

International Transaction Cost Benchmarking Review

October 2014



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Contents

Introduction	6
Executive Summary.....	8
Overview of the Report and Information Sources	10
Section 1: International Benchmarking Review	10
Section 2: Qualitative Focus on Differing Market Models	10
Section 3: A review of clearing and risk management approaches	11
SECTION 1: Transaction Cost Analysis & Comparison Across Global Equity Markets	13
1.1 Overview	13
1.1 Transaction Cost Categories	13
1.2 Markets Covered.....	13
1.3 Trading costs	13
1.4 Data Sources	13
1.2 Assumptions.....	15
1.2.1 Participant Size.....	15
1.2.2 Assumptions Specific to Trading Costs	15
1.2.3 Assumptions specific to Clearing Costs.....	15
1.2.4 Assumptions Specific to Settlement Costs.....	16
1.3 Total Transaction Costs.....	18
1.4 Trading Costs.....	19
1.4.1 Large Firms.....	19
1.4.2 Large Firms: Continuous Trading Cost	19
1.4.3 Large Firms: Auction Trading Cost	20
1.4.4 Medium and Small Firms	21
1.4.5 Medium and Small Firms: Continuous Trading Cost.....	21
1.4.6 Medium and Small Firms: Auction Trading Cost.....	21
1.5 Clearing Costs.....	22
1.5.1 Clearing costs in Australia	23
1.5.2 Clearing Costs in Europe	23
1.5.3 Comparison with a GCM with 15% market share	25
1.5.4 Economies of Scale.....	25
1.5.5 Calculation of Value Cleared and Number of Trades Cleared at each CCP	27

1.6	Settlement Costs	29
1.6.1	Settlement Costs in Australia	30
1.6.2	Comparison with a General Participant with 15% market share	32
1.7	Recent Analysis from Oxera: Differences	33
1.7.1	Markets	33
1.7.2	“User” Profiles	34
1.7.3	Cost Comparison	35
SECTION 2: Market Focus – Examination of a Subset of Markets		38
2.1	Overview	38
2.1.1	The Evolution of Ownership formats	38
2.1.2	Horizontal versus Vertical Models	39
2.2	United States	41
2.2.1	Overview	41
2.2.2	Background	41
2.2.3	Key Regulatory Changes - The Prelude to Competition in the Markets	43
2.2.4	Current Market Status: Trading	43
2.2.5	Current Market Status: Clearing and Settlement	44
2.3	Europe	45
2.3.1	Overview	45
2.3.2	Background	46
2.3.3	The Foundations of the European Cash Equity Markets	47
2.3.4	Key Regulatory Changes - The Prelude to Competition in the Markets	48
2.3.5	Current Market Status	49
2.4	Australia vs. Canada	53
2.4.1	Overview	53
2.4.1	Background: Australia	53
2.4.2	Background: Canada	54
2.4.3	The Prelude to Competition and Key Regulatory Changes: Australia	55
2.4.5	Current Market Status: Australia	57
2.4.6	Current Market Status: Canada	59
SECTION 3: Clearing Analysis Review		61
3.1	Oxera’s Report Summary on CCPs	61
3.2	MSP Summary of the OXERA Report Findings	62
3.3	MSP Methodology and Approach	64
3.4	The Default Waterfall (<i>Oxera report section 4.1.1</i>)	66
3.5	Consistency in Tier 1 (<i>Oxera report section 4.1.2</i>)	67

3.6	Variation in Tier 2 (<i>Oxera report section 4.1.3</i>)	70
3.6.1	Replenishment	74
3.6.2	EMIR Requirement for Skin-in-the-Game	75
3.7	Handling of Participants' Collateral (<i>Oxera report section 4.1.4</i>)	77
3.8	Scope of CCP Services: Segregation of Client Assets (<i>Oxera report section 4.1.5</i>)	79
3.8	CCP Cost Comparison Methodology	80
3.9	Effect On Costs of More Than One CCP Per Market	80
Appendix I: Transaction Costs by Country		83
	Asia-Pacific: Australia	83
	Asia-Pacific: Hong Kong	84
	Europe: Pan-European Trading Venues	85
	Europe: Pan-European CCPs	86
	Europe: France	87
	Europe: Germany	88
	Europe: Norway	89
	Europe: Spain	90
	Europe: Switzerland	91
	Europe: UK	92
	North America: Canada	93
	North America: USA	94
	South America: Brazil	96
Appendix II: Market Share by Value Traded		98
Appendix III: FX Rates		100
Appendix IV: Summary of IOSCO principles and EMIR		102
Appendix V: Principle 4 – Summary of Cover 1 and 2		105

Introduction

On 15 June 2012, the Australian Council of Financial Regulators (the Council) released a discussion paper on competition in the clearing and settlement of the Australian cash equity market. Over the following six months the Council, in collaboration with the Australian Competition and Consumer Commission (ACCC) consulted with market participants on the paper. In December 2012 the Council's report was presented to the Government, which showed that the findings of the consultation were varied and suggested a cautious approach to the introduction of competition. It recommended that a decision on any licence application from a central counterparty (CCP) seeking to compete in the Australian cash equities market should be deferred.¹

The Council also recommended that, in the meantime, the Australian Securities Exchange (ASX) work with stakeholders to develop a Code of Practice for Clearing and Settlement of Cash Equities in Australia. It was further proposed that, at the end of the two years, the Council and the ACCC carry out a public review of the Code's implementation and effectiveness.

In response to the issue, ASX created a Code of Conduct. Fulfilling one of its commitments within that code, ASX commissioned and published an independent study by Oxera, benchmarking the cash equity costs of clearing and settlement (i.e. post-trade) services provided by ASX Clear and ASX Settlement. However, trading costs were also covered for completeness.

The Oxera report² was published in July 2014 and covers a broad number of markets. Its high level conclusions can be summarised as:

- ASX's costs are broadly within the range that financial market infrastructures (FMIs) of a comparable market size charge to investors with similar trading characteristics.
- ASX charges at the low end of the range of fees charged for CSD services and at the high end of fees for CCP services. There are two likely reasons for the latter:
 1. ASX cannot achieve the same lower costs as some markets due to a lack of economies of scale.
 2. ASX can justify higher clearing fees because it has more of its own capital at risk than other clearing houses. Once the contribution to the default fund is taken into account, the overall cost to users of ASX Clear is closer to the middle of the range observed elsewhere.

This independent report by Market Structure Partners was commissioned by a group of 10 Australian clearing participants³ who have significant market share in the Australian market. The intention was to respond to the Oxera report and to help contribute to the debate, particularly with regard to the cost of clearing.

¹ Council of Financial regulators (Dec 2012), "Competition in Australian Cash Equities: Conclusions"

² June 2014: Oxera - "Global cost benchmarking of cash equity clearing and settlement services"

³ Sponsors include: Citigroup Global Markets Australia Pty Ltd, Credit Suisse Management (Australia) Pty Ltd, Deutsche Securities Australia Limited, Merrill Lynch Equities (Australia) Limited, Morgan Stanley Australia Securities Limited and Pershing Securities Australia Pty Ltd.

The brief for this report was to:

1. Examine the costs of trading, clearing and settlement in Australia with particular regard to:
 - a. Benchmarking against similar markets to those covered in the Oxera report, but to focus the scope on a wider selection of markets where there is more evidence of competition in clearing.
 - b. Breaking out auction costs within the trading segment.
 - c. Addressing the argument that economies of scale contribute to cost differentials.
2. Provide a qualitative history of the evolution of a subset of markets to give some context to the different backgrounds in market structure and why differences in costs might arise.
3. To focus on clearing costs and the clearing model; particularly to examine the conclusion that ASX can justify higher clearing fees because it has more of its own capital at risk than other clearing houses and that inter-operability increases costs.

Market Structure Partners (MSP), is a consultancy that specialises in strategic advice related to capital markets infrastructure. The team has many years of practical experience related to global financial market structure and trading, clearing and settlement. MSP operates with the highest integrity and undertook this report on the basis that the sponsors could not influence the findings.

Executive Summary

- MSP benchmarked the costs of trading, clearing and settlement in 18 market combinations against costs in Australia. With a few exceptions, the overall results were broadly in line with the same markets covered by Oxera's report. However, MSP also added new markets and the overall conclusions drawn from the MSP report differed from those of Oxera.
- Total overall transaction costs in Australia are higher than in markets where there is fully functioning competition in trading and either competition or a utility model in clearing and settlement; Australia's costs are more aligned with other markets where the exchange is the dominant market.
- Trading costs are not exceptionally high when compared with other markets, although ASX, along with other incumbent exchanges, charges less during the continuous trading period where there is competition and more for the auction period which is hard to contest.
- Clearing and settlement costs in Australia are high when benchmarked across other global markets. Market structures, particularly clearing models, vary significantly across regions. In markets where there are dominant, vertical, for profit infrastructures, clearing costs tend to be at the highest level, and in markets where there are competitive or utility run models, costs tend to be at their lowest.
- MSP notes that in markets where there is a utility model e.g. the US and Canada, the market structure was clearly determined prior to the listing of any exchanges. This has facilitated competition at a trading level and kept costs low. In Europe, regulation failed to address clearing prior to the listing of exchanges and the introduction of competition in trading. This has made the path to competition hard for alternative trading platforms, and sustained higher costs for market participants. However, new CCP entrants have shown that clearing costs could be reduced and, market participants have striven to increase competition by creating inter-operability between the new entrants and traditional utility models. Vertical for profit models have generally resisted and kept costs higher.
- Oxera's report concluded that the higher cost of clearing in Australia may be attributed to a lack of economies of scale and that interoperability increases costs. MSP agrees that economies of scale can have an effect on cost. However, when taking this into account, making comparisons based on either value or volumes cleared in market infrastructures of a similar size to Australia, the average clearing cost is still higher in Australia than most other markets. Canada and Switzerland are particularly notable as markets that are most easily comparable in size and trading characteristics to Australia. Clearing costs are considerably lower in both these markets. In Norway, where the lack of economies of scale is even greater, the costs of clearing are still much lower than those of Australia.
- MSP has accounted for volume discounts that exist in other markets but would not be available in Australia. This means that some costs are overstated in this report. MSP's analysis and interviews with market participants has found that inter-operability in Europe has driven down costs, not increased them.
- Oxera's report also concluded that Australian clearing fees are higher because ASX has more of its own capital (AUD250mn) at risk than other clearing houses. MSP concludes that there are a number of other factors that have to be taken into account before reaching this conclusion:
 - The risk management and default waterfall model in Australia, managed by ASX Clear, is unusual compared to other global markets. In most other markets there is a default fund where the risk is shared between the non-defaulting market participants. ASX Clear has no

default fund shared between market participants and instead puts it own funds (AUD250mn) in place of a mutualised default fund or one that shares risk.

- The latest European regulation states that CCPs should place 25% of their total minimum capital ahead of non-defaulting members within their default waterfall. ASX Clear is putting well in excess of this ahead of non-defaulting members and is responsible for 100% of the readily available resources in the equivalent of a default fund. This could encourage the wrong type of behaviour from market participants who do not then properly manage their own risk.
- There is no substantiation that AUD250mn is the correct figure for an equity market default fund. This fund covers other instruments that may have a more complex risk profile than equities but they are not segregated. Additionally, many markets operate dynamic calculations of the amount required for the default fund and recalibrate this at least quarterly. By maintaining a static fund, the market may be over or under collateralised thus incurring extra costs to participants or risk to shareholders. Well run CCPs that use a standard initial margin model with participants contributing to the default fund have shown that they can still protect non defaulters' collateral and/or the shareholder capital. History shows, for example, when Lehman Brothers defaulted, the default fund at LCH.Clearnet did not get used.
- In utility markets and competitive markets there is a natural control process to help improve risk management and/or reduce costs. The market participants are the owners of the utility models and are incentivised to make sure that the clearing house works to optimise risk management and costs. Although utility models may be less innovative and also try to protect the interests of the incumbent participants. In competitive models, CCPs will work to innovate with risk management and reduce the cost of collateral to customers whilst keeping costs low. Although this could also incentivise a compromise in risk management processes as CCPs compete to keep costs low. In Australia there is no natural mechanism to ensure either price control or innovation takes place.
- Given that the Oxera report and this report have been generated as the result of a debate on whether to allow competition in clearing in Australia, MSP believes that both reports give rise to some philosophical questions that merit further consideration:
 - The entire Australian market is currently solely reliant on a single clearing entity. Will a single infrastructure model, run on a for-profit basis, create the optimum risk management model and lowest costs for the whole market?
 - Is it appropriate to have such a significant amount of the shareholders capital at risk?
 - Would the presence of competition create more innovative risk management tools such as dynamic default contribution calculations which would reduce the cost of capital for the participants and/or the shareholders?
 - In the very extreme scenario where replenishment of the default fund is required, are shareholders or market participants likely to be more incentivised to replenish the market?
 - Is a mutualised default fund more systemically stable for the market?

Overview of the Report and Information Sources

Section 1: International Benchmarking Review

Section 1 of the report focuses on international cost benchmarking of Australia versus 18 other market combinations of trading, clearing and settlement.

The costs of using trading and post trading services were assessed by taking a user-profile approach. This methodology has been used in similar studies by MSP and is similar to the methodology used by Oxera. However, this report focused solely on costs incurred by the intermediary and not those incurred by the end investor. This simplifies the analysis as, in reality many other costs may be passed onto the end investor along the value chain. The total cost to the end investor is also much harder to account for as the end investor may be purchasing many different services from the intermediary, and the intermediary's transaction costs are not simply passed on to the end investor.

The profiles are representative of the brokers active in the Australian cash equity market and were established in consultation with the ten sponsors of this report. The sponsors represent a variety of business models within the Australian market; both international versus domestic, and institutional versus retail models. The profiles were then applied to the cost schedules of the other FMIs examined in this study to give an estimate of the costs of trading, clearing and settlement in those markets from an Australian user perspective. Note that these costs would be different if taking the profile of a user in a different market such as the US or Europe. If being used for comparison in markets other than Australia, some costs in this analysis would, therefore be overstated. In Section 1 the scope of markets is detailed at the beginning, and the assumptions that had to be made are detailed at the end. It is not intended to be exhaustive, but to expand on the work undertaken by Oxera, and to look at FMIs where there is both a larger and a smaller scale of business being undertaken.

Fee schedules are public for all FMI's reviewed in this report, but some markets bundle services and do not provide a breakdown of pricing for different services. Some discussions were also held with some of the FMIs in this analysis, and they were given the opportunity to provide feedback on MSP's assumptions and interpretation of their fee schedules. Discussions were not held with ASX; their fee schedules are public and the Australian sponsors provided a significant amount of information about their trading, clearing and settlement behaviour to MSP.

Section 2: Qualitative Focus on Differing Market Models

This section is intended to provide some historical context about the evolution of markets and to explain why market models vary across different financial market infrastructures. It also seeks to clarify why the costs discussed in Sections 1 and 3 of this report may vary between markets. It is not intended as a fully comprehensive history of each market's development. It is specifically meant to highlight the elements of different market structures related to the scope of this report, and show how their development has subsequently influenced the regulation and costs in each market. The focus is on a sub-set of markets where the differences between models can be highlighted, and also where investor behaviour is broadly similar to that of Australia.

The history and facts provided are based on publicly available information combined with a synthesis of the practical knowledge and experience of the Market Structure Partners team.

Section 3: A review of clearing and risk management approaches

Section 3 is a review of the clearing and risk management approach at ASX, and examines Oxera's conclusion that ASX can justify higher clearing fees because it has more of its own capital at risk than other clearing houses. It also reviews the conclusion that inter-operability between CCPs increases costs for participants.

The opinions and facts provided are based on MSP's practical knowledge, as well as attributed research for this report into cash equity clearing models globally. This involved interviews with a number of FMIs and international banks about their risk management practices, and testing a number of the assumptions made by Oxera against the knowledge of those FMIs and banks.

Section 1:

Transaction Cost Analysis & Comparison Across Global Equity Markets

SECTION 1: Transaction Cost Analysis & Comparison Across Global Equity Markets

1.1 Overview

This section of the report compares end-to-end transaction costs across various global equity markets for an intermediary firm trading on exchange, and then subsequently clearing and settling that trade.

The analysis includes all direct transaction-related costs, including membership fees to each venue (e.g. trading venue, CCP and CSD). It also includes annual membership fees that are directly part of ongoing transaction costs. The analysis excludes any non-transactional costs such as custody fees and data/connectivity fees.

1.1 Transaction Cost Categories

Transaction costs have been divided into three categories: (i) trading, including both continuous and auction trading, (ii) clearing, and (iii) settlement.

1.2 Markets Covered

Section 2 of this report explains in more detail some of the differences that can be found between market structures globally. The analysis in this section includes the combinations of trading venues, CCPs and CSDs, shown in the table on the next page. It is intended to cover vertical market structures, horizontal market structures (where users may choose trading or clearing platforms), and utility structures.

1.3 Trading costs

Trading costs are calculated based on all trading done on the order book (i.e. excluding off-market and reported trades). The analysis shows a breakdown of continuous and auction trading however uses the combined cost, weighted by value traded, for the overall cost comparison graphs used throughout the report.

1.4 Data Sources

All fee levels in this report, shown in Appendix I, were current as of 1 October 2014.

All market data, including value and volume traded, and therefore market share calculations, are of the full year of 2013, using publicly available data from World Exchanges⁴ and Thomson Reuters⁵, shown in Appendix II. Where FX conversions have been required, the rate used was the average for 2013 from Oanda⁶, shown in Appendix III.

⁴ <http://www.world-exchanges.org/statistics>

⁵ <http://thomsonreuters.com/monthly-market-share-reports>

⁶ <http://www.oanda.com/currency/average>

Table 1: Market Models and Combinations of Trading Venue, CCP, and CSD used in this Analysis

	Listed Stocks of	Multiple Trading Venues Available	Choice of CCP	Trading Venue	Auction	%	CCP	CSD	Settlement
Asia-Pac.	Australia	✓	✗	ASX	Yes	17.0 **	ASX Clear	ASX Settlement	Net
				Chi-X	No ***	-			
	Hong Kong	✗	✗	HKEx	No	-	HKSCC	HKSCC	Gross
Europe	France	✓	✗	NYSE Euronext *	Yes	22.7 **	LCH.Clearnet SA	Euroclear France	Net
	Germany	✓	✓	Deutsche Börse	Yes	23.6 **	Eurex	Clearstream AG	Net
				BATS Chi-X *	No	-	EuroCCP		
				Turquoise *	No	-	LCH.Clearnet Ltd		
	Norway	✓	✓	Oslo Børs	Yes	16.1 **	Oslo Clearing	VPS	Net
							LCH.Clearnet Ltd		
	Spain	✓	✓	BME	Yes	33.1 **	Iberclear	Iberclear	Net
				BATS Chi-X *	No	-	EuroCCP		
	Switzerland	✓	✗	SIX	Yes	22.9 **	SIX X-Clear	SIX SIS	Net
	UK	✓	✓	LSE	Yes	27.2 **	LCH.Clearnet Ltd	Euroclear UK&I	Net
SIX X-Clear									
EuroCCP									
LCH.Clearnet Ltd									
Americas	Canada	✓	✗	TSX	Yes	4.1 **	CDS	CDS	Net
				Chi-X	No	-			
	USA	✓	✗	BATS Direct Edge	No	-	NSCC	DTCC	Net
				NASDAQ	No	-			
				NYSE	Yes	17.2 **			
Brazil	✗	✗	BM&F Bovespa	No	-	BM&F Bovespa	BM&F Bovespa	Gross	

* These trading venues operate in more countries than those listed in the table, however this report examines only the cost of trading of equities in the countries listed.

** This is the percentage of value traded in the auction in the relevant market, relative to total value traded on the Central Limit Order Book (CLOB), e.g. excluding off-market and reported trades.

*** Chi-X Australia does not have an auction, however does facilitate execution at the closing auction price listed by the ASX, referred to as a Market-On-Close order.

1.2 Assumptions

1.2.1 Participant Size

This report focuses on the costs incurred directly by intermediary market participants. Specifically: (i) a small intermediary firm, with 0.5% market share, (ii) a medium-sized intermediary firm, with 2.5% market share, and (iii) a large intermediary firm, with 7% market share.

Usually, intermediary firms will pass on those transaction costs to their clients, such as investment funds, with an additional margin. Therefore, MSP believes that analysing intermediary costs, rather than end investor costs, is the fairest comparison across markets.

In order to reduce market impact, and potentially execute trades at a better price, intermediary firms will often trade passively (add liquidity) where possible. In general, larger firms tend to have more technology capability (e.g. more complex order routing and execution algorithms), and therefore tend to execute a larger portion of their volume passively. In addition, certain trading venues offer a rebate on transaction costs if firms add liquidity. This, therefore, impacts overall trading costs.

The analysis in this report uses the following mix of adding versus removing liquidity for each size of firm:

	Market share (by value traded)	% of trades that add liquidity	% of trades that remove liquidity
Small firm	0.5%	30%	70%
Medium firm	2.5%	40%	60%
Large firm	7.0%	50%	50%

1.2.2 Assumptions Specific to Trading Costs

Membership fee

It is assumed that each firm is a direct member of the exchange. Applicable membership costs have therefore been included in the cost comparison.

Auction trading fees

Both continuous trading costs and auction costs have been analysed, however not all trading venues have an auction process available. Where an auction is available, these costs have been calculated and shown side-by-side to continuous trading costs, together with the percentage of value traded that gets executed in the auction.

1.2.3 Assumptions specific to Clearing Costs

Membership fee & non-transaction related costs

This analysis assumes that all firms have a general clearing membership with the relevant CCP, therefore this membership fee has been included in the transaction costs analysis. However, all non-transaction related costs, such as margin and contribution towards a default fund, have been excluded.

European Interoperable CCPs

In Europe, CCPs that operate in multiple countries (specific to this report: EuroCCP, LCH.Clearnet Ltd and SIX X-Clear) offer volume discounts based on the total number of executions and/or value traded across all markets; in other words, the greater the volume cleared the lower the average clearing fee. In addition, most intermediary firms in Europe tend to have the capability to trade across multiple venues/countries. Therefore, this report shows European clearing costs based on a firm clearing across multiple European countries collectively, limited to the countries listed in Section 1.1. This means that the report allocates a proportion of the volume discount that would be awarded across markets but not the entire discount which would also cover countries that are excluded from this report. In practice this overstates clearing costs in Europe, as a firm using the same CCP in more countries than are listed in this report will receive a lower average fee due to a higher aggregate volume.

To demonstrate this, Section 1.5.3, which analyses clearing costs, contains a sensitivity analysis that compares the clearing costs for a large firm to the clearing costs for a General Clearing Member (GCM) with at least 15% market share of clearing. This level is high enough to receive the maximum volume discount in each market.

Executed Orders

Eurex, the CCP for trades executed through Deutsche Börse, charges members based on executed orders rather than executed trades; the difference being a single order may be sent to the trading venue, which is then executed in multiple trades. For example, a firm may send a day limit order to buy 10,000 shares of company X at price Y. The order may eventually be executed in full, however in separate trades of 5,000, 3,000, and 2,000 shares. Therefore the firm has executed 3 trades from only 1 order.

In order to calculate average costs for Eurex, this report assumes order sizes as follows:

	Average Order Size
Small firm	AUD30,000
Medium firm	AUD20,000
Large firm	AUD15,000

A large intermediary firm will tend to have smaller order sizes, due to an increased technology budget. That is, they will usually have more sophisticated execution algorithms, capable of splitting a single order into smaller orders, in order to reduce market impact.

1.2.4. Assumptions Specific to Settlement Costs

Membership fee & non-transaction related costs

As per clearing cost assumptions, this report assumes that all firms have a general membership with the relevant Central Securities Depository (CSD). The cost comparison is focused on transaction costs only, and therefore does not include custody or maintenance fees.

Failed settlement fees

It is assumed that all trades clear and settle successfully, and therefore failed settlement fees have not been used in any cost comparison calculations.

Markets with Combined Clearing and Settlement costs

For exchanges that provide a single set of fees for both clearing and settlement, the cost comparison divides the total cost between these two categories by the same proportion that the costs are split in Australia, which are shown in the table below. Within the context of this report, those markets are Brazil (BM&F Bovespa), and Spain (Iberclear).

For example, a large intermediary firm operating in Brazil has total clearing at settlement costs of 2.75bps. This report splits those costs as 65.3% (1.80bps) to clearing, and 34.7% (0.954bps) to settlement.

	Clearing (bps)	Settlement (bps)	Total (bps)	Clearing as a % of Total	Settlement as a % of Total
Large firm	0.2506	0.1329	0.3835	65.3%	34.7%
Medium firm	0.2515	0.1380	0.3895	64.6%	35.4%
Small firm	0.2577	0.1702	0.4279	60.2%	39.8%

Note: All basis point figures are rounded to 4 decimal places

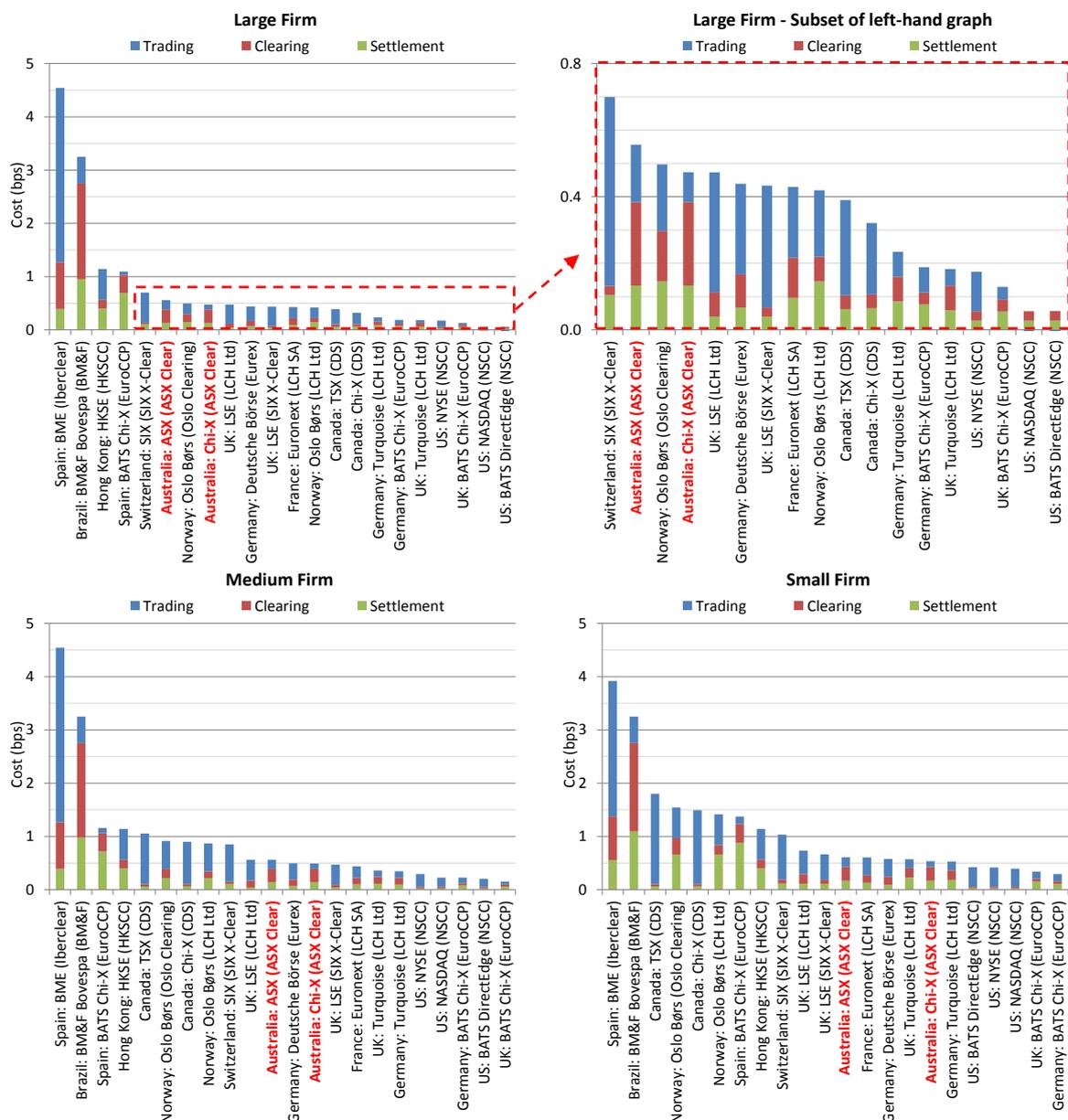
Clearing and settlement costs above include membership fees to the exchange. All figures in the above table are explained in more detail in the following sections.

