UBS

Global Equity Research

Americas

Financial Services

Global I/O

UBS Investment Research

UBS Global I/O®: Global exchanges

The impact of competition on exchanges

20 November 2013

www.ubs.com/investmentresearch

- **Input: Competition/consolidation talks are intensifying**

Brazil, Australia, Russia and Japan present consolidated markets, while the US, Europe and Canada are fragmented. ATS is the latest company to challenge the monopoly of Bovespa in Brazil, and we expect competition after 2H15. Leveraging UBS's global research coverage, we provide an in-depth analysis on the theme of competition and the impact on BVMF.

- **Output: Impact of competition**

We believe Bovespa will strengthen its dominant position and competition will add pressure to streamline cost and upgrade systems. We expect CBOE, by moving to products with less competition, will maintain strong growth. Moscow Exchange is improving its systems and market structure to take volumes back from LSE. ASX's focus on competition has faded but the earnings outlook remains soft.

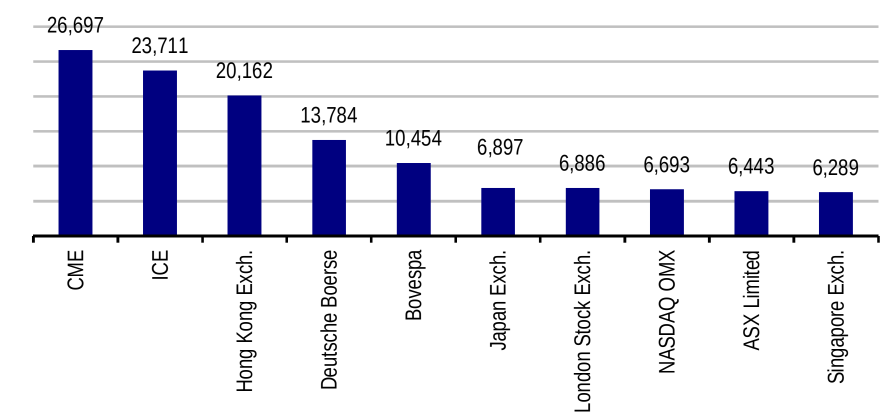
- **Scenario analysis: Competition would reduce BVMF3 valuation by R$0.4**

We conduct a detailed simulation on how competition would impact earnings at BVMF. Equities trading represents just 8% of revenues at BVMF. We do not change our model to include this scenario, as several moving parts still must be defined by participants and regulators. Our simulation suggests that competition would reduce our 2016e EPS by 3% and our valuation by R$0.4 (to R$14.5).

- **Valuation**

Top picks: BVMF3 (de Mariz); DB1 (Giblat); CBOE (Kramm); ICE (Kramm); MOEX (Shlemov). Least preferred: BME (Giblat); JPX (Watanabe).

Chart 1: Top 10 global exchanges (market cap in US$m)



Source: Bloomberg, UBS

Frederic De Mariz
Analyst
frederic.de-mariz@ubs.com
+55-11-3513 6511

Chris Williams, CFA
Analyst
chris.williams@ubs.com
+61-2-9324 3968

Arnaud Giblat
Analyst
arnaud.giblat@ubs.com
+44-20-7568 8086

Mariko Watanabe
Analyst
mariko.watanabe@ubs.com
+81-3-5208 6297

Alex Kramm, CFA
Analyst
alex.kramm@ubs.com
+1-212-713 4060

Mikhail Shlemov
Analyst
mikhail.shlemov@ubs.com
+44-20-7568 3495

Adam Lee
Analyst
adam.lee@ubs.com
+61-2-9324 2998

Philip Finch
Strategist
philip.finch@ubs.com
+44-20-7568 3456

Mariana Taddeo
Analyst
mariana.taddeo@ubs.com
+55-11-3513 6512

Contents

Frederic De Mariz
Analyst
frederic.de-mariz@ubs.com
+55-11-3513 6511

Chris Williams, CFA
Analyst
chris.williams@ubs.com
+61-2-9324 3968

Arnaud Giblat
Analyst
arnaud.giblat@ubs.com
+44-20-7568 8086

Mariko Watanabe
Analyst
mariko.watanabe@ubs.com
+81-3-5208 6297

Alex Kramm, CFA
Analyst
alex.kramm@ubs.com
+1-212-713 4060

Mikhail Shlemov
Analyst
mikhail.shlemov@ubs.com
+44-20-7568 3495

Adam Lee
Analyst
adam.lee@ubs.com
+61-2-9324 2998

Philip Finch
Strategist
philip.finch@ubs.com
+44-20-7568 3456

Mariana Taddeo
Analyst
mariana.taddeo@ubs.com
+55-11-3513 6512

Executive summary

Wide range of market structures

Competition and consolidation talks among global exchanges have intensified. Announcements have included merger talks between US exchanges, such as ICE and NYSE, as well as BATS and Directedge. This is in contrast to Europe, where the latest mega merger (DB-NYSE) was blocked by the European Commission.

In markets such as Australia[1] and Brazil, recent talks have focused on increased competition, with more players in the trading segment. In Brazil, ATS has made headlines for challenging the now well established monopoly[2] of BM&F Bovespa (Bovespa). Indeed, Bovespa is a multi-asset and vertically integrated platform. It is multi-asset because the platform allows trading in equities and derivatives. It is vertically integrated because it offers trading, clearing, settlement and custody.

Exchanges are a global market, with intense talks of consolidation/ competition

We ask global UBS analysts on exchanges to share their views on the themes

A wide spectrum of market structures. The Brazilian structure represents one end of the spectrum: full consolidation where one player is cross-asset and vertically integrated. This structure is also found in Asia. Europe is on the other side of the spectrum, where competing trading platforms and clearinghouses coexist, a legacy of the former nations constituting the European Union. The intermediate solution is represented by the US or Australia, where several trading platforms coexist (sometimes with dark pools), and where trades are cleared by one participant only: DTCC in the US; ASX Clear in Australia. Australia is the latest market to implement competition in trading (in 2011).

UBS's perspective on competition in different markets. Against the rising talk of competition in Brazil, we asked several analysts at UBS covering different regions to share their thoughts on competition among exchanges in the US, Australia and Europe. With the analysis of those regions, and recognizing that every market has its specificities, we try to answer two questions: how does competition impact exchanges globally, and what will be the market structure in Brazil in five years?

We address two questions:

- How does competition impact exchanges globally?
- What will the market structure be in Brazil in five years?

Over the past weeks, we met with a number of local actors in the Brazilian trading area: brokers, potential new players, regulators, specialists of trading technology and, obviously, Bovespa. The regulator in Brazil also organized a public hearing on the theme of competition, triggering a wealth of written contributions from market participants. We take a close look into the potential benefits and risks of competition in Brazil.

[1] Chi-X challenged the dominant position of ASX by starting a competing execution venue on October 2011.

[2] To be complete: While BM&F Bovespa is the only integrated exchange in equities and derivatives in Brazil, companies have alternative funding options such as listing in ADRs (the largest Brazilian companies tend to have a dual listing and derive more than half of their stock liquidity from their NYSE listing). From the point of view of investors, fixed income (in particular public securities) competes against investments in equities, especially as reference rates in Brazil are expected to rise.

Is competition always welcome? Generally speaking, markets favour competition. There is a simple and widespread opinion that competition reduces prices for end users (investors, in this case), favours innovation by stimulating market players and can reduce systemic risk by spreading activities.

Does this hold true for exchanges?

Proprietary analysis on the viewpoints of five stakeholders: regulators; exchange platforms; brokers; companies; and end users (clients)

In this report, we consider the viewpoints of different stakeholders in light of academic research, the decisions of regulators and in light of the reality of the Brazilian market. The apparently simple question about the benefits of competition has complex ramifications. We identified five types of stakeholders in the market structure segment: regulators; exchange platforms; brokers; companies; and end users (clients). We indicate where we think the market structure is headed in the coming years in terms of competition.

Table 1 lists our global exchange valuations.

Table 1: Global valuation table

Company	Rating	Analyst	Price (lcl)	Price Target (lcl)	Mkt Cap (lcl)	Div Yield 2014e	CAGR EPS 14e/12	P/E Adj. 2013e	P/E Adj. 2014e	EV/EBITDA 2013e	EV/EBITDA 2014e
ASX Limited	Neutral	Williams	37.09	34.3	6,827.0	4.9%	2.2%	18.9	18.2	12.0	11.1
CME Group Inc.	Buy	Kramm	79.77	83	26,696.9	4.8%	11.5%	25.5	21.1	13.4	11.6
Deutsche Boerse	Buy	Giblat	54.94	60	10,207.9	4.0%	8.2%	15.6	13.3	10.5	9.6
Hong Kong Exchanges & Clearing	Neutral	Andrews	134.8	123.5	156,291.6	2.9%	7.4%	34.5	31.2	26.6	23.5
IntercontinentalExchange, Inc.*	Buy	Kramm	203.17	215	23,711.0	0.0%	10.1%	25.2	21.9	14.0	12.3
Japan Exchange Group	Sell	Watanabe	2721	1700	6,897.0	1.6%	na	24.4	27.7	8.9	12.1
London Stock Exchange	Neutral	Giblat	1585	1550	4,277.9	2.2%	4.6%	15.7	14.4	13.4	12.1
Bolsas y Mercados Espanoles	Sell	Giblat	26.855	16	2,245.6	6.3%	2.8%	15.8	15.7	10.3	10.3
Singapore Exchange	Neutral	Andrews	7.29	7.45	7,822.2	4.3%	10.4%	22.1	20.4	14.9	13.8
Bursa Malaysia	Buy	Rifaie	8.12	9.6	4,270.2	4.5%	15.7%	23.1	21.3	14.7	13.4
Bolsa Mexicana	Buy	de Mariz	31.3	36	18,560.6	4.4%	10.8%	24.4	22.2	15.5	13.8
BM&F Bovespa	Buy	de Mariz	11.95	15	23,661.0	4.4%	6.2%	14.4	13.3	11.8	10.7
Cetip	Neutral	de Mariz	25.47	25	6,538.1	2.4%	15.2%	13.8	12.4	10.7	10.1
CBOE	Buy	Kramm	51.13	56	4,481.4	1.5%	20.5%	25.4	20.9	13.1	10.9
Moscow Exchange	Buy	Shlemov	65.02	71	142,875.6	3.0%	20.3%	12.8	12.1	5.3	5.1

Note: For ICE, we consider the consolidated market share of NYSE and ICE. All market caps in local currency, except for the Japan Exchange (USD).
Source: Bloomberg, UBS estimates

Competition among global exchanges: Winners and losers

Europe: Competition pressure less of an issue

Deutsche Boerse (DB1, Buy rated by **Arnaud Giblat**) is our top pick among European exchanges. Please refer to the 8 July 2013 note by Arnaud Giblat: *Positive read-across from US into Europe*.

Competition was introduced in trading and clearing of cash equities through the introduction of MiFID in 2007. The consequence of this process resulted in incumbent players loosing 20-40% market share to alternative venues in “lit“

trades; while “dark” venues continue to gradually take market share, and now represent 5% of the total share of volume traded in Europe.

LSE lost the most share and now trades ~50% of FTSE 100 volumes. We mostly attribute this to lower retail participation due to a 50 bp stamp duty. Market shares have broadly stabilized. Since the introduction of MiFID, we have also seen new pricing cards being put in place, resulting in ~20% pricing attrition, although we believe that we have now reached a point of stability.

