to ASIC, reflecting the transfer of the responsibility for supervising trading on the ASX-operated markets from ASX to ASIC.[211]

To estimate the cost for regulators in Brazil, Oxera analysed the cost estimated by ASIC when introducing competition in Australia. Australian markets are similar to the Brazilian markets: the financial markets are in a similar stage of development and, as in Brazil, before competition was introduced Australian markets were self-regulated by the incumbent exchange. This section first outlines the costs incurred by ASIC and then extrapolates them to Brazil, with a few adjustments.

Before the introduction of competition, Australian markets were self-regulated by the incumbent exchange. With the introduction of competition, the regulatory role was transferred from ASX Market Supervision to ASIC. Additional costs were incurred with regard to market supervision, including participant supervision, investigations and IT costs (see section 5.3.1 for more detail). Table 10.1 summarises the total cost to ASIC as a result of both the transfer of supervision from ASX and the incremental costs arising from the introduction of competition. The transfer of supervision includes costs relating to the development of new market integrity rules to encompass competition, upgrading of the integrated market surveillance system capability, and an increase in the number of market supervision staff to manage the expected higher degree of market activity and complexity.[212]

These cost items are further broken down into employee costs (additional headcount needed to undertake the extra supervision), IT costs (additional systems needed to accommodate increased functioning), goods and supplies costs, and indirect costs. All non-IT costs are based on the number of transactions that take place, while all IT costs are based on the number of messages. ASIC assumes that the message to trade ratio is the same as in Canada.

[211] ASX (2011), 'Annual report', pp. 19 and 36.
[212] ASIC (2011), 'Proposed cost recovery model', August, p. 3.

Table 10.1 ASIC costs, January 1st 2012 to June 30th 2013

	A$m	% of total costs
Costs for introduction of competition	15.13	
Costs for transfer of supervision	14.64	
	29.77	
Cost components:		
Employees	11.56	38.8
IT costs	11.89	40.0
goods and suppliers	4.14	13.9
indirect costs	2.17	7.3
	29.76	

Note: Deferred project implementation costs are added to IT costs.
Source: ASIC (2011), 'Proposed cost recovery model', August, pp. 17–19.

In this CBA, the data from ASIC is used, together with the following assumptions:

– Brazil would follow a similar route, with the regulatory responsibility being transferred from BSM to CVM, and hence it would incur the transfer of supervision cost;
– the ratio of number of messages to number of trades is the same as that experienced in Canada, implying that the proportion of IT costs would be the same as in the ASIC's cost estimate.

When estimating the cost of regulation for Brazil, the differences between the Australian and Brazilian markets must be taken into consideration before extrapolating Australian numbers directly.

A few adjustments that are made to ASIC's estimates are explained below:

– the Brazilian equity market is smaller than the Australian equity market. Therefore it is appropriate to scale down some of the Australian regulatory costs when drawing inferences for Brazil. ASIC considers that all regulatory costs are based on either the number of trades or the number of messages. As such, one approach would be to scale down all the Australian regulatory costs.[213] However, it is likely that there are economies of scale in at least some areas of regulation. Therefore, this CBA study takes the conservative assumption that only non-IT costs are scalable. As the number of messages depends on the number of trades, in order to obtain an estimate for Brazil, non-IT costs are deflated by the proportion of number of trades in Brazil's market to Australia's market (61%);[214]
– as labour costs in the Brazilian and Australian financial sectors are broadly comparable, there is no need to adjust the employee costs in the regulatory costs.

The total incremental ongoing annual cost reported by ASIC for the introduction of competition is estimated to be A$16.4, of which A$6.5m is accounted for by additional activities arising specifically from the introduction of competition, and A$9.9m for the transfer of supervision from ASX.[215] Table 10.2 presents the results for Brazil. The total additional ongoing cost that CVM may be expected to incur as a result of introducing competition is US$10.3m. As this includes costs arising from the transfer of activities from BSM, the costs incurred by BSM can be expected to decline. In addition to these ongoing costs, CVM can be

[213] ASIC (2011), 'Proposed cost recovery model', August, p. 3.
[214] Based on the average of the total number of transactions in Brazil versus Australia over the period 2009–10. Data source: World Federation of Exchanges.
[215] The ongoing cost for Australia is taken as the average for FY14 and FY15.

expected to incure some one-off costs as a result of competition. Applying similar adjustments to ASIC's estimate, these aggregate to US$20.1m.[216]

Table 10.2 Annual additional cost of regulation under counterfactual scenario 1

	Australia (A$m)	Brazil (US$m)[1]	Brazil (US$m) post-adjustments[2]
Cost for introduction of competition	6.5	6.7	4.1
Cost for transfer of supervision	9.9	10.1	6.2
Total annual cost (ongoing)	**16.4**	**16.8**	**10.3**

Note: [1]An exchange rate of A$1 = US$1.025 is used. [2]The third column includes an adjustment for the size of the market.
Source: ASIC (2011), 'Proposed cost recovery model', August, and Oxera calculations.

Under the vertical model, an additional CCP would also need to be regulated. This increase in regulatory responsibilities is likely to lead to an increase in costs to the BCB and/or CVM. It is observed in the UK that the FSA regulates multiple clearing houses and charges a periodic fee that is a fair representation of the expected regulatory costs incurred by the FSA.[217] For example, EuroCCP is charged £0.345m per annum,[218] while LCH.Clearnet is charged £0.675m per annum.[219] In addition to the ongoing periodic fees, the FSA charges a one-off application fee of £0.125m for a recognised clearing house.[220]

To estimate the expected increase in costs to regulators in Brail as a result of regulating an additional CCP, Oxera uses the FSA figures and makes the adjustments similar to those made to ASIC's estimates above.[221] Using a range of £0.350m–£0.650m per annum from the FSA's estimates, the estimates obtained for Brazil post-adjustments are US$0.13m–US$0.25m additional ongoing costs and US$0.07m additional one-off cost. A proportion of the one-off cost is attributed to the current steady state, giving a total increase in regulatory costs under counterfactual scenario 2 of US$0.15m–US$0.26m.[222]

10.2 Impact on the cost of capital

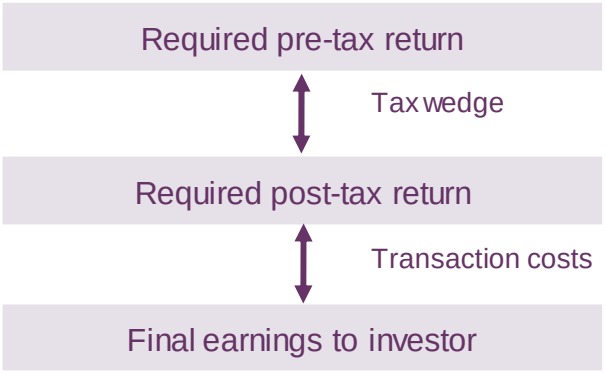
This section examines the effect of competition on the wider economy. It was seen in section 8.2 that competition may lead to a reduction in transaction costs in Brazil as experienced by investors (ie, the prices they face for the use of the infrastructure fall). This section analyses to what extent these reductions in transaction costs are also shared with companies, through a reduction in their cost of equity (ie, the amount of profit that companies in the wider economy must earn in order to persuade investors to invest in that company).

10.2.1 Framework

If it is assumed that equity investors require a minimum rate of return, net of all taxes and transaction costs, it can be shown that there is a direct relationship between transaction costs and the required pre-tax return. Figure 10.1 illustrates this relationship. A reduction in transaction costs influences the required post-tax return directly in a linear manner.

[216] ASIC's estimate of the one-off cost is A$32.1m. ASIC (2011), 'Proposed cost recovery model', August.
[217] FSA's website, 'How we are funded'.
[218] The fees are charged based on the size of the firm. Larger firms are expected to incur higher fees.
[219] FSA Handbook (2012), 'Fees Manual', Periodic fees, Annex 6, May.
[220] FSA Handbook (2012), 'Fees Manual', Application, Notification and Netting Fees, Annex 3, May.
[221] The ongoing costs (demonstrated by periodic fees) are adjusted for the size of Brazilian market relative to the UK market. It is found that the Brazilian market is 35% of the UK market in terms of total number of transactions. In addition, it is observed that Brazil's labour costs are 20% of UK labour costs (based on average monthly earnings; data taken from Datastream), and an adjustment is made accordingly.
[222] 20% of total one-off costs are attributable to the annual figure.

Figure 10.1 Impact of transaction costs



Source: Oxera.

A few empirical studies have supported this theory. For example, Brennan and Subrahmanyam (1996) found that fixed and variable transaction costs have a significant positive effect on the equilibrium rates of return, with the variable costs having more of an impact.[223]

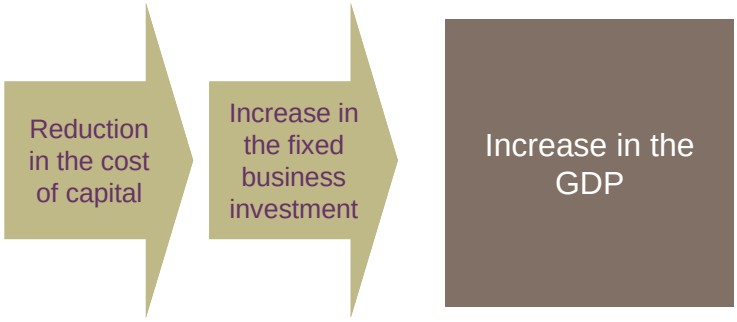
Domovitz and Steil (2001) used data from 1995 to 1998 in 12 European countries and the USA to estimate the relationship between the cost of equity and transaction costs.[224] The cost of equity is estimated using a discounted cash flow, and a fixed-effects panel data model is used to obtain the relative contribution of trading costs and turnover to the cost of equity. The authors found that the post-tax cost of equity elasticity to the trading costs ranges from 0.14 to 0.17, depending on the specification of the cost of equity estimate.[225]

This implies that a 10% reduction in transaction costs would lead to a 1.4–1.7% reduction in the post-tax cost of equity. However, the pass-through of transaction costs into the cost of equity may be less in Brazil than it is in the USA and European countries, owing to limitations on investing overseas by Brazilian residents. If overseas investments are limited, investors have less opportunity to redirect investments in response to transaction costs. This means that a reduction in transaction costs is likely to produce a smaller increase in total investment in Brazil than in the USA or Europe, and therefore the impact on the cost of equity will be less. For this reason, the CBA takes the conservative assumption that a 10% reduction in transaction costs would lead to a 1% reduction in the post-tax cost of equity.

