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EDITION

Traders' Guide to Global Equity Markets

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Global Trading Markets

COUNTRY	CODE	EXCHANGE
Australia	AU	Australian Stock Exchange
Austria	AV	Vienna Stock Exchange
Bahrain	BI	Bahrian Stock Exchange
Bangladesh	BD	Dhaka Stock Exchange
Belgium	BB	Brussels Stock Exchange
Botswana	BG	Botswana Stock Exchange
Brazil	BS	Sao Paulo Stock Exchange
Bulgaria	BU	Bulgarian Stock Exchange
Canada	CF	Canada National Stock Exchange
Canada	CT/CN	Toronto Stock Exchange
Canada	CV	TSE Venture
Chile	CI	Chile Composite
Chile	CC	Santiago Stock Exchange
China	CG	Shanghai Stock Exchange
China	CS	Shenzhen Stock Exchange
Colombia	CX	Colombian Stock Exchange
Croatia	CZ	Zagreb Stock Exchange
Cyprus	CY	Cyprus Stock Exchange
Czech Republic	CP	Prague Stock Exchange
Denmark	DC	Copenhagen Stock Exchange
Egypt	EC	Egyptian Exchange
Estonia	ET	Tallinn Stock Exchange
Finland	FH	Helsinki Stock Exchange
France	FP	Paris Stock Exchange
France	NM	Paris Stock Exchange New Mkt
Germany	GY	Frankfurt Stock Exchange
Germany	NY	Xetra Neuer Market
Ghana	GN	Ghana Stock Exchange
Greece	GA	Athens Stock Exchange
Hong Kong	HK	Hong Kong Stock Exchange
Hungary	HB	Budapest Stock Exchange
Iceland	IL	Icelandic Stock Exchange
India	IB	Bombay Stock Exchange
India	IS	National Stock Exchange India
Indonesia	IJ	Indonesia Stock Exchange
Ireland	ID	Irish Stock Exchange
Israel	IT	Tel Aviv Stock Exchange
Italy	IM	Milan Stock Exchange
Italy	NI	Milan NI Stock Exchange
Japan	JQ	JASDAQ Stock Exchange
Japan	JX	Hercules Stock Exchange
Japan	JN	Nagoya Stock Exchange
Japan	JO	Osaka Stock Exchange
Japan	JT	Tokyo Stock Exchange
Jordan	JR	Amman Stock Exchange
Kazakhstan	KZ	Kazakhstan Stock Exchange
Kenya	KN	Nairobi Stock Exchange
Kuwait	KK	Kuwait Stock Exchange
Latvia	LR	Riga Stock Exchange
Lebanon	LB	Beirut Stock Exchange

COUNTRY	CODE	EXCHANGE
Lithuania	LH	Vilnius Stock Exchange
Luxembourg	LX	Luxembourg Stock Exchange
Macedonia	MS	Macedonian Stock Exchange
Malaysia	MK	Kuala Lumpur Stock Exchange
Mauritius	MP	Mauritius Stock Exchange
Mexico	MM	Mexican Stock Exchange
Morocco	MC	Casablanca Stock Exchange
(MTF)	EB	BATS Trading Europe
(MTF)	IX	BATS CHI-X Europe
(MTF)	TQ	Turquoise
Namibia	NW	Namibian Stock Exchange
Netherlands	NA	Amsterdam Stock Exchange
New Zealand	NZ	New Zealand Stock Exchange
Nigeria	NL	Nigerian Stock Exchange
Norway	NO	Oslo Stock Exchange
Oman	OM	Muscat Stock Exchange
Pakistan	PK	Karachi Stock Exchange
Peru	PE	Lima Stock Exchange
Philippines	PM	Phillipine Stock Exchange
Poland	PW	Warsaw Stock Exchange
Portugal	PL	Lisbon Stock Exchange
Qatar	QD	Qatar Exchange
Romania	RO	Bucharest Stock Exchange
Russia	RM	Moscow Stock Exchange
Russia	RU	Russian Trading System
Serbia	SG	Belgrade Stock Exchange
Singapore	SP	Singapore Stock Exchange
Slovenia	SV	Ljubljana Stock Exchange
South Africa	SJ	Johannesburg Stock Exchange
South Korea	KS	Korea Composite
South Korea	KP	Korea Stock Exchange
South Korea	KQ	KOSDAQ
Spain	SM	Madrid Stock Exchange
Sri Lanka	SL	Colombo Stock Exchange
Sweden	SS	Stockholm Stock Exchange
Switzerland	SW	SIX Swiss Exchange
Switzerland	VX	SIX Swiss Exchange
Taiwan	TT	Taiwan Stock Exchange
Tanzania	TZ	Dar es Salaam Stock Exchange
Thailand	TB	Thailand Stock Exchange
Tunisia	TU	Tunis Stock Exchange
Turkey	TI	Istanbul Stock Exchange
Ukraine	UZ	Ukraine Composite
United Arab Emirates	DH	Abu Dhabi Securities Market
	DU	Dubai Stock Exchange
United Kingdom	LN	London Stock Exchange
United Kingdom	LI	London International Order Book
United States	US	NYSE/NASDAQ
Vietnam	VM	Ho Chi Minh Stock Exchange