1.3 Total Transaction Costs

The graphs below show total transaction costs split into: (i) Trading, (ii) Clearing, and (iii) Settlement. All of these categories are shown individually over the following pages.

Overall costs are highest where there is a strong vertical structure or little competition in the market (e.g. Spain, Brazil, and Hong Kong)⁷. Costs are lowest where there is a utility structure for clearing or a high level of competition in clearing (e.g. the US or certain parts of Europe). There may be other factors contributing to this (e.g. economies of scale), which are covered later in this section.

Total overall costs in Australia are at the higher end of the scale for large intermediaries, around mid-range for medium intermediaries, and slightly cheaper than mid-range for small intermediaries.



⁷ Even though there is competition for trading in Spain, the exchange retains control over clearing and settlement costs, which makes it more expensive to clear and settle outside of the vertical infrastructure.

1.4 Trading Costs

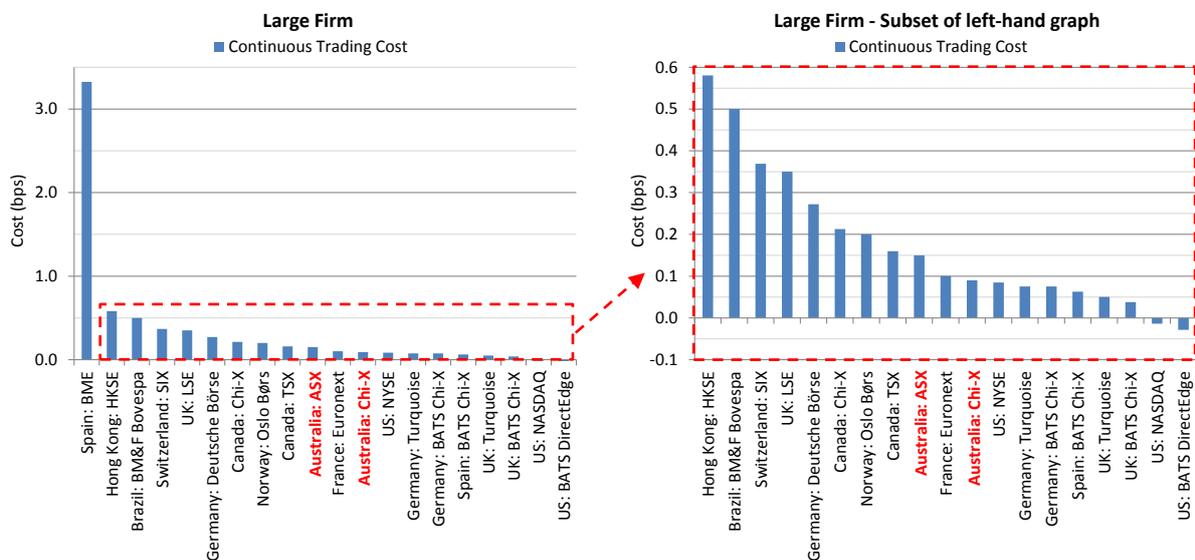
Trading costs in this analysis comprise two components: (i) continuous trading costs, and (ii) auction trading costs. The following graphs compare these two cost components by firm size; the costs for a large firm are shown below, and the costs for small and medium firms are on the next page.

1.4.1 Large Firms

The graphs below illustrate that costs are generally highest for large firms in markets where the exchange is dominant in its market (e.g. Spain, Hong Kong, Brazil), or where the domestic market remains strong due to the complexities of best execution regulation that does not compel participants to search for the best price (e.g. French stocks via the incumbent local exchange, Euronext, UK stocks via the LSE, German stocks via Deutsche Börse). Factors that contribute to this are discussed in Section 2 of this report. However, where there is competition for trading these stocks on alternative platforms, pricing is cheaper.

1.4.2 Large Firms: Continuous Trading Cost

The cost of trading in Australia at either ASX or Chi-X is cheaper than at incumbent exchanges that still have a dominant position, or a very strong position in their home market, but these costs have not reached the same level as fully competitive markets where competition or utility models exist in clearing.



Overstatement of costs e.g. London Stock Exchange (LSE)

The trading costs shown above assume all trades are executed through a single trading connection, known as an ID, to the exchange. In some markets, intermediaries have more than one exchange connection and so they can use multiple IDs to optimise their costs.

The chart potentially overstates trading costs for the LSE, which offers free execution on trades where at least 75% of the value traded adds liquidity. This pricing scheme, referred to as the Liquidity Provider Scheme, is qualified on an ID level rather than a firm level. In practice, most firms have multiple trading IDs of which one, or several, will qualify for the Liquidity Provider Scheme.

If the above graphs assumed two trading IDs, one for removing liquidity and the other for adding liquidity, then the LSE trading cost would be 0.14bps (instead of 0.34bps currently shown in the graph).

Negative Costs e.g. NASDAQ or BATS Direct Edge

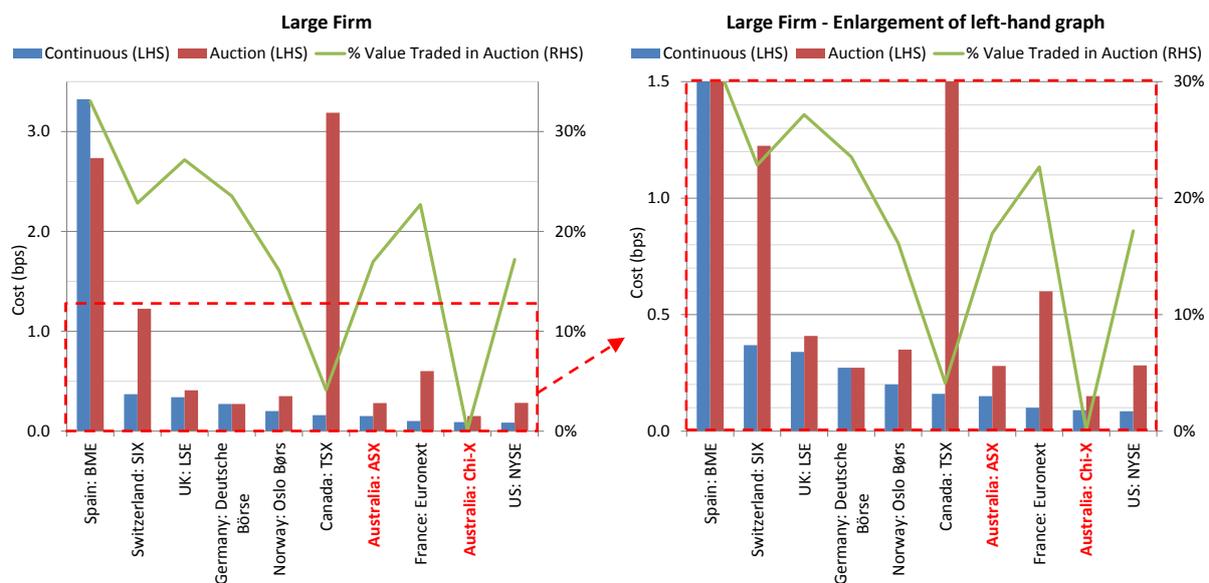
A large firm trading on these exchanges that posts at least as much liquidity as it removes, will be paid for posting liquidity. This is because both of these markets have a tiered rebate structure for adding liquidity, whereby the top two tiers of rebate are higher in absolute terms than the fee for removing liquidity.

1.4.3 Large Firms: Auction Trading Cost

Even in markets where competition exists, pricing is much higher in the auction period. This is most likely due to the fact that it is very hard for competing platforms to contest an auction period, as this is a time when liquidity concentrates at the incumbent exchange.

The graphs below show how these exchanges can price higher for flow executed on the exchange during the auction period. In Australia, ASX is included in this category as the majority of auction flow is conducted on its market. In markets such as Spain where barriers to entry for competing platforms have been high, both the auction and the continuous trading prices are high. However, in most other markets where pricing for continuous trading has come under intense competition, exchanges have adjusted their fees for the continuous trading period whilst defending or increasing pricing in auctions. MSP has previously tracked price changes between auctions and continuous trading.

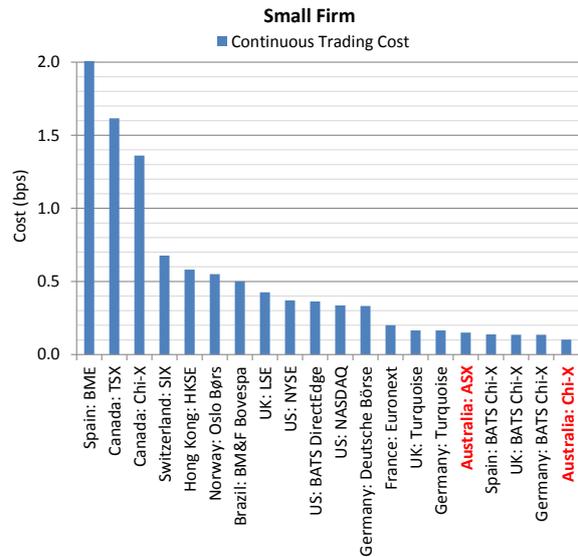
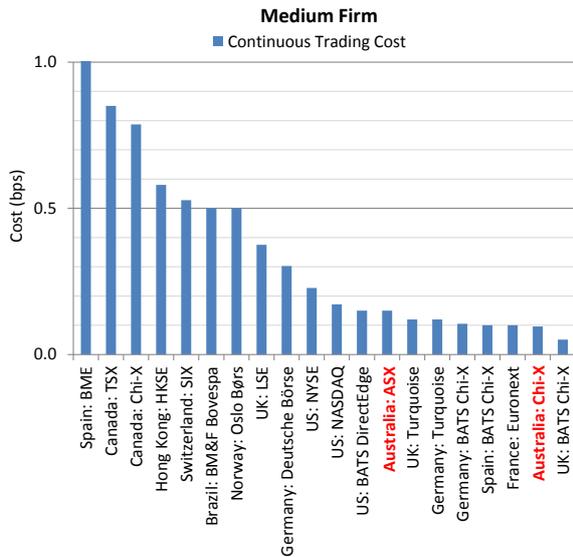
The below graphs are ranked by Continuous Trading Cost.



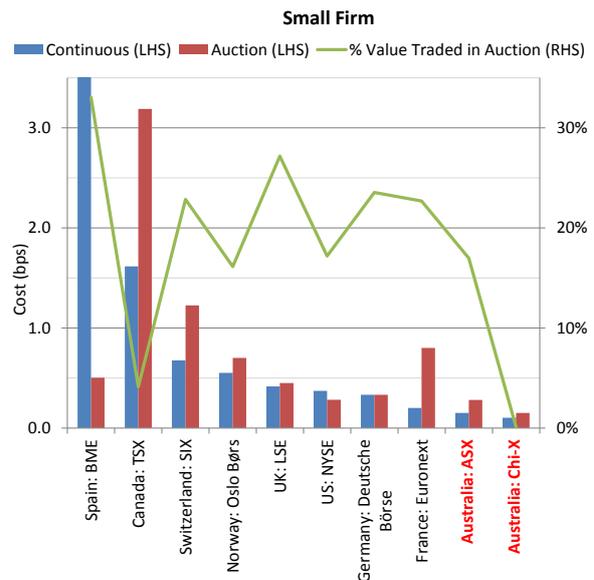
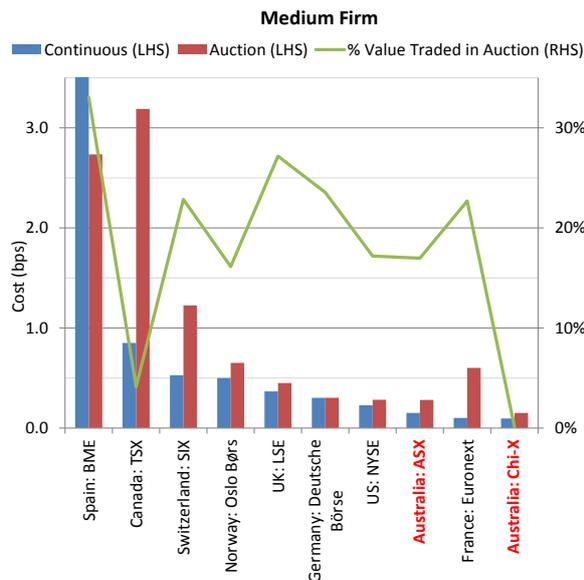
1.4.4 Medium and Small Firms

The below graphs show continuous and auction trading costs for Medium and Small firms respectively. In both cases, the y-axis of the continuous trading cost graphs have been limited, excluding the full continuous trading cost for BME in Spain, in order to give more visible granularity to most of the costs. In each case, BME trading costs are 3.52bps relative to value traded in that market by each size firm.

1.4.5 Medium and Small Firms: Continuous Trading Cost

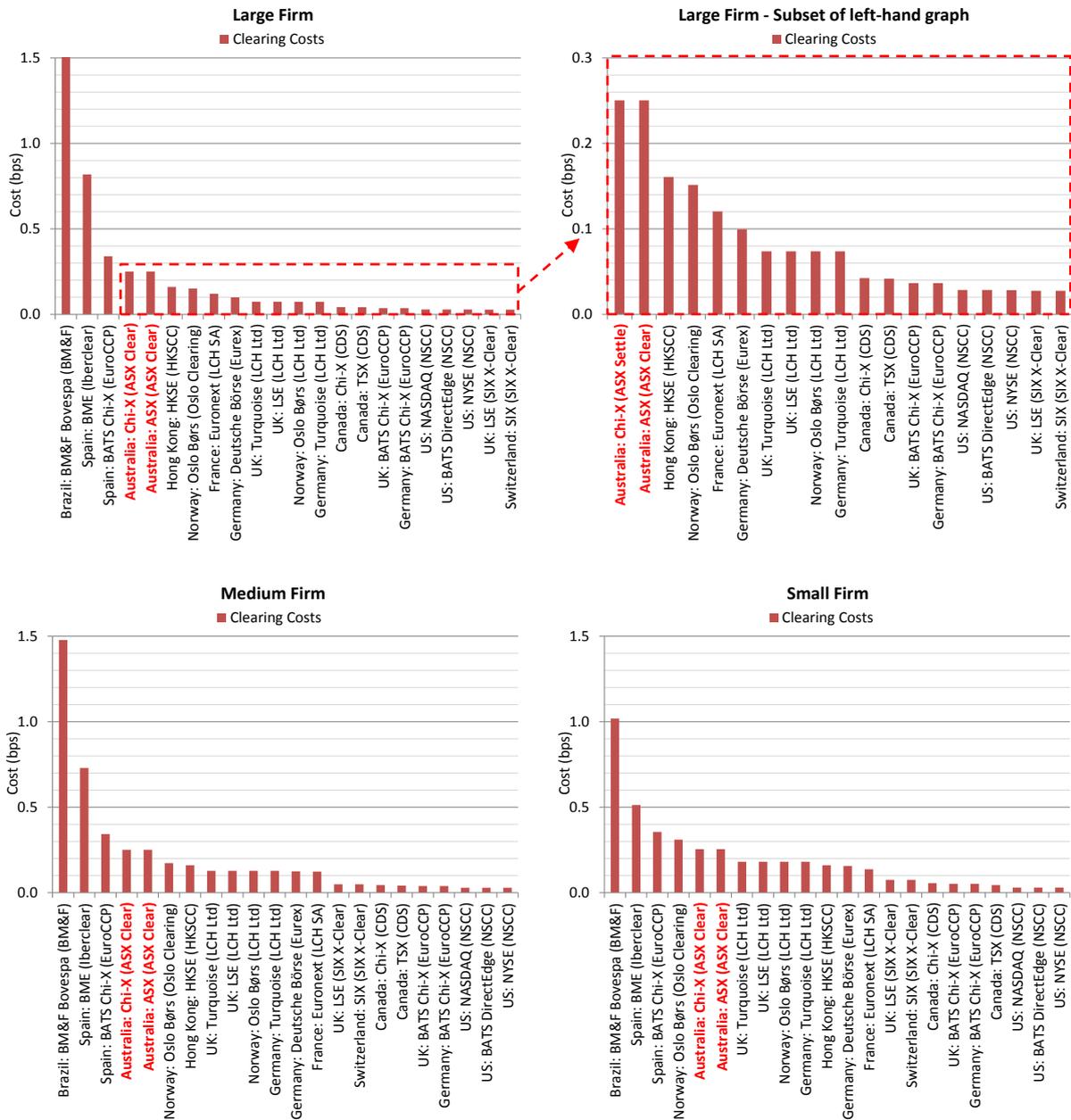


1.4.6 Medium and Small Firms: Auction Trading Cost



1.5 Clearing Costs

In markets where the exchange controls the clearing entity, the cost of clearing remains highest (e.g. Brazil and Spain). Australian clearing costs are also at the high end of the chart. Costs of incumbent clearing houses are also higher than a competitor in those markets where there is some competition. This is likely to be due to complexities in markets such as Europe where domestic participants may only have membership of the local clearing house, and have less incentive to join a clearing house that offers multiple market clearing. Clearing costs are lowest in markets where there is competition or a utility model. Again, this may be affected by economies of scale which is dealt with further on in this section.



1.5.1 Clearing costs in Australia

ASX Clear charges 0.25bps on value traded for clearing. However, the above graphs also include the cost of membership, which is AUD 7,500 per year. As most firms are likely to be members of both ASX and Chi-X, this cost has been divided between the two exchanges, and has been allocated proportionally to the value traded on each exchange. The breakdown of membership cost is shown in the below table.

Firm Size (Market Share)	Trading Venue	2013 Value Traded (AUD m)	Allocated Membership Cost (AUD)	Membership Cost (bps)	Total Clearing Cost (bps)
Large (7%)	ASX	126,030	6,929	0.0005	0.2505
	Chi-X	10,378	571	0.0005	0.2505
Medium (2.5%)	ASX	45,011	6,929	0.0015	0.2515
	Chi-X	3,706	571	0.0015	0.2515
Small (0.5%)	ASX	9,002	6,929	0.0077	0.2577
	Chi-X	741	571	0.0077	0.2577

1.5.2 Clearing Costs in Europe

The CCPs that operate in multiple countries (specific to this report: EuroCCP, LCH.Clearnet Ltd, and SIX X-Clear) offer volume discounts based on the total number of executions and/or value traded across all markets. In addition, most intermediary firms in Europe tend to have the capability to trade across multiple venues/countries. Therefore, the relevant membership fee for European CCPs has been split pro-rata to each country based on value traded by the firm in each market, while any volume discounts for clearing fees are cumulative across those markets. This calculation is shown for each market in the tables below.

Large firm (market share: 7%)

	Markets	Value Cleared (AUD m)	Number of Trades	Clearing Fee (AUD)	Clearing Fee (bps)	Membership Fee (AUD)	Membership Fee (bps)	Total Cost (bps)
EuroCCP	Germany (BATS Chi-X)	14,788	1,263,746	51,971	0.035	1,714	0.001	0.036
	Spain (BME)							
	UK (LSE)							
LCH.Clearnet Ltd	Germany (Turquoise)	19,400	1,754,935	140,981	0.073	1,682	0.001	0.074
	Spain (BME)							
	UK (LSE and Turquoise)							
SIX X-Clear	Switzerland (SIX)	23,213	1,710,551	62,003	0.027	1,560	0.001	0.027
	UK (LSE)							

Note: all figures shown per month

Overstatement of costs e.g. LCH.Clearnet Ltd

The above calculations only include the specific markets listed in this report. In reality, a large firm operating in Europe will trade more markets, and therefore will qualify for greater clearing volume discounts. This is particularly relevant for LCH.Clearnet Ltd, which has a pricing structure oriented towards a firm trading higher volume (or more markets). The below table shows the cost for a large firm that: (i) uses BATS Chi-X and Turquoise to trade all European countries, and (ii) trades all other exchanges listed in this report that are eligible for clearing with LCH.Clearnet Ltd.

Large firm (market share: 7%)

	Markets	Value Cleared (AUD m)	Number of Trades	Clearing Fee (AUD)	Clearing Fee (bps)	Membership Fee (AUD)	Membership Fee (bps)	Total Cost (bps)
LCH.Clearnet Ltd	Pan-Europe (BATS Chi-X, Turquoise), Norway (Oslo Børs), Switzerland (SIX), UK (LSE)	44,622	4,894,253	146,768	0.033	1,682	0.000	0.033

Note: all figures shown per month

Medium and Small firms

The tables below show the same pan-European clearing cost calculation for medium and small firms. These calculations only use the specific markets listed in this report.

Medium firm (market share: 2.5%)

	Markets	Value Cleared (AUD m)	Number of Trades	Clearing Fee (AUD)	Clearing Fee (bps)	Membership Fee (AUD)	Membership Fee (bps)	Total Cost (bps)	
EuroCCP	Germany (BATS Chi-X) Spain (BME) UK (LSE)	5,282	451,338	18,561	0.035	1,714	0.003	0.038	
	LCH.Clearnet Ltd	Germany (Turquoise) Spain (BME) UK (LSE and Turquoise)	6,929	626,763	86,808	0.125	1,682	0.002	0.128
		SIX X-Clear	Switzerland (SIX) UK (LSE)	8,290	610,911	38,676	0.047	1,560	0.002

Note: all figures shown per month

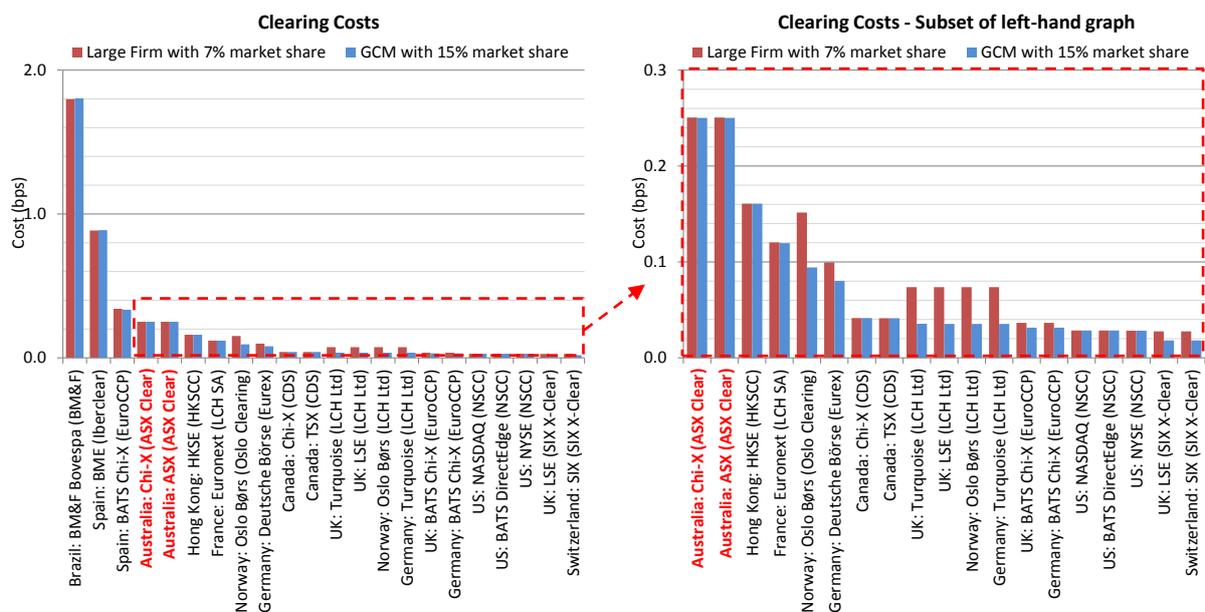
Small firm (market share: 0.5%)

	Markets	Value Cleared (AUD m)	Number of Trades	Clearing Fee (AUD)	Clearing Fee (bps)	Membership Fee (AUD)	Membership Fee (bps)	Total Cost (bps)	
EuroCCP	Germany (BATS Chi-X) Spain (BME) UK (LSE)	1,056	90,268	3,712	0.035	1,714	0.016	0.051	
	LCH.Clearnet Ltd	Germany (Turquoise) Spain (BME) UK (LSE and Turquoise)	1,386	125,353	23,271	0.168	1,682	0.012	0.180
		SIX X-Clear	Switzerland (SIX) UK (LSE)	1,658	122,182	10,889	0.066	1,560	0.009

Note: all figures shown per month

1.5.3 Comparison with a GCM with 15% market share

In a number of markets, smaller firms opt to clear through a third party arrangement with a General Clearing Member (GCM) that clears a large amount of volume and therefore achieves a lower average cost. The graphs below compare the cost of clearing for a large firm, with 7% market share, against a GCM that has 15% market share.



The above graphs are limited to only those markets specified in this report. As per the analysis of Clearing Costs in Europe above, firms trading more European markets would be eligible for greater volume discounts and therefore achieve a lower aggregate clearing cost.

1.5.4 Economies of Scale

In most industries, economies of scale play a part in lowering costs. Therefore, it has been argued that a lack of economies of scale justifies a higher cost of clearing in Australia. MSP's mandate was to look at clearing costs in more detail and examine this by comparing; (i) total value cleared by a CCP, and (ii) total number of trades cleared by a CCP, against the average cost of clearing for a large firm through that CCP. Each set of graphs below include one to show all markets in the report, followed by a second graph excluding outliers to give more granularity on the other markets.

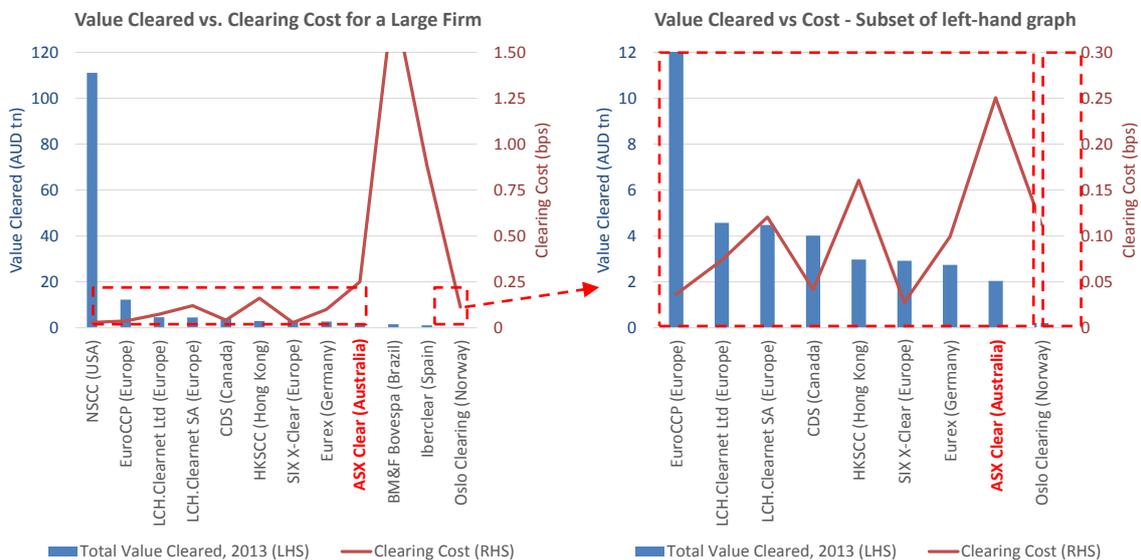
Note that in interoperable (European) markets, the graphs show total value and trades cleared for the CCP across all markets, versus the average clearing cost for clearing for all markets within this report eligible to be cleared through that CCP. This means that a proportion of the volume discount that the participant would receive has been allocated to the markets examined in these reports but not the full volume discount that a participant might receive when trading across all markets i.e. both those included in and excluded from this report.