MiFIR/D proposals (to go live in 2015) envision open access to CCPs. This would give the ability to create competition in the trading of derivative instruments. Competition in the clearing of derivatives is not in question, as the interoperability of derivative clearinghouses has been deemed by regulators and politicians to create increased systemic risk, as clears might be drawn in on competing risk parameters. We ultimately believe that the introduction of competition in trading will be diluted in the trialogue discussions.

The current European Council position is to exclude ETDs from open clearing access. The wording in the EP report is favourable to “non-discriminatory access” to a CCP only for transferable securities and money market instruments and where such access would not threaten smooth and orderly functioning of the CCP or the market. This is a material dilution, in our view, from the commission’s initial proposal, which could have negatively impacted 4-12% of Deutsche Boerse’s earnings (mostly depending on whether there is an obligation to license Eurostoxx, as well open access to clearing).

Target-2 Securities is another major field of competition to be introduced in 2015. The ECB will take over the settlement function, giving investors the opportunity to consolidate their custody into a single CSD for most of their European custodians. We believe Clearstream could continue to win over new custodian clients and take market share from Euroclear, as settlement (Euroclear’s forte) becomes less important to collateral optimisation and value-added services. According DB1 management, Libor ~+ 30bps is the cost to source collateral, which is materially higher costs compared to the advantage of aggregating settlement. Clearstream recently won a major broker-dealer contract. With 38% market share for Clearstream, we think Target 2 Securities should provide a strong incentive for clients to further consolidate their custody activities.

Australia: Diminishing focus on competition for ASX

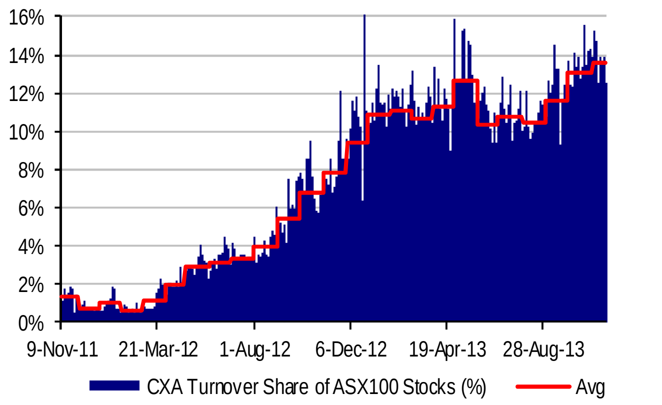
Australia was the latest large market to introduce competition in trading with the entrance of Chi-X in 2011 to challenge historical player **ASX** (Neutral rated by **Chris Williams**). Please refer to the 10 July 2013 note by Chris Williams: *ASX Limited: Not quite so clear* for the latest views on clearing and the policy debate.

Anecdotally at an industry level, the fee reduction benefits of Chi-X’s entry have largely been eroded by additional technology and other costs, with no demonstration of liquidity benefits

For ASX, the impact of Chi-X’s entry has been contained to the 5% of Group revenue that cash equities trading contributes. Market share gains for Chi-X have been most pronounced in “off-market” turnover (~30% share), where the economics for ASX are the least attractive (0.04 bp per side vs. open trading 0.15 bp and auctions 0.28 bp). The share gains in “on-market” turnover have been a more muted 10% over the last two years. This partly reflects competitive responses from ASX around significant fee reductions (while still pricing parts

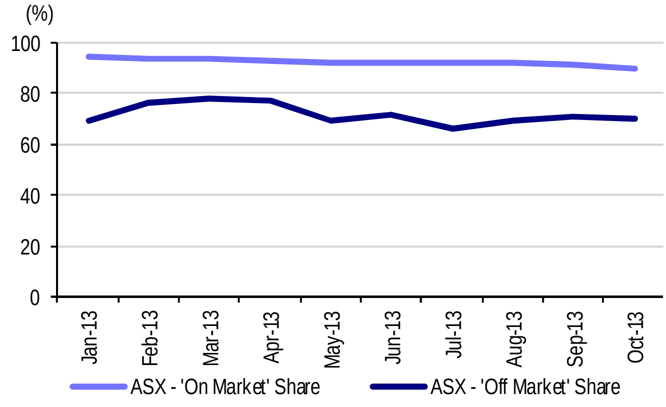
of its offering for the value of liquidity), as well as regulatory limitations placed on Chi-X's pricing model in the interests of preserving market structure.

Chart 2: Chi-X share of ASX100 stocks since launch (%)



Source: IRESS, UBS estimates

Chart 3: ASX cash equities market share – on vs. off market (%)



Source: ASX, UBS estimates

While competition in cash equities trading is now largely viewed as "peripheral" to an investment decision on the stock, the recent discussion on competitive threats has focused more on clearing, particularly in the wake of ASX's capital raising in June. ASX remains the only clearer of cash equities in the Australian market, with a move by regulators in February this year to defer any decision on allowing competition for a two-year period. In our view, ASX's 11.7% ROE in this business presents neither an attractive proposition for potential competitors, nor any demonstration of over-earning on fees charged to customers.

We're not convinced that the fee vs. capital trade-off in cash market clearing is fully appreciated by customers, with substantial industry costs likely if regulators were to endorse competition

Following LCH.Clearnet's clearing license extension in July, ASX Clear (Futures) now competes with SwapClear for its share of clearing the $14tn notional value traded in OTC interest rate swaps (AUD) for the banks each year. The regulator has opted to let market forces determine how OTC clearing unfolds in Australia, with ASX clearing its first OTC derivative trade in September 2013.

At least for the time being, OTC interest rate swaps will represent the extent of LCH.Clearnet's foray into providing clearing services to the Aussie market

For ASX, the policy debate around competition appears to have stabilised, with regulatory capital (unexpectedly) dealt with in the capital raising. Ongoing positive trends in listings activity (mainly IPOs) are providing good support; however, softer trends across other areas of ASX's diverse revenue base are likely to hamper near-term earnings momentum, in our view.

Russia: Competition is triggering welcome changes

The **Moscow Exchange** (Buy rated by **Mikhail Shlemov**) could potentially benefit from improved systems and potentially from regulation changes in Russia. Please refer to the 1 October 2013 note by Mikhail Shlemov: *Moscow Exchange: Solid delivery and momentum, PT upgraded to RBL71, Buy*.

In particular, T+2 liquidation in equities started on 2 September 2013, and average daily volumes increased meaningfully afterwards. This change will be followed by stock euroclearability from 1 Jan 2014.

After its recent IPO, MOEX implemented a series of changes to attract volumes back from main competitor LSE

The Russian equity market is currently split equally between onshore (MOEX) and offshore trading (mostly LSE via GDRs). The recent financial infrastructure

reform (intro of CSD, T+2, upcoming euroclearability) would allow volumes to consolidate locally. As a result, the presence of LSE as a competitor is a driver for MOEX to conduct internal upgrades and improve its infrastructure. Competition in the Russian case could trigger welcome changes to increase domestic trading volumes.

Japan: Negative outlook for dominant player

The **Japan Exchange Group** (JPX, ticker: 8697 JP, Sell rated by **Mariko Watanabe**) currently dominates the cash equity and derivative (index derivatives and Japan government bond derivatives) in Japan.

The Japan Exchange Group is the result of the merger of the Osaka Security Exchange and the Tokyo Stock Exchange, which were competing against each other. The merger was seen publicly as a way to reinforce the position of Japanese capital markets globally (creating a national champion) and also allowed the owners of the former Tokyo Stock Exchange (which was mutualized) to exit their investment.

In Japan, JPX is the result of the merger of the Tokyo and Osaka exchanges and faces little competition

Before the merger, the Osaka Security Exchange was seen as very innovative, as it introduced new derivative products, extended trading hours until midnight, and kept improving trading systems to grow and take market share away from the Tokyo Stock Exchange. In other words, competition acted as a driver of innovation and service improvements.

Today, JPX aims at expanding business by increasing the number of investors, launching a new index and global products. However, we highlight that the company's volume assumption in the medium term (target for March 2016) is below current trading volume, which supports our cautious view on the stock.

Market players before the consolidation were seen as more innovative, and the merger has not led to higher trading volumes

Since JPX has almost a 100% market share, the company's earnings are closely linked to the Japanese economy, a mature market. This suggests that the strategy by management has a limited impact on earnings.

In Japan, overseas exchanges are not allowed to take more than a 20% stake without the permission of the Prime Minister, and JPX is unlikely to be taken over by another exchange. In our view, JPX is protected by Japanese exchange law from global exchange consolidation.

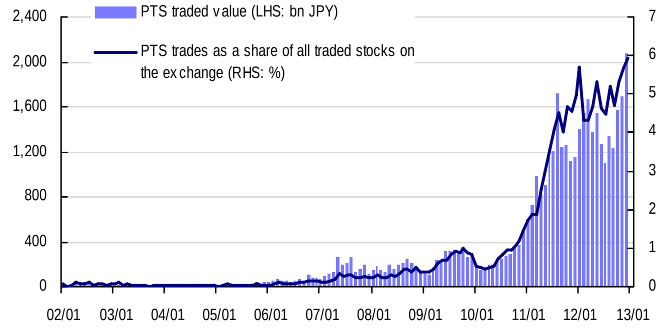
JPX's ROE tends to be below the average for global peers. In general, ROE and payout among Japanese companies are below other countries, as corporates rely less on financial leverage in spite of almost zero cost of debt. JPX's target payout ratio of 40% lowers its reported ROE. JPX derives around 20% of its revenues from equities trading.

The performance of the stock is due to a macro call on Japan, despite the very high valuations of JPX by global standards and its negative outlook for ROE and growth prospects.

Consolidation has been the key trend of the past few years in Japan. In terms of competition, we note that some products relating to the Japanese market are traded outside of JPX: Index futures (Nikkei 225 future) are listed on the Singapore exchange (when volumes increase in Tokyo, they drive higher volumes in Singapore as well).

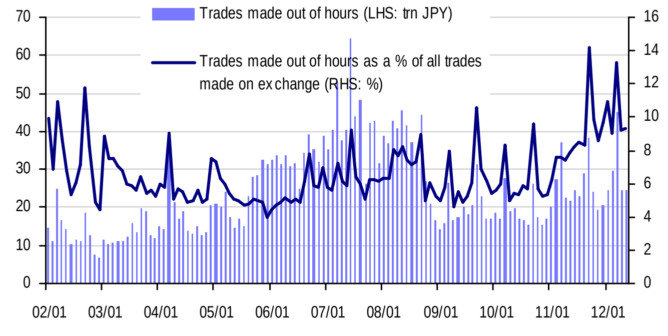
Finally, PTS (Chi-X and SBI) share has been increasing in Japan (mainly for retail investors). We do not see PTS as a meaningful threat to JPX, however, mostly because domestic institutions are reluctant to trade in the evening and prefer to execute trades under the established platform.

Chart 4: Market share of competitor PTS in Japan: JPX still largely dominant



Source: UBS

Chart 5: Trades executed outside of normal business hours



Source: UBS

US: CBOE growing in products with less competition

CBOE Holdings is our top pick among US exchanges (Buy rated by **Alex Kramm**), a stock we recently upgraded to Buy (please refer to Alex Kramm's 18 October 2013 note, *Best-in-Class Growth Comes at a Price*).

CBOE is our top pick for US exchanges as a leader in options trading; CBOE is moving away from commoditized products to grow in areas with less competition

CBOE is the oldest and largest options exchange operating in the US. The company handles more than 25% of total options volumes in the US. In addition to handling contracts listed on multiple exchanges, CBOE has exclusive listing rights over some of the most popular index options contracts, such as the SPX and VIX. CBOE was a member organization since it began operating. We expect commoditization in CBOE's legacy multiply-listed products to continue to pressure pricing. This decline, however, is offset by increased volumes in CBOE's proprietary product suite, including S&P 500 options and VIX futures. CBOE has been using profits in these products to drive down revenue per contract in the more commoditized products. Ultimately, we believe this could be a catalyst for further consolidation in options markets. We expect asset allocation to CBOE's signature volatility products to continue to grow as these products become more liquid and begin to attract new market participants, such as hedge funds, proprietary/HFT, and retail, as well as firms with new trading strategies that rely on CBOE's products.