ConvergEx algorithmic trading markets are in turquoise. Additional ConvergEx DMA trading markets are blue.

Welcome

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Welcome to the 2014 Q3 Traders' Guide to Global Equity Markets. As is customary in our guide, we aim to highlight some market-related topics that are relevant to traders, not only at the time we go to press, but also areas that we believe will remain pertinent for the foreseeable future. Amidst lower global volumes, investors have sought out opportunities to expand their exposure, seeking alternatives outside of developed markets.

As frontier markets continue to offer up eye-catching economic growth rates, investor interest in these markets continues to grow as well. For example, according to their GDP Annual Growth Rates, Nigeria and Pakistan saw 2013 growth rates of 6.3% and 4.1%, respectively. Looking ahead, the target growth for Pakistan for 2015 is at 5.1%. While large growth over the past year on the MSCI Frontier Markets Indices can be attributed to heavily weighted UAE and Qatar, both having graduated to EM status at the end of May, countries like Nigeria and Pakistan are poised to garner more attention. Additionally, YTD growth of the MSCI 100 Frontier Index sits around 15%. While UAE and Qatar names in the index were mainstays within the top ten constituents, four out of ten names were Kuwaiti and Nigerian names that accounted for 17% on the index and still remain.

In addition to the inherent geo-political risks associated with these markets, some of the largest hurdles investors face when transacting in these markets are the lack of sophisticated trading mechanisms, scarce liquidity and a dearth of strong local relationships. One thing is certain: the complexities of frontier markets are unrivaled, and ultimately can be a difficult entry barrier for a client to overcome. Having a trading partner that not only understands the market landscape, but has the extensive local relationship network to meet their demands and trading styles are important factors in successfully navigating frontier markets.

Since there has been so much interest in this field over the past year and with investors seeking to enter these markets, a trader's knowledge of each market is what can truly set them apart. Here at ConvergEx, our global trading desks are ready to support clients in markets and names they express interest in. To do this we can leverage our deep experience and strong relationships in the local markets. During the recent MSCI rebalance, which saw both Qatar and UAE upgraded to EM status, our trading desk supported our clients throughout the session as we executed rebalance names on their behalf.

As we move into the second half of the year, no matter the regulatory or market conditions that may lie ahead, we are happy to be your partner as you navigate the ever changing landscape. As always, if there is anything that we can assist you with as it relates to the global markets – developed, emerging, or frontier - we are here for you. New to this issue is the Witching Days chapter, which aims to explain what witching days are and when they happen. We've also updated the Exchange Guides with the most recent data available to us.

All the best for the second half of the year!

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DMA Order Types

Order types sound like an open-and-shut case: market orders and limit orders, maybe throw in some reserve size and pegging—all standard DMA stuff, right? What's to explain? Actually, quite a lot. These are the underlying tools at traders' and algorithms' disposal, and their behavior varies alarmingly across markets.

Let's start with garden-variety market orders. The general notion is that when you place a market order, you expect to execute 100% of your order at the best price available given the available instantaneous liquidity. We typically expect a market order to sweep multiple levels on the opposite side of all the available limit order books. In some markets, market orders are close to that ideal; for example, a market order will do just what you expect it to do in Japan (where dark pools haven't really taken a firm hold yet). Less than five years ago, market orders in most core European markets (e.g., Germany, London, and the Euro-next markets) would also have met our basic expectations. Today, however, market orders directed to exchanges or MTFs only sweep their specific books. If you need your market orders to sweep all available liquidity, you need to use a broker's smart router.