A reduction in the cost of capital of companies is likely to lead to increased fixed business investment as projects that were not profitable earlier become so now. This increase in fixed business investment is eventually likely to result in an increase in the level of GDP for the country. Figure 10.2 summarises the way in which a reduction in transaction costs may affect the level of GDP.

[223] Brennan, M.J. and Subrahmanyam, A. (1996), 'Market Microstructure and Asset Pricing: On the Compensation for Illiquidity in Stock Returns', *Journal of Financial Economics*, **41**, 441–64.
[224] Domovitz, I. and Steil, B. (2001), 'Innovation in Equity Trading systems: The impact on transaction costs and cost of capital', in B. Steil, D.G. Victor and R.R. Nelson (eds) (2002), *Technological Innovation and Economic Performance*, Princeton University Press.
[225] The authors estimate the impact under two assumptions on the dividend growth: the current year's dividend is an unbiased estimate of the following year's dividend; the market's expectation of the following year's dividend, which is unobservable, is approximately equal to the actual dividend paid in the following year on average over time.

Figure 10.2 Impact on the wider economy



Source: Oxera.

The impact of transaction costs on public equity would differ from that on private equity. In particular, owing to the velocity of trading on public equities, the impact of lower transaction costs may be expected to be significantly greater for publicly listed companies, and the effect for private equity companies is likely to be negligible.

Several academic studies have looked at the links between the cost of capital, investment and GDP. The evidence on elasticity from the literature may be used to arrive at an estimate of the elasticity of Brazilian GDP to changes in the cost of capital of Brazilian-listed companies.

10.2.2 Analysis for Brazil

To estimate the impact on Brazilian GDP as a result of lower transaction costs, a few assumptions are made. Table 10.3 summarises the parameters used in the analysis. The estimates are based on several academic studies and data from Bloomberg.

Table 10.3 Estimate of parameters

Reduction in the cost of equity arising from a 1% reduction in transaction costs[1]	0.1%
Approximate level of gearing in Brazil[2]	21.7%
Fixed investment user cost of capital elasticity[3]	–0.5 to –1.0
Ratio of Brazil fixed business investment of publicly listed companies to total private fixed business investment[4]	0.16
GDP per capita private fixed investment elasticity[5]	0.3

Source: [1] Domovitz and Steil (2001), op. cit. The figure is adjusted downwards owing to the regulatory restrictions on international investment by local investors in Brazil. [2] Bloomberg and Oxera. Gearing is calculated as the average of all firms listed on Bovespa. [3] Hassett, K. and Hubbard, R. (1996), 'Tax policy and investment', NBER working paper No. W5683; Cummins, J., Hassett, K. and Hubbard, R. (1994), 'A reconsideration of investment behaviour using tax reforms natural experiments', Brookings Papers on Economic Activity, **2**, pp. 1–74. [4] HMRC, Datastream and Oxera. [5] Bassanini A., and Scarpetta, S. (2001), 'The driving forces of economic growth: panel data evidence for the OECD countries', OECD Economic Studies No. 33.

It was observed in section 8.2 that the introduction of competition may lead to a reduction in transaction costs of between 0.4% and 2.6% under counterfactual scenario 1, and 2.3% and 8.1% under counterfactual scenario 2. Based on the elasticity of the cost of capital to transaction costs of 0.1, this implies a reduction in the cost of equity of 0.04–0.26% under counterfactual scenario 1, and a 0.23–0.81% under counterfactual scenario 2. Assuming a gearing ratio of 21.7% (from Table 10.3), the reduction in the cost of capital can be estimated to be 0.03–0.20% for counterfactual scenario 1, and 0.18–0.63% for counterfactual scenario 2. This in turn leads to an increase in fixed investment of 0.01–0.20% for counterfactual scenario 1 and 0.09–0.63% for counterfactual scenario 2. The ratio of Brazil's fixed business investment of publicly listed companies to total private fixed business investment is estimated at 0.16. This therefore relates to an increase in total investment of 0.003–0.033% for counterfactual scenario 1 and 0.014–0.101% for counterfactual scenario 2. The rise in

business investment would suggest an increase in 0.001–0.010% in Brazilian GDP under counterfactual scenario 1 and 0.004–0.030% increase under counterfactual scenario 2. Using a GDP estimate of US$2 trillion, under counterfactual 1 this is equal to US$15–195m, and under counterfactual 2, US$86–609m.

These assumptions therefore suggest that even a small reduction in the cost of capital, due to lower transaction costs, could translate into some increase in investment and hence GDP. Such analysis is highly speculative and uncertain, however, as it depends on a wide range of factors regarding economic development and growth. The result is best taken as an indication that efficient capital markets and capital allocation can be important for economic development.

10.3 Impact on market stability

In this study, a number of important elements of the Brazilian regulatory framework are taken as given in the three scenarios for the CBA. These include the end-beneficial owner requirements, transparency and disclosure requirements, and rules on the concentration of trading. These and other regulations are likely to have an impact on the stability of the Brazilian stock market and, consequently, the stability of the wider Brazilian financial market. However, as these regulations are assumed to be in operation in all three scenarios of the CBA, their impact on market stability is not calculated for the CBA.

In this context, much of the potential impact of multiple trading platforms and CCPs on market stability is assumed to be limited by the compliance of new infrastructure providers with the requirements of Brazilian regulation. This will create costs for regulation, but will avoid increasing market instability with associated uncertain wider economic implications.

However, in practice, introducing competition in trading and post-trading does not come without risks. The regulatory framework and the expertise of the regulator would need to be developed in order to be able to supervise multiple trading platforms and CCPs. Although it is not possible to quantify this risk, it needs to be taken into account when evaluating policy options and preparing timetables for any regulatory change.

11 Results of the cost–benefit analysis

As set out in section 7, the CBA evaluates the costs and benefits of different market structures for the provision of trading and post-trading services in Brazil and considers the impact on producers, consumers and the wider economy. The results of the CBA are summarised in this section. The implications of these different market structures for regulation are discussed in section 12.

Table 11.1 summarises the estimated, ongoing, direct impact of introducing competition. This excludes the potentially significant impact on the wider economy arising from a reduction in the cost of capital, and one-off set-up costs. Owing to the considerable uncertainties involved in this type of analysis—for example, over exactly how Bovespa will respond to competition—the results are presented as ranges of quantitative estimates or more qualitative descriptions of potential outcomes.

Table 11.1 Summary of the estimated direct impact of introducing competition, per year

	Counterfactual scenario 1	Counterfactual scenario 2
Explicit cost of trading and post-trading	Fall by around US$18.6m–US$89.3m	Fall by around US$80.9m–US$268.9m
Brokers' costs	Increase by around US$2.9m–US$5.3m	Increase by around US$2.9m–US$5.3m
Implicit costs	Significant impact not expected	Significant impact not expected
Changes in volumes	Increase by 0.6–3.8%	Increase by 3.4–11.7%
Net impact for investors	**Costs fall by US$13.3m–US$86.5m** **Transaction costs fall by 0.4–2.6%**	**Costs fall by US$75.6m–US$266.1m** **Transaction costs fall by 2.3–8.1%**
Infrastructure revenues	Fall by around US$11.2m–US$71.9m	Fall by around US$59.7m–US$238.0m
Infrastructure costs	Increase by around US$8.0m–US$15.8m	Increase by around US$21.5m–US$27.3m
Net impact for infrastructure providers	**Producer surplus is expected to fall by around US$26.9m–US$83.3m**	**Producer surplus is expected to fall by around US$87.4m–US$260.2m**
Increase in the costs for regulatory authorities (CVM and BCB)[1]	Increase by around US$10.3m	Increase by around US$10.5m

Note: [1] This includes a transfer of activities from BSM, and therefore costs to BSM are expected to decline.
Source: Oxera.

Table 11.1 shows that the results of the CBA depend greatly on the assumptions used, and there is no clear outcome in terms of the net benefits minus the costs when consumer and producer surpluses are treated equally. Under certain assumptions, the scenarios for the increase in competition in the Brazilian stock market can produce a net benefit to the stakeholders considered, whereas other sets of assumptions do not produce net benefits.

In addition, given that the majority of consumer and producer surplus is driven by changes in the fees charged by the incumbent (and therefore approximately balance), the impact on the wider economy from either increased trading or the reduction in the cost of capital facing companies is important when evaluating the overall impact. Although the magnitude of these two effects is uncertain, their direction is likely to be positive for the economy overall.

However, the CBA does provide useful findings for the purposes of understanding the potential impact of increasing competition. In particular:

– investors using the Brazilian stock market can be expected to benefit from an increase in competition as they are the primary beneficiaries of likely reductions in the prices of trading and post-trading services. This assumption is likely to hold even with full pass-on of additional brokers costs to investors;

– in contrast, entry into this market is likely to significantly reduce profits for infrastructure providers, owing to lower prices and the duplication of some fixed and variable costs. Unless there is a significant increase in efficiency, the loss of producer surplus could be of a similar magnitude to the gains in consumer surplus for investors;

– there is likely to be a significant increase in the cost of regulation, which may be passed on to investors in some way. Other wider economic implications, such as the effect on market stability, are more difficult to assess, but if regulation is effective in introducing competition in a measured and controlled manner, are not expected to be significant;

– the core benefit from the introduction of competition arises from the reduction in the prices charged by the incumbent, while the economic costs arise from the duplication of facilities with economies of scale and the increased complexity of regulation. As a result, much (but not all) of the benefit of competition might be achieved if the price reductions could be achieved by alternative means;

– the reduction in trading and/or post-trading prices can be expected to have some impact on the cost of capital for Brazilian-listed companies, which, at the margin, is likely to stimulate investment and economic growth. This could have a substantial (positive) impact on the wider economy.