CBOE is the best growth story in the US industry, in our view

We view CBOE as the best growth story in the exchange industry. While growth for the peer group has slowed significantly over the last few years on cyclical headwinds, CBOE's signature products are hitting all-time volume records, while secular growth in the key volatility business remains firmly intact. We expect consensus estimates to move higher as outsized volume growth continues to play out.

Our volume assumptions, which we think could prove conservative, support 15% earnings growth over the next few years, and we believe the stock will trade at a premium multiple (23x) to the group, as investors are willing to pay up for best-in-class growth.

Brazil: Main player Bovespa will strengthen its position

We think **Bovespa** (Buy rated by **Frederic de Mariz**) will strengthen its dominant position.

Moreover, we believe competitive pressure will be quite welcome to force the company to streamline cost and upgrade systems. A second category of winners will likely be the providers of technology and compliance services, including order routing systems and confirmation of best execution. Finally, we highlight that vendors should benefit, as they provide market data.

We expect Bovespa will strengthen its dominant position and be forced to streamline and upgrade its systems, under a competitive environment

On the negative side of the new market structure, we find first the smaller brokers. The advent of a more complex market structure will likely accelerate a consolidation in the largely unprofitable brokerage sector in Brazil. In our view, smaller brokers will not be able to take the higher fixed costs required by the new structure and will consolidate or outsource their trading. A second category includes regulators, which will have to dedicate a larger amount of time and budget to the new structure.

Smaller brokers will likely go through a consolidation phase and regulators will incur a higher cost under a competitive scenario

We view the Brazilian regulators (CVM for markets, Central Bank for clearing, CADE for antitrust) as mostly concerned with the market integrity and the deepening of capital markets in Brazil. To us, regulators are not opposed at all to competition, quite the contrary, but there is a series of difficult questions to address before competition can effectively start in Brazil. Importantly, the regulatory environment in Brazil is one of the most stringent and transparent in the world. We view the regulatory discussions around competition as fluid but mostly benign: we would not expect abrupt changes for market players.

Regulators in Brazil are mostly concerned with market integrity and the deepening of capital markets; to us, they are not opposed to competition

The final outcome for end users (investors) is not clear: we believe – maybe somewhat optimistically – that the expected reduction in trading costs will outweigh the overall costs of the change in market structure.

Brazil: Competition in trading will happen and could strengthen Bovespa

We expect competition in equities trading to happen after 2H15, but we do not expect competition in clearing and settlement. Importantly, we also do not expect competition in derivatives, as those are more difficult products to handle and require more capital. Therefore, the focus of this analysis is on the equities market in Brazil. We do not analyze the potential role of Cetip in custody services, for example.

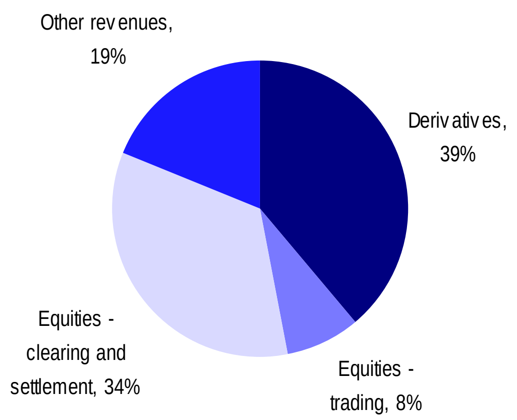
We estimate equities trading should represent just 8% of total gross revenues at Bovespa, versus 34% for equities clearing, 39% for derivatives and 19% for other revenues. Bovespa recently rebalanced its fees, and clearing now represents around 80% of overall revenues from equities, versus 20% for trading. This is similar to what Bolsas y Mercados Espanoles (BME, Sell rated by Arnaud Giblat) did, which made trading less profitable and acted as a deterrent to potential new players.

The focus of this analysis is on equities

Equities trading represents just 8% of Bovespa's revenues

We do not expect competition in clearing or derivatives in Brazil

Chart 6: Breakdown of gross revenues at Bovespa (2013e)



Source: UBS estimates

In 2013, we expect overall equities trading to represent just R$197m in gross revenues at Bovespa (US$87m), making it difficult for a new player to compete profitably.

ATS is the latest company (after BATS, Directedge) to challenge the monopoly of Bovespa. The company, based in Rio, asked the local markets regulator (CVM) for an exchange license in June 2013, and we understand that its application has not been completed yet. We expect Bovespa to open its clearinghouse (CBLC) to new trading platforms, as announced by the company's CEO, Edemir Pinto.[3] Despite ATS's alleged intentions to create a new clearinghouse, we do not see this scenario as likely in the medium term, as setting up a clearinghouse would require a larger investment than just a trading platform, and as the regulator may be concerned about systemic risk. Importantly, we also think the Brazilian market is not large enough to support two profitable clearinghouses.

Competition (real or feared) would strengthen Bovespa's dominance

We believe Bovespa should benefit from competition

We offer six key arguments to explain why competition is not a threat to Bovespa, particularly as equities trading is a small part of its revenues

It may be counterintuitive, but we expect competition to be neutral to positive for Bovespa. In particular, we believe it will strengthen its dominant position and will force the company to streamline and to upgrade its technology platform. We highlight six arguments:

(1) We estimate equities trading should represent just 8% of gross revenues at Bovespa in 2014. This is a small part of the revenues for exchange.

(2) Having competition could favour higher traded volumes in the equities market. Competition among trading platform is not a zero-sum game. However, the Australian example suggests some caution, as volumes did not grow meaningfully after competition was introduced. Therefore, we would expect only a slight increase in volumes under a competitive scenario.

[3] In sharp contrast to the public stance of Bovespa until recently.

(3) Higher demand for equities could also lead to higher demand for other products offered by Bovespa: clearing and settlement (CBLC), where we expect Bovespa will maintain its monopoly, but also securities lending, or FX swaps.

(4) Competition might lead Bovespa to increase the pricing of some of its peripheral products, such as market data, or listing fees,[4] where Bovespa has a natural competitive advantage versus new entrants. Competition could therefore make the overall pool of revenues more stable and less dependent on trading volumes, as is the case for most large international exchanges.

(5) As an integrated platform, Bovespa has a strong competitive advantage against new players, in particular in terms of collateral management.

(6) The most important argument for us is that competition (real or feared) would require Bovespa to move away from its former culture as a mutualised company and become both more cost efficient and more client-oriented. In particular, Bovespa would have to deliver important technology projects, such as the integration of its four legacy clearinghouses (expected for end 2014, early 2015), market data modules and back office systems. The upgrade of those systems would unlock demand for higher volumes, in our view.

Scenario analysis: Competition would reduce BVMF3 valuation by R$0.4. We conduct a detailed simulation with the potential impact of competition on earnings and valuation. Competition would most likely be in place only after 2H15, and we have to make a number of assumptions on the different moving parts of this new scenario.

Under our simulation, 2016 earnings would be negatively impacted by 3% and the valuation of BVMF3 would be R$14.5, which compares with our current valuation of R$15. This supports our call that competition would be a rather positive environment for the exchange.

A detailed scenario analysis suggests Bovespa could lose 3% of net income in 2016 and its valuation would be cut by R$0.4

Table 2: Summary of assumptions for the simulation of a competitive environment on 2016e earnings

Assumptions	2016e
1- equities trading decreases, loses 15% market in 2016	-43.4
2- overall equities trading fee decreases an additional 20%	-49.2
3- equities clearing increases an additional 3%	40.1
4- increase the growth of other revenues by 5% (listing fees, market data)	7.9
5- extra capex and opex (R$20mn each)	-26.6
Total impact (R$mn)	-71.2
Tax rate	14.50%
Total impact, tax adjusted (R$mn)	-60.9
Net income, adjusted	1,807.9
Net income - after simulation	1,747.0
Difference	-3%

Source: UBS estimates

[4] ASX Limited increased its listing fees in 2Q13. Refer to the 23 May 2013 note of Chris Williams: *Price vs. Volume? Volume's the Winner*.

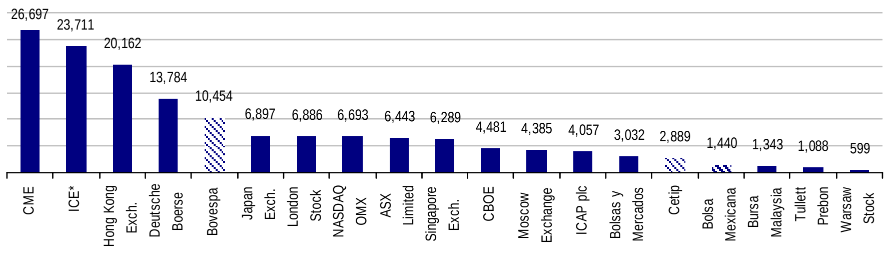
Brazilian equities markets in a global perspective

In this comparative section, we focus on the equities market and do not present data on derivatives, as equities are the key focus on the discussion around competition in Brazil.

Bovespa is one of the largest exchanges globally…

We show first the market capitalization of listed exchanges (BVMF3 for example). BVMF3 is the fifth largest exchange in the world.

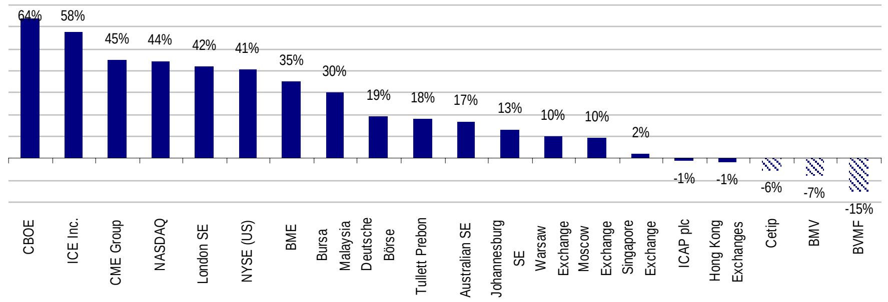
Chart 7: BVMF3 is the fifth largest exchange in the world (market cap in US$m)



* Combined value for ICE and NYSE.
Source: UBS and Bloomberg

We also indicate below the year-to-date performance of exchanges globally. Not surprisingly, LatAm exchanges have done poorly. We explain this by a deceleration of GDP growth across emerging markets and in Latin America, a smaller appetite from international investors for Brazilian equities explained in particular by political interference into the private sector.

Chart 8: LatAm exchanges have done poorly this year in terms of stock performance



Source: UBS and Bloomberg

The interesting and new information from the chart above is that the correlation between the local stock market (IBOV) and the exchange stock (BVMF3) is positive and high again. We observe this correlation among global exchanges, especially in mature markets such as Europe. This had not happened for a couple of years, and we think the decoupling will come back in 2014. To us, the main reason for the decoupling between local equities and BVMF3 in 2014 will be the upgrade of systems which should drive higher volumes. In other words, volumes

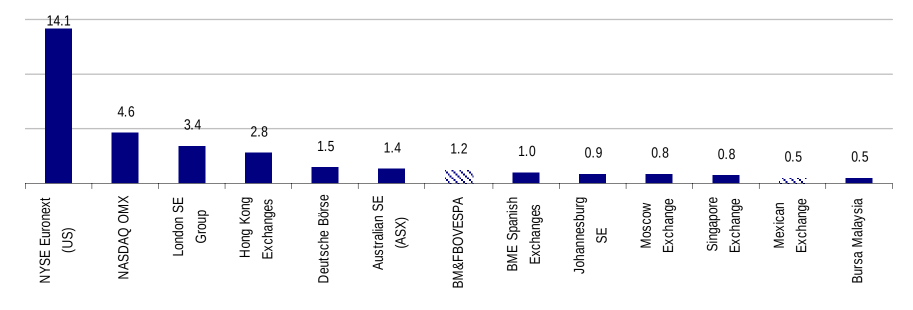
will not be driven just by a good performance of local equities, but primarily by company specific initiatives.

