The convergence between Islamic and conventional exchanges: performances and governance

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Abstract

Based on a dataset of 31 conventional and Islamic exchanges we set down a framework for assessing economic and financial performances in the stock exchange industry. The convergence between conventional and Islamic markets poses, furthermore, relevant implications as for governance in the industry. In particular, we compare performances focusing on the relations between financial and market data. We show that the two clusters operate with different business models and at different stages of the development process. We also find that Islamic exchanges are less efficient that non-Islamic ones. However, their performances are sensitive to the same value drivers. The institutional specificities of Islamic markets do not have, seemingly, a relevant impact on performances.

Keywords: Conventional Exchanges, Islamic Exchanges, Performance, Governance

JEL Classification: G23; G29

1. Introduction

Over the last two decades the securities industry has undergone a process of rapid transformation which has speeding up during last years. The backbone of such a process is the demutualization of a large part of stock exchanges around the world, which, therefore, changed their legal status into a for profit shareholders-owned companies (IOSCO, 2001).

The main drivers that led stock exchanges to demutualize had been increased global competition and advances in technology, rather than the mere need to raise capital (Aggarwal, 2002; Steil, 2002). In the past there were floor-based exchanges, organized as mutual and controlled by their members, that enjoyed monopoly status in their domestic markets. But, in recent years, the securities industry background has changed. Techno-

logical transformations are the main forces of competition, since reducing the costs of accessing exchange's services, the trading costs and prompting the share cross-trading (Macey and O'Hara, 1999). They therefore put under pressure the intermediation function of traditional members, eventually causing the falling of monopolies by eliminating geographical barriers and fostering innovation (Domowitz and Steil, 1999).

Increased competition contributed to diminishing the role of financial intermediaries (Mishkin and Strahan, 1999; Allen, Mc Andrews and Strahan, 2002). Falling national boundaries stimulated mobility at the listing side as well, reducing, at least in part, the home bias that prevents issuers to list abroad (Macey and O'Hara, 1999). These factors have also reduced the barriers to entry, encouraging a direct competition between electronic communication networks (ECNs) and stock exchanges (Otchere and Abou-Zied, 2008).

Following this process, academic literature was engaged, on the one hand, in comparing the relative efficiency conditions of cooperatives and demutualized exchanges and, on the other hand, in establishing the effects of demutualization and self-listing on stock exchange's performance.

One of the features of prevailing contributions in the first strand is to make the case for a contrast between outside and member ownership. In that, outside owners are those that do not use exchange facilities and services (and, therefore, their utility function is arguably focused un value maximization) whereas member owners act as customers as well. Hart and Moore (1996) point out that outside ownership is becoming even more efficient than a mutual organization as the exchanges are facing greater competition and the vesting interests of members are becoming more skewed. In particular, they argue that both the mutual model and the outside ownership model are inefficient; nevertheless, the more intense the competition and the greater the degree of member inconsistency, the more outside ownership emerges as relatively efficient. Moreover, demutualization qualifies as a typical feature of those exchanges located in countries with higher levels of economic freedom and facing greater competition (Brito Ramos, 2006). The link between governance and efficiency is further investigated by Serifsoy and Tyrell (2006): they show how a mutual exchange, facing competition from a for-profit, outsider-owned platform, can only survive by adopting a similar governance structure. However, although capital needs may not have been so compelling at the eve of ex-

changes demutualization, they show that nowadays the access to equity financing is crucial for exchanges wanting to support their growth strategies.

As regards to the stock exchange's performance, the prevailing contributions in the field (Aggarwal, 2002; Krishnamurti *et al.*, 2003; Mendiola and O'Hara, 2003; Worthington and Higgs, 2005; Fleckner, 2006; Otchere, 2006; Otchere and Abou-Zied, 2008; Azzam, 2010) are mainly empirical, comparing pre-demutualization stock exchange's operating and financial performances to post-demutualization and self-listing ones. These studies provide support to the intuition that demutualization leads to increases in profitability, efficiency, and capital expenditure.

Among them, Otchere (2006) finds evidence of strong stock market performance for the listed exchanges, better than non-listed counterparts, deducing a value effects of self-listing. Azzam (2010), analyzing 11 demutualized stock exchanges from 1996 to 2008, shows that demutualization improves exchange's financial performance, size and liquidity, lowering its debt. Otchere and Abou-Zied (2008), performing an "in-depth study" on Australian Stock Exchange (ASX), document evidence of both strong stock market and operating performance, after the conversion from mutual structure to publicly traded self-listed structure. The same results are obtained by Aggarwal and Dahiya (2006), but they also demonstrate the better operating and stock market performance of listed exchanges than those of the demutualized ones.

Indeed, theoretically, imagining changes in the ownership structure as a continuum ranging from mutual structures, demutualized but private exchanges and listed ones, the improvements in performances for listed exchanges may be attributable both to changes in the business model (the adoption of a for-profit objective function) or to the effects of market discipline. The issue has been recently investigated (Otchere and Oldford, 2011). The study examines changes in operating performances at each stage of the exchange governance continuum, with the evidences showing that while publicly-traded exchanges fare better than customer-owned exchanges, the comparison between *pre* and *post-listing* listing operating performances do not show relevant improvements in profitability.

All these factors previously examined have also affected the structure of the securities industry as a whole. In a more competitive environment, with a different sources of

revenues compared to the past and the ever increasing importance of the trading revenues (Lee, 2002), stock exchanges may well pursue an external growth strategy.

Indeed, the reality demonstrates that stock exchanges around the world are consolidating on an increasing scale. First, mergers occurred within specific macro-areas, then started to develop on a transatlantic scale. The major deals involved western exchanges: in 2007, before subprime financial crisis, stock exchange consolidation culminated in three important cross-border mergers (Nyse-Euronext, Borsa Italiana-London Stock Exchange (LSE), and Nasdaq-Omx).

Recently, however, from 2010 onwards, movements have speeded up with a new wave of takeover announcements, not followed by actual mergers: consider, for example, Deutsche Boerse's bid to take over Nyse Euronext, or London Stock Exchange's attempted acquisition of TMX Group and Singapore Exchange's proposed takeover of ASX). But two of them resulted in an acquisition: IntercontinentalExchange agreed to acquire NyseEuronext., and, within Pacific area as well, there was a merger between the exchanges of Osaka and Tokyo.

If we consider the above operations, we can see that an emerging market stock exchange, Singapore, tried to takeover a developed country exchange, the Australia one. Note that the relationship between developed and emerging stock exchanges has improved from subprime financial crisis: in 2008 Nyse Euronext acquired a 5% stake in Mcx, India's most important commodity exchange, and a 25% stake in the Qatar stock exchange.

But, up to now, the effects of this consolidation trend on stock exchanges have not yet been fully analyzed in the academic research. A particular strand of literature focuses on value creation following mergers and alliances, investigating how changing ownership impacts on value. The main contributions in the strategic literature comprise those of Arnold *et altri* (1999), Anand and Kanna (2000), Hasan and Malkamäki (2001), Dessein (2005), Gomes-Casseres *et altri* (2006), Hasan *et altri* (2010).