The United States provides an extreme case for market-order confusion. Under Regulation National Market System (Reg NMS), when an exchange receives a market order, it only has to honor the displayed liquidity at all light exchanges. Beyond that, the exchange is free to plumb the depths of liquidity in the exchange's own book. Exchanges don't have to walk one another's books to fill an order. At this writing, of the exchanges, only BATS ferrets out all available liquidity (walks all light books). ConvergEx's smart routers do the same. However, other brokers' smart routers are configured in all sorts of ways. This is especially the case in Europe, where there is no hard and fast rule that brokers must include all displayed liquidity in their respective smart routers. Our advice: ask, especially if you ever use large market orders.

Marketable limit orders offer a highly attractive alternative to straight market orders.

The variety in market order behavior doesn't end with approaches to fragmentation. For example, in Hungary, a market order acts more like an "Immediate or Cancel" (IOC) order. It only sweeps the top of the book, and cancels any unfilled portion of your order. On the other hand, the stock exchange in Poland also sweeps only the top of the book, but it does something else with any unfilled portion: it turns your order into a limit order with the price set at the last trade executed. (In markets like these, marketable or aggressive limit orders might be better options—we discuss that below.) Meanwhile, other exchanges don't even allow market orders during continuous trading: for example, Hong Kong, Brazil, and Turkey are limit-order only markets.

Marketable limit orders offer a highly attractive alternative to straight market orders. Marketable limit orders essentially act like market orders that allow you to set a ceiling or floor on the price at which you're willing to buy or sell a stock. In addition to helping you access liquidity and protect against the occasional "fat finger," marketable limit

orders allow you to place an order that resembles a market order in countries that don't support market orders, like Mexico or the Czech Republic. They are also useful in exchanges that do support market orders. Remember Hungary and Poland, where a market order acts more like an IOC order? A marketable limit will behave like a normal market order there, sweeping as many levels as necessary on the other side of the book to fill your order. There are other exchanges where most traders agree that you'd be crazy to use a market order, even though technically you can. For example, use a marketable limit order instead of a market order in places with limited transparency and a lot of volatility, like Tel Aviv. Just be careful with what you set as your limit, as some exchanges already have (and many more are getting) reasonability bounds on limit prices. Hong Kong, for instance, will reject a limit order that is more than 24 ticks away from the current bid or offer. During its pre-opening period, Tel Aviv will not allow a limit order that is more than 35% from the previous day's closing price. In the US, NYSE Arca uses percentage price checks:

- If the price is USD 0.01-25.00, your order must be within 10% of the price.
- If the price is USD 25.01-50.00, your order must be within 5% of the price.
- If the price is higher than USD 50.00, your order must be within 3% of the price.

Using marketable limit orders as a substitute for market orders does leave you with one problem: the leaves will be posted at your limit price, which may or may not be what you want. Most brokers support FOK (Fill Or Kill) or IOC (Immediate Or Cancel) instructions to negate this posting behavior if you prefer.

In stark contrast to market orders, plain, vanilla, non-marketable limit orders are well standardized in global markets. When you place a vanilla limit order, you openly declare your willingness to buy or sell a stated number of shares at a given price. Since Turkey now allows traders to cancel their limit orders intra-day, every material market supports non-marketable limit orders in pretty much the same way. Only the order standing rules vary (price, time, size, source, exchange, etc.).

Moving now from vanilla to strawberry (or your second most common ice cream flavor of choice), we turn our attention to reserve/iceberg orders. These orders allow you to display only a portion of your order at a time. Each time that smaller portion gets filled, the iceberg order replenishes it. This allows you to place a larger order without showing your hand—the world only sees a tip of the iceberg at a time. Just how much of a large order to show, under what circumstances, in which conditions and markets, is a matter of high trader art. The knee-jerk response is to always show only one board lot. However, this approach sacrifices the power of liquidity signaling. Small display sizes also compromise order standing in most markets.

While iceberg orders are attractive to traders, not all exchanges support them. Asian-Pacific exchanges do not, as well as a handful of European exchanges. Some brokers offer synthetic iceberg orders in markets that do not support them. However, this can be a bit of a sticky wicket. For example, a trading engine can post the first 1,000 shares of

a 100k buy order at the limit price. When the small order is filled, the trading engine can then replenish the order in the market with another 1,000 shares. However, imagine 20k blasts through the market. This approach will only get 1,000 shares done against the large sell order. This can be very frustrating to watch as you can see lots of shares get done below your limit price. There are technological solutions (be fast) and quantitative solutions (construct a ladder of limit orders below the actual limit) that mitigate these problems (ConvergEx does both), but the trading world will be a better place when all exchanges support iceberg/reserve limit orders. The table on page 6 provides a list of markets that offer native iceberg limit orders. ConvergEx provides them synthetically with our Reserve algorithm for our algo markets where they are not supported.