... but Brazil is a medium sized market for equities

If we consider the number of listed companies or the market capitalization of listed companies, the conclusion would contrast with the market capitalization of BVMF3: Brazil is a medium sized market for equities. We believe its potential is what drives valuation as well as its integrated business model.

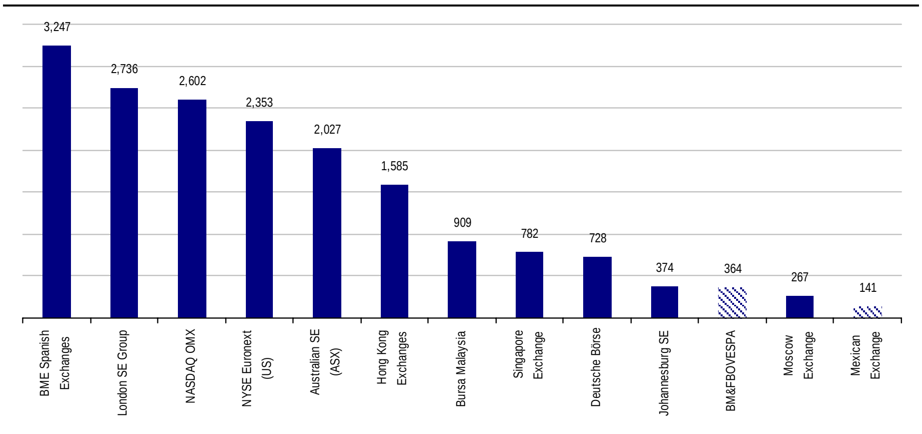
Other markets in Latin America are even smaller, with the Mexican Bolsa (**BMV**, Buy rated by **Frederic de Mariz**) being the second market behind Brazil. Considering the small size of Mexican capital markets and local regulations (regime of authorization), we also see the entrance of new platforms in Mexico as unlikely. We note that the main competition for Mexican equities comes from the NYSE.

Chart 9: Market capitalization of listed companies (US$bn)



Source: WFE (World Federation of Exchanges)

Chart 10: Number of listed companies



Source: WFE

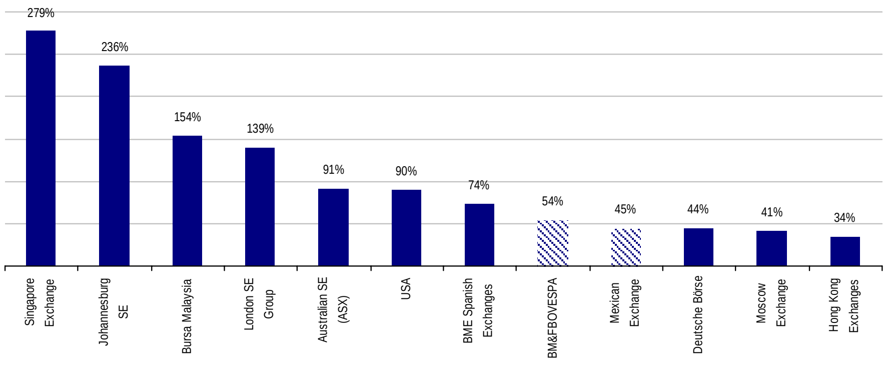
In the discussion around competition in equities trading, potential new players have highlighted the fact that the size and depth of the equities market in Brazil is much smaller than what its economic size would imply. In fact, there are

hundreds of middle sized companies that prefer to be funded via banks or suppliers financing rather than accessing the capital markets.

To be clear, we do not believe that competition would change this situation much: companies remain private for a list of reasons and having a new trading platform may not be enough to cause them to list.

The chart below summarizes the relatively shallow depth of equities markets in Brazil. In fact the market capitalization of listed companies represents a bit more than half of the Brazilian GDP, versus 90% for the NYSE alone (which is not a monopoly).

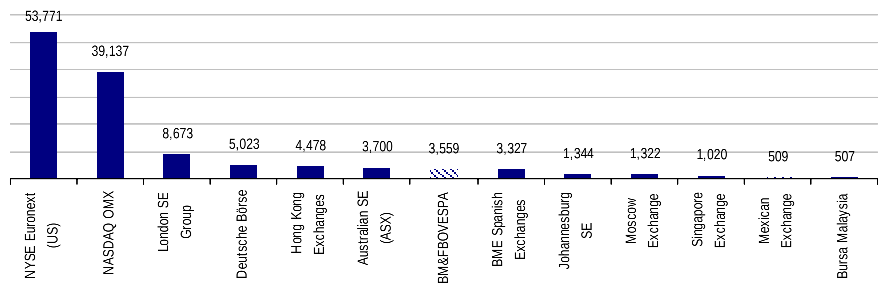
Chart 11: Market capitalization of companies/GDP: Shallow capital markets in Brazil



Note: For the US market, we sum the data for the NYSE and for Nasdaq.
Source: UBS, WFE and World Bank

Finally, on top of the small numbers of listed companies and their relatively smaller market capitalization, we note the small average daily trading volumes (ADTV). In the case of Brazil, the ADTV of US$3.5bn is due to subpar trading technology and a lower velocity (76% as of 3Q13). The question of the turnover is important in the case of Brazil because it can grow together with technology initiatives, which is something that Bovespa can influence. Moreover, as the overall pool of liquidity is relatively limited, we find it difficult – although not impossible – for new players to start trading and clearing.

Chart 12: Lower velocity drives lower trading volumes



Source: UBS and WFE

Brazil: Competition will happen in trading, not in clearing

On June 19, 2013, ATG filed for the CVM approval to become an exchange in Brazil, causing volatility for BVMF3. In September 2013, ATS announced that it was teaming up with Risk Office to develop a clearinghouse, although it has not (yet) applied for a clearinghouse approval to the Central Bank. We also understand that the application of ATS at the CVM is not yet complete.

We do not think that ATS is an imminent threat to BVMF but we consider that competition will emerge after 2015 as BVMF opens its clearinghouse to other trading platforms. While not impossible, we do not think that competition will happen in clearing in the next two years, as investments to set up a new clearinghouse are larger than for a trading platform and we expect the Central Bank to provide a new license only after a careful review of potential risks.

Currently a monopoly, Brazil is preparing for competition

End of a monopoly: Threat of ATS

In the past few years, BATS and Directedge[5] have eyed Brazil as a potential new market for their operations. ATS is the latest player to challenge the monopoly of Bovespa in equities trading and clearing.

ATS is 80% owned by ATG (a technology company in Brazil, with no background in trade matching or execution) and 20% owned by NYSE Technologies (the technology arm of the NYSE). Today ATG routes orders from brokers and buy-side clients to Bovespa but cannot match orders (by law, matching has to be done on an exchange – dark pools are not allowed in Brazil) or clear orders. ATG claims to represent ~6% of equities volumes traded on Bovespa, although we were not able to independently confirm this number. Instead of just directing the liquidity to BVMF, ATS wants to become an exchange for equities and ETFs *only*.

CVM is the regulator for markets and securities while the Central Bank has the oversight of payments systems and clearinghouses. CVM has 90 days to respond to ATS' request once it is complete – potentially requesting some clarifications or further details. The company then has 60 days to answer, after which the CVM has another 90 days and the process is either approved or denied. The Central Bank, in turn, is not bound by pre-defined timeframes.

Bovespa redefined its fee structure so that trading represents roughly 20% of total equities revenues, against 80% for clearing and settlement. This has turned clearing into the most profitable part of the business – but is also the most difficult to set up.

Our rough estimate indicates that the cost of setting up a new vertically integrated platform (trading and clearing) would amount to ~US$100mn, versus roughly ~US$20mn to an execution venue (trading only).

---

[5] BATS and Directedge announced their intention to merge. If approved, this would create the second largest exchange in the US, behind ICE-NYSE. To us, this reduces the risk that either player enters Brazil in the short term.

ATS is targeting a 15% market share of equities trading within two years. ATS aims at attracting liquidity partners by selling a 24% stake of the company to banks and brokers. To our knowledge, no firm agreement has been signed yet. ATS estimates that its platform will be fully up and running (including trading and clearing) in September 2014, a timeframe that we consider excessively optimistic.

Why competition now? What is the context?

More than a decade ago, Brazil used to have several exchanges and several clearinghouses.[6] We do not think that the regulator is opposed to competition at all, but there are a number of difficult questions to answer before competition can happen. Why is the current context favourable to competition?

(1) **Dissatisfaction with Bovespa's fees and systems.** This is despite the conclusions of a report from 2012 (Oxera report) stating that BVMF all-in fees were relatively in line with global averages.[7] Bovespa is currently working on a new fee structure, where fees would depend on the order sizes, liquidity provided by players and the type of investors.

Outside of Brazil, post trading (clearing, settlement) is typically done by prime brokers (the brokerage arms of banks) and not by the exchange. In Brazil, Bovespa maintains information at the level of the final beneficiary (the actual investors, and not just the brokerage house). This means that Bovespa settles trades at the level of every beneficiary, under every fund for every client. Cost incurred by prime brokers is generally not disclosed, which complicates the comparison of all-in costs.

Also, while market participants recognize Bovespa's new trading engine (PUMA) as a performant, they note that other legacy systems (market data, reconciliation) need an upgrade and do not allow the use of the strong trading engine at full capacity. ATS claims that its trading system would have a latency six times lower than Bovespa's.

(2) **Brazilian capital markets are too small and too shallow.** This is in particular a selling point of new entrants. Liquidity for Brazilian stocks is quite low, with the exception of a handful of blue chips – a reality that investors are well aware of. In fact, the Brazilian exchange counts just 364 listed companies (more than 2000 on NYSE) and the top 10 listed companies represent 41% of total liquidity.[8] The average daily traded volumes on Bovespa are just below US$4bn. There is therefore a remarkable gap between the size of capital markets and the size of the economy. We highlight two reasons for this low liquidity: wide bid/ask spreads, and slow trading systems at the exchange and at brokers. Wide spreads discourage trading while slow systems prevent the development of

[6] See the Oxera report filed with the CVM for more details on the history of the exchanges sector in Brazil, *Ibid*, in particular p. 35.

[7] Oxera, Cost and benefits of competition for the trading and post-trading markets in Brazil, June 2012 (Oxera report thereafter), p.47

[8] Source: WFE for number of listed companies, and Bovespa for concentration of trading

high frequency traders. Potential new players such as ATS mention that competition would increase overall trading volumes and liquidity for all stocks, in particular smaller ones – an argument that does not fully convince us (see below).

Stakeholder 1: Regulators

Our first stakeholder is the regulator, or to be more precise, the regulators. We think that regulators, be it the CVM (markets) or the Central Bank (clearing) are primarily concerned with the integrity of the system, and less so with the level of pricing. It seems worth mentioning a third type of government entity – antitrust authorities (CADE in Brazil) – which, together with the Ministry of Justice, could be more concerned with competition and pricing.