Among them, Hasan and Malkamäki's study (2001) is relevant in that it represents one of the first attempts to gain insight into both cost and revenues of stock exchanges. It empirically investigates the productivity of stock exchanges over time, suggesting that both investments in technology and competition positively affect cost and revenue

efficiency. Market size and quality, by contrast, seem to have a positive impact only on revenue efficiency.

Another strand of literature focusing on the relationship between developed and emerging markets' exchanges, is limited and has not improved over the time.

Claessens et al., (2000) showed that eastern Europe emerging market exchanges haven't been involved in the consolidation process among international stock exchanges. Indeed, at the end of the last century, there were only a couples of merger, for example between Estonia, Lithuania and Latvia, that formed the Baltic Market, now owned by Nasdaq-OMX Group. If we consider also the first part of this century, developing country exchanges appear to favor internal growth strategies, (Claessens et al., 2002), or other form of integration, such as linkages or alliances (Meera et al., 2009).

As regards to another subset of emerging markets, the Islamic ones, we find in the previous years a strong preference for internal growth rather than for a consolidation (Kabir and Suk-Yu, 2007), maybe because of their weak regulatory framework, macroeconomic instability and a lack of international institutional investors.

Only in the last couple of years in a particular state of the Islamic area, the United Arab Emirates, a consolidation between their three stock exchanges is already in progress, as Dubai Financial Market bought in 2009 Nasdaq-Dubai. Paltrinieri (2012) shows that the combined effects of market fragmentation, financial crisis and collapse of trading values and market capitalization during the 2007-2011 period, could foster a full merger between Dubai Financial Market, Nasdaq-Dubai and Abu Dhabi Securities Exchange. Furthermore he raises the issue of the relationship between Islamic and conventional stock exchanges, given that the holding company of Dubai Financial market and Nasdaq-Dubai, Borse Dubai, has major stakes in Borsa Italiana-LSE and Nasdaq-OMX.

The issue is of particular relevance at light of the high growth rates of Islamic Finance over the last few years. From 2006 to 2011 total assets in *Shari'ah compliant* financial institution has doubled to reach $ 900 billion (Financial Times, 2011), though *Shari'ah compliant* financial assets represent only 1.5% of total global banking assets. Nevertheless there is still a lack of literature on this topic and major contribution are related to Islamic banks (Aggarwal and Yousef, 2000), their business model, efficiency and stabil-

ity compared to conventional banks (among others, Cihak and Hesse, 2010; Beck et al., 2013). Another strand of literature are related to Islamic mutual funds and their performance (Hayat and Kraeussl, 2011; Hoepner et al., 2011), but, up to now, there has been no literature on Islamic stock exchange efficiency and performances.

The aim of our study is to compare conventional stock exchanges (CE's) and Islamic exchanges (IE's) along a set of variables measuring business models, operational economic performances and efficiency. We investigate whether there are relevant differences between the two groups with the ultimate goal to draw implications as regards the structure of the exchange industry and, in particular, the convergence between CE's and IE's. The topic has obvious implications as for the governance of the global exchange industry that we try to outlay.

Our study is grounded in the field of the performance-related literature. We differentiate in the sense that the extant literature on the topic investigates operational performances of CE's in concomitance with certain relevant events in the life of the exchange (i.e., changes in the legal status following demutualization and self-listing). The works of Otchere compare pre-listing and post-listing performances with the ultimate goal of inferring the determinants of the decision to list. Rather, we compare performances between two clusters of exchanges operating under far different jurisdictions and institutional arrangements.

We build on the governance literature as well. We differentiate by the standard governance literature which is focused on governing different vested interests within the exchange by assuming a wider perspective. We build on the results of the empirical analysis in order to underlay the economic rationale for further convergence among conventional and Islamic exchanges and claim that further integration would lead to a changing rationale of governance, shifting the focus from corporate governance to an industry governance.

2. Theoretical Framework

As it is widely recognized in literature, the theoretical framework driving consolidation in the exchange industry is that of the network economies. More precisely, we can contextualize this framework within the theory of the exchange as a firm (see Di Noia,

2001). According to this view, the management is concerned with efficiency and value creation. Specific to the exchange industry is the relation between market liquidity and efficiency. Exchanges, therefore, have a clear incentive to consolidate in order to exploit economies of network. These are both direct and indirect. The more the traders using the exchange's platforms, the more the traders willing to join it (direct network economies). At the same, time, as the liquidity increases the exchange becomes more attractive for issuers (indirect network economies). The application of the theory of network economies to financial exchanges is due to Economides (1993). Aside the theory of networks, developed another strand of theoretical research dealing with a related topic. We refer, in particular, to the phenomena of economies of scale and scope. There are strong arguments supporting the existence of scale economies in the exchange industry. Stock exchanges operate, to a large extent, with a fixed cost structure (personnel expenses and investments in technology); we expect average costs to decline as the output increases. The issue has been investigated in Hasan and Malkamaki (2001) which accounted for the existence of significant scale economies although with different magnitude across stock exchanges. In particular, they show relevant cost efficiencies in large stock exchanges. These results seemingly provide the rationale for consolidation in the stock exchange industry.

Increasing consolidation lead to the rise of large conglomerates operating with a very diversified business model which provide the case for the exploitation of scale economies. Broadly speaking, we might imagine securities exchanges operating according to different business models (Galper, 2001) spanning from a focalized model (an exchange operating focusing on cash trading) to a model covering all traded-related services (trading on a variety of assets classes, dissemination of data information and post-trading activities). Polato and Floreani (2008) show that large conglomerates derived the largest part of total revenues from complementary activities. Actually, a narrow business model is confined to smallest exchanges. From an economic point of view, the ability to provide a variety of related services using the same platform is expected to foster economies of scope (Macey, O'Hara, 1997). Widening the perspective, the specificities of Islamic markets elicit for the consideration of particular mode of conducting business which is *Shari'ah* compliant. This means that a large part of total revenues derive from *Shari'ah* compliant investments (Paltrinieri, 2012).

3. Data and Methodology

We first provide an industry-wide picture of operative performances, comparing performances across macro-areas and different governance models. We contextualize this analysis within the general framework of convergence among western and Islamic markets. Then, we provide a thorough analysis of performances of selected exchanges. We build on data of 31 exchanges. The sample comprise, in particular, 17 listed exchanges and the most relevant Islamic markets.

As regards to the Islamic subset, we consider stock exchanges of the States belonging to Organisation of Islamic Cooperation (OIC)[1]. Among 57 members, there are a few States that have more than one stock exchange (e.g. People's Republic of Bangladesh has Dhaka Stock Exchange, established in 1954, and Chittagong Stock Exchange, established in 1995), others don't have anyone (e.g. Republic of Tajikistan), still others have a "Regional" stock exchange (for example Regional Securities Exchange, or Bourse Régionale des Valeurs Mobiliérs - BRVM - at the same time serves Republic of Benin, Burkina-Faso, Republic of Guinea-Bissau, Republic of Cote d'Ivoire, Republic of Mali, Republic of Niger and Republic of Togo). Against this background, we have a total of 50 stock exchanges within OIC. We sought data on World Federation of Exchange (WFE) and Euro-Asian Federation of Exchange (FEAS) Annual Reports, Arab Monetary Fund, Annual Reports and websites of stock exchanges. Given that we have to assess performance and business models, we have to consider only those stock exchanges that have both economic and "financial" data. We therefore drop all stock exchanges that, on economic side, don't provide a financial statement (comprehensive of income statement and balance sheet) and, on financial one, don't provide data on trading value, trading volume, market capitalization and the number of listed companies. After applying these criteria, we get a sample of 14 Islamic stock exchanges (see Table 1).