12 Regulatory options

This section begins with a summary of the lessons that can be drawn from the analysis set out in previous sections of this report, including the analysis of the Brazilian stock market and the results of the CBA. This is followed by an examination of the regulatory options, and a discussion about the regulatory approach and timing that arises from this.

12.1 Lessons from the analysis for regulatory options

Before considering the potential relevance of different regulatory options for the Brazilian stock market, it is important to summarise the key lessons that can be drawn from the analysis of this report.

12.1.1 What does the analysis of the Brazilian stock/capital market and other financial centres tell us?

Four important lessons can be drawn from the analysis set out in sections 3 to 6.

– **The Brazilian stock market has grown to a size that is broadly comparable with the size at which entry into the market for trading and post-trading services started to take place in other countries**. The Brazilian stock market would also appear to have considerable potential for further growth, partly owing to the growth potential of the Brazilian economy, but also simply through more trading of existing securities. This would suggest that the level of activity in Brazil with respect to the trading of equities has reached, or soon will reach, a size that is sufficient to sustain a new entrant. **In principle, there is scope for multiple trading platforms, in particular if Brazil continues to grow**.

  However, with the possible exception of Australia, new entry that has achieved the level of market share that would be required to break even in a market of Brazil's current size has been characterised by venues catering for a relatively specialised section of total trading. Typically, these trading venues are dark pools, crossing networks or similar, rather than reproducing the full characteristics of a typical regulated exchange. In addition, at this scale of entry there have often been specific market characteristics that have allowed other degrees of differentiation from the incumbent exchanges, which may not be present in Brazil. In particular, entry in Europe has exploited the national nature of the incumbent exchanges by offering trading in major European securities on a single platform.[226] Hence these entrants have not just tried to reproduce a sub-set of trading facilities of an incumbent, but have offered a sub-set of trading options covering several different incumbent exchanges.

– **The Brazilian stock market (trading and post-trading taken together) is characterised by fees that are high relative to some other stock markets, even after taking account of the range of services provided**. Section 4 finds that prices for trading and post-trading services in Brazil are high compared with a number of other stock markets, although this conclusion is sensitive to the size of the comparator market. Some aspects of quality also appear to be relatively high in Brazil. For example, the incumbent offers a wider range of services than often provided by infrastructure providers and the thorough risk management procedures, arising from the regulatory framework in Brazil, appear to have established a more resilient market.

[226] In theory, the new entrant in Brazil could adopt a similar strategy and, for example, offer trading across a range of Latin American markets. However, in this case the first-mover advantage has already been lost to Mercado Integrado Latino Americano (MILA), a partnership between the stock exchanges in Mexico, Peru, Chile and Colombia.

– **International experience shows that introducing competition through new entry can bring down prices and benefit investors**, but effective competition requires changes to the regulatory framework (for example, the introduction of best-execution rules and a consolidated tape to facilitate price formation). Various models for competition have been successful in other countries. Introducing competition into the market for trading has been the most common approach, often with the provision of open access to the existing post-trading facilities (eg, in Australia). Competition in the market for CCP services can also work under certain circumstances (eg, in Europe). However, economies of scale, together with network externalities, are stronger in relation to CCP services than in relation to trading platforms. This means that one typically observes more trading platforms than CCPs in any financial centre. Legal restrictions regarding the dematerialisation of securities limit the scope for competition for CSD services. Indeed, in Europe, while the legacy of national financial markets has resulted in multiple CSDs, there are few examples of new entry at the CSD level.

– **The Brazilian stock market is regulated in different ways from the majority of the capital markets reviewed in this study**. In particular, Brazilian regulations are distinct in terms of the rules requiring pre-trade transparency, beneficial owner identification, no internalisation, and all trading conducted on the stock exchange. This means that certain specific forms of entry that have taken place in other countries (for example, trading through dark pools) are unlikely to be compatible with current Brazilian rules.

These facets of the Brazilian capital market indicate that managed evolution and not revolution is required. Any intervention by regulators and policy-makers to stimulate competition needs to consider the implications for the quality of the Brazilian stock market. This should then allow investors to benefit in the long run from potential reductions in trading costs, without compromising the quality of markets.

12.1.2 What do the results of the cost–benefit analysis tell us?

The CBA, described in sections 7 to 11, explored two counterfactual scenarios for the Brazilian stock market: 1) competition at the trading level, and 2) competition at both the trading and CCP level. The costs and benefits of entry were considered for investors, for the infrastructure providers, for regulators, and for the wider economy.

The extent of different costs and benefits of competition at the trading level (counterfactual scenario 1) are more clear-cut than for counterfactual scenario 2, but the overall result is not clear-cut. The costs could outweigh the benefits, particularly if the market is not large enough to support a sufficient scale of operation of multiple competing trading platforms. The benefits are somewhat restricted by the result that the current price for trading services in Brazil is not that far out of line with the international comparators, particularly at the current scale of operations. Net benefits (ie, benefits greater than costs) may be expected if the Brazilian market continues to grow significantly.

The overall result of a net benefit, taking into account both consumer and producer surplus, is critically dependent on whether the exchange activities undertaken by Bovespa are being carried out efficiently. If there are significant productivity efficiency gains to be made then competition in the supply of trading services is likely to result in an overall net benefit, rather than simply a redistribution of surplus from producers to consumers (investors).

The costs and benefits of competition at both the trading and post-trading level (counterfactual scenario 2) are more difficult to define and identify precisely than for counterfactual scenario 1, as it is clear that there would be challenges in ensuring that this system works well for the Brazilian market, given the specific requirements of Brazilian regulation. However, the benefits could be more considerable than for counterfactual scenario 1, since more significant reductions could be achieved in the prices paid by investors for services. Prices in Brazil for the combination of trading and post-trading services appear to be slightly out of line with international comparators, but this is offset to some extent by the specifics of the implications of the beneficial owner accounts at the CSD.

Carefully managed evolution of the regulatory framework may be required to realise the benefits of this option. For example, the extent to which the total cost of post-trading services would fall is dependent on how Bovespa unbundles the prevailing settlement fee into a CCP clearing fee and a CSD settlement fee. If the fee for CSD services remains relatively high, as competition is not introduced at this level, competition at the CCP level will have only a small additional impact on reducing the total cost of trading and post-trading in Brazil. These findings highlight the need to consider carefully the regulatory options in terms of the barriers to entry that may exist and the likelihood of options being successful, given the development of the Brazilian stock market.

12.2 Overview of regulatory options

The following sections set out the regulatory options available to regulators and policy-makers in light of the analysis conducted in previous sections, including the tools available to regulators to stimulate competition, and the pros and cons of each option, given the findings in previous sections of the report.

The regulatory options are considered according to a series of logical steps, as follows.

– The simplest option would be to **do nothing**—**the status quo**. Bovespa would be likely to continue as the monopoly provider of services in Brazil, because entry by either a trading platform on its own or a trading platform with a linked CCP would be difficult, if not impossible, without the cooperation of CBLC at either the CCP level or the CSD level.

– Without directly affecting the operations of Bovespa, the regulator could facilitate **entry of both a trading platform and CCP—the vertical model**. However, there could be significant economic barriers to entry for this outcome and there would still need to be cooperation between the new CCP and the existing CSD functions of CBLC.

– An option with lower entry costs could be the **entry of a trading platform with access to the incumbent CCP—the open-access model**. This would require the cooperation of the incumbent to ensure that access to the CCP was provided on reasonable terms.

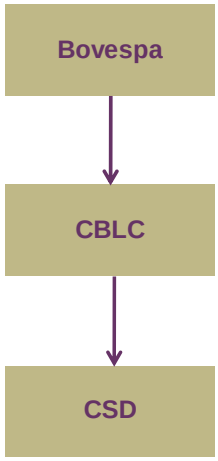
– If conditions are not deemed to *be* right for entry at present, there is an option in the short term for **monitoring trading and post-trading fees**, with a view to putting downward pressure on prices while ensuring that, if conditions for entry changed, entry would not be impeded unnecessarily.

Other possible variants on regulatory options are considered within this framework.

12.3 Do nothing—the status quo

The current market structure of the Brazilian stock market involves fully vertically integrated provision of trading and post-trading services by the incumbent, Bovespa (as presented in Figure 12.1).

Figure 12.1 Current structure: vertically integrated incumbent



Source: Oxera.

Bovespa is the monopoly provider of trading and post-trading services for equities in Brazil. There is some competition outside Brazil, as it is possible to trade stocks of some Brazilian companies through ADRs in the USA, although the extent of competition from ADRs is limited by Brazilian regulation regarding ownership by funds of foreign equity and taxation (see section 3).

As explored in section 4, Bovespa's fees do not appear high compared with other markets of a similar size, but do appear to be higher than they could be. Specifically, in the past ten years there have been only limited fee reductions overall, involving some discounts for specific types of trading. The rapid growth of the Brazilian market might suggest that fee reductions could have been achieved should economies of scale have been realised. The absence of significant fee reductions despite this rapid growth may point towards limited pressure on fees due to the lack of competition.

The cost of trading and post-trading is important for the Brazilian economy as it affects the cost of equity financing. The 'do nothing' option does not provide any additional impetus for fees to come down over time, even if growth of the market means that further economies of scale are realised.

For these reasons, alternative options for the regulatory framework should be considered.

12.4 Entry of both a trading platform and CCP—the vertical model

If entry were to occur, the regulatory option that would not require mandating access to the settlement services of the incumbent would be entry of a vertically integrated trading platform and CCP.

In this scenario, a new trading platform enters with its own CCP (these could be part of the same corporate entity, but not necessarily). As a result, the trading venue on which the trade takes place automatically determines the CCP at which the trade is cleared. This would give Bovespa direct competition at both the trading and post-trading level (at least for the CCP function). Both CCPs would clear trades on their respective trading platforms only, and there would be no direct link between the two. Therefore, trading participants would consider the bundled trading and clearing price when choosing between the new entrant and Bovespa.