As a first comment, the presence of multiple exchanges as opposed to one would increase the cost of oversight. We detail below our thoughts on the three regulators: the CVM (markets), the Central Bank (clearing), and CADE (antitrust).

We do not expect CVM to grant a trading license to ATS... for now

While Brazil used to have several trading platforms and clearinghouses more than a decade ago, breaking the current monopoly in equities of Bovespa is largely uncharted territory for market players and the regulator. This is mostly because technology has evolved rapidly. As we wrote before, we do not think that the regulator is at all opposed to competition, quite the contrary, but we see a number of difficult questions to answer before this could happen. The most pressing questions revolve around clearing and best execution in trading.

When it comes to setting up a new exchange, CVM Instruction 461 is the most important regulatory text. CVM Instruction 461 states that an exchange needs to be able to also clear and settle trades.[9] We think it is unlikely that the CVM would give ATS a conditional approval ("we approve ATS as an exchange and they can provide more details on how they will clear trades later on"). Interestingly, we note that ATS has announced its intention to build a clearinghouse.

What would it take to launch a new clearinghouse?

Setting up a new clearinghouse would require considerable investments, time and regulatory approval, and would demand the collaboration of Bovespa's clearinghouse as both platforms would have to be interconnected.

In terms of costs, based on conversations with market participants, we estimate that launching a new vertically integrated exchange (trading and clearing) would require an investment around ~US$100mn.

In terms of timeframe, ATS estimates that its trading and clearing systems would be fully operational and approved by the end of 2014 – a timeframe that looks excessively optimistic to us. By comparison, we estimate it should take BM&F Bovespa around two years to integrate and upgrade its legacy clearinghouses – an integration that should be ready only by the end of 2014 or early 2015.

[9] CVM Instruction 461, art.16.

Importantly for brokers, maintaining trades with two clearinghouses could increase the cost of margins as each clearing might not be able or willing to net the positions at both clearinghouses. This would be a meaningful additional cost of trading, would probably hurt trading volumes (which goes against one of the best objective of implementing competition), and goes against also the project of integrating the clearinghouses at Bovespa.

In the US, the 1975 amendments of the SEC Act established a national clearing and settlement utility. This was seen as a major progress to ensure the fungibility of orders executed on various venues and alternative systems. By contrast, the absence of a unified post trading system is seen as one of the key weaknesses of the MiFID regulation of 2007 and of the European market.[10]

Regulatory issues raised by competition

Instruction 461 also lists a series of issues that need clarification in order to reduce systemic risk and make the regulator comfortable with competition. We list below the five most relevant themes.

1. **Best execution.** With competition, the CVM will need to define the rules of the game for trade execution (best execution). In other words, each trading platform could have its own rules to process trading orders, potentially leading to an uneven playing field for investors across platforms. This is a simple concept, but rules for best execution may take time to be defined.

Best execution is the most important and difficult question to address in the case of competition. Decisions made relating to best execution will drive solutions to other subjacent themes, such as tape consolidation and mandatory links of brokers to both execution venues.

There is a host of interests involved in this discussion. In particular, if the CVM mandates to use price (total consideration) as the main driver to route an order to an exchange or another, it would *de facto* require all brokers to set up links to bother execution venues. We believe that this would be an unbearable extra cost for most of the smaller brokers.

In the US, the Order Protection Rule of the SEC (Rule 611[11]) mandates that trades in the top of the book are routed to the execution venue that presents the best price.

In Australia, the introduction of competition by Chi-X did not lead the regulator to require broker-dealers or the ASX to access the new venue. Under the Australian Market Integrity Rules, ASIC required market participants to "actively assess whether or not accessing Chi-X will deliver better outcomes for their clients on a consistent basis at a reasonable cost" and offer a transition

[10] Bovespa – Rosenblatt report to CVM, p15

[11] Under the SEC Regulation National Market System (Reg NMS), the Trade-Through Rule (also known as Rule 611 or Order Protection Rule) aimed to "protect limit orders of investors by forbidding a particular market center from trading through another market with a better price and executing the order at an inferior price." The rule applies to intermediaries and requires "market centers to enforce policies and procedures to deter trade throughs." From Bovespa – Aite Group report to CVM, p16

period for intermediaries to complete this assessment.[12] If the assessment concludes that a link to the other exchange would be beneficial, the regulator would expect to access the other venue in a reasonable timeframe.

The focus on price removes the flexibility to brokers who may have routed orders based on other factors (pricing may not always be the most important factor for an investor), such as depth of the book. Focusing on price also may lead to a proliferation of alternative execution venues. Finally and most importantly to brokers, best execution based on price would increase costs to participants.

On the flip side, allowing a full flexibility to brokers to allocate clients trades on the platform that they choose could be detrimental for clients. Brokers may be tempted to arbitrage prices between the two platforms to their benefit, and not in the name of their clients. This is a very important consideration, in particular for retail investors, who do not have the sophistication (knowledge and systems) to ensure that brokers executed in their best interest.

We also do not expect the regulator to force the execution venues to be interconnected and route orders that they receive in the event that the other venue has a better price. In our view, best execution, if implemented, should be done by intermediaries (brokers) and not by the venues (exchanges).

Our view on what the market will look like. Our view is that the CVM will stick to its previous inclination articulated in CVM Instruction 505 (art. 19), which states that the "intermediary has to execute orders under the conditions set by the client, or if the client did not stipulate conditions under the best conditions allowed by the market." Conditions can include "price, velocity, the probability of execution and settlement, the volume and any other relevant consideration".

In other words, the CVM leaves ample flexibility to brokers and is largely inspired by the MiFID rules of the European Commission from 2007.[13] While the CVM Instruction was drafted at a time when no competition was present in equities trading in Brazil, we think that it will be maintained. We expect that this rule may be refined in the future, possibly with a phase-in period (Australian model), to better defend retail investors. In Australia, Market Integrity Rules state that "when handling and executing an order for a client, a participant must take reasonable steps to obtain the best outcome for that client."[14] The rules define the best outcome for retail clients as the best total consideration (total price), while the best outcome can use other factors for institutional investors. We believe that price (total consideration) should be the only consideration in the case of trade execution for retail clients.

---

[12] Direct Edge report to CVM, p.6

[13] Article 21 of MiFID (2007) states that brokers must "take all reasonable steps to obtain, when executing orders, the best possible result for their clients taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order." There is also an exemption for orders that have specific instructions from clients. MiFID imposes several obligations to investment firms, such as to define execution policies, obtain client consent and demonstrate execution. http://www.esma.europa.eu/system/files/07_050b.pdf

[14] ASIC 2011 Market Integrity Rules, Chapter 3

As a result, the introduction of competition will maintain some flexibility for brokers. It will also not mandate links to both execution venues, which would have precipitated a consolidation trend among brokers. However, we expect that best execution based on price will be implemented over time in Brazil for retail investors. To us, the current CVM Instruction should be sufficient to regulate best execution for now. Winners under the new competitive environment will likely be technology providers (links, routing orders), vendors (market data), and providers of compliance systems (to confirm that best execution was provided).

2. Fragmentation. Competition could lead to a fragmentation of liquidity: two sets of investors trading the same stock at different prices. In other words, a fragmented market structure with several execution venues might lead to a fragmentation of trading. This is only a conditional risk. Fragmentation is a risk only if the two platforms do not communicate in real time. This is largely a non-issue in many markets, as liquidity is virtually consolidated.

The consolidation of the tape for pre-trades is essential and a pre-requisite in a market with multiple execution venues. The lack of consolidation in Europe following MiFID rules in November 2007 is widely seen as a weakness of the regulatory environment. The consolidation requires that all brokers are able to receive market data in real time and therefore upgrade their systems for that purpose. The tape consolidation promises to be a lucrative market for technology providers and vendors. We expect all execution venues to sell market data to vendors, who would then perform the function of consolidation. To us, this suggests the potential for additional market data revenues for Bovespa.

3. Custody. There have been only limited discussions on custody (depositary for shares), which we view as en essential part of the overall exchange microcosm.

4. Auto regulation. CVM Instruction 461 requires exchanges to set up auto regulation areas. For that purpose, Bovespa created BSM, an entity that is independent from Bovespa’s management but funded by BVMF.

Two questions arise when thinking of a competitive environment. Will auto regulation suffice or should regulatory functions be performed by the regulator only? The US has long supported the first model of auto regulation, which presents some advantages: market players have the best understanding of their business. The main drawback is that auto regulation can present the impression of a conflict of interest even though auto regulation agencies work hand in hand with the formal regulator. Australia, with the introduction of competition, decided to move up all regulatory functions to the regulator: the Australian Securities and Investments Commission (ASIC). The introduction of competition resulted in an additional cost for the regulator estimated at A$42mn per year.[15] We think Brazil will stick to the auto regulation model.

With the existence of various exchanges, the most likely solution would be to spin off BSM and allocate its costs among players. Spinning off BSM would

[15] Bovespa – Aite Group report to the CVM, 2013, page 70

also remove a perceived conflict of interest and the criticism – justified or not – that the entity is not independent.

5. Alternative trading systems. By law, alternative trading systems, dark pools and the internalization or orders are not allowed in Brazil. We do not think that the CVM is considering a change in the current situation. Generally speaking, we believe that exchanges are following a trend towards more transparency rather than less.[16]

Central Bank: No request for new clearing yet

While ATS has stated that it is partnering with Risk Office to set up its own clearing system, the company has not yet applied for a Central Bank approval to launch a clearing. We understand that conversations between ATS and the Central Bank started around July 2013.

CADE: Focused on competition, not on pricing

Bovespa has already announced that it would like to open its clearinghouse (CBLC) to new players, after it has upgraded its current clearing.[17] The fact that CBLC would be open removes a meaningful reason for antitrust authorities to act against Bovespa. In fact, the vertically integrated and closed structure of Bovespa played as a barrier to entry for new players.

We ask ourselves whether antitrust authorities could opine on pricing or force CBLC to cut its prices to all players? CBLC is an entity authorized by the Central Bank, just like any financial institution in the country. Some participants have sometimes confused the status of authorized entity with a concession (e.g. highways). Authorized entities do not have a timeframe to operate in the sense that a highway operator would and their prices are not predefined by the regulator. To us, the fact that CBLC is authorized does not increase the probability that the regulator would be looking into its pricing policies.

When analyzing the case of CBLC, antitrust authorities would evaluate the contestability of the market position and the fair basis for its pricing policy: the ability for a new player to set up a new clearinghouse. If anything, the fact that ATS is planning to launch its own clearing tends to indicate that the market of clearing trading orders is open.

In terms of precedents in the financial space, we think of the obligation for card acquirers VisaNet and Redecard to end their exclusive agreements with Visa and Mastercard and open their networks to other card players. This was decided by market participants, even though there was pressure from the authorities. Authorities were interested in opening the market structure of card acquiring by making networks interoperable. They were not looking primarily into pricing. In other words, regulators did not act on pricing, they were focused on the contestability of the market.

[16] See the proposal in particular on the registration of OTC derivatives on exchanges in the Dodd-Frank Act.

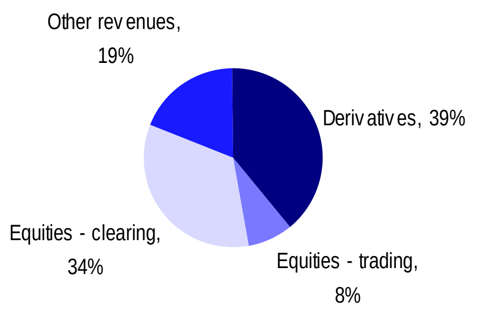
[17] BM&F Bovespa is currently integrating its four legacy clearinghouses (equities, derivatives, FX, public titles) and plans to have a single fully integrated clearinghouse by the end of 2014/early 2015. That integrated clearing could then receive trades executed on other execution venues.