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[1] The Organisation of Islamic Cooperation (formerly Organization of the Islamic Conference) is "the second largest inter-governmental organization after the United Nations which has membership of 57 states spread over four continents. The Organization is the collective voice of the Muslim world and ensuring to safeguard and protect the interests of the Muslim world in the spirit of promoting international peace and harmony among various people of the world". See http://www.oic-oci.org

Table 1 – Islamic Stock Exchanges

Country	Stock Exchange	Establishment	Ownership structure	Market capitalization (billion $, 2011)
Azerbaijian	Baku Stock Exchange	2000	Demutualized	-
Bahrain	Bahrain Bourse	1987	Demutualization in process	17
Bangladesh	Dhaka Stock Exchange	1954	Demutualized	50
Indonesia	IndonesiaStock Exchange	1977	Demutualized	270
Kazakhstan	Kazakhstan Stock Exchange	1993	Mutualized	33
Malaysia	Bursa Malaysia	1930	Self-listed	395
Morocco	Casablanca Stock Exchange	1929	Mutualized	63
Oman	Muscat Securities Market	1988	State-owned	27
Pakistan	Karachi Stock Exchange	1947	Demutualization in process	33
State of Palestina	Palestine Stock Exchange	1995	Self-listed	3
Tunisia	Tunis Stock Exchange	1969	Mutualized	9
Turkey	Istanbul Stock Exchange	1986	Demutualization in process	320
U.A:E.	Dubai Financial Market	2000	Self-listed	49
Uganda	Uganda Securities Exchange	1997	Mutualized	5

Source: our elaborations on exchanges' Annual Reports and websites.

As we can see from the Table 1, we collect data for both old and relatively new stock exchanges: Casablanca Stock Exchange is the oldest one (although Indonesia Stock Exchange, originally Jakarta Stock Exchange, opened in 1912 before being closed for a long period), Dubai Financial Market and Baku Stock Exchange are the newest ones, established in 2000. The largest stock exchange in terms of market capitalization is Bursa Malaysia ($ 395 billion), followed by Istanbul Stock Exchange ($ 320 billion), instead the smallest one is Palestine Stock Exchange ($ 3 billion).

Unfortunately we were not be able to collect data for the two fully *Shari'ah* compliant stock exchanges, namely Teheran Stock Exchange, established in Iran in 1967, and Khartoum Stock Exchange, established in Sudan in 1994, but we have data for Karachi Stock Exchange, established in 1947 in Pakistan, where there is fully *Shari'ah* compliant banking system (Hearn et al. 2011).

An interesting feature of this sample is that stock exchanges are mostly demutualized or, at least, they are undertaking a demutualization process (7 out of 14); moreover 3 of

them are publicly listed exchanges (Bursa Malaysia, Palestine Stock Exchange and Dubai Financial Market). Only one is actually fully state-owned, namely Muscat Securities Market, instead the other 3 remaining are mutualized. This is in contrast with the recent past, when most of emerging market (OICV-IOSCO, 2005) and Middle East North Africa (OECD, 2012) stock exchanges were not demutualized or self-listed.

As regards to the accuracy of data provided by the Islamic stock exchanges analyzed in this paper, we are aware that we could have a biased sample. Indeed, self-listed stock exchanges, such as Dubai Financial Market and Bursa Malaysia, are required to draw up an accurate and truthful financial statement in accordance with IFRS Principle, instead the other markets of the sample are not required to disclose any information about their balance sheets and, beyond the decision to disclose, there is no conformity in what is disclosed. But, on the one hand, we are confident that information are correct, since they are disclosed to the public, on the other hand, we tried to homogenize all the differences that were present in income statement (e.g. the main sources of revenues, namely listing, trading and post trading) and balance sheet (e.g. financial leverage).

The population of listed exchanges consist of 23 stock exchanges, eleven of which are incorporated in the Americas while the others are equally distributed in the Asia-Pacific and the EAME (Europe, Africa and middle-East) regions. However, a few of these only on recent times went public. For other four listed exchanges (namely, Warsaw Stock Exchange and Athens Exchange) we do not have complete and reliable data. We, therefore, excluded them from the analysis. Therefore, our sample at this stage comprises 17 exchanges. We focus on listed exchanges since they count for more than 89% of Wfe total revenues and trading volumes.

For each exchange we collect yearly financial and market data (trading values and listed companies) for a timeframe spanning the period 2007-2011. Our dataset is constructed on basis of the World Federation of Exchange's statistics, the Bloomberg database for listed exchanges and the annual reports for the Islamic markets. We use financial and market data in order to perform a comparison between CE's and IE's along several dimensions encompassing developments in market activity on both primary and secondary markets, business and financial structure (composition of revenues, operational and financial leverage), operational performances and efficiency measures.

The following table summarizes the variables we employ in our analysis.

Table 2 – The variables

Tot_Ass	Total Asstes
Tot_Rev	Total Revenues
Trad_Rev	Trading Revenues
Inv_Rev	Investment Revenues
Oth_Rev	Revenues other than cash market and investment revenues
Tot_Costs	Total Costs
Trad_Val	Trading Value Compound Annual Growth Rate
N_List	Number of Listed Companies Compound Annual Growth Rate
Op_Lev	Operative Leverage
Fin_Lev	Financial Leverage
Ebit	Earning before Interest and Taxes
Cost_In	Cost to Income Ratio
Roe	Return on Equity
Roce	Return on capital employed (Ebit/Tot_Ass)
Rev_Tv	Revenue per unit of value traded (Total revenues/trading values)
Trad_Int	Trading Intensity (Trad_Vol/Tot_Ass)
Trad_Prof	Trading Profitability (Ebit/Trad_Vol)

Our purpose is to give a glance on the functioning of CE's and IE's investigating whether and to what extent there are significant differences in business models, operational measures of performance and efficiency. For each exchange and variable we calculate the mean over the timeframe we consider. We employ a two-tailed t-student test to check whether CE's and IE's belong to different populations on different profiles. For each variable, then, we study the distribution (mean, median, 5% and 95% percentile) across exchanges and study how CE's and IE's distribute. On that ground, we outlay the specificities of the two clusters and explore the drivers of operational performances across groups. In particular, we assume the Ebit margin as the dependent variable and explain it against a vector of explicative variables which we deem as value drivers for exchanges (trading values, listed companies, revenues, revenue composition and efficiency measures).

4. Results

Assuming an industrial perspective, industrial sectors and firms are described and analyzed investigating their production technology and their main outputs. Market activity on both primary and secondary markets characterizes the production function of exchanges which, therefore, might be investigated at light of the two-side platforms theoretical framework. Listed companies and trading values are the main outputs of ex-

changes. Their dynamics are proxies of the evolution of market liquidity which, according to the established literature, is the main driver of exchanges' value.

The liquidity and value literature establishes a nexus between liquidity conditions and attitude of to exchange to value creation. We move along the set of variables describe in the preceding section in order to give an insight on the performances of the two portfolios of exchanges, comprising the Islamic and non-Islamic exchanges respectively.