If reserve orders are the answer to the question "how can I provide a lot of liquidity to the market without telegraphing my intentions?" then pegging orders are the answer to the question, "How can I provide liquidity to the market without telegraphing my intentions and keep up with current prices?" Pegging orders typically float along at the bid or offer displaying a bit of the actual order size. (Pegging orders are always implemented with iceberg functionality.) Essentially, you are telling the market, "I don't want to be alone at the inside. But if there is somebody else who is willing to pay a price (up to my limit price), I will join her." You will not be surprised to learn that not every market supports native pegging. This table provides a list of markets that do:

Country	Market Code(s)
Belgium	BB
Canada	CF, CN, CT
France	NM
Germany	NY
Italy	NI
Japan	JN, JT, JQ, JX
[MTFs]	IX, TQ
United States	US
Vietnam	VH, VM

We offer synthetic pegging in all the other algo markets. There are other alternatives to pegging the bid (for a buy) or the offer (for a sell), but these are special-use products that are beyond our discussion here.

In our chapters on Opening and Closing Auctions, we mention that each exchange has its own rules for which order types you can use during auctions. Most exchanges allow the same order types in auctions as in continuous trading, but there are some exceptions. Hong Kong only allows limit orders in continuous trading, but allows market orders in the opening auction. In their closing auction, Mexico will only permit market orders. Auctions can even change the order type you use: Japan's Funari order type works as a limit order throughout the day, but turns into a Market on Close (MOC) order at the close. It is important to remember, however, that Japan is a tale of two

Country	Iceberg Rules
Australia	Must display at least 5,000 shares.
Austria	Overall order must be > 1000 shares, must display at least 10% of order size.
Belgium	Must display at least 10 shares.
Brazil	Overall display size must be > 1000 shares.
Canada	CT, CV: Display size must be a board lot. CF: Display size must be greater than 50% of total order.
Czech Republic	Not supported
Denmark	Order must be a round lot.
Finland	Order must be a round lot.
France	Must display at least 10 shares.
Germany	Only supported on XETRA. Overall order must be > 1000 shares. Must display at least 10% of order size.
Greece	Not supported
Hong Kong	Not supported
Hungary	Not supported
Ireland	Overall order must be > 1000 shares. Must display at least 10% of order size.
Israel	Not supported
Italy	Must display at least EUR 10,000.
Japan	Not supported
Korea	Not supported
Mexico	Overall order must be at least 2000 shares. Display size must be at least 5% of order.
Netherlands	Minimum display size is 10 shares.
New Zealand	Not supported
Norway	Must display at least NOK 10,000.
Poland	Must display at least 100 shares.
Portugal	Must display at least 10 shares.
Singapore	Not supported
South Africa	Not supported
Spain	Must display at least 250 shares.
Sweden	Order must be a round lot.
Switzerland	Not supported
United Kingdom	Must display at least 40% NMS (Normal Market Size), which is different for each stock.
United States	Display size must be a round lot. Not supported on NYSE.

sessions: be sure to enter Funari orders in the afternoon session to achieve the P.M. closing price—otherwise Funari orders complete at the morning session's closing price.

Finally, we come to more exotic order types, which we mention just to give you an idea of the complexities roaming the world. In the US, where dark pools have captured so much liquidity, the exchanges have hidden order types. London, Germany, and most of the Scandinavian exchanges also support these completely hidden order types. Again in the US, where maker/taker fees are the principle ways in which exchanges compete, you can specify that you want to post hidden at the mid-spread and add liquidity only. Meanwhile, potential contras can tell the markets that they don't want to interact with this flow. Stop orders (or stop-loss orders) are also an interesting type of order; they are orders to buy or sell once your stock hits a certain price (your "stop" price). When the stock hits that price, the stop order becomes a market order. Stop prices for buys are above the current market price, below for sells. These types of orders can help limit your losses if the market turns against you. Be careful with these: once the stop order becomes a market order, it can execute far from your stop price, especially if the market is moving quickly. Stop limit orders are similar, but they turn into limit orders once the stock hits your stop price.