There are, however, two sub-options within the 'vertical model' option. The new CCP may either enter with its own CSD functions (Figure 12.2), in which case it has an omnibus account at the incumbent CSD to hold all the securities that are being traded and cleared within its system, or without its own CSD functions (Figure 12.3), in which case the new CCP simply passes on the trade information for settlement at the incumbent CSD.

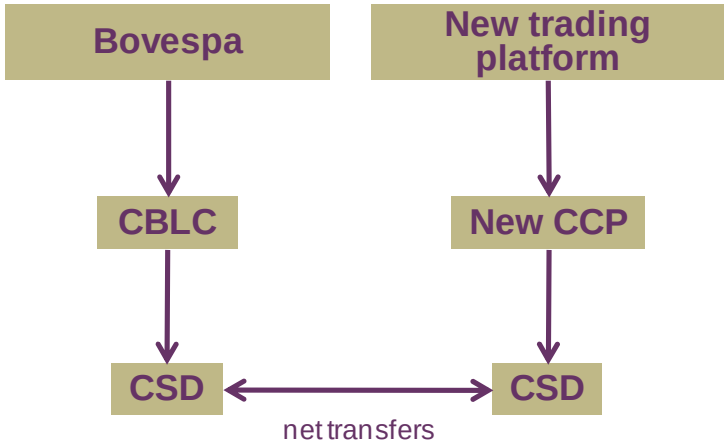
As explained in section 2, the extent to which the multiple CSDs under the first model would compete, and the magnitude of benefits to investors of any such competition, is expected to be limited.

The effectiveness of competition is expected to be limited because, at least initially, securities would not actually move from the incumbent CSD to the new CSD.[227] Therefore, when a trade is settled within the new CSD, the new CSD would be settling only 'shadow' securities between its users' accounts, and would rely on the incumbent to make net transfers of the original security into and out of the omnibus account. Such transfers can operate in a similar way to the creation (and destruction) of ADRs that are subsequently traded across US trading venues.

The reliance of the new CSD on some services from the incumbent CSD, and the cost of such services, will limit the extent to which the new CSD can provide a competitive offering. In Europe, charges for the settlement of securities across different CSDs are often several multiples of the charges for the settlement of securities within one CSD.

Furthermore, the creation of shadow securities and net transfers between CSDs implies an inefficient duplication of costs within the system. This cost duplication, combined with the loss of economies of scale in providing CSD services, will limit the extent to which competition between the CSDs can be expected to result in fee reductions and cost savings for investors. The creation of multiple CSDs can also inhibit competition at the trading and CCP clearing levels, by creating fragmented pools of liquidity. This has been considered by the London Stock Exchange to have reduced the effectiveness of head-to-head competition between trading platforms in Europe.[228]

Figure 12.2 Vertical model entry with multiple CSDs

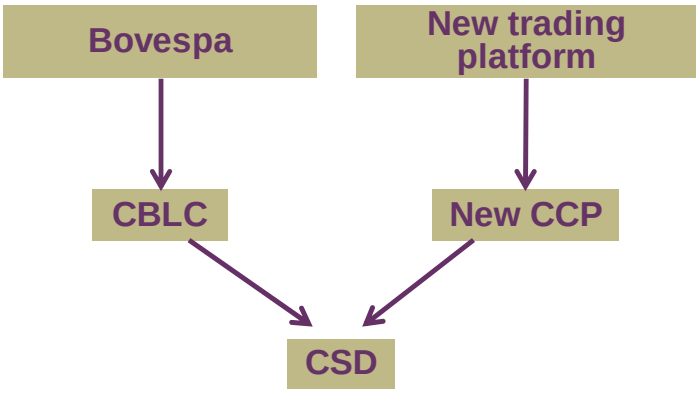


Source: Oxera.

[227] If the new CSD created a sufficient number of shadow securities representing the original securities in the incumbent CSD, a point might be reached where the new CSD could offer settlement services without having to use the incumbent CSD each time, through the link. However, owing to the strong economies of scale in providing CSD functions, the new CSD is unlikely to be able to offer prices that are sufficiently low to achieve this level of scale.

[228] London Stock Exchange (2002), 'Trading, clearing and settlement of securities: where competition does and does not work, at present and under full interoperability', June 13th.

Figure 12.3 Vertical model entry with a single CSD



Source: Oxera.

In both cases, however, there must be some level of cooperation between the incumbent CSD and the new entry—either horizontally, between the new CSD function and the incumbent CSD, or vertically, between the incumbent CSD and the new CCP. This means that, in either market structure, the incumbent is in a position of control over its competitor. The services it supplies are required for the new entrant to compete.

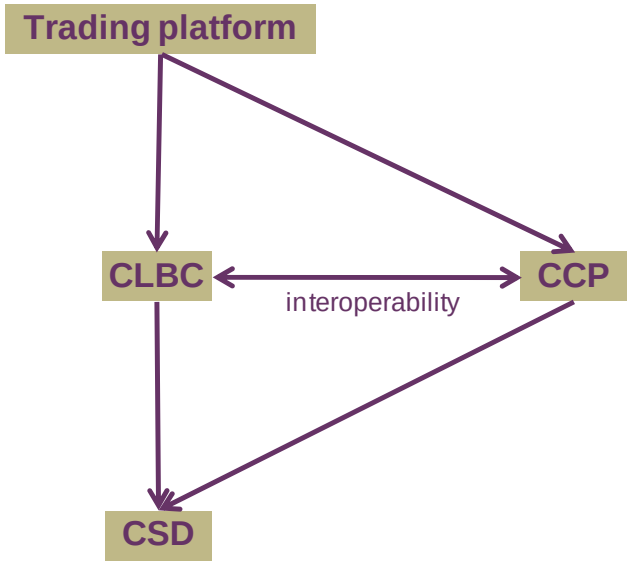
There are other, more complex, options that could be considered within the framework of the vertical model. The 'user choice' model introduces the concept of trading platforms offering participants a choice of CCPs to clear through (ie, interoperability). The presence of multiple clearing houses leads to a choice for trading participants on which clearing house to use.

Each trade has two trading participants and, in the simple scenario, the trading venue through which one trades automatically determines which CCP is going to be used (as is the case in the monopoly 'vertical model'). However, where there is a choice of CCPs, different participants using the same trading platform may want to choose different CCPs. In order to make this possible, the CCPs must interoperate. Achieving interoperability is possible (it has been done in Europe), but is not straightforward and may require explicit or implicit regulatory intervention in order to make it happen.

There are at least three ways in which a user choice model could operate within the Brazilian market structure.

1. A separate CCP enters the market without a new trading platform. In this scenario competition occurs at the post-trading (CCP) level only, with Bovespa maintaining monopoly at the trading level and the CSD level (see Figure 12.4).

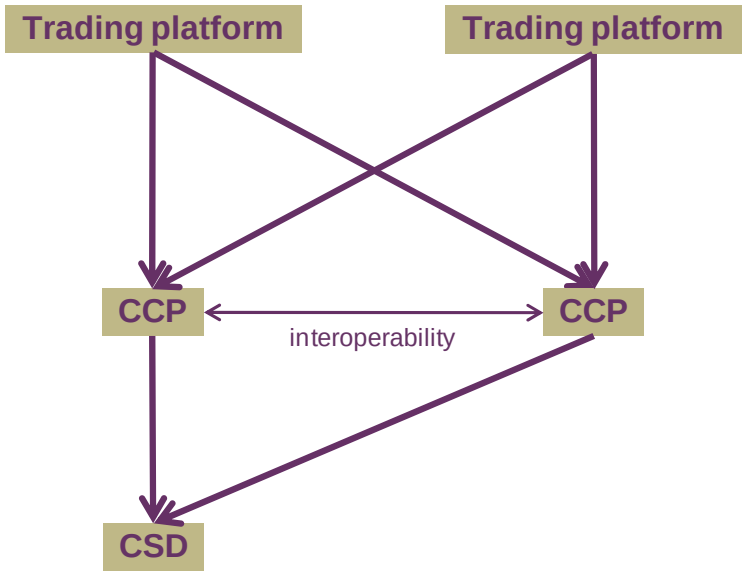
Figure 12.4 User choice model with entry at the CCP level only



Source: Oxera.

2. Alternatively, a separate trading platform and a CCP enter the market. The trading platform would be solely responsible for trading facilities, and the CCP for post-trading. Trading participants would be allowed to choose which trading platform to trade on, Bovespa or the new exchange, probably based on best-execution requirements. Thereafter they may also choose which CCP to clear their trades through: the incumbent or the new CCP. It would not be mandatory for the two trading participants trading with each other to clear through the same CCP. As a result, they may choose their preferred CCP based on a variety of factors, including existing positions, compatibility with their commercial model, or the price of the service (see Figure 12.5).

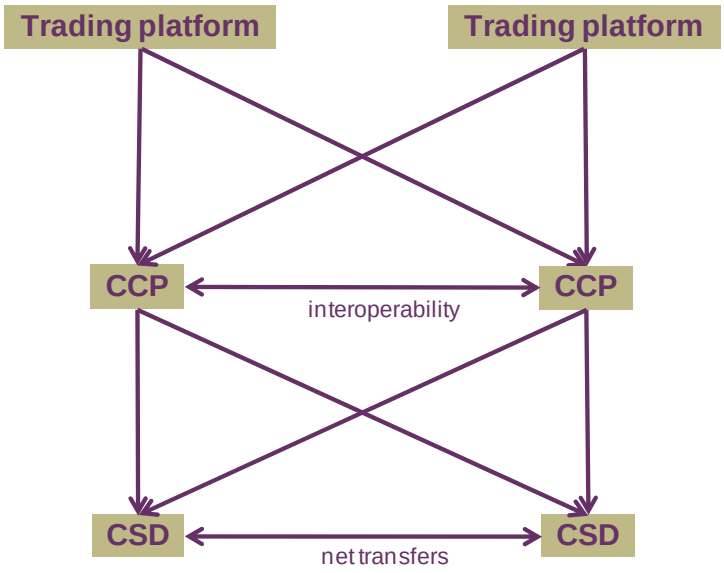
Figure 12.5 User choice model with entry at CCP and trading platform



Source: Oxera.