Stakeholder 2: Bovespa

Bovepsa is currently the only exchange in Brazil. In the last section of this report, we estimate the costs and opportunites brought by competition. What is the potential impact of competition on Bovespa's revenues under different scenarios? What kind of preemptive measures can the company take?

Equities trading represents just 8% of revenues at Bovespa. We estimate equities trading should represent 8% of total revenues at BVMF in 2013, versus 34% for equities clearing, and 39% for derivatives. Competition in equities trading is not *per se* a big risk to Bovespa's revenues. Also we expect the other revenues at Bovespa to become more relevant in the future.

Chart 13: Breakdown of gross revenues at Bovespa (2013e)



Source: UBS estimates

Competition could be positive for revenues. The presence of a new player could potentially increase overall trading volumes – this is not a zero-sum game. For example, high frequency traders could be looking into arbitrage opportunities between the competing trading platforms, suggesting that the loss in trading market share would be smaller at Bovespa than anticipated. Moreover, competition in equities could trigger more demand in products such as securities lending, FX, derivatives, potentially helping BVMF revenues. On a more negative note, we do not expect competition among venues to lead to more listings. See below for a discussion of the impact of competition on Australian volumes.

Bovespa's stance has rapidly evolved from a desire to keep CBLC closed to the recognition that CBLC could be open to other players and that this might actually not be detrimental to the company. Our view is that Bovespa will open CBLC (2015 at the earliest) after it has upgraded its own systems, obtained Central Bank approval for the new platform, built links to the new execution venue, and defined a fair pricing policy. BVMF is updating the Central Bank on a regular basis on the integration of its legacy clearings. We expect competition in equities trading to be a reality in 2015 at the very earliest.

Importantly we also believe that competition could help Bovespa continue its transition from a mutualized company to an efficient, cost focused, client-oriented company. We think that this transition has only partly been completed.

We believe this could translate in particular into more cost efficiencies, the launch of new products and the upgrade of several systems.

In particular, after upgrading PUMA (its matching engine), we think that Bovespa needs to upgrade several other modules, in particular market data and back office reconciliation at brokers, in order for the market to take full advantage of the performance of PUMA. Better systems will likely be key drivers of volumes growth through higher velocity. To us, this indirect benefit of competition is key and very positive.

Stakeholder 3: Brokers

Our third stakeholders are the brokers, the – for now – essential intermediaries in equities trading in Brazil. We added a "*for now*" because the progress of technologies (e.g. direct market access[18]) and increased financial sophistication (e.g. the consolidation and growth of asset managers) beg the question of the necessity of intermediaries. This will be a long-term trend, but for now, brokers are still very much essential intermediaries in Brazil. What does it mean for brokers to adapt to an environment with multiple exchanges?

On the positive side, competition could potentially lead to lower trading fees, faster execution, lower bid/ask spreads, higher stock liquidity, a more stable trading environment, and better service from the exchange.

Brokers have two main concerns relating to competition: cost and isonomy.

1. Cost. How much will it cost for a broker to be connected to a new exchange on top of the existing connection it has with Bovespa? Cost would include a new screen, connectivity, some training and maintenance relating to the system, and regular upgrades. Those costs will depend on the size of the broker, the type of clients and trading strategies, as well as trading volumes, but they have a fixed component. Those costs could be partly covered by the new exchange itself but we expect smaller brokers to be reluctant to increase their IT spending. Costs relating to connectivity and order routing can range from US$400,000 to US$1.6mn in the US market.[19]

Brazil counts around 85 brokers and most of them are not profitable. The extra technology expense would translate in a rapid consolidation of the sector and the strengthening of external technology providers. We think this is an inevitable trend in the Brazilian market as smaller brokers have not invested enough to upgrade their systems, impacting negatively the larger brokers who made those investments and are not able to get the full benefits of a better technology. For example, Bovespa's new trading engine PUMA can process 200mn messages per day, compared to ~15mn messages being actually processed today. Bovespa

---

[18] Direct Market Access – DMA – is a technology that allows investors to be directly connected to the exchange and bypass brokers. DMA often goes hand in hand with collocation, where the investor's engine that sends orders to the exchange is physically close to the matching engine of the exchange (in the same building usually). This reduces latency and allows for high frequency trading.

There are four types of DMA: DMA 1: The broker acts as an IT provider: it offers the infrastructure and routes the order for the investor; DMA 2: An independent IT company provides the routing system and no broker is needed; DMA 3: The investor has its own routing system. DMA 4 combines DMA 3 and collocation.

[19] Bovespa - Aite Group report to CVM, p8

controls the number of messages used so that the system of smaller brokers does not get overwhelmed and freezes. Bovespa would only be able to launch its new system at full capacity when all brokers have upgraded their own infrastructures.

2. Isonomy. What would happen if some brokers are not able or willing to invest in additional trading systems and do not connect to the new exchange? Those brokers and their clients would be at a disadvantage versus other brokers. There is a risk to have two speeds for brokers, the large ones being able to benefit from the upgraded systems and liquidity, the smaller brokers not able to keep up with IT spending.

Could the exchange or market regulator force all brokers to incur higher costs to be connected to all exchange platforms? We do not expect that the regulator would force all brokers to connect to both platforms, which could give some more time for brokers to adapt. We also do not think that best execution will be defined solely on price.

That said, we think it is an inevitable trend of the Brazilian market and we expect smaller brokers to disappear or outsource their trading systems and back office reconciliations.

We think that Brazil will experience both a consolidation and a specialization of brokerage houses. Smaller or less efficient brokers may not be willing or able to adjust to more sophisticated trading platforms and allocate capital for operational risk relating to trading. They might simply cease to exist or they might outsource their trading systems to other brokers or IT companies. We think ATG could benefit from this trend, as it already routes orders to Bovespa.

In other words, some of the winners of the new competitive environment will likely be technology providers (order routing, reconciliation) and compliance functions (confirmation of best execution).

Stakeholder 4: Companies

Would companies benefit from increased competition in their quest for funding? There are two ways to tackle this question: would competition stimulate the listing of new companies? Would competition increase the existing stock liquidityof companies that are already listed?

This is a key argument for new players in Brazil: Brazilian capital markets do not represent appropriately the size of the Brazilian economy and are not an optimal vehicle to meet domestic capital needs of companies.

Dual listing is possible under CVM Instruction 461. In other words, the new exchange would not have to attract companies to list again and investors would be able to trade any stock that is already listed on the new exchange. As a sidenote, this suggests that the exchanges with the primary listing of a company will most likely increase listing fees in the future.

New players argue that trading volumes are low in Brazil partly because bid/ask spreads are too wide and trading fees are too high on Bovespa. Therefore the advent of competition suggests that trading volumes could increase.[20]

We are only partly convinced by this argument. We believe that competition could indeed increase trading volumes for already listed companies (arbitrage between the two platforms and generally lower fees), but we do not think that competition among exchanges *per se* would increase the number of listed companies or increase the liquidity of small caps.

In the case of small caps, we wonder whether it would be sustainable to maintain two pools of liquidity, which already have a low liquidity today. In Australia, new player Chi-X started its operations with the trading of only the eight most liquid stocks.[21]

We view other structural problems as more relevant for liquidity than the absence of competition. We mention only a few obvious ones:

- Technology is probably the largest hurdle and would require upgrades on the exchange side and for brokers. In the case of Brazil, improved technology could lead to higher volumes;
- A small presence of pension funds in active trading of equities in Brazil, smaller than in markets such as Chile;
- High interest rates and fixed income securities indexed to inflation, which make equities investments relatively less attractive, we view the Selic as one of the biggest competitor of equities. Moreover, we note a large presence of public debt, which makes equities investments less attractive under a crowding out effect;
- Tax and regulatory issues, which complicate trading in Brazil.

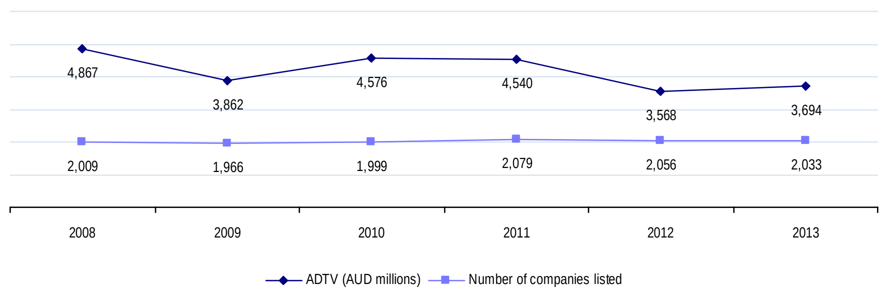
We look at the Australian example to see if competition introduced in 2011 led to higher trading volumes or a higher number of listed companies. Arguably many factors influence volumes and listings. Interestingly, in Australia, the new market player Chi-X has indicated that it planned to gain 20% of market share within two years of its launch and is today slightly below that target. Chi-X Australia currently has a market share of 12% to 17%.[22]

[20] This is one of the conclusions of the Oxera report (p.78).

[21] Oxera report, *Ibid*.

[22] Bovespa – Aite Group report to CVM, p7

Chart 14: Competition did not trigger more listings in Australia



Note: ADTV for ASX only.
Source: WFE

Stakeholder 5: Investors

Last but not least, how are investors impacted by competition? On the one hand, competition could lead to a decrease in trading fees and higher liquidity. On the other hand, competition could add costs for brokers and regulators, which could be passed on to investors. Overall, we estimate that the net impact of competition would be slightly positive for the market as a whole.[23]

[23] See also the mixed conclusions of the Oxera report, p.v, vi.

Small potential earnings impact on Bovespa

Scenario requires a series of assumptions

Arguably, there are several assumptions to make to estimate the potential impact of competition on Bovespa's revenues. As mentioned earlier in this report, we strongly believe that competition will happen in the Brazilian cash equities market and could start in the second half of 2015.

Bovespa plans to open its clearinghouse once it is integrated and upgraded, which is expected to be ready at the end of 2014. After the clearinghouse is ready, a few steps would be required, including the definition of a pricing table by Bovespa, tests of technology and connection and the approval of regulators. This is why we estimate that the new competitive environment would start in 2H15 at best. Thus, the first full year of earnings impact would be in 2016.