Hereafter, we provide a thorough insight on figures above. We group our variables in three categories comprising measures of *market activity*, *structure*, *operational performance*, and *efficiency*.

Table 7 in the appendix provides the matrix of correlations between basic measures of market activity, financial performances and business structure. Significant differences emerge among the two clusters. As for non –Islamic exchanges there is a strong correlation between trading values, revenues and the operative performances. Islamic markets, by contrast, show a lower correlation among those variables. On the other hand, Islamic markets present a positive correlation of the operational leverage with trading volumes whereas the correlation is negative for non-Islamic markets.

Table 8 in the appendix provides more insight by comparing the two groups by summarizing the mean and the standard deviation of for each selected variable across NIE's and IE's. We perform an analysis of variance as well, assuming NIE's as grouping variable. In particular, we perform the Bartlett's test for the *null-hypothesis* of equal variance. Moreover, we analyze the differences in means between non-Islamic and Islamic markets. We report in the lasts two columns the *t statistic* and the *p-value*. For those variable for which we reject the null hypothesis of equal variance we calculate the t statistic recurring to the Satterthwaite's approximation of the degrees of freedom.

Furthermore, table 9 in the appendix summarizes the results providing some descriptive statistics for our variables. In particular, we provide an overview the distribution for each variable and shad a light on the behavior of both NIE's and IE's. At this regard, we try to understand whether the two groups tend to behave differently by providing the number of exchanges for each group which lay above the median, above the 95% percentile and below the 5% percentile. Table 8 and 9 should be read in conjunction.

The evidences are quite mixed. Non-Islamic markets have, obviously, far higher levels of revenues as the group comprises the largest exchanges around the world. Notwith-

standing, there are huge differences in business models, with non-Islamic markets deriving the largest portion of their revenues from business activities other than trading on cash markets. By contrast, Islamic exchanges have a more focused business model.

Islamic exchanges fare better in terms of operative margins and returns (Roe and Roce) the non-Islamic group which might sound somewhat surprising given that the latter are all listed exchanges with, theoretically, the mandate to create value for shareholders. Hereafter a summary of main results.

Market activity

Every representation of performances in the exchange industry starts with a glance to the trends in trading values and listed companies with the focus being posed on main market centers. It is unavoidable for us to start with summary figures on market trends. Given the aims of our work dynamics in Islamic markets are central in our analysis as they are the basis of a broad comparison with non-Islamic markets.

We compare conventional exchanges with Islamic ones, distinguishing the former in western exchanges and Asian-Pacific exchanges (in the performance analysis that follows we comprise both in the "conventional" cluster). We present total value of trading (expressed in $) and the aggregate of companies listed for each group and the CAGR.

Table 3 – Market data

	2007	2008	2009	2010	2011	Cagr
Western	7117908400	13401772164	19460711638	25910856102	25910856102	33.6%
Asia Pacific	347777400	3315893460	2927422180	2532993202	2532993202	-16.9%
Islamic	809	631	600	775	759	6.3%
Western	19204	19269	18971	18633	18573	-1.2%
Asia Pacific	8127	7472	8441	9408	5920	-7.4%
Islamic	2720	2803	3467	3066	3100	3.4%

Source: our elaborations on Wfe data and annual reports. Millions $ for trading values

Western exchanges those presenting stronger trends in both trading volumes and listed companies. Islamic markets despite having very low figures in terms of market activity (especially value traded) compared with non-Islamic ones, experienced a significant growth trend.

On average, CE's fare better in terms of Trad_Val Cagr (Table 8). Looking at the distribution (Table 9) there is a greater proportion of CE's with values above the median. The

analysis of variance lead us to reject the null-hypothesis. Similar patterns could be observed for listed companies. IE's therefore seemingly proved to be more resilient in preserving market trends over the last years.

Structure

Structure can be analyzed along several dimensions encompassing both financial structure and business structure. Along such dimensions there emerge relevant differences between the two groups. As for financial structure, assets an the sources of financing are of great importance. Exchanges largely operate with long term assets given the importance of market infrastructures in order to support trading activity. In today's security industry, investments in market infrastructures are regarded as the main competitive driver. Exchanges moving forward with sizable acquisitions expand, than, their capital employed by means of relevant intangibles (mainly, goodwill). Looking at figures, there are huge differences in Tot_Ass between CE's and IE's with the former having on average a considerably higher capital invested. Only Dubai, in the Islamic area, operate with a capital invested aligned to that of certain CE's. As we'll observe later on, this is expected to have relevant implications in terms of trading efficiency. Financial structure shows relevant differences as well. The financial structure is, here, captured by the financial leverage (defined as the ratio of the debt on equity). IE's, at a first glance, operate with a more fragile financial structure with far lower levels of equity and higher leverage. Actually, when analyzing *Fin_Lev* in more detail, the IE's group contains two exchanges (those above the 95% percentile) with extremely high levels of leverage. Looking more carefully the figures, there is a greater proportion of NIE's with a higher leverage than the median value (table 9). Figures in table 8 let us to reject the null-hypothesis of equal variance.

Business structure, in our analysis, encompasses both the business model and the cost structure on which depends the operational leverage.

Following the intense consolidation process which characterized the exchange industry in the following years, mainly involving (but not restricted to) western exchanges, business models in the exchange industry significantly changed. Evidences (Floreani and Polato, 2013) show that this is a common pattern encompassing major exchanges around the world, both western and most Asian exchanges. Islamic markets appear somewhat different as they operated, so far, in a more segmented jurisdictions, at least

in the sense that there were little pressures to consolidation within the Islamic area and despite the fact certain Islamic financial centers (i.e., Dubai) showed interest in acquiring relevant stakes in the major financial centers. Institutional and religious-related factors, mainly related to sharia compliant investments, contribute to differentiate IE's. Table 4 below describes the composition of revenues among the two clusters.

Table 4 – Reveneue composition

	Li-sting	Cash tra-ding	Derivatives trading	Post trading	Info	IT	Invest-ments	Others
NON ISLAMIC	9,0%	31,8%	20,5%	15,9%	9,2%	2,2 %	0,0%	2,2%
ISLAMIC	6,1%	58,3%	0,8%	2,8%	1,3%	0,1 %	1,9%	11,0%

Source: our elaborations on exchanges' reports.

The figures show that Islamic markets operate according to a narrow business model, largely focused on cash trading whilst complementary activities (derivatives trading, post trading, data dissemination and IT are negligible). They derive, however, roughly 2% of their revenues from sharia compliant investments. However, despite being a specificity of Islamic exchanges, the magnitude of the phenomena is quite limited. Moreover, only the Dubai exchange is engaged in such activities (which count for 27% of total revenues). The other Islamic markets in our sample are apparently not involved in such investments. However, a great part (11% on average) of their revenues derives from other sources, which mainly comprise interest income. Islamic markets, therefore, carry on substantial investment activities which, while not being comprised within sharia compliant investments, notwithstanding they mark a relevant difference with non Islamic exchanges.

The higher weight of investment business, compared to non-Islamic exchanges, might turn to alter the relations between trading activity, revenues and margins providing a possible explanation of a weaker correlation between such variables for IE's.