3. Finally, there could be separate entry for separate trading platforms, CCPs and CSDs (see Figure 12.6).

Figure 12.6 User choice model with entry at CCP, trading platform and CSD



Source: Oxera.

12.4.1 What would the vertical model involve?

The main advantage of the vertical model is that it would introduce competition at both the trading and the post-trading level. Both vertically integrated operators would compete for quality of service as well as price, and the volume of trading on each exchange would be dependent on the combined quality of execution including clearing and settlement. This could lead to better prices for the end-users, and encourage innovation and investment in new technology by the CCPs, leading to development of the financial system in Brazil. Market players have argued that regulators should introduce competition at both the trading and the post-trading level in order to prevent incumbents from manipulating price structures to just transfer their costs (ie, the level of prices they are charged) from trading to post-trading units.[229]

Explicit regulatory action is required for entry by a new CCP. CVM would need to provide regulatory approval for more than one clearing house to clear trades on the exchanges in Brazil. There is regulatory precedent for this: MiFID in Europe has allowed for multiple clearing houses to co-exist and has recently encouraged interoperability.

As depicted in Figures 12.4 and 12.5, the new entrant requires the use of the incumbent's CSD functions, and these functions must be responsive to instructions from the new CCP (or in the case of the creation of a new CSD with 'shadow' securities, instructions from that CSD). Given the likely lack of commercial incentive for the incumbent CSD to cooperate with the new CCP, the regulator is likely to need to ensure that appropriate CSD access services at appropriate fees are available to the new entrant CCP (or CSD).

In order to make the 'user choice' model work, additional regulatory actions would be required. CVM would need to require the CCPs to post collateral with each other such that trading firms on both sides of the trade are protected, irrespective of which CCP they use. Under this framework, each trading participant may choose their preferred CCP, and interoperating CCPs would ensure that they meet the obligations of their customers, even in the case that the other CCP defaults.[230]

[229] *The Trade* (2011), 'Post-trade competition the next step in Australia', available at http://www.thetradenews.com/news/Asset_Classes/Equities/Post-trade_competition_the_next_step_in_Australia.aspx.
[230] For example, assume that trading participants A and B choose CCPs A and B respectively. Now, assume that CCP B defaults. Trading participant A is now at a risk that CCP B will be unable to meet its obligations, which will be carried over to

12.4.2 Risks and challenges

As discussed in section 2.2 and set out above, the scope for competition for CSD services is likely to be limited. A more realistic version of the vertical entry model is one that has entry at the trading platform and CCP level only (see Figure 12.5). The principal challenge to this option arises from barriers to entry for a new CCP, which potentially include:

– the need for explicit regulatory approval for entry of a new CCP;
– material entry costs, economies of scale and network externalities increasing the risk that the new entrant will not be profitable. International experience suggests that achieving sufficient scale to be profitable is difficult;
– losses in the scope for margin offsetting for brokers/investors using both CCPs;[231]
– specific elements of the regulatory framework of Brazil, such as the beneficial owner model and pre-trade risk assessment, which are not necessarily absolute barriers to entry, but do add to the complexity of entry.

Under this model, CVM would be required to have an additional regulatory framework in place to deal with multiple CCPs, which may impose additional costs in terms of technology requirements, staff and market surveillance activities.

It is helpful to consider the international experience in assessing the potential magnitude of these barriers to entry. Examples include the following.

– Europe, where the MiFID has allowed for multiple clearing houses to co-exist and has recently encouraged interoperability, with the user choice model becoming more prevalent in the larger markets. However, new CCPs in the European market hope to leverage their operations across several different European markets, taking advantage of economies of scope that arise owing to (relatively) consistent regulation across different EU markets.

– The USA, where, over a number of years, the regional stock exchanges left the business of clearance, settlement and custody, and customers consolidated these activities at the NSCC (for clearing) and DTC (for settlement and custody). Since 1999, DTCC has continued to consolidate post-trading activities within the USA, integrating the operations of DTC and NSCC, and, more recently, has been consolidating post-trade services for additional asset classes as well. For example, DTCC now carries out the clearing and settlement services of fixed-income securities previously undertaken by the Government Securities Clearing Corporation and Mortgage Backed Securities Clearing Corporation.

– Australia, where competition at the post-trading level has not yet occurred, although both LCH.Clearnet and Chi-X Australia have mentioned their support for multiple clearing venues. ASX continues to retain monopoly in post-trading services.

– Japan, where entry has been slow to occur, but is now beginning to materialise.

It would therefore seem that there are considerable barriers to entry for a new CCP, but that these can be overcome if there is sufficient opportunity for the new entrant. This in turn requires a sufficiently large market with sufficiently attractive growth prospects such that the new entrant can realistically expect to be able to achieve revenues that will cover the fixed costs of entry. It may be that a new entrant would be encouraged to enter the Brazilian market before it has reached the scale that would be required to allow for profitable entry, on

CCP A. However, the interoperability arrangement between CCP A and CCP B would ensure that all obligations are met for trading participant A, possibly through a collateral exchanged between the two CCPs.

[231] As a result of separate CCPs, it is possible that a trading participant *buys* stock A at Bovespa, requiring it to put up a margin at the incumbent CCP, and *sells* stock A at a later date at the new exchange (owing to favourable price conditions then). Although the broker has both an outstanding buy and sell position in the same security, it will not be able to net these positions in the calculation of the margin required for CCP services. As a result, the overall margin required to undertake the same level of trading will tend to increase.

the basis that the market is expected to grow rapidly and there would be a first-mover advantage to entering at the current time, although there would be considerable uncertainty surrounding these calculations.

Options for entry with the vertical model should therefore be considered (eg, by assessing the business models of new entrants), but there remains a high degree of uncertainty about the feasibility of entry of this kind. Therefore, other regulatory options need to be considered.

12.5 Entry of a trading platform with access to incumbent CCP—the open-access model

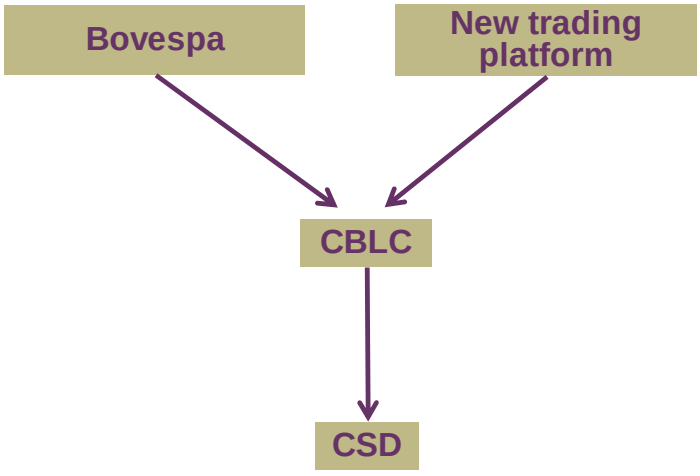
Entry of a trading platform alone, necessitating access to the incumbent CCP,[232] could be an alternative option, in order to avoid some of the costs of entry of a new CCP.

In this case, the expertise of the incumbent clearing house, CBLC, is leveraged to the new trading platform. Figure 12.7 summarises how the process of trading and post-trading is likely to take place under this regulatory option. Bovespa and the new trading platform would co-exist and compete with each other at the trading level. At the clearing and settlement level, the new exchange will have access to Bovespa's clearing facilities (CBLC) for a certain 'access fee', enabling trades at the new exchange to be free of counterparty risk. Traders may then choose which trading venue they want to use based solely on best execution and the price charged by the trading platform, as opposed to the impact of clearing costs. The incumbent CCP will collect margin from transactions on both trading platforms, and therefore margin offsetting should be possible to a similar extent as at present.

Under this model, a new exchange looking to enter the Brazilian market may do so without worrying about how trades will be cleared, increasing the scope of potential candidates willing to enter. This may make entry by trading platforms easier.

Importantly, this option would avoid duplication of the costs of setting up a clearing infrastructure when compared with the existence of multiple CCPs. Bovespa's current investment into the clearing process would continue to be used for all equity trading carried out in Brazil, helping to distribute the costs of clearing infrastructure across a larger number of trades. This may potentially lead to lower costs per trade and/or more spare funds to invest in innovation.

Figure 12.7 Access to incumbent CCP model



Source: Oxera.

[232] The regulations in Brazil mandate that the new trading platform must clear trades through a CCP.

12.5.1 What would this involve?

Bovespa may be reluctant to provide access to its CCP functions for trades carried out on the new exchange, as this would facilitate competition at the trading level and may also lead to increased costs (one-off and possibly ongoing) and adjustments to its systems. Consequently, if CVM were to decide to facilitate competition at the trading level, it would need to encourage Bovespa to provide access to its CCP. Depending on the legal instruments available, such encouragement can potentially come from regulation (eg, imposing a regulatory requirement to provide access to trading platforms on a non-discriminatory basis), through the application of competition law (eg, refusal to supply being found as an abuse of a dominant position), or from the implicit threat of future regulation to encourage a commercial settlement acceptable to both sides. For example, in the case of a single clearing house, Bovespa is likely to want to charge an access fee to the new trading platform. According to how competition develops in Australia, this fee may need to be regulated in order to avoid exploitation of the new entrant, while being high enough for Bovespa to cover the extra costs of providing access to third parties.

Along with allowing the new trading platform to gain access to the incumbent CCP, CVM may also need to review the current best-execution rules to ensure that these take into account the choice of trading venue. Where brokers incur differential costs in relation to the use of different trading platforms and these are not passed directly through to investors, the possibility arises that the interests of the investor (the broker's client) and the broker may not be aligned. In particular, if the best price available for the security is in a trading platform that is relatively expensive (in terms of costs to the broker), the broker may have a financial incentive to use the cheaper trading platform which has the worse price for the investor. To guard against this type of behaviour by brokers, many countries impose obligations on brokers to achieve the best execution for their clients.