For European markets, the average clearing costs are therefore overstated as also demonstrated in the comparisons of clearing costs for a GCM with 15% market share on the previous page. This is due to the limited range of countries included within this analysis. In reality clearing costs may be lower than they appear for some participants in these graphs.

The analysis in the previous section has already demonstrated that in markets where the exchange has greatest control over the infrastructure, the costs are highest. However, it is important to recognise that some markets clear considerably more or less than others value in terms of value traded.

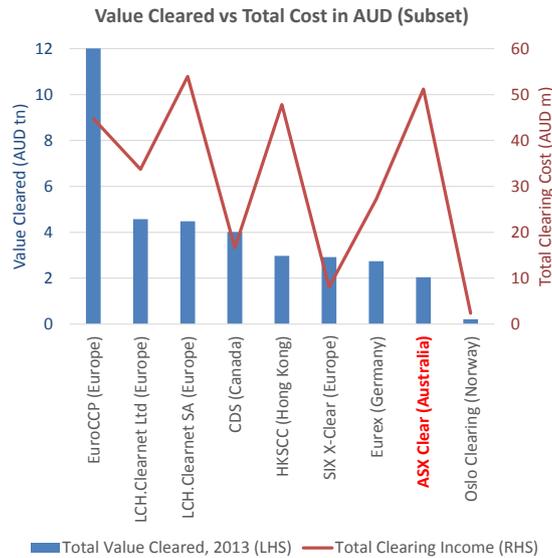
Value Cleared vs. Clearing Cost

Even when compared with peers of a similar value cleared to the Australian market, such as SIX Xclear, Eurex, Canada and HKSCC, the average cost of clearing in Australia is considerably higher. In addition, the graphs demonstrate that a market such as Oslo which has much lower values cleared than Australia has lower average clearing cost. Norway has recently opened the clearing market to competition, with LCH.Clearnet coming online earlier this year.



It could be argued that some of these CCPs have greater economies of scale than ASX Clear or HKSCC, as they clear other products such as derivatives. However, this argument does not hold, as both HKSCC and ASX Clear also clear derivatives.

The following graph shows the AUD equivalent of the basis point costs above. These AUD costs represent the total cost of clearing, across all intermediaries in each market, if all of those intermediaries were large firms on average (e.g. 7% market share). Generally smaller firms have higher clearing costs, while a larger GCM may have lower costs, and therefore changing the assumption of market participants would have the effect of increasing or lowering costs in each market respectively. Overall this shows the total cost that a CCP is potentially extracting from market participants compared to the value that is cleared. Compared to similar size markets such as Eurex and SIX X-Clear, ASX is extracting significantly more income. In Hong Kong, which is a similarly dominant market, the value cleared is slightly higher and the income extracted is slightly lower. LCH extracts a similar amount of income but clears a greater value and, as previously stated, the costs at LCH are over-stated in order to make a fairer comparison with Australia.



Number of Trades Cleared vs. Clearing Cost

In terms of the number of trades cleared, BM&F Bovespa, HKSCC, and ASX Clear have greater economies of scale than some of their peers; however, clearing costs are higher than their peers.



1.5.5 Calculation of Value Cleared and Number of Trades Cleared at each CCP

Countries with only one CCP (US, Canada, Hong Kong, Australia, and Brazil): Value Cleared and the Number of Trades Cleared represent a sum of value traded and number of trades across all exchanges in that country.

Eurex (Germany): Value and Number of Trades Cleared represents all listed equity trades executed on Deutsche Börse. While it is possible that Eurex clears more equity market transactions from other exchanges, this represents the minimum.

Iberclear (Spain): Value and Number of Trades Cleared represent all listed equity trades executed on the BME. Spain now allows for clearing through an international CCP, such as EuroCCP, however, intermediaries executing through BME tend to clear through Iberclear, whereas intermediaries executing through BATS Chi-X may use another CCP.

Oslo Clearing (Norway): Intermediaries readily use LCH.Clearnet Ltd as an alternative CCP in Norway. It has not been possible to obtain a breakdown of clearing volume for Norway listed equities specifically, therefore the above analysis assumes that LCH.Clearnet Ltd has the same market share of trades executed on Oslo Børs in Norway that it does across Europe, which is 15%, while Oslo Clearing clears the remaining 85%.

LCH.Clearnet Ltd & SA: Number of Trades Cleared for both of these CCPs are listed on their website (<http://www.lchclearnet.com/asset-classes/equities>). Value Cleared for these CCPs is a result of multiplying the number of transactions with an average trade size of AUD11,775 (this is the average trade size across all European trading venues in this report, shown in the table below).

	Number of Trades (2013)	Value Traded (2013, AUD m)	Average Trade Size (AUD)
BATS Chi-X	395,270,603	2,427,502	6,141
BME	48,446,076	918,445	18,958
Deutsche Börse	104,079,614	1,376,229	13,223
LSE	211,209,000	2,302,498	10,902
NYSE Euronext	168,811,399	1,713,367	10,150
Oslo Børs	17,775,134	126,133	7,096
SIX Swiss	31,167,152	697,792	22,389
Turquoise	158,189,036	844,793	5,340
Average			11,775

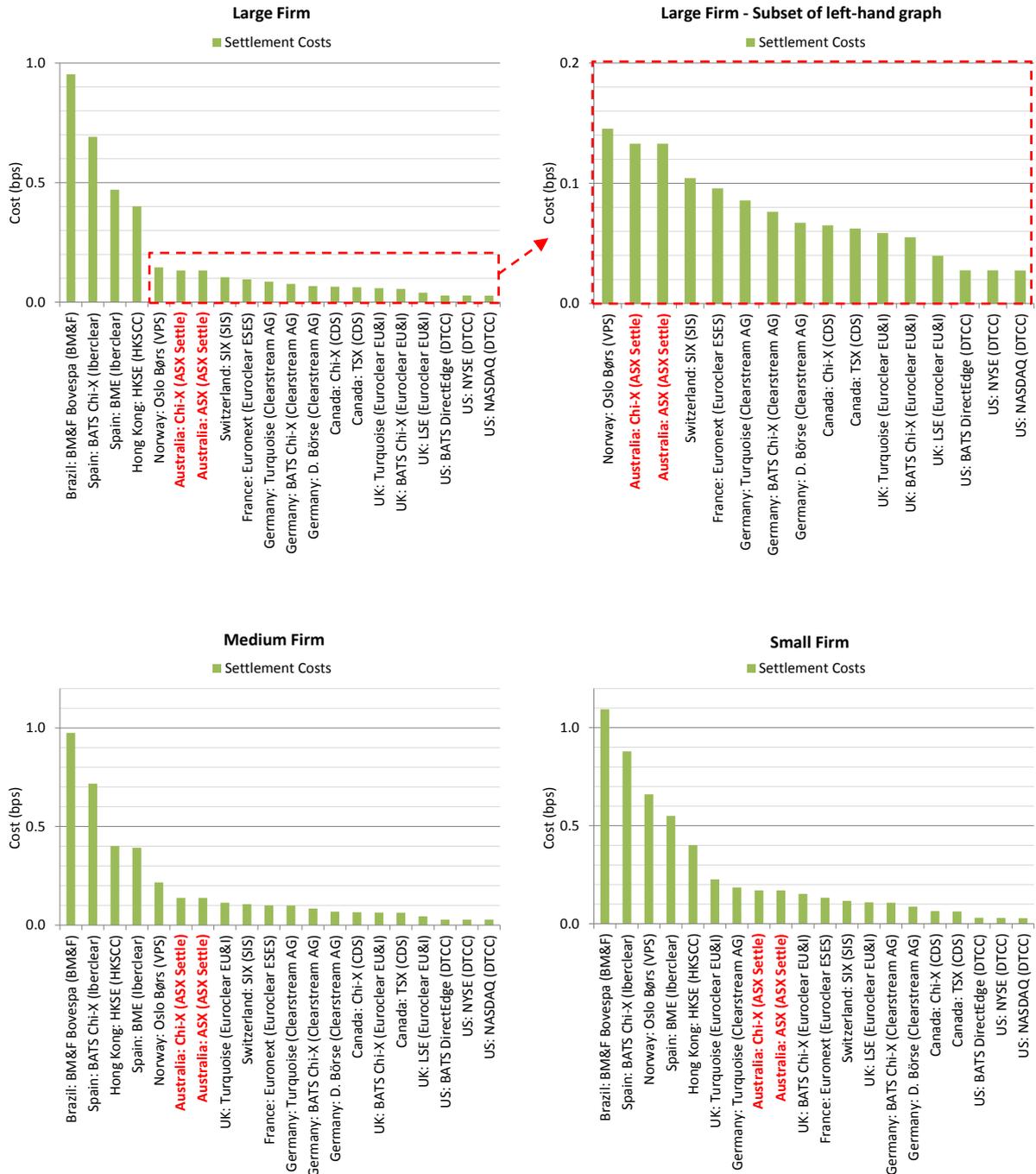
Source: Federation of European Securities Exchanges (www.fese.eu)

EuroCCP: Number of Trades Cleared for EuroCCP has been taken from its 2013 annual report, in which it listed 4 million trade sides cleared per day throughout 2013. This equates to just over 1 billion sides cleared per year based on 252 trading days per year. Value Cleared is the product of the number of sides and an average trade size of AUD11,775, as calculated above, which results in AUD12.26 trillion.

SIX X-Clear: Values have been calculated in a similar manner to EuroCCP. SIX X-Clear lists 240 million executions cleared in their 2013 annual report. Value Cleared is the product of this, and an average trade size of AUD11,775, as calculated above, which results in AUD2.96 trillion.

1.6 Settlement Costs

The graphs below show settlement costs for all combinations of trading venues, CCPs, and CSDs. Once again, markets with a strong vertical infrastructure are the most expensive markets for settlement. Australia sits at the high end of the scale. Markets where there is a utility model are the cheapest markets for settlement but this may also be due to factors such as economies of scale.



1.6.1 Settlement Costs in Australia

Settlement costs in all netted markets can be sub-divided into three layers:

- (i) **CCP to CCP** (applicable to interoperable European countries only)
One settlement per stock, per day.
- (ii) **CCP to intermediary** (or intermediary to intermediary in some markets)
One settlement per stock, per day.
- (iii) **Intermediary to their clients**
One settlement per client, per stock, per day.

With regard to the final layer above, in practice, many client investment firms are unable to support netted settlement, and therefore settle in a single order size. The analysis in this report addresses this by using an average daily settlement size per client for the cost calculation. This is described in more detail further below.

In addition, there is usually a further layer of settlement at the client level, from their master account into their sub-accounts. However this report focuses on costs directly incurred by intermediaries, therefore this final further layer of settlement is not relevant to this analysis.

Calculation of Layers 1 and 2

These layers of settlement costs are relatively insignificant, amounting to 0.0025bps for a large firm operating in Australia, and 0.0070bps and 0.0352bps for a medium and small firm respectively.

In order to calculate these layers of costs, this report assumes that firms trade stocks of the main index in each market only, as not all stocks outside that index are liquid enough to be traded by all firms every day. These indices are shown in the following table:

	Listed Stocks of	Netted Market	Index
Asia-Pac.	Australia	✓	ASX 100
	Hong Kong	x	n/a
Europe	France	✓	CAC 40
	Germany	✓	DAX 30
	Norway	✓	OBX 25
	Spain	✓	IBEX 35
	Switzerland	✓	SMI 20
	UK	✓	FTSE 100
Americas	Canada	✓	TSX 60
	USA	✓	S&P 500
	Brazil	x	n/a

In addition, for those countries with multiple trading venues, these layers of settlement only happen once per day irrespective of the trading venue used to trade the security. Therefore, this cost has been allocated between each trading venue proportionally to value traded. This results in the same basis point cost for each trading venue in that country.

Calculation of Layer 3

In order to calculate this layer of settlement costs, this analysis assumes an average daily settlement value of AUD100,000 for each firm, per client, per stock, per day. This value is the average of estimates from various market intermediaries in Australia.

Settlement cost is then calculated as follows:

- (i) Calculate the number of settlements per firm

$$\text{Number of Settlements} = \text{Value Traded} / \text{Average Settlement Value}$$
- (ii) Calculate the AUD settlement cost per firm

$$\text{Settlement Cost (AUD)} = \text{Cost per Settlement (AUD)} * \text{Number of Settlements}$$
- (iii) Calculate the basis point settlement cost per firm

$$\text{Settlement Cost (bps)} = \frac{\text{Settlement Cost per transaction (AUD)}}{\text{Value Traded by firm (AUD)}} * 10,000$$

The following table illustrates this layer of calculation with respect to Australia:

Firm Size (Market Share)	Trading Venue	2013 Value Traded (AUD m)	Average Settlement Value (AUD)	Number of Settlements (2013)	Cost per Settlement (AUD) *	Settlement Cost (AUD)	Settlement Cost (bps)
Large (7%)	ASX	126,030	100,000	1,260,302	1.30	1,638,393	0.13
	Chi-X	10,378	100,000	103,776	1.30	134,908	0.13
Medium (2.5%)	ASX	45,011	100,000	450,108	1.30	585,140	0.13
	Chi-X	3,706	100,000	37,063	1.30	48,182	0.13
Small (0.5%)	ASX	9,002	100,000	90,022	1.30	117,028	0.13
	Chi-X	741	100,000	7,413	1.30	9,636	0.13

* This is the DvP settlement fee listed by ASX Settle

Then, to find total settlement costs for each firm and trading venue, the above figures are combined with the costs from the first layers of settlement, and with membership costs. This is shown with respect to Australia in the following table:

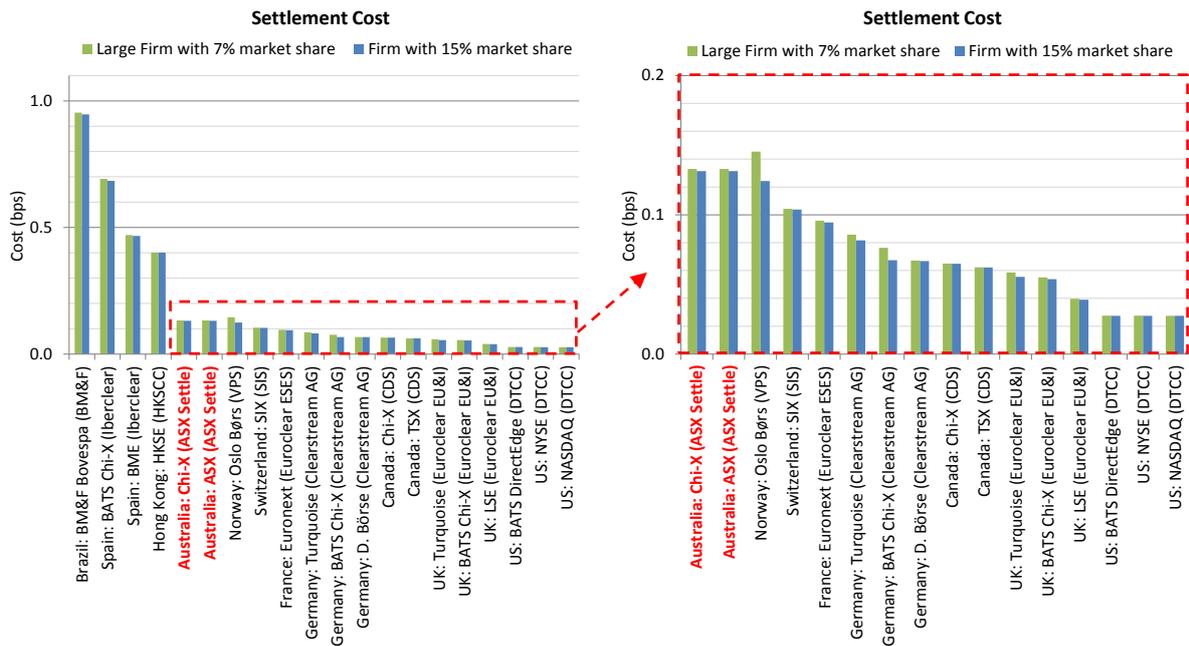
Firm Size (Market Share)	Trading Venue	Settlement Cost Layer 1 (bps)	Settlement Cost Layer 2 (bps)	Settlement Cost Layer 3 (bps)	Membership Cost (bps) *	Total Settlement Cost (bps)
Large (7%)	ASX	n/a	0.0025	0.1300	0.0004	0.1329
	Chi-X	n/a	0.0025	0.1300	0.0004	0.1329
Medium (2.5%)	ASX	n/a	0.0070	0.1300	0.0010	0.1380
	Chi-X	n/a	0.0070	0.1300	0.0010	0.1380
Small (0.5%)	ASX	n/a	0.0352	0.1300	0.0050	0.1702
	Chi-X	n/a	0.0352	0.1300	0.0050	0.1702

* Membership costs in the above table are calculated in the same manner as shown in the Clearing Costs section of this report, using ASX Settle's General Participant membership fee of AUD 5,000

1.6.2 Comparison with a General Participant with 15% market share

In a number of markets, firms opt to settle through a third party arrangement with an agent bank that settles and administrates a large amount of volume thus achieving a lower average cost.

The below graphs compare the cost of settlement for a large firm, with 7% market share, against a General Participant that has 15% market share. They demonstrate a less noticeable difference compared to the same analysis with clearing costs.



1.7 Recent Analysis from Oxera: Differences

Oxera's⁸ recently published report ("Global cost benchmarking of cash equity clearing and settlement services", June 2014) contains similar types of analysis on transaction costs to that undertaken in this report. This section highlights the similarities and differences between the Oxera report and this report.

Overall, the transaction costs from the Oxera report are broadly in-line with MSP's findings, with some differences stemming from differences in assumptions. **MSP recommends using the values published by both Oxera and MSP as a range estimate of the true costs for market participants.**

1.7.1 Markets

The table below highlights the different combination of trading venues, CCPs, and CSDs analysed in both the Oxera report and this report.

	Listed Stocks of	Trading Venue	CCP	CSD	Oxera	MSP
Asia-Pacific	Australia	ASX	ASX Clear	ASX Settle	✓	✓
		Chi-X	ASX Clear	ASX Settle	x	✓
	Hong Kong	HKEx	HKSCC	HKSCC	✓	✓
	Japan	TSE	JSCC	JASDEC	✓	x
	Singapore	SGX	CDP	CDP	✓	x
	South Korea	KRX	KRX	KSD	✓	x
Europe	Denmark	NASDAQ OMX	EuroCCP	VPS	✓	x
	France	Euronext	LCH.Clearnet SA	Euroclear ESES	✓	✓
	Germany	Deutsche Börse	Eurex	Clearstream AG	✓	✓
		BATS Chi-X	EuroCCP	Clearstream AG	x	✓
		Turquoise	LCH.Clearnet Ltd	Clearstream AG	x	✓
	Norway	Oslo Børs	Oslo Clearing	VPS	x	✓
		Oslo Børs	LCH.Clearnet Ltd	VPS	x	✓
	Spain	BME	Iberclear	Iberclear	✓	✓
		BATS Chi-X	EuroCCP	Iberclear	x	✓
	Switzerland	SIX Swiss	SIX X-Clear	SIS	✓	✓
UK	LSE	LCH.Clearnet Ltd	Euroclear UK&I	✓	✓	
	BATS-Chi-X	EuroCCP	Euroclear UK&I	✓	✓	
	Turquoise	LCH.Clearnet Ltd	Euroclear UK&I	x	✓	
Americas	Canada	TSX	CDS	CDS	✓	✓
		Chi-X	CDS	CDS	x	✓
	USA	NYSE	NSCC	DTCC	✓	✓
		NASDAQ	NSCC	DTCC	x	✓
		BATS Direct Edge	NSCC	DTCC	x	✓
Brazil	BM&F Bovespa	BM&F Bovespa	BM&F Bovespa	✓	✓	

MSP selected a combination of trading venue, CCP, and CSD to represent a cross-section of markets both with and without competition at every level. Therefore MSP included the additional selection of trading venues and CCPs in Europe, Canada, the US, and Australia. MSP did not include Japan, Singapore, South Korea, or Denmark, as these market structures were quite similar to combinations already selected by MSP.

⁸ <http://www.oxera.com>

1.7.2 “User” Profiles

Oxera calculates costs from the perspective of an investor, while Market Structure Partners (MSP) uses the perspective of an intermediary. MSP believes it is more accurate to use the perspective of an intermediary since ultimately all costs are borne by the intermediary, who can then choose what to pass on to an investor, with or without an additional fee for their services.

The table below shows a summary of “user” profiles used in both the Oxera report, and the assumptions made for each profile.

Oxera

“User”	Value Traded Per Year (AUD m)	Average Order Size (AUD)	Average Trade Size (AUD)	Average Number of Trades Per Year	Intermediary Size	Average Number of Transactions Per Day	Average Settlement Instructions Per Day
Large long-only fund manager	6,000	400,000	5,000	15,000	Large	126,000	1,000
Small long-only fund manager	350	70,000	5,000	5,000	Medium	59,000	1,000
Large hedge fund	600	400,000	5,000	1,500	Medium	59,000	1,000
Small hedge fund	60	60,000	5,000	1,000	Small	12,000	1,000
Frequent retail investor	0.50	5,000	5,000	100	Online retail broker	20,000	1,000
Infrequent retail investor	0.45	15,000	5,000	3	Online retail broker	20,000	1,000
Infrequent retail investor	0.45	15,000	7,000	3	Retail advice broker	4,000	1,000

By comparison, MSP has only assumed market share of value traded for each size intermediary, and then derived the above statistics using published market data for the full year of 2013. This is demonstrated for Australia in the table below.

MSP
Values for firms in Australia only, for a full list refer to Appendix II

Trading Venue	Value Traded 2013 (AUD m)	Number of Trades 2013 (m)	Average Trade Size 2013 (AUD)	Firm Size	Market Share of Value Traded	Value Traded by Firm 2013 (AUD m)	Number of Trades by Firm 2013 (m)
ASX	900,216	158.5	5,681	Large	7.00%	126,030	13.4
				Medium	2.50%	45,011	4.8
				Small	0.50%	9,002	1.0
Chi-X	74,125	11.9	5,681	Large	7.00%	10,378	1.0
				Medium	2.50%	3,706	0.4
				Small	0.50%	741	0.07

1.7.3 Cost Comparison

The below table compares costs for the following “user” profiles from each report:

- Oxera: Large long-only fund manager
- MSP: Large intermediary

While there is no direct “user” profile comparison between the Oxera and MSP reports, the above two profiles have the greatest similarity. These are shown in the table below for each market.

Listed Stocks of	Trading			Clearing			Settlement			
	Venue	Cost: Oxera	Cost: MSP	CCP	Cost: Oxera	Cost: MSP	CSD	Cost: Oxera	Cost: MSP	
Asia-Pacific	Australia	ASX	0.15	0.15	ASX Clear	0.24	0.25	ASX Settle	0.04	0.13
		Chi-X	n/a	0.09	ASX Clear	n/a	0.25	ASX Settle	n/a	0.13
	Hong Kong	HKEx	0.63	0.58	HKSCC	-	-	HKSCC	0.73	0.56
	Japan	TSE	0.23	n/a	JSCC	0.19	n/a	JASDEC	0.21	n/a
	Singapore	SGX	0.75	n/a	CDP	2.66	n/a	CDP	1.42	n/a
	South Korea	KRX	0.23	n/a	KRX	0.03	n/a	KSD	0.01	n/a
Europe	Denmark	NASDAQ OMX	0.22	n/a	EuroCCP	0.07	n/a	VPS	0.12	n/a
	France	Euronext	0.55	0.10	LCH.Clearnet SA	0.12	0.12	Euroclear ESES	0.43	0.10
		Deutsche Börse	0.39	0.27	Eurex	0.09	0.10	Clearstream AG	0.13	0.07
	Germany	BATS Chi-X	n/a	0.08	EuroCCP	n/a	0.04	Clearstream AG	n/a	0.08
		Turquoise	n/a	0.08	LCH.Clearnet Ltd	n/a	0.07	Clearstream AG	n/a	0.09
	Norway	Oslo Børs	n/a	0.20	Oslo Clearing	n/a	0.15	VPS	n/a	0.15
		Oslo Børs	n/a	0.20	LCH.Clearnet Ltd	n/a	0.07	VPS	n/a	0.15
	Spain	BME	0.46	3.32	Iberclear	-	-	Iberclear	5.96	1.36
		BATS Chi-X	n/a	0.06	EuroCCP	n/a	0.34	Iberclear	n/a	0.69
	Switzerland	SIX Swiss	1.09	0.37	SIX X-Clear	0.06	0.03	SIS	0.84	0.10
	UK	LSE	0.38	0.34	LCH.Clearnet Ltd	0.10	0.07	Euroclear UK&I	0.05	0.04
BATS-Chi-X		0.03	0.04	EuroCCP	0.07	0.04	Euroclear UK&I	0.06	0.05	
Turquoise		n/a	0.05	LCH.Clearnet Ltd	n/a	0.07	Euroclear UK&I	n/a	0.06	
Americas	Canada	TSX	0.12	0.16	CDS	0.02	0.04	CDS	0.72	0.06
		Chi-X	n/a	0.21	CDS	n/a	0.04	CDS	n/a	0.04
	USA	NYSE	0.16	0.08	NSCC	0.01	0.03	DTCC	0.01	0.03
		NASDAQ	n/a	-0.01	NSCC	n/a	0.03	DTCC	n/a	0.03
		BATS DirectEdge	n/a	-0.03	NSCC	n/a	0.03	DTCC	n/a	0.03
	Brazil	BM&F Bovespa	0.50	0.50	BM&F Bovespa	-	-	BM&F Bovespa	2.92	2.75

Notes on the table:

- Costs in **red** highlight where the difference between the Oxera and MSP figure is greater than 0.1bps. Each of these differences is shown below in detail.
- Where Oxera has only shown a single cost for post-trading, the above table combines MSP clearing and settlement costs to similarly show only one post-trading cost for comparison. In all instances this figure is shown in the Settlement Cost column for Oxera and MSP respectively.

The costs shown in the Oxera and MSP reports are mostly in-line. The differences that do exist are due to the following reasons:

Trading Costs

- 1) **Fee changes since the Oxera report:** e.g. Euronext reduced their fees quite significantly in early September 2014, several months after the Oxera report was published.

- 2) **Trading fee volume discounts:** Oxera's large long-only fund does not qualify for trading fee volume discounts in these markets, while MSP's large intermediary, with much higher value traded, does. In practice, all intermediaries operating in Europe will qualify for volume discounts in trading fees, or, if not, then they will trade through a large intermediary that does. This is most relevant for Deutsche Börse, SIX Swiss, and NYSE.
- 3) **Adding vs. Removing Liquidity:** MSP assumes a large intermediary will add at least 50% of value traded, while many trading venues offer a significant fee discount for adding liquidity (e.g. NYSE). MSP has been informed by market participants that 50% is actually a conservative estimate, and, in practice, many large intermediaries add more liquidity than this, which would have the effect of lowering trading fees in certain venues further.
- 4) **Execution in a single order vs. multiple orders:** BME in Spain has a fee schedule that is applied per: (i) final client, (ii) security, (iii) trade direction and (iv) price. Therefore, two executions for the same security, client, and trade direction, but that are executed at different prices will result in greater fees. While Oxera have not published their calculation methodology, their fee for their large fund reflects an assumption that the order size of AUD400,000 is executed in a single execution. MSP believes this is an unrealistic assumption, given market liquidity, unless the execution only happens in the daily closing auction. Therefore, MSP has used the same average execution order sizes as per the assumption for Eurex costs to calculate costs (e.g. AUD 15,000 for a large firm), which results in the difference of trading costs shown in the table above. While these execution order sizes are still higher than the average trade size on the BME, they are achievable in a single execution in normal trading conditions.

Clearing Costs

- 5) **Interoperable CCP volume discounts across markets:** MSP calculates clearing costs in Europe across the markets in this report but not across all markets where volume discounts could be available. Conversely, Oxera calculates clearing costs on a stand-alone basis for each market, therefore not taking into consideration any possible volume discount. In practice, European CCPs are structured to give benefits by operating in multiple markets, therefore intermediaries will either clear across markets, or where they do not have access they will use a General Clearing Member that does, and therefore benefit from maximum volume discounts. In reality clearing costs in Europe in interoperable markets are even lower than those shown in this report.