When running our simulation analysis in our model for Bovespa, we make the following assumptions:

- We estimate that a new player takes a 10% market share at the end of 2015, 20% at the end of 2016, and then stabilizes at 25%. The Australian precedent in competition is the base for those estimates where Chi-X captured less than 20% of the market two years after its launch. We estimate that the new player in Brazil would have a 15% market share *on average* in 2016;

- Equities trading fee will come under pressure, even before a new player starts operating. We estimate a further compression of 20% p.a. in the average fee, on top of the decrease that we had already incorporated in our model;

- We estimate that the presence of a new player provides a further boost to overall liquidity in the market. In other words, this is not a zero-sum game: what one execution venue gains is not what another loses. This is due to the fact that competition can reduce overall trading cost (with lower implicit costs: bid-ask spreads can decrease) and possibilities for arbitrage, which could increase overall volumes for large caps. On a more conservative note, we do not expect an increase in the overall number of listed companies. As a result, we estimate an additional 3% growth p.a. to equities trading volumes on top of the growth we were already forecasting;

- We think competition will be restricted to equities trading and will not include post-trading. As a result, new execution venues will have to connect to CBLC (a subsidiary of BVMF) to clear and settle trades. This means that clearing revenues at Bovespa will continue to include 100% of the market. As a result, we increase clearing revenues together with the overall increase of trading volumes;

- We do not think that Bovespa will open its post trading services before its clearinghouse has been fully integrated and upgraded (Bovespa currently has four legacy clearings). We do not expect the regulator to force Bovespa to open its clearing before that project is completed. Competition would only be able to connect to the new clearinghouse by 2H15;

- We also do not foresee any meaningful changes in the market structure for derivatives in the medium term. In other words, the impact for BVMF is only in cash equities trading, which we estimate should represent 8% of gross revenues of BM&F Bovespa in 2014;

- We estimate that Bovespa's revenues can increase in peripheral lines of business, in particular listing fees and in market data (data sold to vendors to produce a consolidated tape). Market data fees represent from 4.8% to 15% of the revenues of large exchanges, vs. 3% at Bovespa.[24] We expect the growth in the revenues lines for listing an vendors to be 5% above what we were currently estimating in 2016;

- We also estimate some increase in capex and opex at Bovespa to adjust to the new market structure. Additional capex and opex would include expenses in connectivity, man-hours spent with the other exchange(s) to adapt systems and interconnect trading platforms; a potential increase in the cost of auto-regulation. Importantly, we do not expect the regulator to require the creation of a routing system between execution venues for best execution (as in the US market with the Order Protection Rule). We also expect BSM to be spun off from BVMF and a more onerous cost of oversight in a fragmented market. In our simulation, we add an extra R$20mn in annual capex in 2016 (depreciated over three years), and also increase opex growth by an additional R$20m on top of the growth we were already incorporating in our numbers.

Competition would reduce valuation by R$0.4

We summarize in the table below our estimate of the impact of competition on Bovespa's revenues. We use 2016 in the table below as we do not expect competition to start earlier.

Table 3: Summary of assumptions for simulation of competitive environment on 2016e earnings

Assumptions	2016e
1- equities trading decreases, loses 15% market in 2016	- 43.4
2- overall equities trading fee decreases an additional 20%	- 49.2
3- equities clearing increases an additional 3%	40.1
4- increase the growth of other revenues by 5% (listing fees, market data)	7.9
5- extra capex and opex (R$20mn each)	- 26.6
Total impact (R$mn)	- 71.2
Tax rate	14.50%
Total impact, tax adjusted (R$mn)	- 60.9
Net income	1,807.9
Net income - after simulation	1,747.0
Difference	-3%

Source: UBS estimates

[24] Bovespa report to CVM, p15. For CBOE, market data fees represented 4.8% of revenues in 2012, versus 15% for NYSE.

This simulation would impact our valuation for BVMF3 (discounted cash flow model) by just R$0.4. Under our scenario for competition, our valuation for BVMF3 would decrease to R$14.5 (R$15 currently).

Importantly, we have not incorporated this scenario in our model, as we await the decision from both regulators (CVM and Central Bank) on the future of the trading environment in Brazil. As highlighted earlier, the scenario around competition is fluid and will likely take several years to take full effect.

Valuation

We have a Buy rating on BVMF3 and a price target of R$15, based on a DCF methodology.

Finally, in terms of valuation, BVMF3 trades on 13x 2014e earnings, vs. 12-31x for global exchanges.

■ Statement of Risk

Global financials' performance is closely linked to local economic conditions and changes in interest rates and foreign exchange. Also, global financials may be affected by changes in regulatory framework and overall local and foreign competition.

BM&F Bovespa is highly exposed to the overall capital markets and changes in government policy towards foreign investment could also have a negative impact on the company.

Risks for Moscow Exchange: As a government controlled company, ME is exposed to the risk of state interference and tighter regulation. Broader structural risks include the adverse outcome of the pension reform implementation resulting in the redistribution of pension assets in favour of meeting the current obligations in turn making asset accumulation by the pension funds more challenging. On the operating side, the key risk is competition from other exchanges, specifically the LSE, which has recently become the preferred exchange for new Russian placements. The company is also exposed to credit, market and liquidity risks. Finally, should equity or fixed income come under stress, ME's earnings are likely to be negatively impacted.

Valuation for Moscow Exchange: We value MoEx based on DCF and adjusted comparable peers multiples.

■ Analyst Certification

Each research analyst primarily responsible for the content of this research report, in whole or in part, certifies that with respect to each security or issuer that the analyst covered in this report: (1) all of the views expressed accurately reflect his or her personal views about those securities or issuers and were prepared in an independent manner, including with respect to UBS, and (2) no part of his or her compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed by that research analyst in the research report.

Required Disclosures

This report has been prepared by UBS Brasil CCTVM S.A., an affiliate of UBS AG. UBS AG, its subsidiaries, branches and affiliates are referred to herein as UBS.

For information on the ways in which UBS manages conflicts and maintains independence of its research product; historical performance information; and certain additional disclosures concerning UBS research recommendations, please visit www.ubs.com/disclosures. The figures contained in performance charts refer to the past; past performance is not a reliable indicator of future results. Additional information will be made available upon request. UBS Securities Co. Limited is licensed to conduct securities investment consultancy businesses by the China Securities Regulatory Commission.

UBS Investment Research: Global Equity Rating Allocations

UBS 12-Month Rating	Rating Category	Coverage[1]	IB Services[2]
Buy	**Buy**	44%	32%
Neutral	**Hold/Neutral**	46%	32%
Sell	**Sell**	10%	19%
UBS Short-Term Rating	**Rating Category**	**Coverage[3]**	**IB Services[4]**
Buy	**Buy**	less than 1%	less than 1%
Sell	**Sell**	less than 1%	less than 1%

1:Percentage of companies under coverage globally within the 12-month rating category.
2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.
3:Percentage of companies under coverage globally within the Short-Term rating category.
4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

Source: UBS. Rating allocations are as of 30 September 2013.

UBS Investment Research: Global Equity Rating Definitions

UBS 12-Month Rating	Definition
Buy	FSR is > 6% above the MRA.
Neutral	FSR is between -6% and 6% of the MRA.
Sell	FSR is > 6% below the MRA.
UBS Short-Term Rating	**Definition**
Buy	Buy: Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.
Sell	Sell: Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.

KEY DEFINITIONS

Forecast Stock Return (FSR) is defined as expected percentage price appreciation plus gross dividend yield over the next 12 months.
Market Return Assumption (MRA) is defined as the one-year local market interest rate plus 5% (a proxy for, and not a forecast of, the equity risk premium).
Under Review (UR) Stocks may be flagged as UR by the analyst, indicating that the stock's price target and/or rating are subject to possible change in the near term, usually in response to an event that may affect the investment case or valuation.
Short-Term Ratings reflect the expected near-term (up to three months) performance of the stock and do not reflect any change in the fundamental view or investment case.
Equity Price Targets have an investment horizon of 12 months.

EXCEPTIONS AND SPECIAL CASES

UK and European Investment Fund ratings and definitions are: Buy: Positive on factors such as structure, management, performance record, discount; Neutral: Neutral on factors such as structure, management, performance record, discount; Sell: Negative on factors such as structure, management, performance record, discount.
Core Banding Exceptions (CBE): Exceptions to the standard +/-6% bands may be granted by the Investment Review Committee (IRC). Factors considered by the IRC include the stock's volatility and the credit spread of the respective company's debt. As a result, stocks deemed to be very high or low risk may be subject to higher or lower bands as they relate to the rating. When such exceptions apply, they will be identified in the Company Disclosures table in the relevant research piece.

Research analysts contributing to this report who are employed by any non-US affiliate of UBS Securities LLC are not registered/qualified as research analysts with the NASD and NYSE and therefore are not subject to the restrictions contained in the NASD and NYSE rules on communications with a subject company, public appearances, and trading securities held by a research analyst account. The name of each affiliate and analyst employed by that affiliate contributing to this report, if any, follows.

UBS Brasil CCTVM S.A.: Frederic De Mariz; Mariana Taddeo. **UBS Securities Australia Ltd:** Chris Williams, CFA; Adam Lee. **UBS Limited:** Arnaud Giblat; Philip Finch. **UBS Securities Japan Co., Ltd.:** Mariko Watanabe. **UBS Securities LLC:** Alex Kramm, CFA. **UBS Securities CJSC:** Mikhail Shlemov.

Company Disclosures

Company Name	Reuters	12-mo rating	Short-term rating	Price	Price date
ASX Limited[2, 4, 8, 16c]	ASX.AX	Neutral	N/A	A$37.00	20 Nov 2013
BM&F Bovespa	BVMF3.SA	Buy	N/A	R$11.78	19 Nov 2013
Bolsa Mexicana[16a]	BOLSAA.MX	Buy	N/A	P30.89	19 Nov 2013
Bolsas y Mercados Espanoles	BME.MC	Sell	N/A	€26.41	20 Nov 2013
Bursa Malaysia	BMYS.KL	Buy	N/A	RM8.10	20 Nov 2013
CBOE Holdings Inc.[16c]	CBOE.O	Buy	N/A	US$51.36	19 Nov 2013
Cetip	CTIP3.SA	Neutral	N/A	R$25.39	19 Nov 2013
CME Group Inc.[2, 4, 5, 6a, 6c, 7, 16c]	CME.O	Buy	N/A	US$81.14	19 Nov 2013
Deutsche Boerse[12, 16c]	DB1Gn.DE	Buy	N/A	€55.00	20 Nov 2013
Hong Kong Exchanges & Clearing[2, 4, 12, 16b]	0388.HK	Neutral	N/A	HK$138.90	20 Nov 2013
IntercontinentalExchange, Inc.[6b, 7, 13, 16c]	ICE.N	Buy	N/A	US$206.42	19 Nov 2013
Japan Exchange Group	8697.T	Sell	N/A	¥2,721	20 Nov 2013
London Stock Exchange	LSE.L	Neutral	N/A	1,584p	20 Nov 2013
Moscow Exchange[2, 4]	MOEX.MM	Buy	N/A	RBL65.35	20 Nov 2013
Singapore Exchange	SGXL.SI	Neutral	N/A	S$7.26	20 Nov 2013

Source: UBS. All prices as of local market close.
Ratings in this table are the most current published ratings prior to this report. They may be more recent than the stock pricing date

2. UBS AG, its affiliates or subsidiaries has acted as manager/co-manager in the underwriting or placement of securities of this company/entity or one of its affiliates within the past 12 months.

4. Within the past 12 months, UBS AG, its affiliates or subsidiaries has received compensation for investment banking services from this company/entity.
5. UBS AG, its affiliates or subsidiaries expect to receive or intend to seek compensation for investment banking services from this company/entity within the next three months.

6a. This company/entity is, or within the past 12 months has been, a client of UBS Securities LLC, and investment banking services are being, or have been, provided.

6b. This company/entity is, or within the past 12 months has been, a client of UBS Securities LLC, and non-investment banking securities-related services are being, or have been, provided.

6c. This company/entity is, or within the past 12 months has been, a client of UBS Securities LLC, and non-securities services are being, or have been, provided.

7. Within the past 12 months, UBS Securities LLC has received compensation for products and services other than investment banking services from this company/entity.
8. The equity analyst covering this company, a member of his or her team, or one of their household members has a long common stock position in this company.
12. An employee of UBS AG is an officer, director, or advisory board member of this company.
13. UBS AG, its affiliates or subsidiaries beneficially owned 1% or more of a class of this company`s common equity securities as of last month`s end (or the prior month`s end if this report is dated less than 10 days after the most recent month`s end).

16a. UBS Casa de Bolsa S.A. makes a market in the securities of this company.