Looking at the figures, NIE's and IE's operate with far different business models. On average, the fraction of *Oth_Rev* on total revenues is higher compared with IE's. On balance, they tend to distribute above the median value (table 9) whereas IE's are almost all below the median value. We reject also the null-hypothesis of equal variance.

At a first glance, the analysis of variance induce us to reject the *null hypothesis* of equal variance for *Op_Lev*. On average (Table 8) IE's are operating with a higher operative

leverage and a more fragile financial structure (an higher leverage). As for the operational leverage, the conditions are quite different. NIE's seemingly operate with lower values of leverage compared to IE's. There is a lower fraction of NIE's with an operational leverage below the median value. Since NIE's comprise major listed exchanges, which carried on relevant investments (which implied significant fixed costs) in light of the competitive struggle which mainly arm large international players, one should expect operative leverage to be higher for these exchanges. However, the results are largely influence by the very low figures of NyseEuronext (-4.22), Johannesburg Stock Exchange (-2.49) and the Mexican Exchange (-2.89) which might seem quite unusual. This might depend on the methodology we employed for calculating the leverage. However such figures might also be influenced by structural transformations occurring within the securities industry which, supposedly, had some impact on the cost structure of exchanges. Let think at costs related to the mergers which, during the very last years, interested western exchanges. Certain markets, then, and especially American markets bear significant costs of revenues[2]. Excluding those figures, the average operative leverage for non-Islamic markets is 0.84[3].

Operational performances

We compare operational performances between our groups by means of the Ebit margin, the Roe and Roa.

Non Islamic markets seemingly enjoy, on average, higher operative performances than non Islamic ones (table 8) with a slightly lower standard deviation. When looking at the distribution (table 9), we infer that Ebit margin is quite normally distributed; moreover, we note that there is a similar number of NIE's and IE's above and below, respectively, the median value. However, only three Islamic markets (Dubai, Dhaka and Casablanca) have operative performances above 70%, resembling those of most profitable western exchanges. There is, therefore, room for improving efficiency among Islamic financial markets. In the meanwhile, figures above elicit a few considerations with regard to fu-

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[2] Which comprise hugh rebates for liquidity provision and routing fees to other market centers (which are directly related to the *Interlinked Market System* envisaged by the US Reg.NMS).

[3] Actually, Nasdaq (-0.51) and Osaka (-0.22) exchange presents negative values for the operative leverage, although not with the same magnitude. Excluding also these exchanges, the average operative to leverage would be greater than 1.

ture developments which might involve these exchanges. On the one hand, we might enucleate a very few Islamic markets which would, eventually, lead a possible consolidation process within the Islamic arena. On the other end, those figures might unveil possible further convergence between Islamic and non-Islamic markets.

Looking at the Roe and the Roce, there is no clear different pattern between the two group nor there is, at a first glance, clear evidence of the superiority of NIE's. However, there is a greater proportion of IE' which lay above the median value although none of them falls above the 95% percentile. By contrast, we count 2 NIE's for both the Roe and the Roce that have extremely high performances. Such exchanges are operating in fast growing areas (i.e. Singapore exchange) or perform the high growing derivatives business (i.e., the CBOE). Apart the outliers, NIE's do not outperform IE's. Looking in more detail at the figures in table 8, we cannot reject (given the Bartlett's statistic and the *p-value*) the *null hypothesis* of equal variance between the two groups.

Efficiency

We compare efficiency performance across our dataset by through a set of variables encompassing the ratio of total revenues on trading value (*Rev_Tv*), the *trading intensity* and the *trading profitability* and the *cost to income ratio*.

In particular, Trad_Prof and Trad_Int are the basic measures into which the Ebit margin breaks down. By employing such measures our aim is to establish a direct link between liquidity measures (assuming trading values as a proxy of it) and economic measures. The measures we employ encompasses both technical and economic efficiency.

Trading value are expected to play a relevant role in determining trading revenues. Empirical research on that ground account for such a relation. However, depending on a variety of factors (the first and most intuitive being increasing competition) the ability of capturing revenues on trading values might be different across exchanges or jurisdictions. On average IE's fare much better than CE's in terms of Rev_TV. On the other hand, when considering the overall distribution, IE's concentrate in the upper 50% of the distribution while CE's lay on the lower 50%. This pattern, therefore, suggest that our clusters form two distinct groups. The Bartlett's statistic suggest to reject the null-hypothesis of equal variance.

In particular, *Trad_Int* measures the efficiency of firm's assets (i.e., their attitude to transform into trading values) and should be deemed as a measure of technical efficien-

cy whereas Trad_Prof measures the operational margins for each unit trading value. Figures in the appendix evidence interesting results. While the distribution of the Ebit margin is quite more closer to a normal distribution with a similar behavior of NIE's and IE's exchanges, things significantly change when looking to *trading intensity* and *trading profitability*. Both *Trad_Int* and *Trad_Prof* are quite skewed. But what is more worth to stress is the different behavior between the two groups. When looking to *Trad_Prof* we observe that the vast majority of IE's is above the median value, while only one NIE's lays above the 50th percentile. By contrast, NIE's are characterized by higher values of *Trad_Int* tending to distribute above the median value, while almost all IE's (except two) are below the 50th percentile. Looking at the distribution of the outliers, moreover, IE's are more prone to show extreme values.

These results imply that NIE's are far more efficient in exploiting assets while having poorer results as regards *Trad_Prof* than IE's. By contrast, IE's seemingly evidence higher levels of Cost_Inc. However, there are huge differences among market centers within the Islamic world, whit a few exchanges in the area having rations who are aligned (for example Dubai) with the most virtuous CE's exchanges and the majority suffering of particularly high ratios (85% of Islamic exchanges are above the median value against 29% of CE's). The Palestine exchange have, on average, a 126.5% ratio.

These results seemingly evidence two different models of competition. NIE's are arguably more exposed to competitive pressures and are able to retain tighter margins from trading activity compared with the more closed IE's. Non Islamic markets have, therefore, to compete on quantities by devoting large efforts to improve platforms. On grounds of the results described in table 8 in the appendix, the following table summarizes the variables for which we reject and accept, respectively, the null-hypothesis that the mean difference is zero. We perform a two tailed t-test with a 0.05 significance level.

Table 5 – The t-*statistic*

	Accept H_0			Reject H_0
Liquidity and revenues	N_List			Trad_Vol
Structure	Equity,	Op_Lev,	Fin_Lev	Tot_Ass, Oth_Rev%
	Tot_Rev, Trad_Rev,			
Operational performances	Roe, Roce			Ebit%

Efficiency	Rev_Tv, Trad_Prof	Cost_In, Trad_Int

Evidences are quite mixed. We reject the null hypothesis of equal population mean for a few variables. It is worth noting, at a first instance, the behavior of Trad_Vol and Oth_Rev. Apparently, there is a difference in average compound annual growth rate of trading values across the two groups. The results account for a different pattern in market activity, with IE's that on average performed better. One of the assumptions of our work is that IE's and CE's operate with different business models. According to our results, the difference we accounted for are significant. It is to note that with a 0.1% significance level the Op_Lev itself would present significant difference in means. This would imply that the two groups are differently exposed to the business risk (intended here as the risk of loosing margins as a result of declines in revenues).