Settlement Costs

- 6) **Order size for settlement:** Oxera uses AUD 400,000 while MSP uses AUD 100,000 as an average daily settlement size per client per stock per day. Both of these assumptions make sense in each context (Oxera only for a large long-only fund, and MSP for a large intermediary that services all sized clients). As a result of this difference, Oxera's settlement cost for ASX Settle is 0.04bps, while MSP's is 0.13bps.
- 7) **Custody fees:** Oxera includes these fees, while MSP's report focuses only on transaction fees and therefore excludes custody fees. In all instances, including these fees will have the effect of increasing settlement costs.

Section 2:

Market Focus

Examination of a Subset of Markets

SECTION 2: Market Focus – Examination of a Subset of Markets

2.1 Overview

This section is intended to provide some historical context about the evolution of markets and to explain why market models vary across different financial market infrastructures. It also seeks to clarify why the costs discussed in Sections 1 and 3 of this report may vary between markets. It is not intended as a fully comprehensive history of the each market's development. It is specifically meant to highlight the elements of different market structures related to the scope of this report and show how their development has subsequently influenced the regulation and costs in each market.

Overall, it would appear that the financial market structures in Western markets including markets such the US, Europe and Australia have developed along similar trajectories but the homogenous geographic, political and economic nature of the North American markets versus the heterogeneous geographic, political and economic nature of Europe, and the isolated nature of the Australian market mean that there have also been significant differences. Therefore Market Structure Partners (MSP) has focused on a subset of the markets/regions reviewed in this report, specifically the US, Europe and Australia.

The history and facts provided are based on publicly available information combined with a synthesis of the practical knowledge, experience and previous research of the MSP team.

2.1.1 The Evolution of Ownership formats

Given the importance of efficient price formation to the real economy and the efficient functioning of markets, exchanges have evolved since the middle ages either by market demand and/or by governmental acts. Historically there have been two prevailing methods in the evolution of ownership of exchanges as (i) a mutual organization or (ii) part of the public/government administration.

Increased interest in cross border trading and opportunities created by improvements in technology have resulted in significant pressure on the market to reinvent itself; to be able to harness greater efficiencies and to respond to differing client needs and regulatory requirements. In order to effect change, many stock and derivative exchanges have become listed companies in their own right and, in some markets, new regulation has created competition that has lowered barriers to entry. This has spurred a number of incumbent exchanges to consolidate in the search for continuing economies of scale, diversification and better technology. However, the structure of the market and the ownership of an exchange have had different ramifications for different markets depending on their economic, political and regulatory context.

2.1.2 Horizontal versus Vertical Models

Exchanges are often broadly defined as covering the full value chain of trading, clearing, settlement and data provision. When an exchange owns all of these aspects it is deemed to be a vertical model. However, the ownership and infrastructure models vary globally and many exchanges have evolved with a horizontal model where the exchange only owns the trading platform, and the underlying clearing and settlement business is under a separate ownership structure. Sometimes the separate ownership structure is a for-profit model and sometimes it is a utility run model. As the ownership of exchanges has transformed, the pressure has started to move down the value chain with increasing focus on the clearing and settlement processes.

There are advantages and disadvantages to both models and MSP briefly outline some of these in the table below.

Vertical Model (trading, clearing, settlement under one ownership)	Horizontal Model (separate ownership)
+ Risk management and settlement is critical in maintaining investor confidence and under this model the process can be tightly coupled with the trading process.	- Possible breaks in the value chain and can induce potential errors or divergent targets between the value chain layers.
+ Real time risk management is more likely to be guaranteed when both systems are run by the exchange.	- Real time risk management may be harder when the exchange and clearing house are not under the same ownership.
- Protects the exchange from competition by ensuring access to its dominant clearing house is difficult or not available. This may be detrimental to the economy by levying high fees or inefficiencies when competition arises (inefficient capital usage for clients and competition in areas of risk management in two clearing houses).	+ Ensures a competitive openness by allowing multiple new exchange entrants to easily connect to the clearing and settlement layer. A single utility model like in the US offers homogenous clearing costs regardless of the trading platform, highly efficient capital usage and a stringent, unified approach to risk management.
-/+ Possibly allows cross-subsidizing between value layers and from large to small caps if the shareholders allow it.	+ Usually will lead to lowest pricing per asset class with only limited potential for cross subsidizing.
- If the exchange is for profit, pricing either needs to be regulated or competition between models has to be introduced. Competition between risk models may not be desirable.	- May require interoperability with other CCPs in an openly competitive market.

In some markets, CCPs must have a banking licence which means that they are backed by the Central Bank. In other markets this is not a requirement and they are, therefore, not backed by the Central Bank.

Table 2: Overview of Operating Environment and Functions by Focus Market

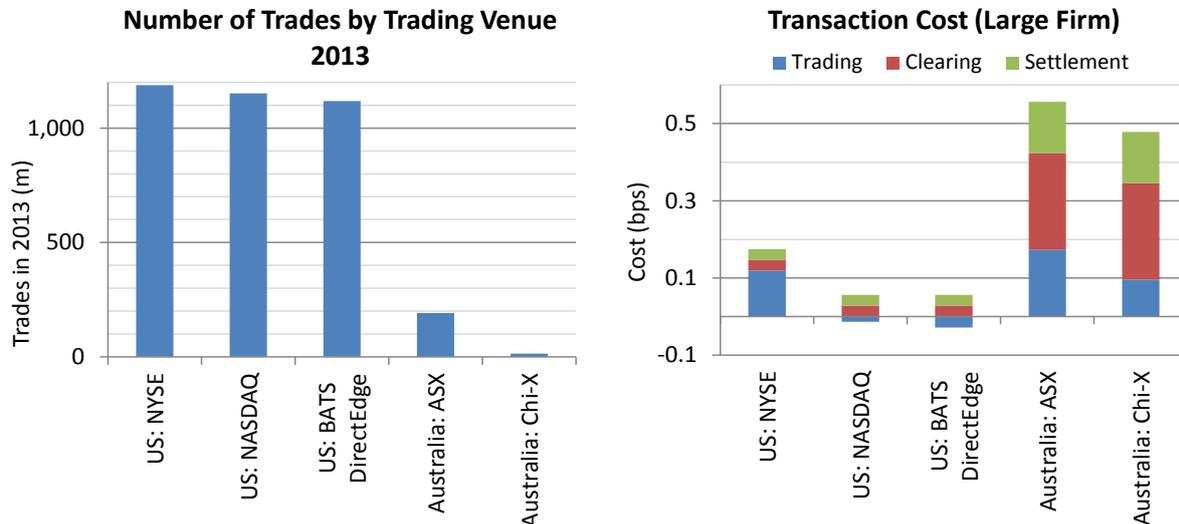
	Canada	US	EUROPE (UK)	EUROPE (Germany)	Australia
Environment					
Competitive Trading	●	●	●	●	●
Competitive Clearing	○	○	●	◐	○
Competitive Settlement	○	○	○	○	○
Functions					
Trade Matching ⁹	Exchange/ATS	Exchange/ATS	Exchange/MTF	Exchange/MTF	Exchange/MLO
Trade Reporting	Exchange	Exchange/ATS	Exchanges or alternative mechanisms (e.g. BATS, Reuters)	Exchanges or alternative mechanisms (e.g. BATS, Reuters)	Exchange/MLO
Data Consolidation	Not mandated by regulation.	Mandated by regulation and undertaken by exchanges	Not mandated by regulation.	Not mandated by regulation	Not mandated by regulation
Clearing/Central Counterparty (CCP)	Single clearing mechanism (vertical utility)	Single CCP (horizontal utility model)	Multiple CCPs (horizontal moving to vertical)	Multiple CCPs (mainly vertical for profit model)	Single CCP (vertical for profit model)
Settlement/Depository (CSD)	Single CSD	Single CSD	Single CSD	Single CSD	Single CSD

Key: ○ = No competition, ◐ = Some competition, ● = Full competition

Source: Market Structure Partners

⁹ ATS = Alternative Trading System, MTF = Multilateral Trading Facility, MLO = Market Licence Operator, PTS = Proprietary Trading System

2.2 United States



Source: World Federation of Exchanges, Thomson Reuters, Market Structure Partners

2.2.1 Overview

- The US is a homogeneous market with broad economic, political and regulatory clarity.
- The market benefits from significant economies of scale.
- There is competition amongst trading platforms in equities.
- A single, horizontal, utility model operates for clearing and settlement for equities.
- This means that the cost of clearing is homogenous regardless of where a trade takes place, making the concept of best price clear to the market.
- The horizontal utility model was established prior to the demutualisation and listing of any exchange.
- The CCP runs a mutualised risk model and is not backed by the Central Bank. The existence of a consolidated tape, clear rules for best execution and a single utility clearing platform makes a level playing field for competing trading platforms.
- Many participants use third party clearing arrangements.

2.2.2 Background

As the leading economy in the world, the US has clearly played one of the most significant roles in the development of capital markets structure in the last century. As a large geographical region, it benefits from a single economic and political structure that includes a one language, one currency, a broadly homogenous legal and tax structure and a centralised treasury and banking system. It also has clear regulatory oversight with two main regulators; the US Securities and Exchange Commission (SEC) which regulates and oversees was brokerage firms, transfer agents, and clearing agencies as well as the nation's securities exchanges and other self-regulatory organisations, and the US Commodity Futures Trading Commission (CFTC) which regulates the commodity futures and options markets.

Given its geographical expanse, the size of the population and the need to raise capital in many different areas, regional exchanges were historically established and flourished to support issuers

and investors in the different regions. By the 1970s the US market was significantly fragmented with numerous regional stock exchanges, whose existence meant that competition between exchanges was already accepted as a legal concept within the U.S.

It is important to remember that the exchange, clearing and settlement structure did not develop in isolation. The US has a long history of both public and private pension fund management, managed by institutional asset managers and also a long history of retail investment interest in the market. As communication improved and the assets under management increased, asset managers and retail investors did not want to simply invest in their local region, but to take advantage of investment opportunities across the US. Financial market structure had to continuously evolve to meet the needs of the underlying investors.

As technology and telecommunications increased, the need for multiple regional exchanges decreased and they competed with each other to attract issuers and trading; the same stocks were often traded across multiple platforms. However, there was no interaction between the orders of the different exchanges or transparency for investors on a market wide basis.

In 1975, there was a push to improve efficiencies and create a more aligned national market through amendments to law and Congress directed the SEC to develop a National Market System, the concept of which still underlies much of the US regulatory efforts today (Reg. NMS). The idea was to improve best execution, transparency and competition by linking markets through data processing and communications so that investors had a better view of the whole market and access to the best price regardless of the number of venues. This led to the establishment of the National Best Bid and Offer (NBBO; showing the best price at which an investor could deal), the Order Protection rule (given that prices could now be seen across the entire market it mandated that orders should be routed to the market displaying the best price; however, sophisticated electronic routing systems would not exist for another 25 years) and the Consolidated Tape (which consolidated all post trade data in one place).

Around the same time the Depository Trust Corporation (DTC) and the National Securities Clearing Corporation (NSCC) were established in response to a paperwork crisis that had arisen due to the millions of shares being traded every day in physical stock certificates across many different regional markets. As customers had greater transparency and improved choices about where to trade, it no longer made sense to clear and settle trades in the multiple clearing and settlement centres that also existed at this time. The establishment of the DTC and NSCC ensured that greater processing efficiencies and cost reductions could be created on a market wide basis and they were run as user owned organisations on a not-for-profit basis.

By creating a so called “horizontal” model with the establishment of the National Market System and the DTC and NSCC (now both held under one holding company; the Depository Trust & Clearing Corporation (DTCC)), the foundations for greater competition amongst trading platforms were established. They lowered the barriers to entry as any new platform could connect to them. This has led to a decrease in the cost of trading, clearing and settlement in the US. Importantly, this was achieved prior to the demutualization and listing of the exchanges.

2.2.3 Key Regulatory Changes - The Prelude to Competition in the Markets

Regulatory change, technology and investor desire to simplify the trading model continued to weaken the need for multiple regional exchanges and considerable consolidation took place. By 1995, the number of regional exchanges in the US had fallen from one hundred in 1900 to five, and the market was dominated by the AMEX, NYSE and NASDAQ. NYSE has since acquired AMEX.

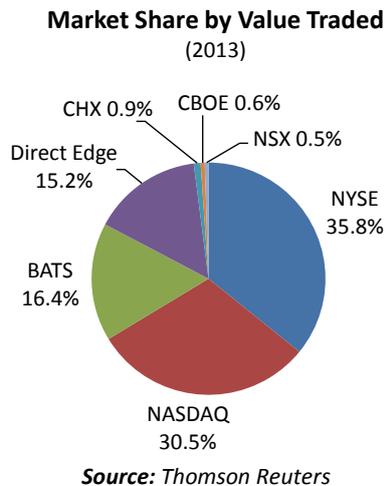
The main US exchanges were slow to adapt to order driven trading models but at the periphery they started to develop mechanisms that allowed electronic routing and automatic execution of smaller orders. This gave rise to a new speed of execution that had not been possible previously and firms began to develop electronic systems to take advantage of it.

However, new platforms known as Electronic Communication Networks (ECNs), later known as Alternative Trading Systems (ATSS) (e.g. Island, Archipelago and Brut), started to appear in the market with better technology, improved price formation and more efficient cost bases. They started to create online matching for small orders. These ECNs were not only innovative with their systems but they also prompted the move to decimalisation of trading. The increasing electronic trading capabilities, the lowering of trading costs and tick sizes, and the need for new platforms to attract liquidity gave rise to more automated and algorithmic trading.

Their progress in attracting flow was initially slow due to regulatory barriers such as the order protection rule, which did not mandate routing to ECNs, and the fact that speed and reliability were not taken into account when measuring best execution. NYSE and NASDAQ were therefore sluggish to respond as their dominance was preserved by the rules. Additionally, their member-owned organizations and legacy members (especially specialists) wanted to preserve their lucrative privileges under the old system. However, the SEC made a number of updates in Regulation NMS that levelled the playing field by first requiring market makers to send to ECNs any limit orders whose price fell between the market maker's best buy and sell prices and then taking speed and reliability into account. Investors started to transact more business on the alternative platforms. Ultimately only a deal with the new entrants (i.e. NYSE's merger with Arca and NASDAQ's acquisition of INET), allowed them to remain competitive. This did not stop more new trading platforms from emerging such as BATS and Direct Edge which both continued to erode the incumbents' market share.

2.2.4 Current Market Status: Trading

There has been significant competition between trading platforms in the US which has led to a reduction in trading fees, and improvements in technology across all participants. The incumbent exchanges are no longer the dominant trading platforms. BATS and Direct Edge consolidated into one organisation and have significant market share in the main index stocks.



High frequency firms have thrived in this environment and are often shareholders of the ATSS as well as being paid for liquidity provision through fee schedules that offer “maker taker” fees. High frequency trading has been estimated to contribute to 60 to 70% of market share, though this has been dampened by the more recent downturn in volumes. The presence of high frequency firms and the general use of algorithmic trading have led to smaller order and execution sizes and lower spreads.

Competition has been facilitated by the homogeneous nature of clearing and settlement and also by a contribution of the order protection rule and the consolidated tape which ensures full transparency across the region and an obligation to find best price. The overall size of the US market creates significant economies of scale, not only for clearing and settlement through the DTCC, but also for multiple trading platforms able to attract meaningful market share.

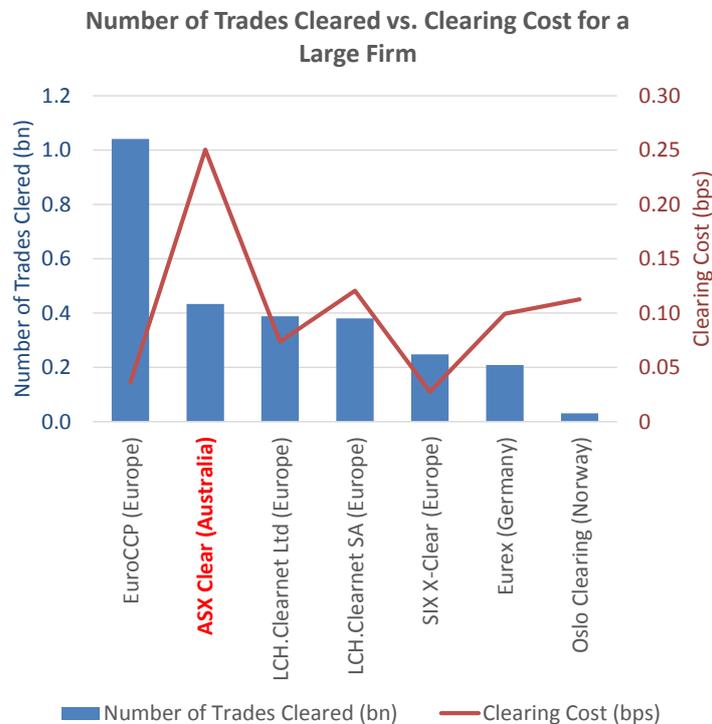
In response to the fragmentation of liquidity, large brokers have developed smart order routing technology, though the obligation of best execution rests with the exchange or ATS which is mandated to forward an order to another platform if there is a better price there. This means that not all brokers have had to develop their own smart order routing.

This report examined the costs of trading US equities on NASDAQ, NYSE and BATS Direct Edge, and the associated clearing and settlement cost. Given the scale of the market, the competitive tension in trading and a horizontal model for clearing and settlement, it is not surprising that costs on the US exchanges are amongst the cheapest of the markets reviewed.

2.2.5 Current Market Status: Clearing and Settlement

DTCC remains the sole provider of clearing and settlement services in the US and therefore manages all counterparty risk and margining as well as books and records. It is able to provide massive economies of scale in its provision of clearing and settlement services. Its equities service takes trades from more than 50 platforms and processes as many as 13 billion transactions in a year in a fixed cost operation. It achieves an average of 97% netting for settlement. DTCC operates on an “at-cost basis” returning excess revenue to its members. Additional revenues may be raised from charges for fails, corporate action, custody and exception processing etc. DTCC also gains revenue from its joint venture in OMGEO, the post trade processing organisation. DTCC is extending its activities to include an OTC derivative trade repository.

2.3 Europe



Source: World Federation of Exchanges, Thomson Reuters, Market Structure Partners

2.3.1 Overview

- Europe is a heterogeneous market with a complex economic, political and regulatory background at both a national and European level.
- Pan-European competition amongst trading platforms was established in 2007.
- To date there has been no pan-European regulation on clearing and settlement and some competition has been introduced by market participants at a clearing level, but barriers to entry for alternative trading and clearing platforms in some markets remain high.
- There is a combination of vertical and horizontal structures in place across the market.
- The cost of clearing in each stock varies depending on the combination of market structures used in the trading and clearing process. The concept of a single best price is therefore impossible to achieve.
- Depending on their country of origin, some CCPs must have a banking licence and are, therefore, backed by the central bank. Others do not require a banking licence. Most CCPs operate a mutualised risk model for their default fund but due to new European regulation must now put 25% of the CCP's capital ahead of the non defaulters contributions in the event of a default.
- The market should benefit from significant economies of scale but the current nature of regulation and historical legacy of differing structures mean that it is hard to optimise these economies.
- The differing models between exchange infrastructures and ownership, the lack of a consolidated tape and the absence of clear rules for best execution create an uneven playing field for trading platforms and clearing houses.
- Many participants use third party clearing arrangements.

2.3.2 Background

Europe and US financial markets are often compared on a block regional basis but the homogeneous geographic, political and economic nature of the US versus the heterogeneous geographic, political and economic nature of Europe mean that there have also been significant differences, and whilst economies of scale exist in Europe, they cannot be harnessed to their optimal extent.

In Europe each national market evolved with its own exchange/s, central depository, financial regulation and regulatory body to oversee its financial market. In some markets the exchanges were mutualised models and in others some were (and still are) owned by government entities. Infrastructure models varied as some had a horizontal market structure, where clearing and settlement were separated from the exchange structure (e.g. UK and Scandinavian markets), and in other markets a vertical model was adopted (e.g. Germany and Spain). Whilst each national market had a cohesive domestic structure, Europe as a whole block was an extremely fragmented market.

European economies were also developing at a different pace. The progress of, and approach to, public and private pension fund management and retail investment also varied significantly across the different national markets. In countries such as the UK and the Scandinavian markets, institutional asset management models were much more sophisticated than in countries such as Spain and Italy. Cross border investment across the region was harder due to problems such as the lack of a single currency, different languages and regulation that created barriers by creating currency exposure and a lack of understanding of company information and different laws about investor protection.

The first move towards the development of a pan-European financial market began in the 1990s when new regulation, the Investment Services Directive (ISD). The impact was accelerated by the introduction of the Euro towards the end of the decade. Though there has been significant progress in harmonising not just the financial markets but all aspects of the European Union (EU), it nevertheless currently consists of 28 different countries and, as such, remains a much more fragmented region than the US, but a much bigger combined group of markets than Australia. Many countries have opted out of the Euro and retained their own currency and the legal and tax structure across all EU countries remains very heterogeneous.

Historically, the drafting of European regulation was undertaken by individual country regulators who worked together in the form of a committee to advise the EU's executive arm. However, there was room for differing interpretation and implementation, and no centralised accountability or enforcement of the rules. Efforts were then made to create a more centralised regulatory power and in 2010 the European Securities and Markets Authority (ESMA), an independent EU Authority was created to ensure the integrity, transparency, efficiency and orderly functioning of securities markets, as well as enhancing investor protection. ESMA began functioning in 2012 but works closely in cooperation with national regulators who continue to oversee their respective domestic markets.

Taking into consideration advice from the regulatory bodies, new regulation has to be drafted by the European Commission and passed through European Parliament and then agreed with a Council of Ministers, made up of Financial Ministers from each member country. The relative maturity of the different financial markets across the EU is broad; some markets have very mature institutional markets whilst, in others, institutional asset management is yet to take a strong hold and retail

investors dominate. The best interests of the EU, therefore, often remain secondary to national self-interest and decision making is highly political and full of compromise.

2.3.3 The Foundations of the European Cash Equity Markets

As previously stated, each country in Europe evolved with its own exchange, depository and regulation. It is important to note that most countries adopted a model that combined government authorities and self-regulatory organisations (SROs), which gave the exchanges some power to create and enforce industry regulations and standards at a national level. All of this contributed to an extremely fragmented market.

In the 1990's investment demand changed; US fund and European investment managers increased their assets under management and began to look for greater exposure beyond their domestic market. Cross border trading in Europe opened up and the introduction of the Euro in 1999 was a catalyst for banks and brokers to start trading on a more sectorised basis which focused on European wide sectors (e.g. consumer goods), regardless of the country of origin. It also helped retail traders to trade more seamlessly within Eurozone markets without worrying about FX risk.

Up until the ISD was established, any investment firm that wished to become a member of another stock exchange in an EU member state had to establish a fully staffed on-shore organisation in every single country where it wished to be an exchange member, thus making it a very expensive and lengthy operation. Most firms wanting to trade across borders traded and cleared through local 3rd party agents that added considerable cost and barriers to entry. The ISD created the concept of "passporting" which allowed a firm that was regulated by one EU member country to start doing business in other jurisdictions without the need to set up a local infrastructure.

This was a major breakthrough in terms of lowering barriers to entry. International banks and brokerage firms took advantage of their ability to access multiple exchanges remotely from one location, usually London, and domestic exchanges saw their membership base change significantly. Local domestic intermediaries became challenged by the international firms who now found it easier to bypass them and enter the local market directly.

Around this time, exchange models started to move to electronic central limit order books, creating greater transparency for investors and improving risk management by introducing central counterparties. The exchanges, most of which were member owned, found that their competitiveness across Europe was decreasing. Equity trading started to migrate to other markets such as London, which saw the greatest inflows of capital coming into Europe. However, the local members were reluctant to change the exchange structure as it served to protect their interests and business models. Ultimately, the listing of exchanges was the way to incentivise brokers to change the structure of the exchange so that it could freely transform and compete on a pan-European basis; many exchanges demutualised and became public limited for profit organisations.

However, many elements of local market behaviour were not addressed and significant barriers to entry still existed. For example, whilst some countries such as the UK allowed competition between trading platforms and also allowed trading to happen away from the stock exchange, other countries, such as France, had concentration rules where all trading had to be conducted on the one stock exchange; competition therefore did not exist and trading away from the exchange was not allowed. The differences between vertical and horizontal models also became more obvious.

2.3.4 Key Regulatory Changes - The Prelude to Competition in the Markets

As international brokers began to become direct members of exchanges and flow became more automated, their margins became squeezed. Clients wanted lower commissions, but order sizes were decreasing whilst the number of trades proliferated, thus increasing brokers' processing costs. The increase in number of trades served to benefit revenue generation for the newly for-profit exchanges, and in many cases exchanges were perceived to be exploiting their position as the dominant marketplace. There was an increased focus on cost but brokers found that they could not easily compare costs between markets and that vertical infrastructures were not transparent about their "all in one" fees.

In 2007 the EU passed new regulation known as the Markets in Financial Instruments Directive (MiFID) which was intended to further harmonise the European financial markets and create greater competition and transparency in the equity markets. MiFID created the possibility for alternative trading platforms, known as Multilateral Trading Facilities (MTFs), to compete with incumbent exchanges for flow on a pan-European basis and for the incumbent exchanges to compete with each other. It also harmonised pre and post trade transparency rules which, amongst other things, allowed trading to happen off-exchange provided it was reported according to standards prescribed in the regulation. It did not address consolidation of that information.

As the regulators introduced more competition, they began to reduce the regulatory role that the national exchanges played in order to allow a more level playing field between the incumbents and the new entrants. Equally, as exchanges came under pressure to cut costs, this put pressure on non-revenue producing areas like regulation, which only added overheads. Many activities that had previously been undertaken by the exchanges were handed to the national regulators. This has not necessarily resulted in an explicit cost being passed between the regulator and the participants.

The Clearing Issue

Though MiFID's intention was to introduce competition it did not address clearing and settlement, which MSP believes is critical to the foundation of a truly competitive financial market.

The need to address settlement had started to be addressed with the identification of a set of barriers that prevented more harmonisation across Europe. CSDs across Europe perform some common functions but also offer a variety of different services on different platforms and under different rules. Harmonisation in the settlement of securities is particularly difficult to achieve in Europe due to national differences in company law, legal structures and tax regimes. In addition, the CSDs themselves had been set up under different laws and regulations in each jurisdiction. In 2007, the European Central Bank (ECB) established a project known as Target2-Securities to resolve this but it was acknowledged that this would be a long term project. Clearing was not being addressed at any level.

In the US the introduction of competitive trading platforms was immediately facilitated by one homogeneous clearing platform that any new platform could link into, which has meant that the transformation into a competitive marketplace has gone relatively smoothly. This was established at a time when exchanges were not for profit and paper still dominated clearing and settlement.

However, in Europe the establishment of competition came at a time when exchanges were already listed entities, trying to maximise their profits and starting to come under competitive pressure in trading. Many European exchanges owned the clearing (CCP) and settlement (CSD) entities

associated with trading on their exchange. They therefore had an incentive to protect the trading on their exchange and exclude potential competitors from using their infrastructure at a trading or clearing level. Those with a vertical infrastructure also held pricing and access power over the entire trading, clearing and settlement process.

Brokers took their concerns to the European Commission and in 2006 a voluntary European Code of Conduct was established. Trading and post-trading infrastructures signed the Code of Conduct which was meant to enhance transparency and increase competition in the post-trading infrastructure. In reality it had very little immediate effect other than to force exchanges to be more transparent about their fees, but it created the longer term foundations for competition in clearing.

As a result of the high barriers to entry for new trading platforms, new CCPs were formed or invited into Europe by new trading platforms who were struggling to get access to the incumbent facilities and by participants who wanted to create competition. Newly established CCPs include EuroCCP, part of the National Securities Clearing Corporation (NSCC) group in the US, and EMCF.