Implementing best-execution rules may impose some additional costs on brokers, but there are already technology providers and larger brokers in Brazil with investments in SOR systems, which could help in minimising the implementation costs of such a change.[233]

12.5.2 Risks and challenges

The main challenge facing this option would be successfully encouraging Bovespa to allow access to its CCP—Bovespa has already declined an access request from DirectEdge. Bovespa could argue, for example, that it has made the investment in the settlement infrastructure and therefore should not be required to share the fruits of that investment with a competitor at the trading platform level.

International evidence also suggests that an incumbent is likely to be reluctant to offer access to the CCP. In Japan, the incumbent CCP did not grant an alternative trading platform (ATS) access until a decade after competition was introduced. The ATS was allowed to enter, but its success was limited. In 2008, ten years after competition in trading was allowed, the existing nine ATS accounted for only about 0.2% of the market.

Coupled with inaccessibility, the regulator in Japan did not enforce best-execution rules, which may restrict competition further. Thomson Reuters noted that in the Nikkei 225 stocks, the ATS represented the best price about 60% of the time in terms of the duration of time spent at the consolidated best bid–ask price, yet the trades were directed more towards the main exchange.[234] Best-execution rules prevalent under MiFID and Reg NMS have led to the success of multiple trading venues in Europe and the USA. This implies that CVM may need to consider introducing best-execution rules in order for competition to be effective and allow new trading platforms to gain market share.

[233] Oxera's calls with international technology providers have suggested that these systems are prevalent in Brazil and that extending the systems from other countries to Brazil may be done at minimal cost.
[234] Whipp, L. (2009), 'Thomson Reuters starts Japan service', *Financial Times*, July 20th.

In addition, one response from a vertically integrated operator facing competition in an upstream market (trading) while providing services to its competitor in a downstream market (CCP and CSD services) is to provide these services, but to overcharge for them and either cross-subsidise the competitive activity (making entry harder) or just take a monopoly profit in the downstream market. As a result, these market structures also tend to generate allegations of below-cost pricing in the competitive market (often in the form of an allegation of a margin squeeze). The types of behaviour complained about often also include allegations of non-price discrimination.[235]

Finally, the international evidence of successful long-term entry of a general exchange (as opposed to trading facilities catering for specific niches of trading activity) set up in competition with an established incumbent, and offering just a duplication (or even sub-set) of that incumbent's trading opportunities is very thin on the ground. The best example of such an entry is Chi-X Australia, but this venue has been operating for under a year and is therefore still in its start-up phase.

These would be significant regulatory challenges that would need to be overcome to ensure successful and material entry of a new trading platform. If these challenges appear to be difficult to overcome, and market scale appears to be insufficient to support entry of a new CCP (or even simply a trading platform), some form of price monitoring may be considered.

12.6 Monitoring trading and post-trading fees

Putting in place a new regulatory regime to support entry, at either the trading platform or CCP level, is likely to take considerable time and effort. It could be argued that, at present, a lack of entry would be unlikely to cause significant harm, except to the extent that it limits the opportunity for trading and post-trading fees to decline as the scale of the market increases (or the likelihood of this arising), or limits the ability of market forces to squeeze inefficiencies out of the existing infrastructures (if they exist), or reduce monopoly profits (if these exist). For this reason, an alternative regulatory option might be considered—rigorous monitoring and benchmarking of the prices (and, where possible, the quality) of trading and post-trading services provided in Brazil.

This option would involve putting into place regular benchmarking of the fees charged by the incumbent infrastructure provider against comparable international benchmarks. End-to-end costs for investors could also be considered if there is uncertainty surrounding how best to compare fees with other countries (notably as the incumbent may be offering services that are provided by brokers and other market participants in other countries).

With price monitoring, there would also need to be a regulatory framework within which to act on the results of the price monitoring, if they were to indicate that fees have deviated to an excessive extent relative to international comparators. Prices and costs could be benchmarked against those in other financial centres. Comparator countries should be selected on the basis of identifying markets that are somewhat more developed and larger than the Brazilian market at present, given that the Brazilian market is growing and should be aspiring to the performance of the more developed markets.

Price benchmarking will also, indirectly, create information about the relationship between individual prices and costs. The pattern of relative prices, and relative total revenues, for different services can be compared with the pattern in other markets. Where anomalies appear to be occurring, these can trigger further investigation into whether differences between markets stem from differences in the scope or quality of services, or because the price structure is deviating from the cost structure.

[235] For an example of this type of issue, see the series of allegations against the UK telecoms company, BT, over decades, culminating in the creation of functionally separate units between the parts supplying services that are competed for, and those where BT has retained an obligation to supply its competitors in the downstream market.

However, given that price monitoring is just that, even if such monitoring indicated that prices in Brazil were out of line with (efficient) costs, there is a risk that there would be insufficient pressure on the incumbent for it to react. Price monitoring is therefore more likely to be effective if the necessary pre-conditions for (managed) entry are put in place at the same time. This would increase the threat of future entry, while ensuring that most of the additional costs of entry are incurred only if price monitoring is ineffective.

Price monitoring would, however, involve some cost itself, although this should be relatively minor. There is also an argument for suggesting that the incumbent should conduct the price monitoring for its own customers, as this may help to engage the incumbent in a meaningful debate about fees with those customers. There would always be a risk that the approach to price monitoring is unfair or biased, but this should be addressed by ensuring that the methodology is robust and that there is a minimal, but critical, amount of regulatory oversight.

12.7 Conclusions on the appropriate regulatory approach

In light of the discussion presented above, a three-pronged approach is proposed, including:

– self-imposed price monitoring and benchmarking by the incumbent;
– creating the pre-conditions for access to the (new multi-asset class) CCP;
– developing market supervision and regulation.

Each of these proposals is discussed below.

12.7.1 Self-imposed price monitoring by the incumbent

It is proposed that price monitoring be introduced, led by Bovespa, not the regulator, in order to help engage the incumbent with its stakeholders (notably brokers and investors) about the charges it levies for using its services.

Price monitoring should be based on the fees charged for trading and post-trading services relative to suitable comparator countries. These comparators could include:

– markets that are highly developed, such as the USA, to provide a suitable benchmark for the Brazilian market to aspire to in terms of scale and efficiency;
– well-developed markets that are of a similar size to, or somewhat larger than, Brazil, such as those of Germany and Australia.

This procedure would encourage more monitoring by investors, including brokers and end-investors. Regulators would be able to oversee such a process and occasionally may request more in-depth explanations for changes (or the lack of changes) to fees charged to end-users, or ask for explanations of apparent deviations from cost structures. Similarly, this would encourage an alignment of Bovespa's prices relative to the costs of providing the various services along the value chain.

This could also improve the contestability of the market, by making clearer the incumbent's costs of providing the services and therefore the potential economic space for an entrant to provide specific services.

12.7.2 Access to the new multi-asset class CCP

It is proposed that the regulator begins to assess whether access to the new multi-asset class CCP may be possible for a new trading platform. The new platform could provide an opportunity for access on a level playing field without causing excessive disruption to the operations of Bovespa, as long as sufficient planning and suitable arrangements are put in place. Both price and non-price aspects would need to be considered.

Oxera understands that the current plan is for the new CCP platform to be available in 2014, which should allow sufficient time to explore opportunities for facilitating access to the CCP for a new trading platform, on fair terms, at a future point in time.

A managed process of this type should help to ensure that there are suitable standards of risk management in the approval of both the new CCP platform and any new trading platform that would seek access to the CCP and CSD. Bovespa would have to ensure that the new technology is capable of providing access on fair terms, and that this can be planned adequately under regulatory supervision.

12.7.3 Developing market supervision and regulation

Over the next few years, the Brazilian market is likely to experience further growth, which may make the prospects for competition more real and concrete. In preparation for future competition, it would be advisable for the regulator to begin to consider the additional regulations that are likely to be required to ensure a well-functioning market given the introduction of competition.

The experience of other international markets would suggest that a number of regulations are likely to be required, including:

– the development of the regulatory framework to deal with multiple infrastructures, in advance of their arrival, even if the relevant rules are not imposed until competition actually arises (for example, best-execution rules for brokers, access conditions for the incumbent CCP, interoperability conditions for CCPs, etc);

– changes to the organisational structure of regulation, since the current high degree of self-regulation may not be appropriate given entry into the market. The functions of BSM may need to be integrated within the regulator to some extent;

– as part of the development of regulation, to address emerging issues (eg, rules specific to high-frequency trading) in order to ensure that they will operate satisfactorily in a multi-infrastructure market (eg, if required, harmonisation of circuit-breaker conditions, tick sizes).

A1 Additional sensitivity

A1.1.1 Sensitivity on netting efficiency

The netting efficiency determines how many settlement instructions are required to settle an end-investor's trade. Increasing this efficiency reduces the number of settlement instructions required, and, where CCP and/or clearing and settlement fees are charged per post-netting transaction, this reduces the cost of trading for the user. A small change in the netting efficiency rate can have a substantial impact on the number of settlement instructions. For example, if netting efficiency is 90%, 100 trades would result in 10 settlement instructions (plus the additional transfer to move securities between the intermediary and the end-investor); whereas, if netting efficiency is 95%, half as many settlement instructions are required.

Figure A1.1 below presents the results of the sensitivity analysis, in which the netting efficiency rate in each financial centre where netting occurs was increased by 1% and decreased by 5%.[236] There is no significant change in the cost of trading in any of the financial centres.

Table A1.1 summarises the assumptions underlying Figure A1.1.