In our view, however, the most interesting results are those related to operational performances and, above all, to efficiency measures. While there are, apparently, no significant differences in Roe and Roce, IE's fare better as for Ebit margin and such differences are significant. As for efficiency measures, results are seemingly ambiguous. We rejected the null-hypothesis for Cost_Inc and Trad_Int; however, when assuming a 0.1% significance level we had to reject the null hypothesis for Trad_Prof as well (and, Rev_TV would be just slightly below the critical t value). We had to draw the implication, therefore, that the two groups we analyzed belong to two different populations as regards efficiency conditions.

These results are expected to have significant implications as for exchanges' competitive strategies. We'll turn in the next section on this point. The differences we have accounted for, lead us to delve in more detail into the determinants of margins. One should expect the two groups having different drivers of operating performance, given the differences in business structures. We now turn to analyze the determinants of the Ebit margin. We model a linear relation of the margin with a set of variables capturing market dynamics (variations in trading values and listed companies), financial variables (total revenues and revenues coming from other businesses than cash markets), efficiency measures (Trad_Int and Trad_Prof) and the operational leverage. We use a panel data analysis; in particular, we apply a GLS model. Hereafter we provide the results.

Table 6 – Regression Results

	All Exchanges	Non-Islamic	Islamic
Var. Trad_Val	0.0913(.)	0.0913''	0.0309(.)
Var. List	-0.0421''	-0.0074''	-1.1570(**)
Log Tot_Rev	0.0596(*)	-0.0988''	0.2639(***)
%Other Rev	-0.339 (***)	-0.5689(***)	0.0043''
Op Lev	-0.0016''	-0.0104''	0.0488''
Trad_Int	-0.0007(**)	-0.00009(***)	0.1359(*)
Trad_Prof	0.0116(***)	2.0142(*)	0.0104(***)
Intercept	0.3845 (***)	1.0623 (***)	-0.0172''
Chi 2	0.0000	0.0000	0.0000
R-sq within	0.3637	0.1805	0.6254
R-sq between	0.1470	0.7078	0.3536
R-sq overall	0.1844	0.6294	0.4377

Significance codes: ***0.001; **0.01; *0.05; '.' 0.1

Regressing the Ebit margin to the explanatory variables for the entire sample, we obtain that only the variation in trading revenues has some significance in explaining margins. Looking at the r-squares, the overall effects are quite high for each of the two clusters while, when considering all the exchanges is far lower. Performing the regression on the two clusters separately, we obtain slightly different results. Looking at the chi square, the model seems to fit the data with reference to each group. Looking at the regressors, seemingly emerge different models across the two groups. Market activity is generally positively related with margins with the exception of the variation in listed companies. However, market measure are, seemingly, not significant in explaining margins.

For CE's the % of other revenues is very significant in explaining margins. This seems coherent whit the business models we have accounted for non-Islamic markets (i.e., a high diversification of the revenue sources). Surprisingly, the sign of the coefficient is negative. One explanation could be related with complexities arising from managing large conglomerates which would turn to reduce efficiency.

By contrast, for Islamic exchanges we found total revenues having a great significance in explaining margins and, to a lesser extent, the variation of listed companies. Note the

relatively high value of the estimator of Tot_Rev for Islamic markets, compared with a negative value for CE's.

On the one hand this results are seemingly coherent with a more traditional business model. On the other, hand, the strong relation between revenues and margins could be attributable to lower competitive pressures (weaker price elasticity) or a different cost structure at all. Turning to Tra_Int and Trad_Prof, we find interesting results. Especially Tra_Prof is significant in explaining margins for IE's, while Trad_Int is more significant with reference to CE's. This results are coherent with the previous considerations. Interestingly, however, there emerge a negative relation between Trad_Int and margins for CE's. Expanding trading values, therefore, would put pressures on profitability. Putting together the results we have found, it seemingly emerges that CE's operate at a more mature stage of the industries' development, making the case for seeking expansion in new markets. In both clusters finally, there is a negative relation between the Ebit margin and the operational leverage.

5. Strategic implications

The previous analysis performed a comparison analysis between CE's and IE's exchanges. The main results account for significant differences, at least for certain profiles. While the main variables describing business structure seemingly do not account for relevant differences across the two groups, basic measures of efficiency apparently describe different patterns.

In our view, our results suggest relevant implications in the perspective of the further development in the global exchange industries' structure. Arguably, despite the intense wave of consolidation occurring during the very last years, there still remain room for improvement along the path of convergence among international financial centres.

Actually, relevant differences still remain between CE's and IE's. The differences we accounted for in efficiency measures might be deemed as paradigmatic of different economic and institutional environments. In the meantime, such differences might constitute the economic and strategic rationale for increasing convergence between CE's and IE's. Although some consolidation took place among IE's, nevertheless the latter seemingly favour convergence with CE's and, in particular, the largest western exchanges. Such pattern of development might seem somewhat surprising to those who would ex-

pect a consolidation within the Islamic world before starting expansion outside that area.

However, our analysis suggest that it is cross-convergence (intended as the convergence between exchanges belonging to different economic, social and institutional areas) particularly beneficial to both Islamic and non-Islamic exchanges (at least to major exchanges in the two areas) permitting to mutually leverage on the respective competitive strengths.

CE's are exposed to massive competitive threats. In particular are the largest exchanges which suffer for the threats stemming from new competitors and, namely, Economic Communication Networks. These are platforms similar to exchanges that offer trading facilities on large caps comprised in the main stock indexes. Their relevant market, therefore, tend to overlap with that of main exchanges, replicating the model of global platforms with thinner organizational structures than traditional exchanges. The latter react with an intense consolidation process which, while creating highly-liquid, asset-efficient (as accounted by the higher values of Trad_Int) large pools, nevertheless they give rise to complex conglomerates with heavy organizational structures. On the other hand, the jostle with Ecn's lead to massive cuts in tariffs putting pressures on margins.

IE's, in particular those controlled by sovereign funds, gain access to large liquidity pools by converging with the largest CE's markets and play a relevant role in international capital flows. On the other hand, convergence would be beneficial for CE's by accessing new markets and diversifying their risk exposure. Greater revenues and margins per unit of value traded suggest that elasticity of fees is lower in the Islamic world.

Considerations above do not necessarily imply, in our view, a further speeding up in the convergence process between IE's and CE's in the short run. The case for alliances mainly rests on strategic issues rather than pure financial considerations. So far, the deals involving CE's and IE's were centred on the main exchanges in the respective areas and, namely, Nasdaq Omx and London Stock Exchange on the one hand and the Dubai financial centre on the other. The latter is the major exchange in the Islamic cluster coming only after Bursa Malaysia and the Philippine Stock Exchange which, in our view, are diverse for geo-political reasons.

Actually, the Islamic world is quite heterogeneous in terms of financial conditions. Certain exchanges (in particular, Istanbul, Palestine Tunis and Kazakhstan exchanges) op-

erate with fragile financial structures (low margins, high cost to income rations and high leverage) and low trading values (apart the Istanbul exchange). Arguably, some form of consolidation have to occur within the Islamic world.