2.3.5 Current Market Status

Trading

Competition in trading has been established and has helped reduce headline costs in trading. BATS and Chi-X have been the most successful MTFs and have recently merged. Indeed BATS-Chi-X is now the largest exchange in Europe for trading in the main indices. However, clearing and settlement remains complicated and acts as a restraint on real competition which has not yet taken full force. As a result, potential economies of scale in Europe have yet to be realised. The uneven playing field created by lack of regulation on clearing, and the lack of a consolidated tape, has prevented many of these new platforms from succeeding.

In fact the present market structure has created greater complexity in other ways. When trading was only focused on one domestic market, each participant only had to deal with one set of processes and the associated legal and financial framework. Now that trading happens on a much more international basis, the issue of dealing with multiple different infrastructures and legal and financial frameworks is constantly highlighted.

High frequency traders have been attracted to European markets as costs have come down, however they tend to dominate the more mature Northern European markets. In some markets they are estimated to account for up to 50% of market share. As both high frequency trading and algorithmic trading have increased, trade sizes have reduced.

Additionally, as a result of the lack of unified clearing and the costs associated with linking to all new markets in Europe, MiFID could not strictly define what constituted best price; differing clearing and settlement costs needed to be accounted for. Nor did MiFID implement a Trade Through rule like the US. Brokers that wished to deal across multiple platforms, needed to invest in smart order routing technology which increases the implicit costs of trading. However, due to a spectrum of possible interpretations as to what constitutes best execution, and with no trade through rules in place, it has been very hard for new platforms, often with better prices, to compel market participants to route orders to them. Without addressing these issues, it remains an uneven playing field for new entrants.

As a result of the changes to off exchange trade reporting rules, a number of new trade reporting service providers such as BOAT and BATS Chi-X's trade reporting facility have been established. These reporting entities do not have to be exchanges, and data vendors, such as Reuters, also provide reporting facilities. This adds to the multiple sources of data that regulators need to oversee. There is no consolidated tape yet and the European regulators are hoping that the industry will provide a solution to improve the aggregation and visibility of data across Europe. However, the many vested commercial interests of market participants are making this a difficult task.

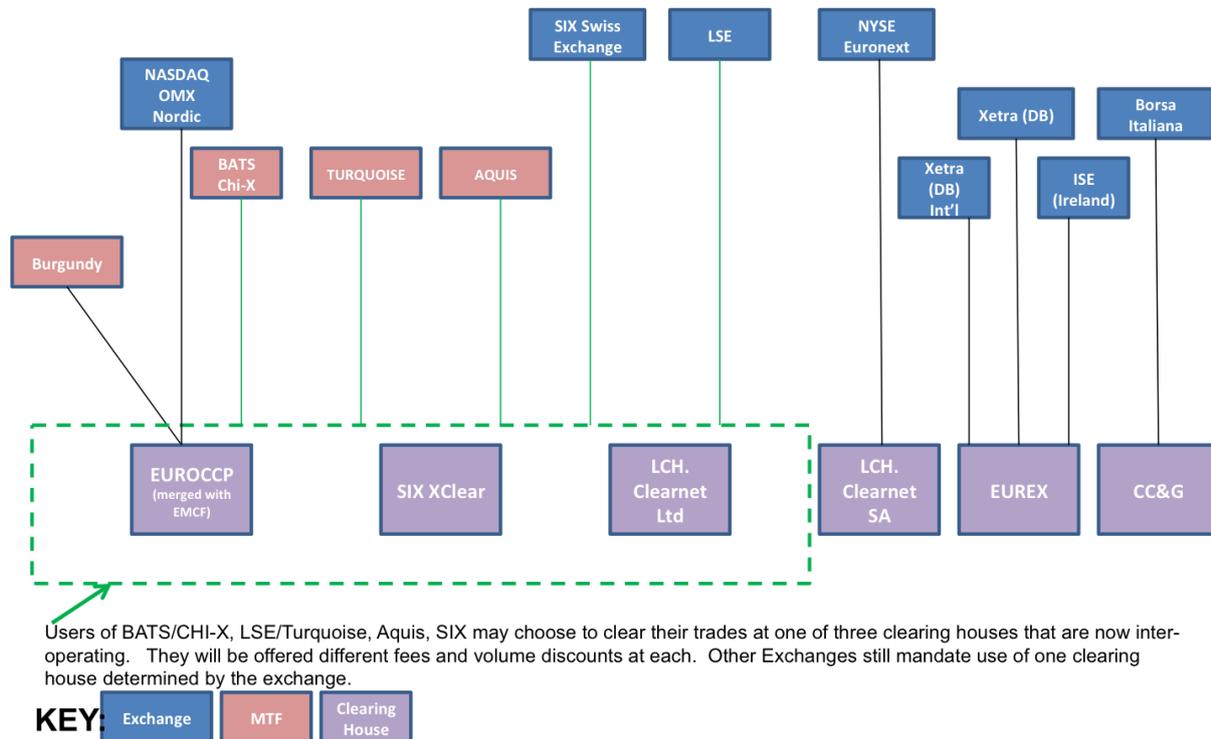
Clearing and Settlement

Even though a trade can now be executed directly on exchange from any one location within the EU, the issue of multiple underlying clearing and settlement infrastructures remains. Firstly, the combined cost of sustaining a different infrastructure in every country is high and estimated by some market participants to run into tens of billions of euros. Secondly, most market participants cannot afford to establish a direct interface with every market and individually manage the different processes of each market. Therefore, they pay a third party, an agent bank, to manage this for them which adds a second layer of cost that is ultimately borne by the end investor. Though these costs are significant, they are not reflected in the analysis in Section 1, because they are negotiated on a case by case basis with commercial service banks or brokers, rather than infrastructure providers and vary widely depending on the scale and scope of each business.

Clearing

In clearing, participants have pushed for interoperability, or links, between CCPs to create choice and competition in clearing. Progress has been slow, but it is progressing, in particular where exchanges and MTFs have appointed multiple clearers and given users choice. For example, users of BATS Chi-X, the London Stock Exchange, Turquoise, the Oslo Exchange and SIX Swiss Exchange may choose to clear trades at one of three CCPs (previously this was four but EuroCCP and EMCF have consolidated) and benefit from volume discounts across multiple markets. However, the decision as to whether to offer multiple clearing platforms to users is made by the trading venue and some venues still only offer their customers access to one CCP.

For example, all trades executed through Borsa Italiana (which is owned by the LSE Group) must be cleared using Cassa di Compensazione e Garanzia (CC&G), the domestic clearing counterparty. However Italian stocks listed on Borsa Italiana can be traded through pan-European exchanges and MTFs such as BATS Chi-X and Turquoise, which in turn offer the trading firm a choice of clearing counterparty. A similar structure exists in Germany; trades executed via Deutsche Börse must be cleared via Eurex, the domestic CCP. However, Deutsche Börse listed stocks may be traded via other pan-European exchanges, again offering the trading firm a choice of clearing counterparty.



It should be noted that CCPs run different netting processes. For example, LCH.Clearnet (London) and EuroCCP use trade date netting, whereas LCH.Clearnet SA (France) uses continuous net settlement, where rolling fails over into the next day's net. LCH.Clearnet (London) does not perform the netting calculation itself which is outsourced to the underlying depository, Euroclear UK & Ireland. Margin calculations and processes are different at each CCP. The legal construct of the netting arrangements may vary in different jurisdictions. Group companies such as LCH.Clearnet and Euroclear SA/NV have to comply with different legal frameworks, rules and regulations and regulators in each country in which they operate.

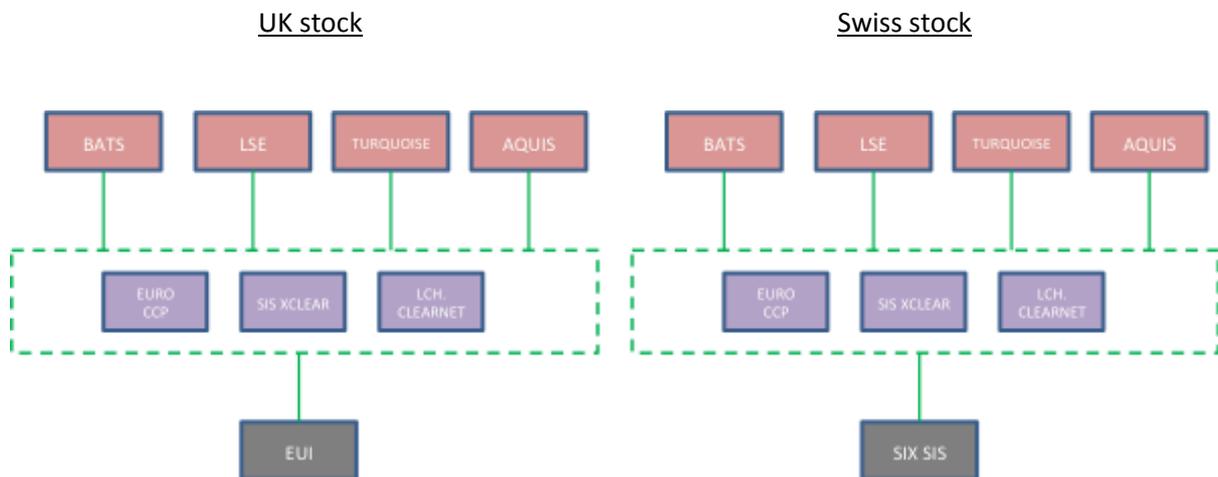
Post the financial crisis there has been increased regulatory focus on clearing, and new regulations have been passed as well as updates being made to previous regulations. MiFID II/MiFIR, which is an update to the current MiFID regulation, has been passed through European Parliament and should be fully implemented by end of 2016. At a high level it compels open access across clearing houses and trading platforms. This means that any trading platform should be allowed to request access to have its trades cleared at any clearing house, and any clearing house should be able to ask for a trade feed from an exchange so that it can clear those trades. In practice the details as to how this will work have yet to be established, particularly in relation to derivatives where risk horizons are longer, but it suggests that there will be increased competition in clearing.

Additionally, new regulation, the European Markets Infrastructure Regulation, EMIR, which is already being implemented, addresses the fact that CCP owners must now put at least 25% of their capital at risk ahead of non defaulting market participants. This is addressed in more detail in Section 3 and an explanation of EMIR is given in Appendix IV.

Settlement

Despite increasing interoperability at the clearing level, the majority of trades in Europe are still settled at the national CSD, each of which has fixed costs to recover and may operate on a for-profit

basis. There has been some consolidation; for example, CREST, the UK's depository and Euroclear UK & Ireland (EUI) have combined. The diagram below shows an example of possible flow for a UK and a Swiss stock executed on BATS, Chi-X, and Turquoise respectively:



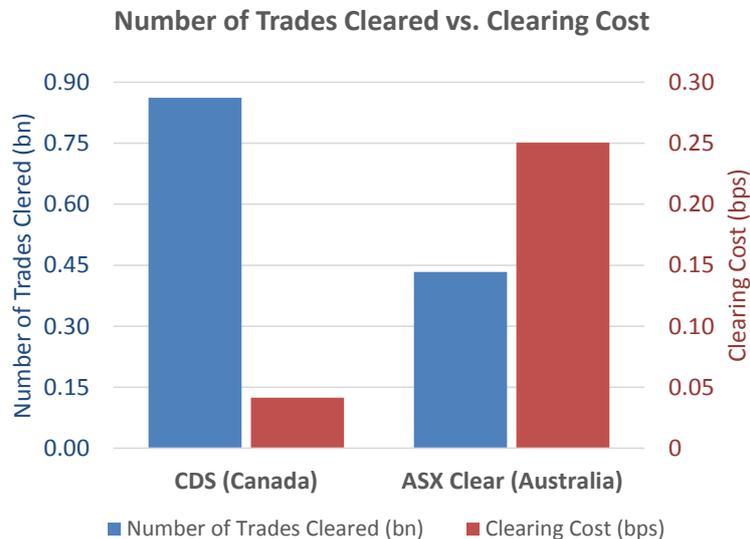
A firm trading a UK listed stock can choose from a number of trading venues such as BATS/Chi-x, LSE or Turquoise. It can choose from three CCPs but all trades must settle in EUI.

A firm trading a Swiss listed stock can choose from a number of trading venues such as BATS/Chi-x, SIX or Turquoise. It can choose from three CCPs but all trades must settle in SIS.

Source: Market Structure Partners

However, settlement models still vary across markets. Following on from Target2-Securities (T2S), the new Central Securities Depository Regulation (CSDR) is now being drafted. It is unlikely to be implemented before 2017 but should lead to increased harmonisation, competition and consolidation across Europe.

2.4 Australia vs. Canada



Source: World Federation of Exchanges, Thomson Reuters, Market Structure Partners

2.4.1 Overview

- Australia and Canada are single homogeneous markets with economic, political and regulatory clarity, although Canada has a mix of Provincial and National regulatory bodies.
- Neither market benefits from the same economies of scale as other Western trading blocks, but both have similar economies of scale to each other.
- Both have similar average trade sizes (in 2013 this was AUD4,717 and AUD4,658 on the ASX and TSX respectively).
- There is competition amongst trading platforms in equities in both markets but no competition in clearing.
- A single vertical model is operated by ASX for clearing and settlement.
- A horizontal clearing model has historically been operated in Canada and is owned by market participants.
- In Australia, the cost of access to clearing would vary under the Trade Acceptance Service charging model at ASX, although this is currently suspended. Therefore, the concept of best price should be clear to market participants. In Canada the cost of clearing has historically been homogenous and best price is clear to market participants.
- The CCP in both markets does not require a banking licence. The default fund is 100% backed by ASX capital in Australia and mutualised amongst participants in Canada.
- The model of third party clearing is less prevalent in Australia.

2.4.1 Background: Australia

Australia has a history of recognising multiple stock exchanges, albeit one that has not involved competition in the secondary market trading of listed securities: it used to have one per state but these were mostly consolidated into a single exchange in the 1980s to become the Australian Stock Exchange (ASX).

Similarly, Australia also had a number of regulatory bodies mainly focused on corporate regulation which were unified by law in 1989 to become the Australian Securities Commission. This ultimately became Australian Securities & Investments Commission (ASIC) in 1998 but the exchange remained a self-regulatory organisation until 2009.

In 1998, ASX demutualised and became a listed company. In 2006, it merged with the Sydney Futures Exchange and they jointly became ASX Limited. ASX is a vertically integrated, demutualised exchange group with its shares listed on its own market.

There are several other licensed market operators in Australia including, amongst others, the National Stock Exchange (NSX; formerly, Newcastle Stock Exchange); a regional exchange offering smaller companies an alternative path to listing.

In 2001, the Corporations Act was created to prohibit any unauthorised securities or futures market in Australia and it ensured that Ministerial approval was required for any new exchanges.

Prior to the consolidation, a series of “fidelity funds” existed to meet certain claims from dealing with participants of the various stock exchanges. These funds had been collected via a “user tax” in the form of interest taken from broker funds. When the six state stock exchanges merged, these funds were pooled into an independently run “caretaker” organisation, the National Guarantee Fund (NGF). This became part of the Securities Exchanges Guarantee Corporation (SEGC).¹⁰

Up until March 2005, SEGC provided investor compensation and clearing and settlement support in the circumstances set out in the Corporations Act. On 31 March 2005, the NGF was split by a payment out of the NGF to ASX Clear, ASX’s clearing entity, which then assumed sole responsibility for clearing counterparty risk. As a result, the NGF now only covers investor compensation in relation to listed securities¹¹. According to reports, it had AUD60.4 million when the state exchanges merged to create the ASX. By 2004 this had swelled to AUD164.4 million, before the fund was split and AUD71.4 million allocated to ASX Clear.¹² According to market participants no interest was paid back to the original fund participants when this split took place.

2.4.2 Background: Canada

Canada has a history of recognizing multiple exchanges, with most provinces historically operating their own exchange but by 1999, four main stock exchanges were operating and in 1999 the four remaining exchanges agreed to restructure and Toronto Stock Exchange, TSX, became the main exchange for blue chip equities. The Montreal Exchange became the centre for derivative trading, while the Vancouver and Alberta Exchanges merged to form the Canadian Venture Exchange handling trading in junior equities. At the same time, TSE demutualized and then became listed on its own market in 2002 and rebranded as TSX. In 2007, the TSX Group and the Montreal Exchange agreed to merge and undergo a name change to the TMX Group.

The Canadian Depository for Securities Limited (CDS) is Canada’s national depository, clearing and settlement hub. It was incorporated in 1970 and began clearing trades executed on the Montreal Exchange in 1976. By the following year, CDS was clearing trades for the Toronto Exchange. The has CDS has become the main clearing house for the Canadian market.

¹⁰http://www.takeovers.gov.au/content/Resources/acts_bills_ems/ASX_National_Guarantee_Fund_Bill_ExMem_1986.aspx

¹¹ The NGF covers trading in these securities on the Chi-X market by ASX participants that are also Chi-X participants.

¹² 2006: ASX Annual report

It was owned by the market participants in Canada, operated on a cost-recovery basis, passing any gains directly through to industry participants in the form of volume discounts and year-end rebates

In 2012, a group of market participants known as the Maple Group completed the acquisition of each of The Canadian Depository for Securities Limited (“CDS”) and of Alpha Trading Systems Inc. and Alpha Trading Systems Limited Partnership (collectively, “Alpha”).¹³

The Investment Industry Regulatory Organization of Canada, IIROC is the national self-regulatory organization which oversees all investment firms in Canada as well as trading activity on debt and equity market places including all exchanges and alternative trading systems (ATs), under a single set of rules.¹⁴

Each province and territory has their own securities regulator, which govern trading activity and enforce compliance to the provisions of the Security Act of their province. The Canadian Securities Administrators (CSA) is an umbrella organization of Canada’s provincial and territorial securities regulators, whose objective is to improve, coordinate and harmonize regulation of the Canadian capital markets.

The CDS is regulated by the Ontario Securities Commission (OSC) and is recognized as a clearing agency under the Ontario Securities Act (OSA). In Québec, the Autorité des marchés financiers (AMF) regulates CDS Clearing and has authorized CDS Clearing to carry on clearing activities under the Québec Securities Act (QSA). Both acts provide broad discretionary powers upon the OSC and the AMF to regulate clearing agencies. CDS Limited, as the holding company parent of CDS Clearing, is subject to regulation by the OSC and AMF under the same terms and conditions as CDS Clearing.

2.4.3 The Prelude to Competition and Key Regulatory Changes: Australia

Due in large part to its compulsory superannuation system, Australia boasts the largest pool of funds under management in the Asia-Pacific region, and is amongst the largest pool of funds in the world. A significant proportion of the market is therefore given over to institutional investors.

Along with similar trends in other developed markets, once the ASX demutualised and became for profit, brokers made attempts to bring competition to the market. The first serious threat of head to head competition to the ASX was in 2006 when AXE ECN (a joint venture between New Zealand exchange operator NZX (51%) and six investment banks and brokerages) entered the market with the aim of providing a low cost electronic platform for reporting of large trades. A formal market operator licence was applied for in 2007 although a subsequent review of the business saw the shareholders decide not to press forward with the application.

The attempt to create competition heralded a review by the regulator of its significant implications for the market. In 2009, ASIC took on responsibility for oversight of the ASX and prepared for the oversight of other new markets. The move to a competitive market crystallized with the launch of

¹³ The Maple Group is made up of Alberta Investment Management, Caisse de depot et placement du Quebec, Canada Pension Plan Investment Board, CIBC World Markets, Fonds de solidarite des travailleurs du Quebec, National Bank Financial, Ontario Teachers' Pension Plan Board, Scotia Capital, TD Securities, Desjardins Financial Group, Dundee Capital Markets, GMP Capital and Manulife Financial

¹⁴ IIROC operates under a recognition order by the CSA

Chi-X Australia (an entity with a separate ownership structure to Chi-X Europe¹⁵) in 2011. Alternative trading platforms in Australia have become known as Market Licence Operators (MLOs).

In order to allow competition into the Australian marketplace several fundamental reforms had to take place. The most material change was the transition for ASIC to be required to take a 'whole of market' approach to supervision, whilst each Australian market operator continued to be responsible for the supervision of their own market. There were two aspects to this market structure change; (i) transition of supervision related ASX software and staff to ASIC and (ii) ASIC cost recovery for the required ongoing supervision:

1. Transition of Supervision Related ASX Software and Staff to ASIC

Once it was recognised that “whole of market” supervision needed to be transferred to ASIC as the national regulator (an institution that had previously been unfamiliar with high volume transaction processing, data management and low latency environments), arrangements were made to transfer the SMARTS (market surveillance) functionality and key staff members from ASX to ASIC.

A one off payment, partially funded from the National Guarantee Fund (NGF), was made to the Government’s Financial Industry Development Account (FIDA) in order to cover some of the initial costs in changing the supervision framework. It is not known exactly how this payment was broken down but an amount of AUD5.8mn¹⁶ was transferred between the NGF to FIDA in 2012. It is believed that part of this sum was paid to the ASX to compensate for their time and investment in developing the surveillance systems.

2. ASIC on-going cost recovery

At the same time the government implemented a cost recovery model for the new supervisory functions. For the initial period of supervision the costs to be recovered for implementing market competition have been determined as AUD29.8 million¹⁷ over an 18 month period. This is broken into:

- Non-IT costs to be recovered from operators and participants for the period from 1 January 2012 to 30 June 2013 are AUD2.43 million and AUD14.92 million respectively.
- IT costs to be recovered from market operators and market participants for the period from 1 January 2012 to 30 June 2013 are AUD1.29 million and AUD7.89 million respectively.

¹⁵ The Chi-X ownership structure is worthy of note. Chi-X Europe, was created by the broker Instinet, subsequently syndicated to users and was eventually sold to BATS in Nov 2011. Chi-X Global (CXG) similarly originated within the broker Instinet but was kept as a separate company and is now owned by Nomura. CXG is a holding company for various regional franchises including Chi-X Canada, Chi-X Japan, Chi-X Australia and Chi-East (a joint venture with the Singapore Stock Exchange which closed in May 2012). Nomura has sought various partners for CXG, but this has been at the holding company level rather than the local operating entities. To date the following organisations have made undisclosed investments in CXG: BofA Merrill Lynch, Getco, Goldman Sachs, Morgan Stanley, Quantlab and UBS.

¹⁶ 2012: The Securities Exchanges Guarantee Corporation 2012 annual report,

http://www.segc.com.au/pdf/segc_annual_report_2012.pdf

¹⁷

<http://www.asic.gov.au/asic/asic.nsf/byheadline/About+the+new+market+supervision+and+competition+cost+recovery+regime?openDocument>

The basis for claiming the funds from participants:

<http://www.asic.gov.au/asic/asic.nsf/byheadline/Market-supervision-and-competition-cost-recovery?openDocument#basis>

The basis for claiming the funds from market operators:

<http://www.asic.gov.au/asic/asic.nsf/byheadline/Markets+FAQs+-+fee+arrangements?openDocument>

These costs are collected via a fixed and variable fee. The variable element of the fee is based on the number of transactions undertaken by operators and participants (for shares, ETFs and listed managed funds). According to some market participants the total cost over a 5 year period is being discussed to be AUD45 million, inclusive of the original AUD29.8 million.

2.4.4 The Prelude to Competition and Key Regulatory Changes: Canada

In the early 2000s regulation was changed to allow for more competing alternative trading platforms. Initially these platforms were slow to take off but by 2008, a number of industry platforms that were owned by the industry or offered stakes to broker-dealers such as Alpha and Chi-x were starting to increase market share.

In 2011, the London Stock Exchange made a bid to merge with TMX Group, but this was thwarted by a consortium of Canadian banks and pension funds which made an offer for the TMX Group in order to keep control of the Canadian market. By this time Alpha had gained 20% market share and was subsequently bought by TMX when it was acquired by Maple in 2012.

2.4.5 Current Market Status: Australia

Trading

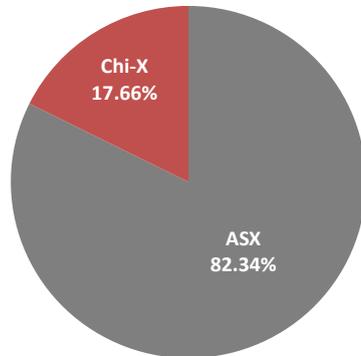
ASX and Chi-X Australia (CXA) are the only licenced Australian market operators competing head to head for secondary market flow in ASX listed stocks. ASX remains the competent listing authority for its market as do other exchanges. CXA offers trading in the full stock universe of ASX listings.

ASX remains the competent listing authority for its market as do other exchanges. CXA offers secondary market trading in the full universe of ASX cash equity and ETF listings.

The largest Australian brokers have now connected to CXA. Its market share is growing but remains low. ASX has responded to competition in a similar manner to other incumbent exchanges in Europe and the US; the exchange has become more innovative with new order types to match functionality of new entrants, it now offers a premium “liquidity” centre for co-location services and intra-day trading prices on the lit market have reduced, although the proportion of flow being executed during the auction period has increased.

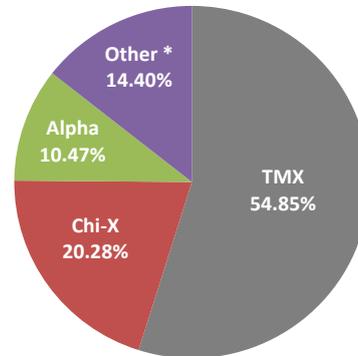
This is in line with other European markets, where, as platforms compete for liquidity and trading costs reduce, high frequency trading starts to increase market share. This leads to perceptions that venues now have 'toxic' flow (as opposed to the natural flows provided by brokers and retail investors onto primary markets) and more flow starts to move to the auction periods.

September 2014
% Total Equity Value Traded
Australia



Source: iress

Full Year ending June 2014
% Total Equity Value Traded
Canada



Source: IIROC

September 2014 Value Traded

ASX Equity Total Market	179,505,424,940.75
Chi-X Equity Total Market	38,494,734,159.38

* Other consists of an additional 10 trading venues

Clearing and Settlement

ASX runs a vertical model for clearing and settlement. Unlike some European models (e.g. LCH.Clearnet SA and Eurex), ASX Clear does not have a banking licence nor does it have a mutualised default fund like other global models. Details about this are covered in Section 3.

The government made a decision in Q1 2013 not to allow competition in clearing for a two year period, which is due to end in Q1 2015. During this two year moratorium, ASX has been required to take specific steps intended to enable an assessment of how the outcomes delivered by ASX Clearing compare to those which may be achieved if competition were present. The steps include the development and implementation of a code of practice, the establishment of a user forum and a benchmarking of ASX prices against global standards.

CXA, which needed access to the CCP in order to operate an anonymous market, uses ASX's Trade Acceptance Service (TAS), to access ASX Clearing and Settlement services. ASX Trading platforms do not use the TAS. CXA initially signed up to the TAS for a period of 5 years at a fixed cost of AUD275,000 per annum but it did not pass this on directly to customers. ASX Clear also charges Chi-X participants full clearing fees on every trade received via the TAS. The fees from the TAS thus represented a new revenue stream for ASX. On 27 June 2014, ASX advised Chi-X that it was waiving the annual TAS service fee from 9 August 2013 (the date on which ASX Clear's code of practice came into effect), resulting in Chi-X receiving a reimbursement of past fees paid of AUD338,287.67. The waiver of fees applies for as long as the Code of Practice and the related government policy decision to defer consideration of a licence application from a competing clearing facility to clear ASX listed securities, remain in force.

ASX Clear charges participants a basis points amount charge which means that it is the same relative cost for trades executed on either CXA or ASX. However, ASX Settle charges a fixed cost per transaction which means that settling trades on CXA will appear more expensive to an intermediary when measured in basis points relative to value traded, as the value traded on CXA is much lower than ASX.

Market participants are increasingly looking for ways to increase competition and lower the cost of clearing. In December 2012, the Council of Financial Regulators in Australia made a report to the Australian Government which was based on responses to a consultation paper regarding the issue of competition in the clearing and settlement of the Australian cash equity market. The findings of the consultation were varied and, in its report, the Council recommended a cautious approach to the introduction of competition. It recommended that a decision on any licence application from a CCP seeking to compete in the Australian cash equities market should be deferred for a two year moratorium period as referenced above.