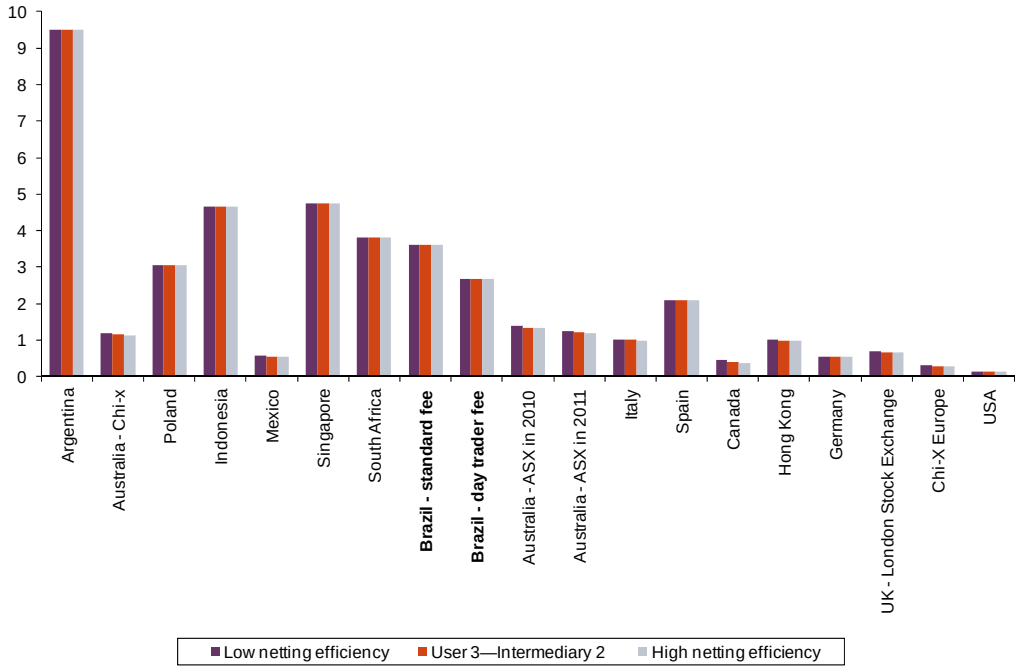
Table A1.1 Sensitivity of total trading and post-trading costs to changes in assumed netting efficiencies

	Low netting efficiency	Base-case scenario	High netting efficiency
Average order size of end-investor trade (US$)	100,000	100,000	100,000
Average daily number of client orders	5	5	5
Netting efficiency variation	–5% less efficient than the base case for the CCP	–	1% more efficient than the base case for the CCP
Average order size of intermediary trade (US$)	11,000	11,000	11,000
Average daily number of intermediary transactions	30,000	30,000	30,000

Source: Oxera.

[236] Given the cap of 100% on the netting efficiency assumption and the need to maintain differentiated netting profiles for different exchanges, it is not possible to increase the netting efficiency by more than 1%.

Figure A1.1 Sensitivity of trading and post-trading costs to changes in assumed netting efficiencies (bp)

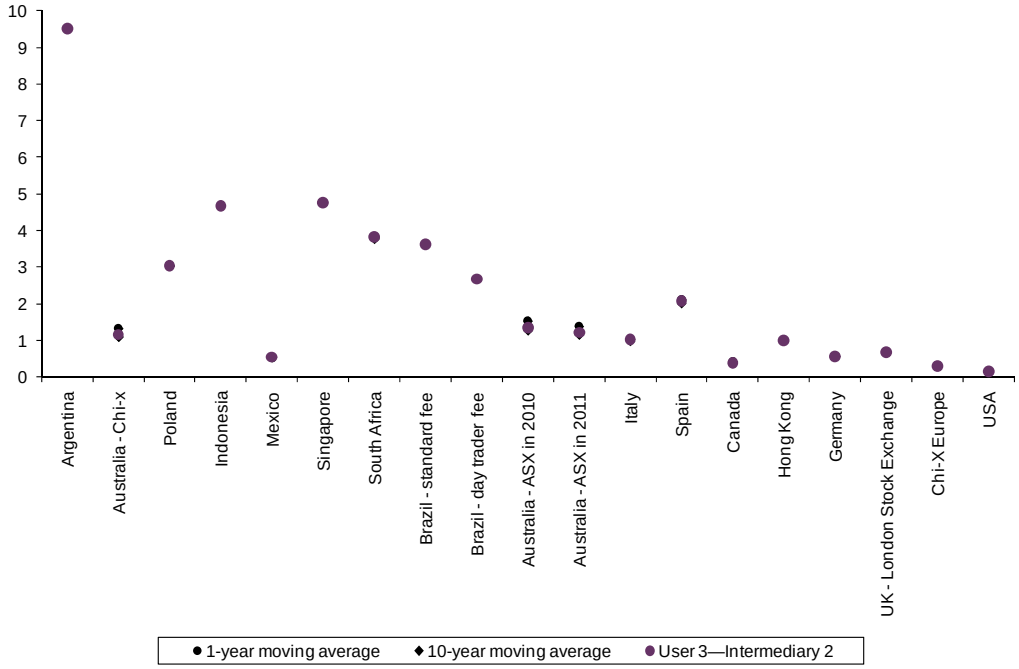


Source: Oxera analysis.

A1.1.2 Sensitivity analysis on the exchange rate

As the Brazilian exchange rate has fluctuated considerably over the past ten years, it is important to consider whether the results are sensitive to the exchange rate used. To be conservative, the results presented in section 4 use an exchange rate of R1.96 to US$1, based on a seven-year average of the historical exchange rate—with the same methodology being applied to all other non-US financial centres. Figure A1.2 repeats the analysis but using a longer and a shorter averaging window for all exchanges (ten- and one-year average exchange rates).

Figure A1.2 Sensitivity of trading and post-trading costs to changes in the exchange rate (bp)



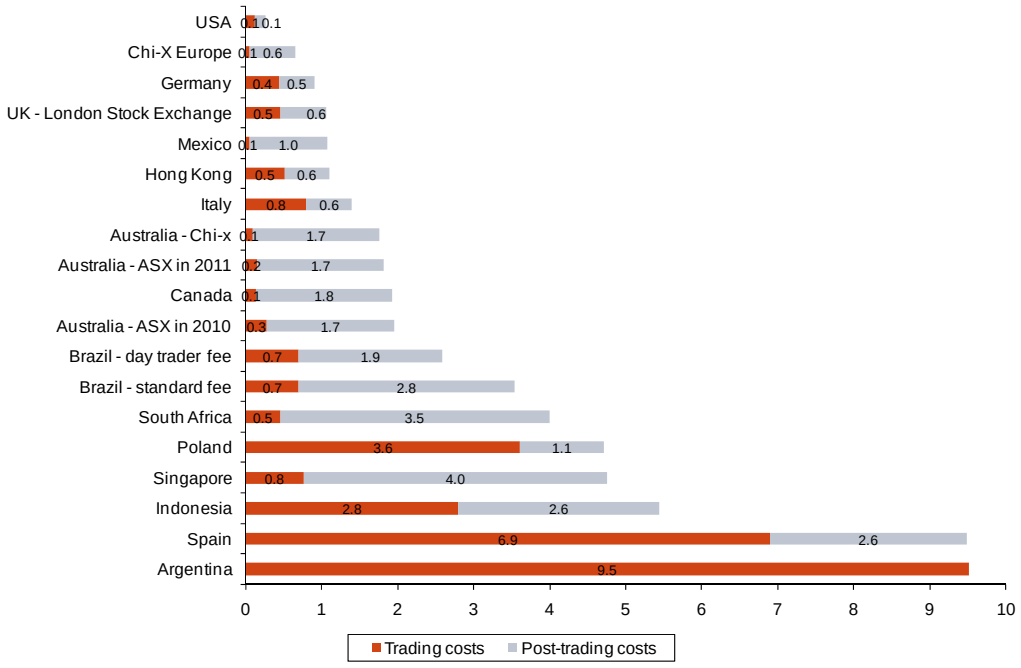
Source: Oxera analysis.

There is no significant impact on the results when changing the exchange rate used. This reflects the fact that many charges are per value of trading, or per value of AuM, and therefore not sensitive to the exchange rate.

A1.1.3 Excluding fail management fees

Figure A1.3 presents the costs of trading and post-trading in each financial centre, excluding explicit fail management charges, where these are imposed. As not all financial systems impose such charges and the assumed failure rate is low (reflecting US data on failed trades), excluding these charges has little impact on the results.

Figure A1.3 Cost of trading and post-trading excluding fail management charges (bp)



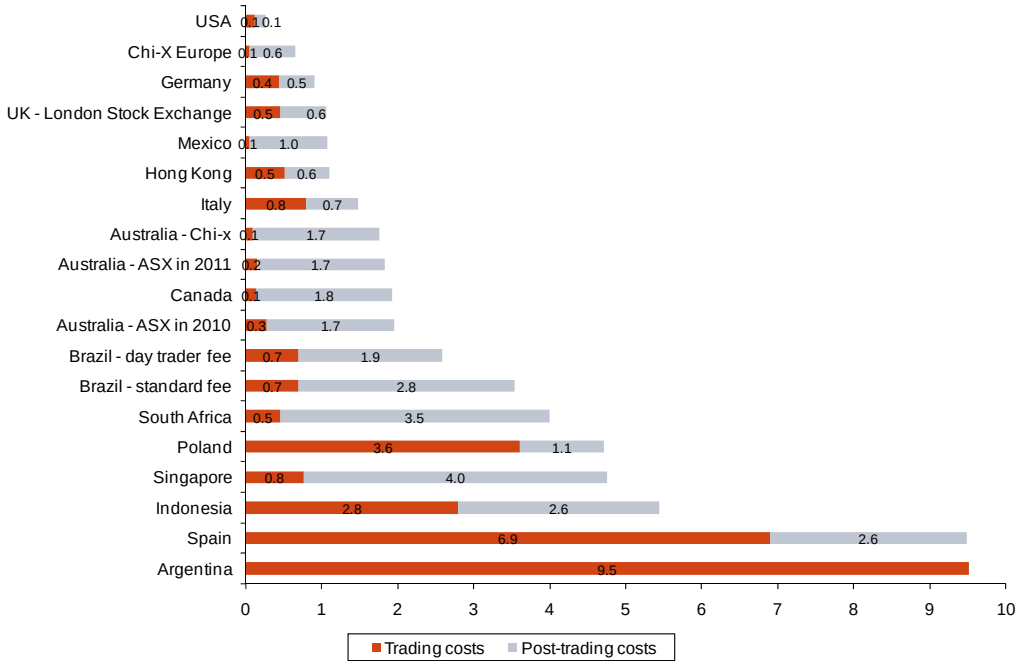
Source: Oxera analysis.