Moving a step forward with the reasoning, such developments claim for reconsidering the prevailing governance paradigm in the exchange industry. Formal mergers are not the only way to organise convergence. Recent experiences of cooperation between CE's and IE's follow a cluster model where convergence is built on a network of cross-shareholdings having the power to foster strategic coordination. We see relevant implications at this stage of development of the exchange industry.

The governance paradigm as traditionally conceived is no longer appropriate to govern relations among different groups of shareholders. In other terms, while theoretical literature and regulators have always regarded corporate governance as a way of governing relations within the exchange, recent developments claims for refocusing governance arrangements to govern relations at an industry-wide level. Particularly challenging at this regard is how value is distributed among exchanges within the cluster. Considering them as different nodes of the cluster under the strategic direction of a common nucleus of shareholders, the rationale of value maximization is changing. The profit function bears the objective of maximizing value at cluster-wide level rather than at an exchange level. However, given different competitive pressures on each node and different price elasticity, this implies that certain exchanges in the node might serve to subsidize the others. An interesting point, at this stage, is how and to what extent, eventually, this would affect the flows of liquidity across economic areas. With increasing economic and market integration the point should be carefully addresses as it would imply relevant cross externalities. Eventually, the nature of conflicting interests in the exchange industry might turn to change, opposing a core of large shareholders (mainly large international institutional investors) and investors, economic agents and communities who need fair and transparent capital markets to foster wealth creation.

Finally, a strictly related question raises the question of who ultimately appropriate the control over international liquidity flows. When clusters of exchanges under the direction of a few shareholders were to emerge they would concentrate power over a large bulk of liquidity. Floreani and Polato (2013) elaborated an index to measure exchange's liquidity as $I_i = \frac{Vet_i}{Mcap_i} \cdot \left(1 + \frac{Ncr_i}{GDP_j}\right)$, where I_i is the liquidity index of i-th exchange

which is function of turnover (the ratio of value of share trading on market capitalisation) and the ratio of new capital raised on GDP. The sum of I_i's represents the liquidity index of the cluster. Suppose that the cluster comprises some among the large exchanges intermediating high trading values and relevant capital raised on primary markets and that one or few large shareholders having a α% ownership. Those shareholders, in that case, would enjoy a fraction α of control rights over large international liquidity flows. Such a pattern is, for example, to be traced in the close links between Lseg, Nasdaq Omx and the Dubai financial centre. By the way, such developments raise the issue of full transparency of ownership interests on clusters of internationally active exchanges, especially when belonging to different economic areas.

6. Conclusion

The paper performs a comparison of financial Islamic and non-Islamic exchanges' financial performances. We started by providing an overview of the main dynamics on market activity (trading values and listed companies). We, then, turned to the analysis of main financial matters. We accounted for some major differences among the two clusters. The first pertains to the degree of diversification of the business model. We showed how Islamic markets have a substantially narrow business model focused on cash markets, while non-Islamic are a step forward on the evolutionary process pursuing, in certain cases consistent business diversification strategies. It is often maintained that a specific feature of Islamic exchanges are Shariah compliant investments. However, what it emerges is that such investments do not have a paramount relevance in Islamic markets (at least as regards revenue generation) with the only case of the Dubai exchange deriving large revenues from such investments.

Efficiency results shows that IE's perform better in terms of operational margins and trading efficiency (revenues and margins per unit of value traded). CE's fare better in terms of asset exploitation. Seemingly, the exchange industry, at least in certain non Islamic countries (mainly western countries) is approaching the features of a mature sector.

Our results elicit a few considerations regarding future evolutionary paths within the securities industry. On the one hand, we might enucleate a very few Islamic markets which would, eventually, lead a possible consolidation process within the Islamic arena.

On the other end, figures might unveil possible further convergence between Islamic and non-Islamic markets. At this regard, there remains room for future research investigating the governance implications. In our view, further research on that field should focus on the industry-level (rather than exchange-level) governance. The most challenging developments here are related to the distribution of value across economic areas and the appropriation of control over capital flows.

Appendix

Table 7 – The matrix of correlations

		Tv	N_List	Revenues	Ebit	Op. Lev
Non Is-lamic markets	Tv	1				
	N_List	-0.0064	1			
	Revenues	0.9771	0.0338	1		
	Ebit	0.7464	0.0023	0.7352	1	
	Op. Lev	-0.1333	0.0955	-0.1608	-0.2088	1
Islamic markets		Tv	L	Revenues	Ebit	Op. Lev
	Tv	1				
	N_List	0.1838	1			
	Revenues	0.4865	-0.0857	1		
	Ebit	0.3141	-0.0956	0.2810	1	
	Op. Lev	0.3606	0.1996	0.2375	0.0741	1

Table 8 – Islamic a non-Islamic markets: a comparison

	Non-Islamic markets		Islamic markets		Bartlett's statistic		t-Student*			
	Average (a)	St.Dev/Av	Average (b)	St.Dev/Av	Statistic	p-value	Diff. (a-b)	t statistic	p-value	DF
Tot_Ass	9121.18	11047.15	281.59	610.86	55.8606	0.000	8839.58	-3.1951	0.006	15.1
Equity	42578.45	158019.4	210.786	585.0533	123.6459	0.000	42367.66	-1.0725	0.3005	15
Tot_Rev	35841.21	112125.1	39.7363	53.9929	175.2256	0.000	35801.48	-1.3165	0.2066	16
Trad_Rev	16460.98	57572.81	27.7625	34.7137	167.1275	0.000	12564.01	-1.0283	0.3191	16
Oth_Rev%	80.26%	0.2247	40%	0.4509	6.5274	0.011	0.402586	-3.0431	0.0069	18.2
Trad_Val	-2.68%	0.1037	-19.49%	0.2465	9.3536	0.002	0.1680	-2.3737	0.0297	16.9
N_List	-1.23%	0.1348	3.07%	0.040	15.9592	0.000	-0.043	-1.0730	0.3001	15.1
Op_Lev	0.0982	1.6322	0.8809	0.4875	15.6728	0.000	-0.7826	1.8782	0.0755	19.3
Fin_Lev	29.75%	0.1677	47.17%	0.5420	16.9053	0.000	-0.1742	1.1543	0.2664	15.04
Ebit%	26.01%	0.2203	47.60%	0.3343	2.4084	0.121	0.3576	2.1565	0.0395	29
Rev_Tv	0.2798	0.9062	7.0408	14.3407	51.8861	0.000	-6.7610	1.7605	0.1016	13.10
Cost_In	27.53%	0.2334	67.23%	0.2780	0.04270	0.513	-0.3969	4.0954	0.0003	29
Roe	21.39%	0.1839	21.70%	0.1444	0.7723	0.379	-0.0030	0.0507	0.9599	28
Roce	13.61%	0.1330	14.63%	0.1013	0.9733	0.324	-0.010123	0.2343	0.8165	28
Trad_Int	656.3051	561.5925	0.3860	0.5530	155.4209	0.000	655.919	-4.2111	0.0012	12
Trad_Prof	0.0145	0.0531	1.5570	3.0112	83.7287	0.000	-1.5424	1.9163	0.0776	13

*Source: our elaborations on data collected from the annual reports of exchanges and the Bloomberg database. * Two tailed test, with a 0.05 significance level.*