2.4.6 Current Market Status: Canada

Trading

There is significant market fragmentation in the Canadian equity markets. Today, there are 13 market places each with different trading rules and fee structures. Competition has led to an overall reduction on trading fees and product innovation but it also has placed new technology demands on participants.

Competition has impacted the incumbent exchange, the TMX market share is declining. At the end of the second quarter of 2014, its market share was 54.853% down from 57.153 a year earlier. Chi-X Canada held 20.276% market share and Alpha 10.468%.¹⁸ New entrants such as Aequitas Innovations are still coming to market.

However, the Canadian Securities Administrators (CSA) appears to be trying to reduce the level of competition by proposing amendments to the Order Protection Rule (OPR) which was a rule that was brought into effect in 2011. It currently requires marketplaces to establish and ensure compliance with policies and procedures designed to prevent trade-throughs on that marketplace. The protection is intended to ensure that all immediately accessible, visible, better-priced limit orders are executed before inferior-priced limit orders and are not traded through.

The proposed amendment is intended to limit the protection to marketplaces that meet a certain threshold. An order would be protected only when the adjusted share volume and value of trades of the marketplace is 5%. Exchanges that do not meet that threshold will only be protected on their listed securities. This would mean that 'best bid' and 'best ask' would be determined by reference to orders displayed on protected markets only and competition would be reduced as only market places with a 5% threshold or more would have flow routed to them.

There is no competition in the Canadian equity market for clearing services. CDS charges a flat clearing fee of 0.0041 for every reported trade to both the buyer and the seller plus an equivalent net settlement charge for each CNS eligible trade. CDS protects itself from losses due to default by only taking on the risk on the morning of the value date. Therefore, the replacement cost risk of trades that have not reached value date is borne by the individual participants on a bilateral basis with their counterparty to the trade.

¹⁸ IIROC MarketplaceStatisticsReport – June 30 2014. http://www.iiroc.ca/industry/marketmonitoringanalysis/Documents/MarketplaceStatisticsReportCurrent_en.pdf

Section 3:

Clearing Analysis Review

SECTION 3: Clearing Analysis Review

Oxera's report and this report by MSP look at quantitative transaction costs incurred at a number of CCPs across the world when a trade occurs. However, neither report undertakes a quantitative analysis that accounts for differing risk management practices, including initial and variation margin processes, collateral management, default management and the use and cost of both customer and shareholder capital. These costs may be much higher than the transaction costs but can be harder to quantify.

Market participants are reliant on clearing houses to manage risk to the highest standards while keeping both transaction costs and the cost of capital low. Oxera has concluded that the transaction costs for clearing in Australia are justifiably higher because of the amount of ASX Clear funds at risk in the event of a default. In making such a statement, all approaches to risk management and the cost of capital to participants and shareholders need to be taken into consideration.

It also concludes that inter-operability adds cost for market participants and that market participants would not achieve volume discounts in other markets.

MSP believes that a number of assumptions made by Oxera require further exploration and analysis before such a conclusion can be reached. This section is a review of the methodology and assumptions that Oxera has used in Section 4 of its report with regard to CCPs in order to reach its conclusion and MSP's view as to whether these assumptions are adequate or why further analysis is required. Oxera covered both clearing and settlement: this review is restricted to CCP clearing.

3.1 Oxera's Report Summary on CCPs

Oxera's introduction to and summary of its report on clearing are shown in the box below (MSP's formatting changes):

The purpose of this section is to explore the main differences in the services and systems operated by each FMI, to understand whether some of these differences can provide further explanations for the observed variations in fees charged to users.

Section 4.2 explores the key differences in risk management services.

- *From a user cost perspective, the most significant difference is whether the clearing costs estimated in section 3 include the provision of CCP services.*
- *Of next significance (from a user-cost perspective) is*
 - *the position of participants' contribution in the default waterfall and*
 - *the extent to which the CCP itself provides a buffer to protect the capital committed by non-defaulting participants.*

Section 4.3 analyses the main differences in the clearing and settlement services and systems, including, for example, the variation in netting efficiencies, and failure rates.

Oxera then concludes in 4.1 (MSP's formatting changes) that with the exceptions of Spain (Iberclear) and Canada (CDS):

- *The function that the CCP fulfils is effectively the same across all financial centres,*
- *Differences in the structure of the default waterfall (i.e. on whom the costs of a default fall and in what order) do vary*
- *This can have a significant impact on the overall costs to users*
- *Other aspects that can affect user costs include:*
 - *Account structure*
 - *Scope of CCP services*
 - *Handling of client collateral – for example, whether the CCP passes back to participants any earnings on participants' margins”.*

3.2 MSP Summary of the OXERA Report Findings

MSP's summary of this Section can be summarized as:

1. The risk management and default waterfall model model in Australia, managed by ASX Clear, is unusual compared to other global markets:
 - In most other markets, after the funds of the defaulting participant are used, there is a default fund where the risk is shared between the non defaulting market participants. ASX Clear has no default fund shared between market participants and instead puts it now funds (AUD250mn) in place of a mutualised default fund or one that shares risk.
 - Increasingly regulators are encouraging CCPs to put some of their own “skin in the game”. European regulation now requires CCPs to place 25% of their total minimum capital ahead of non-defaulting members within their default waterfall. ASX Clear puts significantly more “skin in the game" than is required by other regulation and is responsible for 100% of readily available resources in the event of a default.
2. The Oxera report states that ASX's higher clearing costs can be justified because of the shareholder funds that are at risk. However, the report omitted to consider a number of factors that MSP believes should be taken into consideration when making such an assumption:
 - Clearing fund contributions made by defaulting participants were not included in the analysis and should factored in as they will be used prior to impacting non-defaulter's collateral or shareholder funds.
 - CCP's have more than just the initial margin process to help them manage risk before utilising the default fund or shareholders capital. This includes proper initial and on-going screening of clearing members as well as effective procedures for collateral management and valuation.
 - The report suggests that ASX's model is correct because it fully protects non defaulting participants' collateral in all but the most extreme circumstances but the benefits of other models have not been assessed:

- A well managed CCP should rarely have to use the default fund and the likelihood of using those funds should be very low. CCPs that use a standard initial margin model with participants contributing to the default fund can still protect non defaulters' collateral and/or the shareholder capital. When Lehman Brothers defaulted, the default fund at LCH.Clearnet did not get used.
 - Well managed default funds do not have to be static. Some CCPs offer dynamic management of the default fund by reassessing contributions based on risk profiles. This improves collateral management and costs for the market.
 - ASX's model where risk is not mutualised amongst participants could lead to a higher risk profile and a higher cost of financing for the organisation which may then be passed onto participants. However this could be offset by savings on collateral posted because it is less at risk.
 - Risk calibration is therefore extremely important. If there is very high confidence that the default funds or shareholder funds will not be used, this creates over collateralisation for market participants which comes at additional cost. However, if confidence is low then the participants may be under-collateralised and other funds may be more at risk.
- It does not consider whether a static fund of AUD250 mn is optimum size for the business that is being cleared.
 - There is acknowledgement that ASX does not segregate client funds. However this can reduce/increase costs depending on the user perspective.
3. Inter-operability has reduced participant costs in Europe.

3.3 MSP Methodology and Approach

MSP's view is that CCPs have many tools to manage risk and their responsibilities which include:

- Default prevention
- Default management
- Resolution management

This report has used all of the above as context when reviewing Oxera's report.

The Oxera CCP review focuses on default management. MSP have used the diagram below, which shows a standard CCP risk management waterfall structure, to provide the structure for the review of the methodology and assumptions used by Oxera in the CCP part of Section 4 of its report. The diagram covers default prevention and default management. It does not show resolution management, which is addressed in section 2.5.

	Oxera Ref 4.1.1	ASX Clear	Standard CCP model
Pre-default	Membership criteria	✓	✓
	Eligible collateral	✓	✓
	Investment/liquidity/sett risk mgmt	✓	✓
	Concentration risk mgmt	✓	✓
Funded	Initial margin	Tier 1a ✓ 99%	✓ 99% (IOSCO)
	Default fund - defaulter	Tier 1b ✗	✓ variable
	CCP capital (skin in the game)	Tier 2 ✓ AUD250m	✓ 25% (EMIR)
	Default fund – non-defaulters	Tier 3 ✗	✓ c.3-5% of IM
Unfunded	Unfunded default fund contributions (assessment)	Tier 4 ✓	✓
	Additional CCP capital	Tier 4 ✓	✓

Source: Market Structure Partners

The column headed Oxera Ref 4.4.1 refers to the references (Tier 1a, Tier 1b, etc) used in Box 4.1 in section 4.1.1 (The default waterfall) of their report.

Pre-default refers to the tools used by the CCP and available to their clients to support risk management and reduce the chance of a default occurring.

Funded refers to assets held by the CCP that are immediately available in the event of a default. These may be provided by the CCP's participants (initial margin and default fund contributions) or by the CCP itself (CCP capital).

Unfunded refers to contractual obligations by the CCP's participants or the CCP itself to provide immediate additional funding should the funded assets prove insufficient to deal with a default.

Funded assets are held by the CCP. The CCP has the right to collect and use unfunded assets (emergency assessments on participants) but does not hold them.

An explanation of the European Markets Infrastructure Regulation (EMIR) requirement for CCP capital skin in the game is provided in section 2.6.

A summary of the underlying IOSCO Principles and EMIR is provided in the appendices:

- Appendix IV: Summary of IOSCO Principles and EMIR
- Appendix V: Principle 4 – Summary of Cover 1 and 2

The analysis in the following sections follows the Oxera Report structure. Each section starts with a summary of MSP's key findings.

MSP's main focus has been on areas where it believes that Oxera's findings might have been different if it had used different approach or had fully substantiated a conclusion. This report notes where MSP agrees or disagrees.

MSP's main focus has been on areas where it believes that Oxera's findings might have been different if it had used different approach.

MSP notes that CCPs that have been used in the comparisons of both reports may clear different instruments and segregate default funds in different ways, but MSP have not carried out any analysis into potential differences between ASX Clear and other CCPs with regard to either.

3.4 The Default Waterfall (*Oxera Report Section 4.1.1*)

MSP Analysis Finding	MSP Recommendation
The Oxera report uses the default waterfall as a proxy for the full CCP risk waterfall – it does not cover pre-default risk management tools that should also be used by an exchange to manage risk.	The Oxera approach is reasonable. These differences between CCP are not sufficiently material to justify the effort needed to compare them.
Eligible collateral and haircut differences should be considered with regard to IM. This topic is covered in section 4.1.4 of the the Oxera report.	The impact of eligible collateral and haircut differences do need to be considered with regard to IM. These are covered in section 4.1.4 of the the Oxera report.

The Oxera report does not consider pre-default tools as part of its comparative analysis (circled below). MSP asked a number of market participants representing both CCPs and their clients whether this was reasonable.

	Oxera Ref 4.1.1	ASX Clear	Standard CCP model
Pre-default	Membership criteria	✓	✓
	Eligible collateral	✓	✓
	Investment/liquidity/sett risk mgmt	✓	✓
	Concentration risk mgmt	✓	✓
Funded	Initial margin	Tier 1a ✓ 99%	✓ 99% (IOSCO)
	Default fund - defaulter	Tier 1b ✗	✓ variable
	CCP capital (skin in the game)	Tier 2 ✓ AUD250m	✓ 25% (EMIR)
	Default fund – non-defaulters	Tier 3 ✗	✓ c.3-5% of IM
Unfunded	Unfunded default fund contributions (assessment)	Tier 4 ✓	✓
	Additional CCP capital	Tier 4 ✓	✓

Source: Market Structure Partners

The Oxera report does not consider pre-default tools as part of its comparative analysis (circled below). MSP questioned a number of market participants representing both CCPs and their clients whether this was reasonable.

The feedback MSP received from market participants is that:

- There can be significant differences in membership fees
- These tools would be part of the credit review a firm would carry out before it joined a CCP (specifically with regard to quality of other participants and collateral required)
- Overall it is believed that pre-default tools are not material with the possible exception of eligible collateral (see section 3.7 of this report)

3.5 Consistency in Tier 1 (Oxera Report Section 4.1.2)

MSP Analysis Finding	MSP Recommendation
<p>It is impossible to assume complete consistency in Tier 1 management. The Oxera report (4.1.2) does not comment on the level of stress testing applied by CCPs to ensure 99% confidence. Currently CCPs use different definitions and approaches so the 99% confidence levels are not necessarily comparable. The implication is that although all CCPs may achieve 99% confidence, those with more stringent stress testing will have:</p> <ul style="list-style-type: none"> • Higher participant IM costs as more collateral will be needed • Less likelihood that CCP capital and default fund contributions from non-defaulters will be drawn on • A well-managed CCP should not have to draw on its default fund. 	<p>MSP does not recommend comparing CCP stress testing methodologies, which would require a very significant effort. However these differences should be noted as there may not be consistency at this level. This has significant implications on costs for participants and the likelihood of the default fund being utilised.</p>
<p>The Oxera report does not consider the impact of clearing fund contributions by defaulting participants in terms of reducing the likelihood of needing to draw on CCP capital.</p>	<p>The defaulting participant clearing fund contribution should be recognized and included as it is fundamental to the conclusions drawn in the Tier 2 comparison section of the report.</p>

Section 4.1.2 in the Oxera report looks at consistency in Tier 1. As previously noted, Box 4.1 in their report shows two components to Tier 1:

- Initial margin (margin of the defaulting participant)
- Default fund contribution of the defaulting participant

	Oxera Ref 4.1.1	ASX Clear	Standard CCP model	Needed in LCH managed defaults	
Pre-default	Membership criteria	✓	✓	LCH has managed 7 participant defaults as a CCP <ul style="list-style-type: none"> • Drexel Burnham Lambert • Woodhouse, Drake and Carey • Barings • Griffin • Lehman Brçchers • MF Global • Cyprus Popular Bank 	
	Eligible collateral	✓	✓		
	Investment/liquidity/sett risk mgmt	✓	✓		
	Concentration risk mgmt	✓	✓		
Funded	Initial margin	Tier 1a ✓ 99%	✓ 99% (IOSCO)		✓
	Default fund - defaulter	Tier 1b ✗	✓ variable		✓
	CCP capital (skin in the game)	Tier 2 ✓ AUD250m	✓ 25% (EMIR)		✗
	Default fund – non-defaulters	Tier 3 ✗	✓ c.3-5% of IM		✗
Unfunded	Unfunded default fund contributions (assessment)	Tier 4 ✓	✓		✗
	Additional CCP capital	Tier 4 ✓	✓		✗

Source: Market Structure Partners

Tier 1 (circled above) represents the assets that a CCP will normally call on to manage a default and protect the next layers in the waterfall:

- Funded: CCP skin in the game capital and other participants' default fund contributions
- Unfunded: emergency assessments on participants and additional CCP capital

A well managed CCP should not have to call on non defaulters or shareholder contribution in all but extreme circumstances. Evidence suggests that the conventional model of IM plus default fund contribution should protect other participant's collateral. LCH has negotiated seven participant defaults as a CCP without using the non defaulters funds in the default fund (Drexel Burnham Lambert; Woodhouse, Drake and Carey; Barings; Griffin; Lehman Brothers; MF Global; and Cyprus Popular Bank). In each of these cases, LCH's "defaulter pays" approach has been successful in managing the work-out of outstanding positions¹⁹.

This evidence suggests that the conventional model of IM plus default fund contribution will also protect other participant's collateral in all but extreme circumstances.

However, in December 2013, there was a near failure in Korea (KRX) as a result of a trading error by HanMag Securities and

- The losses exceeded the HanMag IM and default fund contributions
- The CCP rules allowed it to then use other participants' default fund contributions before contributing itself (KRX rules have subsequently been changed so that its capital now comes before its non-defaulting members)
- All KRX members therefore lost part of their default fund contribution
- The exchange itself paid nothing
- A small firm (market cap USD20m) caused USD40m losses

Oxera 4.1.2 concludes that there is consistency across all CCPs based on:

- An understanding that the IOSCO recommendation 3.4.18 has become standard practice²⁰
- Confirmation from the CCPs that responded to Oxera's RFI that they adhere to this standard

MSP believes it is difficult to make the statement that there is consistency without noting that CCPs use different stress testing definitions and approaches to ensure initial margin provides 99% confidence levels. The lack of a standard approach means that 99% confidence levels are therefore not necessarily comparable. The more robust the stress testing, the higher the actual confidence level that the CCP obtains through IM and:

- The higher participant IM costs will be as more collateral will be needed
- The less likely it is that CCP capital and default fund contributions from non-defaulters will be drawn on

It would require a very significant effort to compare CCP stress testing methodologies and this is not something MSP would recommend. However these differences should be noted.

¹⁹ http://www.lchclearnet.com/documents/515114/515811/LCH+Clearnet's+default+history+May-13_tcm6-63482.pdf/245cb035-5755-48bf-83d3-23b283764e56

²⁰ initial margin should meet an established single-tailed confidence level of at least 99 percent of the estimated distribution future exposure (paragraph 3.4.18 extract)

Oxera 4.1.2 does not comment on the lack of consistency with regard to Tier 1b contributions (Default fund contribution of the defaulting participant) and specifically that most CCPs have them but ASX Clearing does not.

The presence or absence of the defaulter's contribution to the default fund as the next line of defence in the waterfall is fundamental to the conclusions drawn in the next section – Variation in Tier 2 – about there being little further protection for non-defaulting participant's collateral once the defaulting participant's margin has been exhausted.

3.6 Variation in Tier 2 (*Oxera Report Section 4.1.3*)

This section covers an analysis of the waterfall layer described as Tier 2 (Tranche of CCP's own resources) in Box 4.1 in the Oxera report.

It does not include Tier 1b (Clearing fund contribution of the defaulting participant).

It does reference Tier 3 (Clearing fund contributions from non-defaulting participants).

MSP Analysis Finding	MSP Recommendation
<p>The Oxera report conclusion (4.1.3) that 'At most CCPs, once the defaulting participant's margin has been exhausted, there is little further protection for non-defaulting participants' collateral' does not consider the defaulter's contribution to the default fund and is therefore misleading.</p>	<p>Further analysis should be carried out that includes consideration of the performance of the standard IM plus defaulting participant clearing fund contribution in coping with defaults at other CCPs (eg LCH and KRX).</p>
<p>The Oxera report conclusion (4.1.3) that 'At ASX Clear, the buffer is intended to be large enough to protect non-defaulting participants' collateral in all but very extreme circumstances' is not sufficiently defined. The IOSCO IM 99% confidence level is also intended to provide protection against all but extreme circumstances and the benefits of providing significantly higher confidence levels are not quantified.</p>	<p>The analysis should try to quantify the additional protection provided by this buffer compared to the standard IM plus defaulting participant model.</p>
<p>The Oxera report conclusion (4.1.3) that 'These default arrangements imply that ASX Clear will have a higher probability of loss of own resources relative to participants in case of default, leading to a higher risk profile of the business and hence a higher cost of financing' is not sufficiently defined. The Oxera conclusion is reached without quantifying:</p> <ul style="list-style-type: none"> • The impact of pre-default management tools • The Tier 1 IM confidence level • The impact of drawing on defaulting participant default fund contributions 	<p>The analysis should include quantitative analysis of the probability of ASX Clear losses arising:</p> <ol style="list-style-type: none"> 1. Without participant default fund contributions providing a buffer (current state) 2. If ASX Clear had a default fund <p>This analysis should include an assessment of how effectively a default event can be managed in each scenario.</p>

MSP Analysis Finding	MSP Recommendation
<p>The Oxera report conclusion (4.1.3) that ‘To cover this cost the CCP may need to impose higher fees’ and ‘At the same time, participants will realize cost savings as the collateral they post at ASX Clear is (much less) likely to be used to settle the obligations of another participant’s default’ is not sufficiently defined and the risk reduction should be quantified to understand the cost of this insurance.</p>	<p>The analysis should include quantitative analysis of:</p> <ul style="list-style-type: none"> • The reduction in the risk of other participants’ resources being required • The cost of ASX Clear providing insurance against this risk <p>It should also consider whether under stressed market conditions:</p> <ul style="list-style-type: none"> • Insurance would be available on a commercial basis • Shareholders will want to continue to provide this insurance
<p>The Oxera (4.1.3) reasoning for using value of share trading as the measure for showing relative buffer sizes is unclear.</p>	<p>The analysis should explain the use of this measure rather than one that shows the level of risk associated with the instruments being traded (e.g. total margin pool or largest margin requirement).</p>
<p>The Oxera calculations for the cost of financing the default fund assume that AUD250m is the optimum fund size and that this remains constant. If this is larger than required then this model imposes unnecessary costs on participants.</p> <p>This is not the experience at other CCPs, which recalculate the default fund requirement daily and adjust periodically (eg quarterly) to reflect market risk and ensure the right level of funding. The default fund for cash instruments is typically 3-5% of IM.</p> <p>There is no mention of other instruments cleared at ASX which may have a different risk profile and more impact on the AUD250mn fund.</p>	<p>The analysis should include:</p> <ul style="list-style-type: none"> • A justification for AUD250m being the optimum size for protecting non-defaulting participant funds on a like for like basis • An explanation for the reason why this is much more static in Australia than other markets and whether a static fund is the optimum way to manage risk • A review of instruments cleared at ASX Clear and the attribution of the AUD250mn to those instruments.
<p>The Oxera report does not include any analysis of the process for replenishing the default fund or shareholder CCP capital if this is required following a default.</p>	<p>The analysis should include a detailed comparison of the replenishment processes with a default fund and with shareholder CCP capital. MSP understands that replenishment is currently under review by both the Reserve Bank of Australia and the Australian Treasury so this may not be possible until their requirements have been defined.</p>
<p>There is a view that it is possible for a CCP to have too much skin in the game - S&P credit rating on ASX Clear (Futures).</p>	<p>This should be noted as a view as it may alter participant behavior and may put extra risk on ASX shareholders</p>

	Oxera Ref 4.1.1	ASX Clear	Standard CCP model	Needed in LCH managed defaults	
Pre-default	Membership criteria	✓	✓	LCH has managed 7 participant defaults as a CCP <ul style="list-style-type: none"> • Drexel Burnham Lambert • Woodhouse, Drake and Carey • Barings • Griffin • Lehman Brccchers • MF Global • Cyprus Popular Bank 	
	Eligible collateral	✓	✓		
	Investment/liquidity/sett risk mgmt	✓	✓		
	Concentration risk mgmt	✓	✓		
Funded	Initial margin	Tier 1a ✓ 99%	✓ 99% (IOSCO)		✓
	Default fund - defaulter	Tier 1b ✗	✓ variable		✓
	CCP capital (skin in the game)	Tier 2 ✓ AUD250m	✓ 25% (EMIR)		✗
	Default fund – non-defaulters	Tier 3 ✗	✓ c.3-5% of IM		✗
Unfunded	Unfunded default fund contributions (assessment)	Tier 4 ✓	✓		✗
	Additional CCP capital	Tier 4 ✓	✓		✗

Source: Market Structure Partners

Oxera (4.1.3) moves directly into an analysis of the funds that are used after the defaulting participant's collateral but before the collateral lodged by non-defaulting CCPs.

As the table shows, the conventional CCP model will use the following before collateral lodged by non-defaulting participants:

- Defaulting participant IM
- Defaulting participant default fund contribution
- CCP capital

The Oxera analysis of the impact of having a default fund is unclear. The assessment focuses on funding costs rather than on the risk management implications of being able to draw on defaulter contributions ahead of shareholder capital or non-defaulter contributions. It also omits any analysis relating to replenishment of the default fund / CCP shareholder capital if this is required.

Oxera Appendix 6 (Calculation of the default fund cost) states:

The default fund can be provided either by the CCP or clients of the CCP. If it is supplied by the clients, then they will have to hand over capital/collateral to the CCP for the time they remain as clients. In order to do this and maintain the same operational position in their activities outside the posting of those securities, they will have to raise additional finance.

Oxera 4.1.3 states:

..., in order to compare like for like between the clearing fees charged by ASX and those charged by CCPs where the default fund is composed of participant's contributions (and there is minimal additional protection by the CCP), ASX fees should be reduced by around 0.04-0.07bp based on the methodology for the estimated cost of funding the default fund.

Where there is some protection to non-defaulting participants' collateral, in addition to the defaulting participant's own collateral, the reduction to ASX fees is slightly less. Compared with CDP, the CCP providing the next greatest level of protection after ASX (as shown in Table 4.1), the relevant reduction to ASX's fees is between 0.03bp and 0.06bp.

The advantages and disadvantages of a default fund versus CCP shareholder capital in terms of managing a default event are not considered by the analysis. In the event of a default, the requirement will be for immediate, intra-day liquidity. MSP understands that the AUD250m shareholder capital is liquid and is immediately available.

Oxera report table 4.1 sets out the value of funds at a number of CCPs that are used after the defaulting participant's collateral but before the collateral lodged by non-defaulting participants. However this does not appear to include defaulting participant's contribution to the default fund.

For example, it shows Eurex (Germany) as having a buffer of AUD66m. This refers to the €50m that Eurex would draw on after the clearing member in default contributions have been exhausted. However it does not show the difference between Eurex, which has both IM and the defaulting participant's default contributions to draw on, and ASX Clear, which does not have a default fund.

It is also unclear as to reasoning behind the use of value of share trading as the measure for showing relative buffer sizes, rather than one that shows the level of risk associated with the instruments being traded and the period between trade and settlement dates (e.g. total margin pool or largest margin requirement).

The calculations also assume that AUD250m is the optimum size for the default fund and that this remains constant. The Oxera approach is to consider the default fund as an amount that could be funded by either the CCP or clients of the CCP and Table 4.1 shows the amounts available before non-defaulting members are required to contribute.

The experience at other CCPs is that while the CCP skin in the game capital is recalculated annually, the default fund requirements are recalculated daily with adjustments being made periodically (eg quarterly) or immediately if required to reflect market risk and ensure the right level of funding.

If the fund (e.g. AUD250m) is larger than required then this imposes unnecessary costs on participants. The default fund for cash instruments is typically 3-5% of IM.

MSP understands that a large participant in a CCP may put up about 5% of the IM pot. Their contribution to the default fund is therefore about 3-5% of 5% of the IM pot. The funding cost for the additional protection this participant gets from the CCP skin in the game being larger than 25% needs to be quantified so that it can be compared to their cost of contributing to the default fund.

MSP also understands that ASX Clear provides services for a range of financial products traded on the ASX market, including cash equities, pooled investment products, warrants, certain debt products and equity- and commodity-related derivatives. There is no segregation in the default fund for different types of activity and yet managing \$1 of equities risk is very different to the cost of \$1 of a derivative product. The costs are much more significant when open positions are maintained as daily mark to markets and calculation of variation margin must be undertaken whereas an equity has a much more limited risk period, usually T+2 or T+3. The cost for a default fund solely related to

equities is therefore, expected to be lower than that of a fund attributed to other instruments. The Oxera Report makes no reference to this.

The conclusions in this section do not appear to consider the risk management implications of having a default fund.

Oxera 4.1.3 states:

- *At most CCPs, once the defaulting participant's margin has been exhausted, there is little further protection for non-defaulting participants' collateral*
- *At ASX Clear, the buffer is intended to be large enough to protect non-defaulting participants' collateral in all but very extreme circumstances*
- *These default arrangements imply that ASX Clear will have a higher probability of loss of own resources relative to participants in case of default, leading to a higher risk profile of the business and hence a higher cost of financing*
- *To cover this cost the CCP may need to impose higher fees*
- *At the same time, participants will realize cost savings as the collateral they post at ASX Clear is (much less) likely to be used to settle the obligations of another participant's default.*

As noted in the section "Consistency in Tier 1", LCH has successfully negotiated seven participant defaults as a CCP.

This evidence suggests that the conventional model of IM plus default fund contribution will also protect participant's collateral in all but extreme circumstances.

Given these experiences MSP recommends that further analysis should be carried out that includes consideration of the performance of the standard IM plus defaulting participant clearing fund contribution in coping with defaults at other CCPs.