16b. UBS Securities (Hong Kong) Limited is a market maker in the HK-listed securities of this company.

16c. UBS Securities LLC makes a market in the securities and/or ADRs of this company.

Unless otherwise indicated, please refer to the Valuation and Risk sections within the body of this report.

For a complete set of disclosure statements associated with the companies discussed in this report, including information on valuation and risk, please contact UBS Securities LLC, 1285 Avenue of Americas, New York, NY 10019, USA, Attention: Publishing Administration.

Global Disclaimer

This document has been prepared by UBS Brasil CCTVM S.A., an affiliate of UBS AG. UBS AG, its subsidiaries, branches and affiliates are referred to herein as UBS.

This document is for distribution only as may be permitted by law. It is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or would subject UBS to any registration or licensing requirement within such jurisdiction. It is published solely for information purposes; it is not an advertisement nor is it a solicitation or an offer to buy or sell any financial instruments or to participate in any particular trading strategy. No representation or warranty, either express or implied, is provided in relation to the accuracy, completeness or reliability of the information contained in this document ('the Information'), except with respect to Information concerning UBS. The Information is not intended to be a complete statement or summary of the securities, markets or developments referred to in the document. UBS does not undertake to update or keep current the Information. Any opinions expressed in this document may change without notice and may differ or be contrary to opinions expressed by other business areas or groups of UBS. Any statements contained in this report attributed to a third party represent UBS's interpretation of the data, information and/or opinions provided by that third party either publicly or through a subscription service, and such use and interpretation have not been reviewed by the third party.

Nothing in this document constitutes a representation that any investment strategy or recommendation is suitable or appropriate to an investor's individual circumstances or otherwise constitutes a personal recommendation. Investments involve risks, and investors should exercise prudence and their own judgement in making their investment decisions. The financial instruments described in the document may not be eligible for sale in all jurisdictions or to certain categories of investors. Options, derivative products and futures are not suitable for all investors, and trading in these instruments is considered risky. Mortgage and asset-backed securities may involve a high degree of risk and may be highly volatile in response to fluctuations in interest rates or other market conditions. Foreign currency rates of exchange may adversely affect the value, price or income of any security or related instrument referred to in the document. For investment advice, trade execution or other enquiries, clients should contact their local sales representative.

The value of any investment or income may go down as well as up, and investors may not get back the full amount invested. Past performance is not necessarily a guide to future performance. Neither UBS nor any of its directors, employees or agents accepts any liability for any loss (including investment loss) or damage arising out of the use of all or any of the Information.

Any prices stated in this document are for information purposes only and do not represent valuations for individual securities or other financial instruments. There is no representation that any transaction can or could have been effected at those prices, and any prices do not necessarily reflect UBS's internal books and records or theoretical model-based valuations and may be based on certain assumptions. Different assumptions by UBS or any other source may yield substantially different results.

Research will initiate, update and cease coverage solely at the discretion of UBS Investment Bank Research Management. The analysis contained in this document is based on numerous assumptions. Different assumptions could result in materially different results. The analyst(s) responsible for the preparation of this document may interact with trading desk personnel, sales personnel and other parties for the purpose of gathering, applying and interpreting market information. UBS relies on information barriers to control the flow of information contained in one or more areas within UBS into other areas, units, groups or affiliates of UBS. The compensation of the analyst who prepared this document is determined exclusively by research management and senior management (not including investment banking). Analyst compensation is not based on investment banking revenues; however, compensation may relate to the revenues of UBS Investment Bank as a whole, of which investment banking, sales and trading are a part.

For financial instruments admitted to trading on an EU regulated market: UBS AG, its affiliates or subsidiaries (excluding UBS Securities LLC) acts as a market maker or liquidity provider (in accordance with the interpretation of these terms in the UK) in the financial instruments of the issuer save that where the activity of liquidity provider is carried out in accordance with the definition given to it by the laws and regulations of any other EU jurisdictions, such information is separately disclosed in this document. For financial instruments admitted to trading on a non-EU regulated market: UBS may act as a market maker save that where this activity is carried out in the US in accordance with the definition given to it by the relevant laws and regulations, such activity will be specifically disclosed in this document. UBS may have issued a warrant the value of which is based on one or more of the financial instruments referred to in the document. UBS and its affiliates and employees may have long or short positions, trade as principal and buy and sell in instruments or derivatives identified herein; such transactions or positions may be inconsistent with the opinions expressed in this document.

United Kingdom and the rest of Europe: Except as otherwise specified herein, this material is distributed by UBS Limited to persons who are eligible counterparties or professional clients. UBS Limited is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. **France:** Prepared by UBS Limited and distributed by UBS Limited and UBS Securities France S.A. UBS Securities France S.A. is regulated by the ACP (Autorité de Contrôle Prudentiel) and the Autorité des Marchés Financiers (AMF). Where an analyst of UBS Securities France S.A. has contributed to this document, the document is also deemed to have been prepared by UBS Securities France S.A. **Germany:** Prepared by UBS Limited and distributed by UBS Limited and UBS Deutschland AG. UBS Deutschland AG is regulated by the Bundesanstalt fur Finanzdienstleistungsaufsicht (BaFin). **Spain:** Prepared by UBS Limited and distributed by UBS Limited and UBS Securities España SV, SA. UBS Securities España SV, SA is regulated by the Comisión Nacional del Mercado de Valores (CNMV). **Turkey:** Distributed by UBS Limited. No information in this document is provided for the purpose of offering, marketing and sale by any means of any capital market instruments and services in the Republic of Turkey. Therefore, this document may not be considered as an offer made or to be made to residents of the Republic of Turkey. UBS AG is not licensed by the Turkish Capital Market Board under the provisions of the Capital Market Law (Law No. 6362). Accordingly, neither this document nor any other offering material related to the instruments/services may be utilized in connection with providing any capital market services to persons within the Republic of Turkey without the prior approval of the Capital Market Board. However, according to article 15 (d) (ii) of the Decree No. 32, there is no restriction on the purchase or sale of the securities abroad by residents of the Republic of Turkey. **Poland:** Distributed by UBS Limited (spolka z ograniczona odpowiedzialnoscia) Oddzial w Polsce. **Russia:** Prepared and distributed by UBS Securities CJSC. **Switzerland:** Distributed by UBS AG to persons who are institutional investors only. **Italy:** Prepared by UBS Limited and distributed by UBS Limited and UBS Italia Sim S.p.A. UBS Italia Sim S.p.A. is regulated by the Bank of Italy and by the Commissione Nazionale per le Società e la Borsa (CONSOB). Where an analyst of UBS Italia Sim S.p.A. has contributed to this document, the document is also deemed to have been prepared by UBS Italia Sim S.p.A. **South Africa:** Distributed by UBS South Africa (Pty) Limited, an authorised user of the JSE and an authorised Financial Services Provider. **Israel:** This material is distributed by UBS Limited. UBS Limited is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. UBS Securities Israel Ltd is a licensed Investment Marketer that is supervised by the Israel Securities Authority (ISA). UBS Limited and its affiliates incorporated outside Israel are not licensed under the Israeli Advisory Law. This Material is being issued only to and/or is directed only at persons who are Qualified Investors within the meaning of the Israeli Advisory Law, and this material must not be relied on or acted upon by any other persons. **Saudi Arabia:** This document has been issued by UBS AG (and/or any of its subsidiaries, branches or affiliates), a public company limited by shares, incorporated in Switzerland with its registered offices at Aeschenvorstadt 1, CH-4051 Basel and Bahnhofstrasse 45, CH-8001 Zurich. This publication has been approved by UBS Saudi Arabia (a subsidiary of UBS AG), a Saudi closed joint stock company incorporated in the Kingdom of Saudi Arabia under commercial register number 1010257812 having its registered office at Tatweer Towers, P.O. Box 75724, Riyadh 11588, Kingdom of Saudi Arabia. UBS Saudi Arabia is authorized and regulated by the Capital Market Authority to conduct securities business under license number 08113-37. **United States:** Distributed to US persons by either UBS Securities LLC or by UBS Financial Services Inc., subsidiaries of UBS AG; or by a group, subsidiary or affiliate of UBS AG that is not registered as a US broker-dealer (a **'non-US affiliate'**) to major US institutional investors only. UBS Securities LLC or UBS Financial Services Inc. accepts responsibility for the content of a document prepared by another non-US affiliate when distributed to US persons by UBS Securities LLC or UBS Financial Services Inc. All transactions by a US person in the securities mentioned in this document must be effected through UBS Securities LLC or UBS Financial Services Inc., and not through a non-US affiliate. **Canada:** Distributed by UBS Securities Canada Inc., a registered investment dealer in Canada and a Member-Canadian Investor Protection Fund, or by another affiliate of UBS AG that is registered to conduct business in Canada or is otherwise exempt from registration. **Hong Kong:** Distributed by UBS Securities Asia Limited. **Singapore:** Distributed by UBS Securities Pte. Ltd. [mica (p) 107/09/2013 and Co. Reg. No.: 198500648C] or UBS AG, Singapore Branch. Please contact UBS Securities Pte. Ltd., an exempt financial adviser under the Singapore Financial Advisers Act (Cap. 110); or UBS AG, Singapore Branch, an exempt financial adviser under the Singapore Financial Advisers Act (Cap. 110) and a wholesale bank licensed under the Singapore Banking Act (Cap. 19) regulated by the Monetary Authority of Singapore, in respect of any matters arising from, or in connection with, the analysis or document. The recipients of this document represent and warrant that they are accredited and institutional investors as defined in the Securities and Futures Act (Cap. 289). **Japan:** Distributed by UBS Securities Japan Co., Ltd. to institutional investors only. Where this document has been prepared by UBS Securities Japan Co., Ltd., UBS Securities Japan Co., Ltd. is the author, publisher and distributor of the document. **Australia:** Distributed by UBS AG (Holder of Australian Financial Services License No. 231087) and/or UBS Securities Australia Ltd (Holder of Australian Financial Services License No. 231098). The Information in this document has been prepared without taking into account any investor's objectives, financial situation or needs, and investors should, before acting on the Information, consider the appropriateness of the Information, having regard to their objectives, financial situation and needs. If the Information contained in this document relates to the acquisition, or potential acquisition of a particular financial product by a 'Retail' client as defined by section 761G of the Corporations Act 2001 where a Product Disclosure Statement would be required, the retail client should obtain and consider the Product Disclosure Statement relating to the product before making any decision about whether to acquire the product. **New Zealand:** Distributed by UBS New Zealand Ltd. The information and recommendations in this publication are provided for general information purposes only. To the extent that any such information or recommendations constitute financial advice, they do not take into account any person's particular financial situation or goals. We recommend that recipients seek advice specific to their circumstances from their financial advisor. **Dubai:** The research distributed by UBS AG Dubai Branch is intended for Professional Clients only and is not for further distribution within the United Arab Emirates. **Korea:** Distributed in Korea by UBS Securities Pte. Ltd., Seoul Branch. This document may have been edited or contributed to from time to time by affiliates of UBS Securities Pte. Ltd., Seoul Branch. **Malaysia:** This material is authorized to be distributed in Malaysia by UBS Securities Malaysia Sdn. Bhd (253825-x). **India:** Prepared by UBS Securities India Private Ltd. 2/F, 2 North Avenue, Maker Maxity, Bandra Kurla Complex, Bandra (East), Mumbai (India) 400051. Phone: +912261556000 SEBI Registration Numbers: NSE (Capital Market Segment): INB230951431, NSE (F&O Segment) INF230951431, BSE (Capital Market Segment) INB010951437.

The disclosures contained in research documents produced by UBS Limited shall be governed by and construed in accordance with English law.

UBS