Table 9 – Relevant measures of performance

	Tot_Ass	Rev_Tv	Ebit margin	Trad_Prof	Trad_Int	Cost_In	Roe	Roce	Op_Lev	Fin_Lev	Oth_Rev	Tr_Vol	List
DB	32039.2	0,0014	54,9%	0,00076	107,0934	57,5%	27,0%	5,4%	1,29	30,0%	84,4%	-15,0%	-3,7%
BME	23226.9	0,3040	68,1%	0,20567	0,1899	32,9%	33,6%	2,5%	1,38	21,9%	47,4%	-14,5%	-1,9%
LSEG	3100.5	0,0002	37,0%	0,00009	2553,5141	62,8%	4,1%	9,7%	0,15	27,6%	40,4%	-18,7%	-5,5%
NASD	11350.3	0,0003	13,2%	0,00004	1888,6428	58,4%	10,4%	6,4	-0,51	42,6%	43,3%	-1,9%	-3,1%
NYSE E	14286.6	0,0003	12,8%	0,00003	1730,8319	66,3%	6,2%	5,3%	-4,22	28,2%	61,0%	-12,0%	0,8%
TMX	2849.1	0,0005	38,0%	0,00020	564,3424	31,5%	32,9%	10,9%	0,93	43,0%	63,0%	-1,7%	0,0%
OSAKA	623.2	0,1572	0,3%	0,00045	3,4823	0,5%	13,9%	14,0%	-0,22	18,3%	99,6%	-7,3%	26,7%
JOHANNESB.	258.8	0,0048	3,1%	0,00015	170,6087	7,0%	23,0%	18,8%	-2,49	49,7%	96,8%	2,0%	-41,3%
AUSTRALIAN	3609.9	0,0008	46,3%	0,00035	294,5808	19,2%	11,9%	11,2%	1,36	66,4%	68,7%	-3,5%	0,3%
BOVESPA	1349.7	0,0033	3,5%	0,00011	38,0755	1,9%	4,8%	5,4%	1,09	3,2%	97,8%	7,4%	-1,3%
MEXICAN	383.9	0,0219	2,3%	0,00049	18,4617	3,4%	8,1%	11,3%	-2,31	4,6%	98,2%	2,5%	8,0%
SINAGPORE	726.1	0,0031	32,4%	0,00102	297,3048	20,6%	51,5%	41,3%	0,69	25,1%	68,1%	-7,0%	0,3%
HONG KONG	2999.2	0,0056	7,9%	0,00044	68,9491	2,3%	63,2%	23,7%	1,31	19,0%	95,8%	-8,0%	4,3%
COLOMBIA EXCHANGE	-	3,4140	0,0%	0,00045	-	0,02%	-	-	1,23	19,0%	100%	21,6%	-2,0%
CME	28403.9	-	49,4%	-	-	31,1%	5,3%	6,2%	1,08	27,7%	100%	6,5%	-
CBOE	406.0	-	31,6%	-	-	42,2%	50,6%	52,5%	0,00	25,1%	100%	6,5%	-
ICE	20325.9	-	41,8%	-	-	30,4%	15,0%	4,6%	0,90	54,4%	100%	-	-
BAKU	3.3	0,3137	38,9%	0,10395	2,3743	61,0%	29,8%	29,4%	0,00	0,4%	0,5%	13,7%	0%
DUBAI	2324.8	3,8255	72,9%	2,77017	0,0210	49,3%	4,5%	5,0%	1,01	4,2%	7,1%	-46,1%	3,5%
INDONESIA	349.9	0,5670	49,0%	0,27760	0,3955	55,0%	26,6%	10,8%	1,28	163,7%	28,8%	5,0%	3,5%
UGANDA	1.3	53,760	12,3%	8,67274	0,0160	87,7%	19,8%	19,8%	1,00	4,6%	25,9%	-11,8%	13,0%
KARACHI	93.0	0,4382	34,4%	0,13362	0,4147	70,1%	12,7%	5,7%	1,35	148,2%	100%	-44,3%	-0,7%
BAHRAIN	13.5	19,6788	23,5%	4,02335	0,0715	76,5%	19,6%	15,9%	1,02	23,7%	43,3%	-28,6%	-1,0%
DHAKA	132.0	0,7511	78,0%	0,57404	0,2808	22,0%	35,7%	14,2%	1,04	50,2%	2,5%	-63,4%	6,4%

ISTANBUL	383.2	0,3175	27,8%	0,09259	1,0662	86,8%	16,7%	8,4%	1,13	37,9%	18,5%	9,3%	4,9%
TUNIS	11.1	2,7333	22,6%	0,65022	0,2224	77,4%	14,3%	14,8%	0,00	21,3%	100%	13,7%	2,8%
MUSCAT	20.1	3,5075	37,5%	1,11715	0,2984	62,5%	47,3%	40,1%	1,15	64,8%	11,6%	-21,9%	0,6%
PALESTINA	12.5	6,1398	-5,4%	-0,35269	0,0349	126,5%	1,1%	-1,1%	0,00	8,1%	14,7%	-18,1%	7,1%
KAZHAKI-STAN	13.8	3,3102	25,9%	0,80252	0,3242	75,4%	13,8%	16,1%	1,09	10,3%	12,0%	-41,3%	0%
MALAYSIA	503.1	1,0708	51,5%	0,54914	0,2413	48,4%	19,5%	13,0%	1,16	104,2%	45,0%	-5,4%	-1,2%
CASABLAN-CA	80.0	2,1588	70,7%	1,49065	0,1478	42,6%	15,7%	19,5%	1,10	18,9%	100%	-33,6%	1,0%
Mean	4996	3.6603	31.67%	0.7541	286.7403	45.4%	21.3%	14.69%	0.4517	37.62%	62%	-10.5%	0.76%
Median	454.58	0.3155	32.37%	0.0468	1.0662	48%	16.2%	11.27%	1.0245	25.12%	62.95%	-7.2%	0.29%
P 5%	3.31	0.0002	0.01%	0.00003	0.0210	0	4.13%	2.53%	-2.4884	3.21%	2.49%	-46.1%	-5.46%
P 95%	28403.8	19.678	72.89%	4.0233	1888.643	88%	51.5%	41.31%	1.3589	148%	100%	13.7%	13.04%
St.Dev.	9132.8	10.548	0.233	1.8115	662.2815	0.3110	0.1585	0.1224	1.2964	0.3873	0.3956	0.2002	0.1031
Skewness	1.899	4.1478	0.2464	3.3759	2.4777	0.2963	1.0116	1.5475	-2.2112	1.9871	0.0424	-0.814	-1.8851
Kurtosis	5.227	19.758	2.178	14.5137	7.7772	2.7354	3.2821	5.0247	7.4914	6.6056	1.996	3.1824	12.304
NIE above median	13	1	9	1	12	5	7	6	7	10	13	10	5
IE above median	2	13	8	13	2	12	8	9	9	6	3	5	9
NIE above P 95%	2	0	0	0	1	0	2	2	2	0	0	1	1
IE above P 95%	0	2	2	2	0	1	0	0	0	2	0	0	1
NIE below P 5%	0	0	0	0	0	0	0	0	2	0	0	0	2
IE below P 5%	1	0	1	1	1	0	1	1	0	1	1	0	0

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