A1.1.4 Distribution of costs between trading and post-trading services

Figure A1.4 below illustrates the distribution of costs between costs incurred at the trading level and those incurred at the post-trading level in each financial centre, for User 1, Intermediary 1. The significance of post-trading costs is clear. This illustrates the importance of including both trading and post-trading when considering the cost of trading in any financial centres. It also shows that the substantial reduction in trading costs introduced by the ASX prior to the entry of Chi-X Australia (fees were cut from 0.28bp to 0.15bp) had only a small impact on the cost of trading, owing to the relative magnitude of post-trading costs at ASX Settlement Corporation.

The distribution of costs between trading and post-trading depends on the velocity of trading. The velocity of trading also has some impact on the relative cost of trading in each financial centre, resulting from the difference in the extent to which post-trading costs are recovered through custody charges, or clearing and settlement transaction fees, in different financial centres. This is assessed in the sensitivity analysis.

Figure A1.4 Distribution of costs in each financial centre

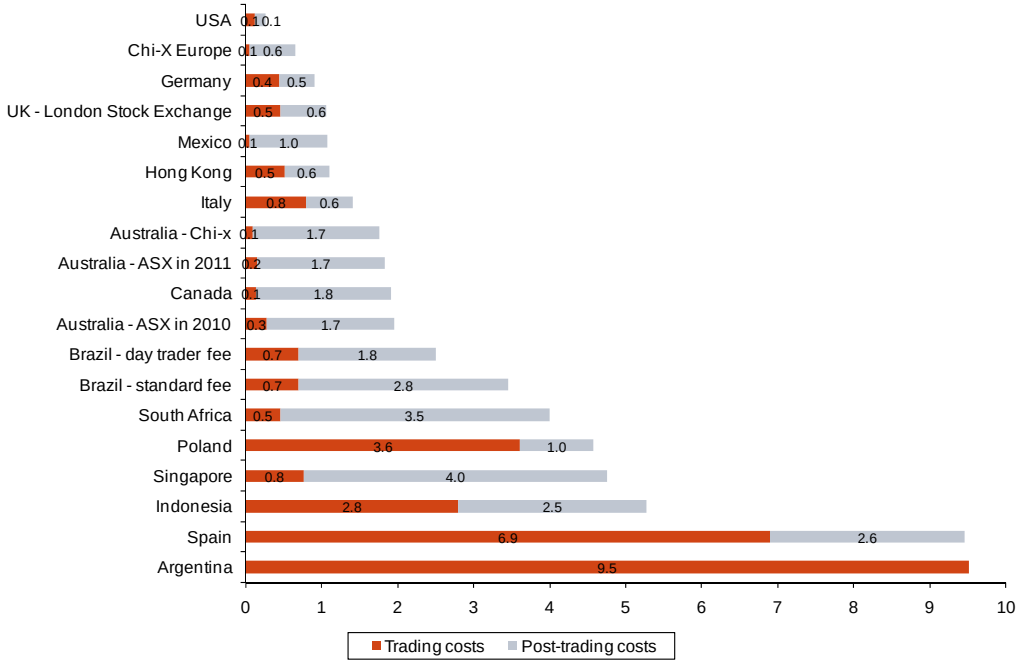


Source: Oxera analysis.

A1.1.5 Excluding custody fees

Figure A1.5 presents the variation in the cost of trading and post-trading, but excluding safekeeping fees. There is little impact on the relative cost of trading and post-trading in each financial centre, indicating that custody fees, where charged, are not a substantial cost driver for the user profiles considered in this analysis.

Figure A1.5 Cost of trading and post-trading—excluding explicit charges for custody fees (bp)



Source: Oxera analysis.

A2 Overview of pricing schedules

Table A2.1 Overview of pricing schedules—trading platforms

	Fixed fees	Basis of variable fees	Volume discounts
BM&FBovespa	No	Per value of transaction	Volume discounts available to high-frequency traders only
London Stock Exchange	Yes	Per value of transaction	Discounts based on monthly trading activity
Chi-X BATS Europe	No	Per value of transaction	Rebates on passive executions
Frankfurt	Yes	Per value of transaction	Discounts based on daily trading activity. The exchange offers three tariff menus which accommodate different trade-offs between fixed and variable fees. A minimum fee per transaction applies
Borsa Italiana	Yes	Per transaction	Discounts based on number of transactions. The exchange offers two tariff packages which accommodate different trade-offs between fixed and variable fees
Bolsas y Mercados Espanoles	Yes	Both per value and per number of transactions	Overall trading costs capped by a maximum ad valorem charge
SGX	Yes	Per value of transaction	A flat rate applies
NYSE	Yes	Per traded share	Rebates on orders that add liquidity to the platform
Toronto	Yes	Per traded share	Rebates on orders that add liquidity to the platform
Warsaw	Yes	Both per value and per number of transactions	Discounts based on the size of the trading order. Cap on maximum fee per transaction
BMV	Yes	None (only a fixed fee applies with adjustments to reflect volume discounts)	Discounts based on monthly value of trade. Discount structure exhibits strong incentives for brokers to achieve a threshold level of trading activity
Indonesia Stock Exchange	No	Per value of transaction	A flat rate is applied. A minimum monthly fixed fee applies
Johannesburg	Yes	Per value of transaction	Volume discounts apply. Minimum and maximum per-transaction fees apply
ASX	Yes	Per value of transaction	Lower fees apply to cross-trades
Chi-X (Australia)	No	Per value of transaction	A 50% discount applies to aggressive orders
Buenos Aires	No	Per value of transaction	A flat rate is applied
Hong Kong	No	Both per value and per number of transactions	Flat rates are applied

Source: Oxera analysis of pricing schedules.

Table A2.2 Overview of pricing schedules—CCPs

	Fixed fees	Basis of variable fees	Volume discounts
BM&FBovespa (CBLC)	n/a: CCP services are included in CBLC charges	n/a: CCP services are included in CBLC charges	n/a: CCP services are included in CBLC charges
LCH.Clearnet Ltd	Yes	Per transaction	Discount based on daily number of transactions
Eurex AG	Yes	Per transaction, per value of transaction and per settlement instruction	Discounts based on monthly number of transactions.
CC&G	Yes	Per transaction	Discounts based on the number of transactions. Additional charges apply for failed trades
Iberclear	Yes	Per value of transaction	A minimum and maximum fee per transaction apply
SGX	Yes	Per value of transaction	Maximum fee capped according to the number of transactions executed
NSCC	Yes	Per value of transaction and settlement and per number of transactions	Discounts based on the number of transactions
CDS	Yes	Per transaction	A flat rate is applied
KDPW CCP	No	Per transaction	A flat rate is applied
CCV	Yes	Per value of transaction	Additional fees apply for fail trades (both value and number)
KPEI	No	Per value of transaction	A flat rate is applied
Strate	Yes	Per value of transaction and per number of transactions and settlement instructions	Discounts apply depending on the value of individual transactions
ASX Settlement Corporation	Yes	Per value of transaction	Flat rates apply
Buenos Aires	n/a: no separate charges for CCP and CSD services	n/a: no separate charges for CCP and CSD services	n/a: no separate charges for CCP and CSD services
Hong Kong Securities Clearing Company Limited	No	Per settlement instruction	A flat rate is applied

Source: Oxera analysis of pricing schedules.

Table A2.3 Overview of pricing schedules—CSDs

	Fixed fees	Safekeeping fee	Basis of settlement fees	Volume discounts
BM&FBovespa (CBLC)	Yes	Yes	Per value of transaction	For fee per value of securities held, volume discounts are available according to the value of the end-investor's account
Euroclear (for London Stock Exchange trades)	Yes	No	Both per number of transactions and per number of settlement instructions	Discounts based on daily number of transactions. Additional rebates also apply to the final amounts payable
Clearstream Banking	Yes	Yes	Per settlement instruction	Flat rate is applied. Settlement fee is charged by Eurex. Discounts based on value of securities under custody also apply
Monte Titoli	Yes	Yes	Per settlement instruction	Discounts based on value of securities under custody
Iberclear	Yes	Yes	Per settlement instruction	Discounts based on value of securities under custody. Additional fees are charged for failed trades
SGX	n/a: no separate charges for CSD services	n/a: no separate charges for CSD services	n/a: no separate charges for CSD services	n/a: no separate charges for CSD services
DTC	Yes	Yes	Per settlement instruction	Discounts based on number of settlement instructions. Additional fees apply for failed trades (number and value)
CDS	Yes	Yes	Per transaction and per settlement instruction	Flat rates apply. Additional fees apply for failed trades
KDPW	Yes	Yes	Per number of settlement instructions	Additional fees are charged for failed trades (number and value)
Indeval	No	No	Per settlement instructions	A lower rate applies to cash transfers—as opposed to security transfers
KSEI	No	Yes	Per settlement instruction	Flat rates apply
Strate	n/a: no separate charges for CSD services	n/a: no separate charges for CSD services	n/a: no separate charges for CSD services	n/a: no separate charges for CSD services
ASX Settlement Corporation	Yes	No	Various charges applicable to the number of transactions, settlement instructions, or security transfers	Settlement fail fees apply (value of failed trades)

	Fixed fees	Safekeeping fee	Basis of settlement fees	Volume discounts
Caja de Valores	n/a: no separate charges for CCP and CSD services	n/a: no separate charges for CCP and CSD services	n/a: no separate charges for CCP and CSD services	n/a: no separate charges for CCP and CSD services
Hong Kong Securities Clearing Company Limited	No	No	Per value of transaction	Total fee is capped, based on number of transactions executed

Source: Oxera analysis of pricing schedules.

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