MSP also recommends that the conclusions relating to the protection provided by the ASX Clear capital buffer should be quantified. To understand the cost that is being charged for this additional protection, the analysis should include:

- As far as possible, the confidence levels delivered by each level of the risk waterfall to ensure the comparison is being made equally at each level or, where not, that differences are understood and the methodology for costing these variations fully explained
- Quantitative analysis of:
 - The reduction in the risk of other participants' resources being required
 - The cost of ASX Clear providing insurance against this risk

3.6.1 Replenishment

No consideration is given to the process for replenishing the default fund or shareholder CCP capital if this is required.

- Shareholders
 - A Single source of funding: what is the guarantee that the shareholders will want to invest again?
 - Potential delays to the on-going market due to fundraising process
- Participants
 - Mutualisation means multiple contributors and possibly a more systemically stable CCP

- Mutual self interest should be present to get the CCP up and running again
- Generally the CCP can take money required from its members, avoiding any fundraising process

MSP recommends that the analysis should include a detailed comparison of the replenishment processes with a default fund and with shareholder CCP capital. MSP understands that this is an issue currently under discussion in Australia, as reflected by the below extract from the ASX website:

CCP recovery and resolution

Recovery

Australian regulatory standards now in force require ASX's central counterparties (CCPs), ASX Clear and ASX Clear (Futures), to establish powers ('recovery tools') under their operating rules to address fully any credit losses or liquidity shortfalls they may face as a result of clearing participant default, and to replenish their default funds following such events. The Reserve Bank of Australia, which is responsible for setting and monitoring ASX's compliance with the domestic standards, requires these recovery tools to address very extreme scenarios under which the CCP's financial resources are insufficient to cover credit losses or payment obligations following a clearing participant default. The Reserve Bank also expects these recovery tools to be consistent with international guidance on recovery of financial market infrastructure (FMI). In addition, the CCPs must have legally enforceable arrangements in place to re-establish general business risk capital, in the event that general business losses (such as an investment counterparty default loss) fully or partially erode the capital held by ASX for such contingencies.

ASX is consulting with customers and other stakeholders on the enhancement of the CCPs' operating rules to comply with domestic and international standards. Consultation and reference material can be found below.

Resolution

Separately, the Australian Treasury is developing legislative proposals for an Australian FMI resolution regime consistent with international standards. 'Resolution' refers to a public authority taking control of a distressed FMI to either return it to viability or facilitate its orderly wind-down. ASX's recovery plans will need to be consistent with the resolution regime.

3.6.2 EMIR Requirement for Skin-in-the-Game

This is a European Union (EU) requirement for a Central Counterparty Clearing House (CCP) to place 25% of its total minimum capital ahead of non-defaulting clearing members within the default waterfall. CCPs in Europe must maintain minimum capital requirements that are either a minimum EUR7.5m or, in aggregate, sufficient to ensure an orderly winding down (at a minimum six months of operating costs) and to provide adequate protection to the CCP against credit, counterparty, market, operational, legal and business risk²¹. Skin-in-the-Game represents an additional 25% on top of the total minimum capital.

²¹ European Market Infrastructure Regulation (EMIR) Article 16

Oxera 4.1.1 states:

“the greater the amount of the CCP’s own resources that are at risk, the higher its position in the waterfall and increasing its relative size to the amounts committed by clearing participants, the greater the risk protection provided by the CCP to its participants”.

However this is not a universally held view, some commentators believe that too much skin in the game can incentivise the wrong behaviour as is shown by the extract below.

Extract from ‘CCP in Focus – Skin in the Game’, Thomas Murray, 17 March 2014

Is there an opposite case for the fair mutualisation of risk? What happens if there is too much Skin-in-the-Game? **ASX Clear (Futures) recently received a credit rating from Standard & Poor's (S&P). Within the report, S&P stated that ASX Clear (Futures) contributes paid-in financial resources that are more than twice that of the clearing participants, which in its opinion reduced effective risk mutualisation.** The clearing members might feel less of a need to stay sharp on risk management. Can there be too much Skin-in-the-Game? Possibly.

As Skin-in-the-Game increases, the clearing members' capital exposure reduces, up to a point. This is to encourage CCPs not to take excessive risks with, among other things, their investment policy. By a CCP placing more capital higher up in the default waterfall, non-defaulting members are less likely to be affected by losses caused by another clearing member. This is essentially what a CCP is set up to do; however, there exists a fine balance between requiring a CCP to place capital ahead of non-defaulting clearing members whilst still incentivising clearing members to carry out effective risk management standards.

The International Swaps and Derivatives Association (ISDA), in a response to the European Banking Authority (EBA) consultation paper, stated that having a 50% Skin-in-the-Game requirement may not strike the right balance between protecting non-defaulting members and ensuring that they have incentives to bid competitively in an auction of a defaulting clearing member's portfolio at a time when resources need to be replenished.

This is partly negated by the fact that CCPs have changed, or are in the process of changing, their rulebooks to incentivise participation in the auctioning of a defaulting clearing member's positions. SGX recently held a consultation, whilst ICE Clear Europe and Eurex Clearing AG already implement these rules within their rulebooks.

3.7 Handling of Participants' Collateral (*Oxera Report Section 4.1.4*)

MSP Analysis Finding	MSP Recommendation
Collateral is an area where there are significant differences between CCPs and its importance is likely to increase. However it is difficult to see how this could be quantified as part of this analysis	It should be noted that there is an implicit cost to participants depending on different collateral management processes.
Eligible collateral and haircut differences should be considered with regard to initial margin. High IM but with but lower grade collateral accepted to cover it may be similar to having low initial margin requirements but only accepting high quality haircut collateral. The 4.1.4 Oxera conclusion relating to end user costs cannot be justified on the information provided.	As per MSP's recommendation on Oxera's report section 4.1.2, Consistency in Tier 1, it would require a very significant effort to compare CCP stress testing methodologies, how they are impacted by different types of collateral, and the haircuts applied, This is not something MSP recommends. However it should be noted that impact on total costs has not been quantified.

Oxera's report section 4.1.4 looks at differences in the way that CCPs handle their participants' collateral. In summary, the report explains that their conclusions do not take into account any differences between:

- The types of collateral accepted
- The haircuts applied to less liquid instruments
- Whether interest generated on the collateral held by the CCP on behalf of participants is passed back to its participants
 - This is unlikely to be material at most CCPs, the posting of margin is a requirement in all financial markets, and most (if not all) pay participants interest on collateral held
 - This is substantial at LCH.Clearnet Group Ltd but this is on commodities and derivatives, not cash equity clearing

MSP recommends also adding the costs of handling different types of collateral to this list.

This is a difficult area for quantitative assessment but note that it is becoming increasingly important for CCPs. There are differing views on whether it is better to narrow the types of collateral accepted as this potentially introduces further risks. Collateral is of particular concern to the buy-side: if they provide cash, they cannot invest and if they provide assets they need to manage the resultant replacement risk if they can't get back the same assets they deposited.

Oxera 4.1.4 states:

There is variation in the handling of participants' collateral between CCPs. This variation covers aspects including:

- *the types of collateral accepted*
- *the haircuts applied to the less liquid instrument*
- *whether interest generated on the collateral held by the CCP, on behalf of participants, is passed back to participants*

The updated guidelines for financial market infrastructures from CPSS/IOSCO cover some of these aspects – in particular, the types of collateral that CCPs should accept. CPSS/IOSCO recommends that:

- CCPs should (only) accept collateral with low credit, liquidity and market risks, and set and enforce appropriately conservative haircuts and concentration limits (Principle 5)*
- in general, guarantees should not be considered acceptable collateral, exceptions include when the guarantee is from a central bank (paragraph 3.5.2)*

This suggests that, over time, there will be convergence in the types of financial instrument that will be accepted as collateral, and the conditions surrounding different security types. However, at present considerable variation remains. For example, the CCP in Singapore accepts only cash contributions to the default fund, whereas in most other financial centres government bonds are an acceptable form of collateral. At some CCPs (e.g. in Brazil), equity is also accepted.

The more restrictive the types of acceptable collateral and the greater the haircuts applied to the less liquid instruments, the higher the cost to users of supplying that collateral, and hence of using the CCP's services. However by increasing the robustness of the CCP, such measures may also reduce the risk to the users of the CCP of having to pay out in the event of another participant's default.

MSP does not think that sufficient analysis has been carried out to conclude that users necessarily have higher overall costs as a result of being restricted in the types of acceptable collateral and the haircuts applied to less liquid instruments.

There is a relationship between different types of collateral, haircuts and initial margin levels. A high IM but with but lower grade collateral accepted to cover it may be similar to having low initial margin requirements but only accepting high quality haircut collateral.

As per MSP's recommendation on Oxera's report section 4.1.2, Consistency in Tier 1, it would require a very significant effort to compare CCP stress testing methodologies, how they are impacted by different types of collateral, and the haircuts applied. This is not something MSP recommends, however it should be noted that impact on total costs has not been quantified.

3.8 Scope of CCP Services: Segregation of Client Assets (*Oxera Report Section 4.1.5*)

MSP Analysis Finding	MSP Recommendation
ASX Clear offers lower client protection than the minimum EMIR requirement, which reduces the costs to its participants. No adjustment has been made for this.	It should be noted the segregation of assets can increase costs due to lack of netting possibilities but can also reduce risks for clients. MSP assumes that ASX Clear offers lower client protection because Australia has much lower levels of 3 rd party clearing than Europe. If competition were to be introduced then this could change and segregation may be more important. CCP services would need to be enhanced.

Section 4.1.5 of the Oxera report considers investor protection.

Oxera 4.1.5 states:

Investors are not generally direct beneficiaries of CCPs; rather, the CCP novates market transactions between brokers (who may use third-party clearers to manage the interactions with the CCP), and national client money regulation provides the framework for investor protection for transactions consolidated by a clearing agent.

Oxera 4.1.5 describes four main models for protecting client assets:

- CCP directly guarantees investor transactions with custodians and brokers
- Individual client segregation, where individual client assets are segregated from each other, as well as from proprietary assets
- Omnibus client segregation, where individual client assets are co-mingled but are segregated from firm assets. This is the minimum level of segregation required under EMIR
- Un-segregated accounts, where client and proprietary assets can be managed in the same account. This is the case at ASX Clear

It identifies the advantage of segregation as protecting the client from the default of their intermediary (the CCP participant) but states that **this benefit 'is not easily quantified and will depend on characteristics such as the probability of intermediary default'**.

It identifies the disadvantages as:

- A reduction in the netting of transactions, thereby increasing the total number of settlements and settlement fees paid
- A requirement for greater margin to be posted at the CCP because opposing client and/or house positions cannot be offset

Oxera does not attribute any pricing adjustments in its comparisons between CCPs to account for different levels of client protection.

As ASX Clear offers very low levels of protection, this would have the effect of increasing its costs in comparison with CCPs that require segregation.

Third party clearers are not currently a feature of the Australian market and therefore this is not currently a major issue. However it would be a requirement if the use of third party clearers were to expand.CCP cost comparison methodology.

3.8 CCP Cost Comparison Methodology

The approach taken to comparing costs by both Oxera was to apply a methodology to compare the cost of one vertical trading-clearing-settlement system at a time. Oxera made the following assumptions:

- That Australian users would use services as they do in Australia and not adopt local market practice
- That CCP netting and associated volume discounts across multiple markets should be ignored
- That having more than one CCP per market is likely to increase user costs

Additionally, Oxera section 3.1 refers to Economies of scale in FMI post-trading services only in the context of vertical integration and not economies arising from:

- CCP providers covering multiple markets
- The use of General Clearing Members (GCMs)

MSP's cost analysis has taken a slight different approach. Our report uses a typical Australian user profile, similar to that of Oxera and this has been overlaid on the markets that form part of this report. This means that if there are volume discounts available in that market then the participant would receive those discounts if eligible.

Oxera's also makes the point that retail and institutional investors would not achieve the same volume discounts but LCH, EuroCCP and X-Clear allow all trading participants, regardless of size, to clear through the largest clearing member who will get the volume discount. They will therefore all pay the same clearing fee so the distinction between institutional or retail broker is not applicable. However, they may pay an additional fee to the clearing agent.

3.9 Effect On Costs of More Than One CCP Per Market

Oxera's report (section 2.1) makes the assumption that more than one CCP per market adds cost to market participants.

From our own knowledge as practioners and through interviews conducted with market participants for this report, our findings are that interoperability has significantly reduced user costs in Europe:

- Internal costs have reduced as it is simpler to interface to one CCP, more netting so lower total IM, only one Default Fund contribution needed
- External costs have reduced from both competition and the ability of participants to directly compare CCPs

Interoperability has, however, introduced a new cost: the cost the CCP incurs as a participant in another CCP. We understand there is no standard approach regarding how much of this cost is passed back to each CCPs member.

The following is an explanation of how interoperability works from the LCH.Clearnet website:

Where a trade is made/matched between two parties on a trade platform (exchange, MTF or OTC matching service) and each party chooses a different CCP to clear their trade then a balance contract automatically arises between the two CCPs on the same terms to ensure that each party retains a balanced book. The two CCPs are therefore said to 'interoperate' in managing the risk and settlement obligations arising between them.

The rights and obligations between interoperating CCPs are governed by a 'Master Clearing Link Agreement' and 'inter-CCP procedures'.

Each CCP has the risk that a CCP with which it interoperates goes into default. Each CCP is required to apply the same daily risk management methodology it applies to its interoperable CCP positions as it does for its member positions. However CCPs do not contribute to each other's default funds.

Therefore interoperating CCPs call margin from each other on a daily basis (end-of-day and intra-day where necessary). CCPs are required to fund these calls by taking specific additional collateral from their members. LCH.Clearnet collects the additional collateral required by applying a multiplier to the end-of-day initial margin. The multiplier is recalculated each day based on the actual positions held against each interoperating CCP and is available in the ERA parameter files on the LCH.Clearnet website. Where there is a shortfall between the additional collateral collected and the actual calls made by the interoperating CCPs then a further call is made on members in the morning, again on a pro rata basis to the previous end-of-day initial margin. Where intra-day calls are made by an interoperating CCP then further additional intra-day calls may be required on members.

If a CCP defaults, the collateral provided by its members to meet inter-CCP calls is at risk, as required to cover losses arising from the close out of the open positions by the non-defaulting CCPs.

Each CCP holds collateral to cover inter-CCP risk at Clearstream Luxembourg and meets calls against it from the other CCPs through pledge arrangements.

A CCP can treat another CCP as a defaulter in a limited but appropriate range of circumstances (including, most importantly, insolvency) and manage the defaulting CCP's open balance contract positions with it in accordance with its own default rules.

As interoperating CCPs do not contribute to the LCH.Clearnet default fund, the members' mutualised risk in the default fund is reached sooner than for a member default.

Each CCP retains the ability under its own published rules to reject trades which do not meet its eligibility criteria. Therefore, where either CCP rejects a trade, each member leg of the transaction and the corresponding balance contract between the parties falls away to ensure that each CCP retains a balanced position.

Each CCP can suspend its obligation to continue clearing new trades and becoming party to new balance contracts with another CCP in a defined range of emergency and other situations so as to manage its ongoing risk exposure.

Appendix I:

Transaction Costs by Country

Appendix I: Transaction Costs by Country

Asia-Pacific: Australia

Trading Fees

Australia Stock Exchange (AUD)	
Membership	
Annual fee	2,500
Access fee to ASX Trade	
<i>General</i>	5,000
<i>Market Maker</i>	2,500
CLOB Trades	
Trade fee ¹	0.150 bps
Midpoint match trade fee	0.500 bps
Hidden trade fee	0.500 bps
Auction trade fee ¹	0.280 bps
Excessive order usage	
n/a	

1. capped at AUD 75 per trade

Chi-X Australia (AUD)	
Membership	
Annual fee	0
CLOB Trades	
Remove liquidity, ad valorem	0.120 bps
Add liquidity	0.060 bps
Auction trade fee (MOC)	0.150 bps
Excessive order usage	
n/a	

Clearing Fees

ASX Clear (AUD)	
Membership fee, annual	
<i>General participant</i> ¹	7,500
<i>Direct participant</i> ²	5,000
Clearing fee, ad valorem	0.250 bps

Settlement Fees

ASX Settle (AUD)	
Membership fee, annual	
<i>Annual fee: General participant</i>	5,000
<i>Annual fee: Account participant</i>	2,500
<i>Annual fee: Specialist participant</i>	2,500
Settlement fee, per instruction	1.30

1. General Clearing Participant is a third party clearer, can clear for itself, clients, and market participants and their clients

2. Direct Clearing Participant can clear futures transactions for itself and its clients only

Asia-Pacific: Hong Kong

Trading Fees

Hong Kong Stock Exchange	(HKD)	(AUD)
Membership		
Annual fee ¹	0	0
CLOB Trades		
Trading fee, fixed per trade	0.50	0.07
Trading fee, ad valorem ²	0.500 bps	0.500 bps
Trade reporting		
n/a		
Excessive order usage		
n/a		

1. There is no annual fee, however a member firm must first purchase a Trading Right (a seat on the exchange) for HKD 500,000

2. Market makers exempt

Clearing & Settlement Fees

Hong Kong Securities Clearing Corporation	(HKD)	(AUD)
Membership fee, annual ¹	0	0
Clearing fee, per transaction	1.00	0.13
Settlement fee ²	0.200 bps	0.200 bps
Settlement fee, crossed trade ³	0.100 bps	0.100 bps
Transfer fee, paid by buyer, per trade ⁴	2.50	0.33

1. There is no explicit annual fee, however each general and trading member of HKSCC must pay:

i) an initial admission fee of HKD 50,000

ii) an initial contribution to the Guarantee Fund of minimum HKD 150,000 for a general clearing member, HKD 50,000 for a trading member, and an ongoing monthly contribution to the Fund based on trading activity and undisclosed risk parameters

2. min HKD 2 and max HKD 100 per side

3. min HKD 1 and max HKD 50 per side

4. Payable to the registrar of each listed company

Europe: Pan-European Trading Venues

Trading Fees

BATS Chi-X Europe	(EUR)	(AUD)
Membership		
Annual fee	0	0
CLOB Trades		
Trading fee, BATS (BXE)		
<i>Remove liquidity</i>	0.150 bps	0.150 bps
<i>Remove liquidity, hidden</i>	0.150 bps	0.150 bps
<i>Add liquidity</i>	0.000 bps	0.000 bps
<i>Add liquidity, hidden</i>	0.150 bps	0.150 bps
Trading fee, Chi-X (CXE) UK & Ireland		
<i>Remove liquidity option 1</i> ¹	0.300 bps	0.300 bps
<i>Remove liquidity option 2</i> ¹	0.200 bps	0.200 bps
<i>Add liquidity (monthly total, GBP)</i>		
<i>0 to 1.5bn</i>	(0.150 bps)	(0.150 bps)
<i>1.5bn to 2bn</i>	(0.175 bps)	(0.175 bps)
<i>2bn to 3bn</i>	(0.200 bps)	(0.200 bps)
<i>3bn to 4bn</i>	(0.225 bps)	(0.225 bps)
<i>4bn +</i>	(0.250 bps)	(0.250 bps)
Trading fee, Chi-X (CXE) Spain		
<i>Remove liquidity</i>	0.350 bps	0.350 bps
<i>Add liquidity</i>	(0.250 bps)	(0.250 bps)
<i>Hidden orders</i>	0.350 bps	0.350 bps
Trading fee, Chi-X (CXE)		
<i>Remove liquidity</i>	0.300 bps	0.300 bps
<i>Remove liquidity, hidden</i>	0.300 bps	0.300 bps
<i>Add liquidity</i>	(0.150 bps)	(0.150 bps)
<i>Add liquidity, hidden</i>	0.150 bps	0.150 bps

Turquoise	(EUR)	(AUD)
Membership		
Annual fee	0	0
CLOB Trades		
Trading fee, standard order book:		
<i>Remove liquidity</i>	0.300 bps	0.300 bps
<i>Add liquidity (monthly total, EUR)</i>		
<i>0 to 1.5bn</i>	(0.150 bps)	(0.150 bps)
<i>1.5bn to 3bn</i>	(0.200 bps)	(0.200 bps)
<i>3bn+</i>	(0.260 bps)	(0.260 bps)
Trading fee, hidden	0.300 bps	0.300 bps

NYSE Euronext (Europe)	(EUR)	(AUD)
Membership		
Annual fee	0	0
CLOB Trades		
Trading fee: Tier 1 ²		
<i>Continuous trading fee</i>	0.100 bps	0.100 bps
<i>Auction trading fee</i>	0.600 bps	0.600 bps
Trading fee: Tier 2 ²		
<i>Continuous trading fee</i>	0.200 bps	0.200 bps
<i>Auction trading fee</i>	0.800 bps	0.800 bps
Trading fee: Tier 3 ²		
<i>Continuous trading fee</i>	0.300 bps	0.300 bps
<i>Auction trading fee</i>	1.000 bps	1.000 bps

1. Option 1 is ad valorem of 0.3bps only, whereas option 2 is a monthly subscription fee of £20,000 and ad valorem of 0.2bps

2. Tier Levels

Tier 1: trades >1.75% of MSCI Euro Index transaction value per month

Tier 2: trades more than EUR 200m per month

Tier 3: trades less than EUR 200m per month

Europe: Pan-European CCPs

Clearing Fees

EMCF + EuroCCP (merged)	(EUR)	(AUD)
Membership, annual		
<i>General</i>	15,000	20,562
<i>Individual</i>	12,000	16,450
<i>Trading</i>	5,000	6,854
Clearing fee, per execution ²		
<u><i>Avg daily executions</i></u>		
<i>0 to 100,000</i>	0.030	0.041
<i>100,001 to 230,000</i>	0.010	0.014
<i>230,000+</i>	0.000	0.000

LCH.Clearnet Ltd	(GBP)	(AUD)
Membership, annual		
<i>General</i>	12,500	20,179
Clearing fee, per execution ²		
<u><i>Avg daily executions</i></u>		
<i>0 to 10,000</i>	0.115	0.186
<i>10,001 to 40,000</i>	0.070	0.113
<i>40,001 to 50,000</i>	0.050	0.081
<i>50,001 to 70,000</i>	0.010	0.016
<i>70,001 to 100,000</i>	0.002	0.003
<i>100,001 to 500,000</i>	0.001	0.002
<i>500,001+</i>	0.000	0.000

SIX x-clear	(CHF)	(AUD)
Membership, annual		
<i>General</i>	16,800	18,715
<i>Trading</i>	2,400	2,674
Clearing fee, per execution ²		
<u><i>Executions per month</i></u>		
<i>0 to 250,000</i>	0.080	0.089
<i>250,001 to 500,000</i>	0.050	0.056
<i>500,001 to 1.5m</i>	0.020	0.022
<i>1.5m to 2.5m</i>	0.015	0.017
<i>2.5m to 4m</i>	0.010	0.011
<i>4m to 6m</i>	0.007	0.008
<i>6m+</i>	0.005	0.006

LCH.Clearnet SA	(EUR)	(AUD)
Membership, annual		
<u><i>Monthly volume</i></u>		
<i>0 to 80,000</i>	500	685
<i>80,000 to 500,000</i>	3,500	4,798
<i>500,000+</i>	15,000	20,562
Clearing fee, per execution		
<i>Main index</i> ³	0.040	0.055
<i>Other stock executions</i>	0.100	0.137
Assignment for settlement		
<i>Euroclear France, Belgium</i>	0.650	0.891
<i>Euroclear Netherlands</i>	0.650	0.891
<i>Euroclear Interbolsa</i>	0.410	0.562
<i>Euroclear Bank</i>	1.270	1.741

1. Relevant band applied to all executions for the month

2. Fee bands applied sequentially in tiers

3. Defined as AEX25, BEL20, CAC40 and PSI20 only

Europe: France

Trading Fees

NYSE Euronext	(EUR)	(AUD)
<i>(See Pan-European Trading Venues for details)</i>		

Clearing Fees

LCH.Clearnet SA	(EUR)	(AUD)
<i>(See Pan-European CCPs for details)</i>		

Settlement Fees

Euroclear ESES	(EUR)	(AUD)
Membership, annual		
<i>Standard</i>	20,000	27,416
Settlement fee, per instruction (net)		
<u><i>Standard Tier, based on monthly instructions</i></u>		
<i>0 to 4,200</i>	0.900	1.234
<i>4,201 to 16,700</i>	0.810	1.110
<i>16,701 to 25,000</i>	0.770	1.056
<i>25,001 to 41,700</i>	0.720	0.987
<i>41,701+</i>	0.680	0.932

Europe: Germany

Trading Fees

Deutsche Börse	(EUR)	(AUD)
Membership		
Annual fee	0	0
CLOB Trades		
Trade fee (DAX)		
<i>High volume</i> ^{*1}	0.360 bps	0.360 bps
<i>Medium volume</i> ^{*1}	0.378 bps	0.378 bps
<i>Low volume</i> ^{*1}	0.414 bps	0.414 bps
Rebate scheme for trade fees		
<u>Value traded per month (EUR)</u>		
0 to 250m	0%	0%
250m to 500m	4%	4%
500m to 1bn	8%	8%
1bn to 2bn	12%	12%
2bn to 3.75bn	16%	16%
3.75bn to 7.50bn	20%	20%
7.50bn to 15bn	24%	24%
15bn to 30bn	28%	28%
30bn+	32%	32%
Trade fee: Midpoint matching, Xetra stocks		
<i>High volume</i>	0.480 bps	0.480 bps
<i>Medium volume</i>	0.504 bps	0.504 bps
<i>Low volume</i>	0.552 bps	0.552 bps
Trade fee: Midpoint matching, non-Xetra stocks		
<i>High volume</i>	0.480 bps	0.480 bps
<i>Medium volume</i>	0.504 bps	0.504 bps
<i>Low volume</i>	0.552 bps	0.552 bps

*** Category definitions**

High: fee commitment of at least EUR 20,000 per month

Medium: fee commitment of at least EUR 5,000 per month

Low: fee commitment of at least EUR 2,000 per month

1. maximum of EUR 4.00 per trade

Clearing Fees

Eurex	(EUR)	(AUD)
Membership, annual	25,000	34,271
Transaction fee: fixed		
<u>Number of executed orders per month</u>		
0 to 50,000	0.030	0.041
50,001 to 100,000	0.025	0.034
100,001 to 200,000	0.020	0.027
200,001 to 400,000	0.015	0.021
400,001 to 750,000	0.010	0.014
750,001 to 1,500,000	0.005	0.007
1,500,000+	0.000	0.000
Transaction fee: variable		
<u>Value traded per month (EUR)</u>		
0 to 2bn	0.080 bps	0.080 bps
2bn to 4bn	0.070 bps	0.070 bps
4bn to 8bn	0.060 bps	0.060 bps
8bn to 15bn	0.050 bps	0.050 bps
15bn to 30bn	0.040 bps	0.040 bps
30bn+	0.030 bps	0.030 bps
Assignment of shares for settlement	0.125	0.171
Payment instruction (per order)	0.150	0.206

Settlement Fees

Clearstream AG	(EUR)	(AUD)
Account maintenance, annual	1,500	2,056
Settlement fee, per instruction (net)	0.569	0.780
Volume discount (transactions per month):		
50,000 - 75,000	5.00%	5.00%
75,000 - 100,000	7.50%	7.50%
100,000+	15.00%	15.00%

Europe: Norway

Trading Fees

Oslo Børs	(NKK)	(AUD)
Membership		
Annual fee ¹	0	0
CLOB Trades		
Trade fee, continuous trading		
<u>Value Traded per month (NOK)</u> ²	<u>Continuous</u>	
1bn	0.550 bps	0.550 bps
2bn	0.500 bps	0.500 bps
3bn	0.450 bps	0.450 bps
4bn	0.400 bps	0.400 bps
5bn	0.350 bps	0.350 bps
6bn	0.300 bps	0.300 bps
7bn	0.250 bps	0.250 bps
8bn	0.200 bps	0.200 bps
9bn	0.150 bps	0.150 bps
10bn+	0.100 bps	0.100 bps
Trade fee, continuous trading		
<u>Value Traded per month (NOK)</u> ²		
1bn	0.700 bps	0.700 bps
2bn	0.650 bps	0.650 bps
3bn	0.600 bps	0.600 bps
4bn	0.550 bps	0.550 bps
5bn	0.500 bps	0.500 bps
6bn	0.450 bps	0.450 bps
7bn	0.400 bps	0.400 bps
8bn	0.350 bps	0.350 bps
9bn	0.300 bps	0.300 bps
10bn	0.250 bps	0.250 bps
11bn+	0.200 bps	0.200 bps
Trade cancellation		
Deleted by the Member	125.00	22.00
Deleted by the Exchange	250.00	44.00

Clearing Fees

Oslo Clearing	(NOK)	(AUD)
Membership, monthly		
General	10,000	1,760
Non-clearing	1,500	264
Clearing fee, per execution		
<u>Executions per month</u>		
0 to 250,000	0.55	0.10
250,001 to 500,000	0.35	0.06
500,001 to 1.5m	0.14	0.02
1.5m to 2.5m	0.10	0.02
2.5m to 4.0m	0.08	0.01
4.0m to 6.0m	0.05	0.01
6.0m+	0.04	0.01

Settlement Fees

VPS	(NOK)	(AUD)
Membership, monthly		
< 3,000 transactions per month	12,000	2,112
>= 3,000 transactions per month	27,500	4,840
Transaction fee		
Netted settlements	6.00	1.06
Direct settlements	4.00	0.70
Additional fees		
Same day settlement	12.00	2.11
Transfer in real-time	12.00	2.11
Cancellation	6.30	1.11
Statements	5.00	0.88
Rejected transaction	4.00	0.70

1. Minimum trade fee per month of: 20,000

2. Fee bands applied sequentially in tiers

3. All trades reported free of charge

Europe: Spain

Trading Fees

Bolsas y Mercados Españoles (BME)	(EUR)	(AUD)
Membership		
Joining fee	100,000	137,082
Annual fee	2,900	3,975
CLOB Trades		
Trade fee ¹		
<i>Value traded per day (EUR)</i>		
0 to 300 (fixed per day)	1.10	1.51
0 to 300 (ad valorem per day)	0.000 bps	0.000 bps
300 to 3,000 (fixed per day)	2.45	3.36
300 to 3,000 (ad valorem per day)	2.400 bps	2.400 bps
3,000 to 35,000 (fixed per day)	4.65	6.37
3,000 to 35,000 (ad valorem per day)	1.200 bps	1.200 bps
35,000 to 70,000 (fixed per day)	6.40	8.77
35,000 to 70,000 (ad valorem per day)	0.700 bps	0.700 bps
70,000 to 140,000 (fixed per day)	9.20	12.61
70,000 to 140,000 (ad valorem per day)	0.300 bps	0.300 bps
140,000+ (fixed per day)	13.40	18.37
140,000+ (ad valorem per day)	0.000 bps	0.000 bps
Membership fee ²	0.010 bps	0.010 bps

Clearing & Settlement Fees

BME Clearing	(EUR)	(AUD)
Membership		
Fixed, annual	9,000	12,337
<i>Ad Valorem on Value Traded (EUR), annual ³</i>		
0 to 500m	0.060 bps	0.060 bps
500m to 1.5bn	0.057 bps	0.057 bps
1.5bn to 5bn	0.054 bps	0.054 bps
5bn to 10bn	0.050 bps	0.050 bps
10bn to 20bn	0.045 bps	0.045 bps
20bn to 50bn	0.035 bps	0.035 bps
50bn to 75bn	0.025 bps	0.025 bps
75bn to 100bn	0.025 bps	0.025 bps
75bn to 100bn	0.025 bps	0.025 bps
Transactions		
Transaction fee		
Fixed ⁴	0.90	1.23
Ad Valorem ⁵	0.260 bps	0.260 bps
Instruction Modification Fee	0.15	0.21
Delayed Settlement	4.50	6.17
Fee for using another CCP	0.25	0.34

1. Applied per: (i) final client, (ii) security, (iii) price, and (iv) trade direction. If the daily amount for the same final client, security and trade direction is > €125, the fee is the lesser of 0.40bps of value traded or the rate already calculated, subject to a minimum of €125.
2. Additional membership fee, based on value traded, payable quarterly.
3. Referred to as a Book-Keeping Fee
4. Comprises €0.15 for the actual transaction, and €0.75 for changing the book entry
5. Minimum of €0.10, maximum of €3.50 per transaction

Europe: Switzerland

Trading Fees

SIX Swiss	(CHF)	(AUD)	(CHF)	(AUD)
Membership				
Annual fee	20,000	22,280		
CLOB Trades				
Trade fee: no minimum commitment			Trade fee: commitment level 2 *	
<i>Fee per trade, continuous trading</i>	0.75	0.84	<i>Fee per trade, continuous trading</i>	0.25 0.28
<i>Option A) Remove liquidity ¹</i>	0.650 bps		<i>Option A) Remove liquidity ¹</i>	0.500 bps
<i>Option A) Add liquidity</i>	0.000 bps		<i>Option A) Add liquidity</i>	0.000 bps
<i>Option B) Remove liquidity ¹</i>	0.320 bps		<i>Option B) Remove liquidity ¹</i>	0.270 bps
<i>Option B) Add liquidity ¹</i>	0.320 bps		<i>Option B) Add liquidity ¹</i>	0.270 bps
<i>Fee per trade, auction</i>	1.00	1.11	<i>Fee per trade, auction</i>	1.00 1.11
<i>Auction ¹</i>	0.750 bps		<i>Auction ¹</i>	0.750 bps
Trade fee: commitment level 1 *			Trade fee: commitment level 3 *	
<i>Fee per trade, continuous trading</i>	0.50	0.56	<i>Fee per trade, continuous trading</i>	0.00 0.00
<i>Option A) Remove liquidity ¹</i>	0.550 bps		<i>Option A) Remove liquidity ¹</i>	0.450 bps
<i>Option A) Add liquidity</i>	0.000 bps		<i>Option A) Add liquidity</i>	0.000 bps
<i>Option B) Remove liquidity ¹</i>	0.290 bps		<i>Option B) Remove liquidity ¹</i>	0.250 bps
<i>Option B) Add liquidity ¹</i>	0.290 bps		<i>Option B) Add liquidity ¹</i>	0.250 bps
<i>Fee per trade, auction</i>	1.00	1.11	<i>Fee per trade, auction</i>	1.00 1.11
<i>Auction ¹</i>	0.750 bps		<i>Auction ¹</i>	0.750 bps

* Commitment levels

Level 1: minimum monthly fee CHF 100,000

Level 2: minimum monthly fee CHF 175,000

Level 3: minimum monthly fee CHF 250,000

1. Maximum traded value applicable CHF1,000,000, minimum fee CHF0.5

Clearing Fees

SIX x-clear
(See Pan-European CCPs for details)

Settlement Fees

SIX SIS	(CHF)	(AUD)
Membership, annual ¹	0	0
Settlement fee	0.40	0.45
Position transfer	0.80	0.89

1. No membership fee if firm is already a member of SIX x-clear

Europe: UK

Trading Fees

London Stock Exchange	(GBP)	(AUD)
Membership		
Annual fee	12,500	20,179
Credit for trading fees for member firms	2,500	4,036
CLOB Trades		
Trade fee		
<i>First GBP 2.5bn of value executed</i>	0.450 bps	
<i>Next GBP 2.5bn of value executed</i>	0.400 bps	
<i>Next GBP 5bn of value executed</i>	0.300 bps	
<i>All subsequent trade value</i>	0.200 bps	
Hidden trade fee	0.250 bps	
Remove liquidity fee, per trade ¹	0.010	0.016
Remove liquidity Scheme ²		
<i>Package 1: monthly fee</i>	40,000	64,572
<i>Package 1: trading fee</i>	0.150 bps	
<i>Package 2: monthly fee</i>	4,000	6,457
<i>Package 2: trading fee</i>	0.280 bps	
Liquidity Provider Scheme ³		
<i>Add liquidity</i>	0.000 bps	
<i>Each non-member client elected, monthly</i>	2,500	4,036
<i>All orders that do not qualify for the scheme</i>	0.450 bps	

Clearing Fees

LCH.Clearnet Ltd	(GBP)	(AUD)
<i>(See Pan-European Clearing Counterparties for details)</i>		
SIX x-clear		
<i>(See Pan-European Clearing Counterparties for details)</i>		
Euroclear UK & Ireland		
Membership, annual		
<i>Standard 4</i>	10,000	16,143
<i>Low-volume user 4</i>	2,000	3,229
Netting fee, per instruction ⁵	0.250	0.404
Settlement fee, per instruction		
<i>Number of transactions per month</i>		
<i>0 to 3,000</i>	0.425	0.686
<i>3,001 to 5,000</i>	0.400	0.646
<i>5,001 to 7,500</i>	0.375	0.605
<i>7,501 to 10,000</i>	0.350	0.565
<i>10,001 to 12,500</i>	0.275	0.444
<i>12,501 to 15,000</i>	0.200	0.323
<i>15,001 to 20,000</i>	0.125	0.202
<i>20,000+</i>	0.075	0.121

1. Applicable to all "Immediate or Cancel" and "Fill or Kill" orders

2. The Remove liquidity Scheme is available by choice and applies to Remove liquidity transactions only

3. To qualify, 75% of all continuous trading executions (by value) must add liquidity to FTSE350 securities

North America: Canada

Trading Fees

Toronto Stock Exchange	(CAD)	(AUD)
Membership		
Annual fee	18,000	18,070
CLOB Trades		
Trade fee, securities over CAD 1.00		
<u>Remove liquidity</u>		
Monthly volume <= 250m shares	0.00350	0.00351
Monthly volume > 250m shares	0.00340	0.00341
Hidden / Dark Order Book	0.00100	0.00100
<u>Add liquidity</u>		
Displayed	(0.00310)	(0.00311)
Undisclosed iceberg	(0.00020)	(0.00020)
Hidden / Dark Order Book	0.00000	0.00000
Trade fee, securities between CAD 0.10 and 1.00		
Remove liquidity	0.00008	0.00008
Add liquidity	0.00008	0.00008
Trade fee, securities less than CAD 0.10		
Remove liquidity	0.00003	0.00003
Add liquidity	0.00003	0.00003
Auction		
Opening ¹	0.00300	0.00301
Closing ²	0.00300	0.00301
Extended Trading	0.00100	0.00100

Chi-X Canada	(CAD)	(AUD)
Membership		
Annual fee	6,000	6,023
CLOB Trades		
Trade fee, securities over CAD 1		
Remove liquidity	0.00290	0.00291
Add liquidity	(0.00250)	(0.00251)
Add liquidity, hidden	(0.00200)	(0.00201)
Trade fee, securities under CAD 1		
Remove liquidity	0.00010	0.00010
Add liquidity	0.00000	0.00000

* Reward Tier qualification if >80% of executed volume through Toronto Exchange

1. maximum charge of CAD 30 per side, CAD 100,000 per month

2. maximum charge of CAD 30 per side

Clearing Fees

Clearing & Depository Services Inc (CDS)	(CAD)	(AUD)
Clearing fee, per trade, gross	0.00410	0.00412
Clearing fee, per trade, net	0.01500	0.01506

Settlement Fees

Clearing & Depository Services Inc (CDS)	(CAD)	(AUD)
Settlement fee, per side per trade	0.03000	0.03012
Real-time settlement, per side per trade	0.16000	0.16062

North America: USA

Trading Fees

NASDAQ	(USD)	(AUD)
Membership		
Annual fee	3,000	3,099
Trading license, annual	12,000	12,396
CLOB Trades		
Trade fee, securities above USD 1, Remove liquidity		
<i>Firm trades > 0.06% US avg daily close volu</i>	0.00295	0.00305
<i>All other firms</i>	0.00300	0.00310
Trade fee, designated securities 1, Remove liquidity		
<i>Firm trades > 0.25% US avg daily volume</i>	0.00280	0.00289
<i>All other firms</i>	0.00300	0.00310
Trade fee, securities above USD 1, add liquidity		
<u>Traded volume compared to US avg daily volume</u>		
<i>Less than 0.10%</i>	(0.00200)	(0.00207)
<i>0.10% to 0.30%</i>	(0.00250)	(0.00258)
<i>0.30% to 0.45%</i>	(0.00270)	(0.00279)
<i>0.45%+</i>	(0.00290)	(0.00300)
<i>1.20% to 1.60% and adds > 0.75% daily volu</i>	(0.00300)	(0.00310)
<i>1.60%+ and adds > 0.75% daily volume</i>	(0.00305)	(0.00315)
Trade fee, securities below USD 1		
<i>Remove liquidity</i>	30.000 bps	30.000 bps
<i>Add liquidity</i>	0.000 bps	0.000 bps
Midpoint Execution		
<i>Remove liquidity</i>	0.00050	0.00052
<i>Add liquidity, <3m shares daily</i>	(0.00170)	(0.00176)
<i>Add liquidity, >3m shares daily</i>	(0.00150)	(0.00155)
Supplemental liquidity		
<i>Less than 1m shares added</i>	(0.00150)	(0.00155)
<i>1m shares+ added</i>	(0.00180)	(0.00186)
Hidden liquidity added		
	(0.00100)	(0.00103)
National Best Bid Offer (NBBO) rate setter		
<i>MPID qualifying as market maker</i>	(0.00050)	(0.00052)
<i>All other MPIDs</i>	(0.00020)	(0.00021)
NYSE Opening auction cross ¹	0.00050	0.00052
NYSE Closing auction cross	0.00095	0.00098

1. Maximum fee USD 15,000 per month

2. NYSE liquidity provider tier 3: to qualify, firm (i) adds >0.35% daily volume, >0.05% of close volume

3. NYSE liquidity provider tier 2: to qualify, firm (i) adds >0.75% daily volume, >0.10% of close volume

4. NYSE liquidity provider tier 1: to qualify, firm (i) adds >1.10% daily volume, >0.12% of close volume

5. NYSE Supplemental Liquidity Providers (SLP) are defined as (i) maintaining a bid/offer at the NBBO in each security at least 10% of the trading day, and (ii) trading only for their own proprietary accounts

9. Tiers: (1) Average Daily Added Volume (ADAV) > 0.1% or Average Daily Volume (ADV) > 0.25%, (2) ADAV > 0.2% or ADV > 0.5%, (3) ADAV > 0.3% or ADV > 0.75%, (4) ADAV > 0.5% or ADV > 1%, (5) ADAV > 0.75% or ADV > 1.4%, (6) ADAV > 1% or ADV > 1.75%

10. NBBO Setter is any order establishing a new NBBO

11. NBBO Joiner is any order joining the NBBO when BATS DirectEdge is not already at the NBBO

NYSE	(USD)	(AUD)
Membership		
Floor trading position, annual	12,000	12,396
Trading license, annual	20,000	20,660
CLOB Trades		
Trade fee, securities above USD 1		
<i>Remove liquidity</i>	0.00270	0.00279
<i>Remove liquidity, floor broker</i>	0.00240	0.00248
<i>Add liquidity</i>	(0.00150)	(0.00155)
<i>Add liquidity, floor broker</i>	(0.00190)	(0.00196)
<i>Add liquidity Tier 3 ²</i>	(0.00180)	(0.00186)
<i>Add liquidity Tier 2 ³</i>	(0.00200)	(0.00207)
<i>Add liquidity Tier 1 ⁴</i>	(0.00220)	(0.00227)
<i>Add liquidity SLP ⁵</i>	(0.00150)	(0.00155)
<i>Add liquidity SLP Tier 2</i>	(0.00260)	(0.00269)
<i>Add liquidity SLP Tier 3</i>	(0.00290)	(0.00300)
<i>Opening auction</i>	0.00100	0.00103
<i>Closing auction</i>	0.00095	0.00098
Trade fee, securities below USD 1		
<i>Remove liquidity</i>	30.000 bps	30.000 bps
<i>Add liquidity</i>	0.000 bps	0.000 bps
<i>Closing auction</i>	30.000 bps	30.000 bps
Midpoint Execution	0.00020	0.00021

BATS DirectEdge	(USD)	(AUD)
Membership		
Annual fee ⁹	0	0

CLOB Trades		
Trade fee, securities above USD 1		
<i>Remove liquidity</i>	0.00300	0.00310
<i>Add liquidity</i>	(0.00200)	(0.00207)
<i>Add liquidity Tier 1 ⁹</i>	(0.00250)	(0.00258)
<i>Add liquidity Tier 2 ⁹</i>	(0.00280)	(0.00289)
<i>Add liquidity Tier 3 ⁹</i>	(0.00290)	(0.00300)
<i>Add liquidity Tier 4 ⁹</i>	(0.00300)	(0.00310)
<i>Add liquidity Tier 5 ⁹</i>	(0.00310)	(0.00320)
<i>Add liquidity Tier 6 ⁹</i>	(0.00320)	(0.00331)
<i>Additional rebate: NBBO Setter</i>	(0.00020)	(0.00021)
<i>Additional rebate: NBBO Joiner</i>	(0.00010)	(0.00010)
Trade fee, securities below USD 1		
<i>Remove liquidity</i>	30.000 bps	30.000 bps
<i>Add liquidity</i>	0.000 bps	0.000 bps
Opening auction, all securities	0.00050	0.00052
Closing auction, all securities	0.00100	0.00103

Clearing Fees

National Securities Clearing Corporation	(USD)	(AUD)
Membership fee, per month	200	207
Clearing account fee, per month	300	310
Clearing activity fee, fixed per trade ¹		
<u>Volume per month</u>		
0 to 35,000	0.02159	0.02231
35,001 to 42m	0.00120	0.00124
42m+	0.00063	0.00065
Clearing activity fee, ad valorem on gross value	0.00332 bps	0.00332 bps
Clearing activity fee, ad valorem on net value	0.02368 bps	0.02368 bps

1. Clearing fee applied sequentially through volume tiers

Settlement Fees

Depository Trust Corporation	(USD)	(AUD)
Membership fee, per month	760	785
Direct Registration System account fee, per month	275	284
Book entry fee to Continuous Net Settlement (CNS)	0.09000	0.09297
Book entry fee from CNS	0.03500	0.03616
Overnight delivery	0.20000	0.20660
Daytime delivery	0.45000	0.46485

South America: Brazil

Trading Fees

BM&F Bovespa	(BRL)	(AUD)
Membership		
Annual fee	0	0
CLOB Trades		
Trade fee (per side)	0.500 bps	0.500 bps
High-Frequency Trader (HFT) trade fee *		
<u>Average daily value traded (BRL)</u>		
0 to 20m	0.500 bps	0.500 bps
20m to 50m	0.300 bps	0.300 bps
50m to 250m	0.050 bps	0.050 bps
250m to 500m	0.050 bps	0.050 bps
500m+	0.050 bps	0.050 bps

* Firm registered as HFT on a bespoke basis

Clearing & Settlement Fees

BM&F Bovespa	(BRL)	(AUD)
Clearing & Settlement fee		
<i>General investors</i>	2.750 bps	2.750 bps
<i>Investment funds</i>	1.800 bps	1.800 bps
HFT settlement fee		
<u>Average daily value traded (BRL)</u>		
0 to 20m	2.000 bps	2.000 bps
20m to 50m	2.000 bps	2.000 bps
50m to 250m	1.950 bps	1.950 bps
250m to 500m	1.750 bps	1.750 bps
500m+	1.550 bps	1.550 bps

Appendix II:

Market Share by Value Traded

Appendix II: Market Share by Value Traded

Market Share by Value Traded (AUD)

Market	Market Total				Small Firm (0.50% market share by value)			Medium Firm (2.50% market share by value)			Large Firm (7.00% market share by value)					
	Value Traded 2013 (AUD m)	% of Value Traded in Auction	Number of Trades 2013	Average Trade Value 2013 (AUD)	Continous		Auction	Continous		Auction	Continous		Auction			
					Value Traded per month (AUD m)	Shares Traded per month (m)	No. of Trades per month	Value Traded per month (AUD m)	Value Traded per month (AUD m)	Shares Traded per month (m)	No. of Trades per month	Value Traded per month (AUD m)	Value Traded per month (AUD m)	Shares Traded per month (m)	No. of Trades per month	Value Traded per month (AUD m)
Asia-Pacific																
Australia: ASX	900,216	16.97%	190,864,320	4,717	623	310	132,060	127	3,114	1,549	660,301	637	8,720	4,336	1,848,843	1,782
Australia: Chi-X *	74,125	-	15,700,413	4,717	62	31	13,084	0	309	153	65,418	0	864	430	183,171	1
Hong Kong: HKSE	1,487,361	-	179,451,202	8,288	1,239	2,453	149,543	-	6,197	12,263	747,713	-	17,353	34,337	2,093,597	-
Europe																
France: Euronext	1,115,021	22.68%	84,941,433	10,150	718	31	70,785	211	3,592	154	353,923	1,054	10,058	430	990,983	2,950
Germany: Deutsche Börse	1,367,956	23.55%	104,079,614	13,143	872	37	66,308	268	4,358	187	331,538	1,342	12,201	524	928,307	3,758
Germany: BATS Chi-X	491,319	-	37,381,520	13,143	409	18	31,151	-	2,047	88	155,756	-	5,732	246	436,118	-
Germany: Turquoise	135,011	-	10,272,212	13,143	113	5	8,560	-	563	24	42,801	-	1,575	68	119,842	-
Norway: Oslo Børs	123,695	16.13%	17,775,134	6,959	86	13	12,423	17	432	63	62,114	83	1,210	177	173,918	233
Spain: BME	546,369	33.05%	48,446,076	11,278	305	39	27,028	150	1,524	194	135,140	752	4,267	544	378,392	2,107
Spain: BATS Chi-X	86,915	-	7,706,641	11,278	72	9	6,422	-	362	46	32,111	-	1,014	129	89,911	-
Switzerland: SIX	731,060	22.86%	31,167,152	23,456	470	10	20,036	139	2,350	49	100,180	696	6,580	136	280,505	1,949
UK: LSE	1,258,596	27.17%	84,087,268	10,902	764	113	70,073	285	3,819	567	350,364	1,425	10,695	1,587	981,018	3,989
UK: BATS Chi-X	689,335	-	63,232,949	10,902	574	85	52,694	-	2,872	426	263,471	-	8,042	1,193	737,718	-
UK: Turquoise	269,260	-	24,699,319	10,902	224	33	20,583	-	1,122	166	102,914	-	3,141	466	288,159	-
Americas																
Canada: TSX	1,097,196	4.13%	235,551,550	4,658	877	93	188,186	38	4,383	464	940,931	189	12,272	1,299	2,634,607	529
Canada: Chi-X	249,484	-	53,560,398	4,658	208	22	44,634	-	1,040	110	223,168	-	2,911	308	624,871	-
US: NASDAQ	11,503,370	-	1,151,817,991	9,987	9,586	260	959,848	-	47,931	1,302	4,799,242	-	134,206	3,645	13,437,877	-
US: NYSE	13,555,743	17.20%	1,187,799,850	11,412	9,354	268	819,618	1,943	46,769	1,341	4,098,091	9,713	130,954	3,754	11,474,654	27,196
US: BATS DirectEdge	11,964,849	-	1,118,229,947	10,700	9,971	278	931,858	-	49,854	1,391	4,659,291	-	139,590	3,894	13,046,016	-
Brazil: BM&F Bovespa	768,227	-	191,596,841	4,010	640	589	159,664	-	3,201	2,946	798,320	-	8,963	8,249	2,235,296	-

* Chi-X Australia does not have an auction, however does offer a closing price settlement, referred to as Market-On-Close

Source: ThomsonReuters, World Federation of Exchanges, Market Structure Partners

Appendix III:

FX Rates

Appendix III: FX Rates

FX Rates used in any calculations where applicable are shown below. These are the mid-price of the average bid and offer prices for the full year of 2013, sourced from Oanda.com:

	per AUD 1
AUD	1.000000
BRL	2.082030
CAD	0.996135
CHF	0.897670
EUR	0.729490
GBP	0.619460
HKD	7.508850
USD	0.968045
NOK	5.681415

Source: <http://www.oanda.com/currency/average>

Appendix IV:

Summary of IOSCO principles and EMIR

Appendix IV: Summary of IOSCO principles and EMIR

CPSS-IOSCO – Principles for financial markets infrastructure – April 2012

Introduction (extract)

- 1.1. Financial market infrastructures (FMIs) that facilitate the clearing, settlement, and recording of monetary and other financial transactions can strengthen the markets they serve and play a critical role in fostering financial stability. However, if not properly managed, they can pose significant risks to the financial system and be a potential source of contagion, particularly in periods of market stress. Although FMIs performed well during the recent financial crisis, events highlighted important lessons for effective risk management. These lessons, along with the experience of implementing the existing international standards, led the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO) to review and update the standards for FMIs. This review was also conducted in support of the Financial Stability Board (FSB) initiative to strengthen core financial infrastructures and markets. All CPSS and IOSCO members intend to adopt and apply the updated standards to the relevant FMIs in their jurisdictions to the fullest extent possible.
- 1.2. The standards in this report harmonise and, where appropriate, strengthen the existing international standards for payment systems (PS) that are systemically important, central securities depositories (CSDs), securities settlement systems (SSSs), and central counterparties (CCPs). The revised standards also incorporate additional guidance for over-the-counter (OTC) derivatives CCPs and trade repositories (TRs). In general, these standards are expressed as broad principles in recognition of FMIs' differing organisations, functions, and designs, and the different ways to achieve a particular result. In some cases, the principles also incorporate a specific minimum requirement (such as in the credit, liquidity, and general business risk principles) to ensure a common base level of risk management across FMIs and countries. In addition to standards for FMIs, the report outlines the general responsibilities of central banks, market regulators, and other relevant authorities for FMIs in implementing these standards.

Central counterparties

- 1.3. A central counterparty interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer and thereby ensuring the performance of open contracts. A CCP becomes counterparty to trades with market participants through novation, an open-offer system, or through an analogous legally binding arrangement. CCPs have the potential to reduce significantly risks to participants through the multilateral netting of trades and by imposing more-effective risk controls on all participants. For example, CCPs typically require participants to provide collateral (in the form of initial margin and other financial resources) to cover current and potential future exposures. CCPs may also mutualise certain risks through devices such as default funds. As a result of their potential to reduce risks to participants, CCPs also can reduce systemic risk in the markets they serve. The effectiveness of a CCP's risk controls and the adequacy of its financial resources are critical to achieving these risk-reduction benefits.

The following principles are applicable to CSDs:

Principle

- 1 Legal basis
- 2 Governance
- 3 Framework for the comprehensive management of risks
- 4 Credit risk
- 5 Collateral
- 6 Margin
- 7 Liquidity risk
- 8 Settlement finality
- 9 Money settlements
- 10 Physical deliveries
- 12 Exchange-of-value settlement systems
- 13 Participant-default rules and procedures
- 14 Segregation and portability
- 15 General business risk
- 16 Custody and investment risks
- 17 Operational risk
- 18 Access and participation requirements
- 19 Tiered participation arrangements
- 20 FMI links
- 21 Efficiency and effectiveness
- 22 Communication procedures and standards
- 23 Disclosure of rules, key procedures, and market data

Appendix V:

Principle 4
Summary of Cover 1 and 2

Appendix V: Principle 4 – Summary of Cover 1 and 2

Principle 4: Credit risk

An FMI should effectively measure, monitor, and manage its credit exposures to participants and those arising from its payment, clearing, and settlement processes. An FMI should maintain sufficient financial resources to cover its credit exposure to each participant fully with a high degree of confidence.

In addition, a CCP that is involved in activities with a more-complex risk profile or that is systemically important in multiple jurisdictions should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions.

All other CCPs should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions.

Cover 2 is a term used to describe the situation where a CCP needs to cover the default of the **two** largest participants and affiliates with the greatest credit exposure.

Cover 1 is a term used to describe the situation where a CCP needs to cover the default of the **single** largest participant and affiliates with the greatest credit exposure.

ASXCL has to meet Cover 1 requirements.²²

ASXCLF²³, which is outside the scope of this analysis, has to meet Cover 2 requirements.

²² ASX Clearing Participant Default overview (ASXSafeguardStruct.pdf)

²³ ASX Clear (Futures) Pty Limited (ASXCLF) provides CCP clearing services for the ASX 24 market. This market is operated by Australian Securities Exchange Limited and facilitates the trading of futures and options on interest rate, equity index, energy and commodity products (also referred to as “derivative market” products or transactions).