Every exchange has its own unique menagerie of order types; if you are looking to trade in a new market, it would be a good idea to get to know its native order types early on.

The sheer magnitude and complexity of DMA order types across the world calls for a more extensive discussion than we can provide in this overview. You'll find our contact information on the cover of this guide; if you have any questions about order types in any of the 100+ markets we serve, please give our trading desks a call.

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Opening Auction

Trading well entails playing each global opening auction properly… which is way, way easier said than done. There are almost as many quirks to trading the open as there are markets. In some markets, the opening auction is so small that it is better to disregard it altogether. In other markets, the opening auction represents 10% of the daily volume on a normal day and 35% on a big day. Some markets even have multiple competing opening auctions for the same name. While nothing can replace local knowledge, we'd like to point out a few of the land mines.

The theory of the opening auction is simple. Ideally, it is an efficient process that follows a 16-hour hiatus in trading. Its purpose is to find an opening price that balances the supply and demand for a stock. In its most full-blown form, the opening auction consists of three periods:

1. Call (open to all orders)
2. Balancing (open to orders that decrease the trading imbalance)
3. Crossing and printing

However, the balancing phase is part of only a few auctions and is much more common in closing auctions. Probably the best known example of an explicit balancing period at the open is known as "Kehai Ticking," which is invoked in Japan when the market is struggling to find the right opening price for a stock in the face of huge, atypical volume. This can delay the normal opening for many minutes.

Probably the most important thing a trader needs to understand about each market's opening auction is how big it is compared to the market's daily volume. Misjudge this and you could undersize your initial order and miss valuable liquidity, or oversize your opening order and inadvertently wreck the price. For almost all markets, the opening volume percentage is pretty consistent from day to day, though double or triple witching days in the US and SQ days in Japan move a huge amount of volume to the open. But that consistent percentage itself varies from market to market. For example, Lisbon runs about 0.5%, London about 3%, Mexico 2%, Toronto 5% and Tokyo SE about 10%.

Some global markets provide a great deal of information about the impending auction size and price. Some provide nothing. This table shows how we categorize auctions:

Auction Types	Exchanges
Indicative Size and Price	United Kingdom, South Africa, Austria, Greece, Hong Kong, Italy, Scandinavian markets, Germany, Ireland, Israel, Czech Republic, Australia, Korea, Euronext and Swiss markets, Japan, Spain, Canada
Indicative Price Only	Poland and Singapore
Blind Static Auctions	Mexico, New Zealand and Hungary
Dynamic Auctions	Brazil

The chart's "Indicative Size and Price" markets make it easy to right-size your opening orders. The next category supplies an indicative price feed that may be useful for making a go/no-go decision on your opening orders. "Blind Static Auctions" are the trading equivalent of the dark abyss. Meanwhile, Brazil is in a class of its own. While Brazil does supply an indicative size and price, the auction time is so random that the information is difficult to exploit.

It can often be tricky just to identify the opening prints on the tape.

While we are on the topic of auction sizes, many markets make it hard to discern the size of the opening print(s) even after continuous trading begins. A few exchanges make the open auction obvious by putting up the auction prints well before the regular session (Hong Kong and Singapore). In most exchanges, however, the auction prints immediately lead regular market trading prints. Some exchanges show a single aggregated auction trade (e.g. Austria, Japan, South Africa, and the United Kingdom). Other exchanges show individual auction trades with the same opening price (e.g. Australia, Brazil, Scandinavian markets, and Spain).

It can often be tricky just to identify the opening prints on the tape. Some exchanges such as London, Brazil, Germany and Singapore, provide opening auction print condition indicators while others do not. If an exchange does not put up the open as one print and does not provide an auction print condition indicator, you have two ways of guesstimating the opening print size. In markets with full indicative auction data, use the last indicative auction size. In markets where this approach is not feasible, you are left to add up all the initial prints of the day (within, say, the first 2 seconds) that are done at the price of the first print. Assume the first off-price print is the start of continuous market trading. This approach is crude, at best.

You can find information on the size and price of any specific opening auction by using Bloomberg's QR function to pull all trade records. Bloomberg normalizes indications and auction trade conditions. Trade condition T means theoretical/indicative price and volume. AU means auction trades. Other market data vendors have other coding schemes. For example, IDC uses "AuctionMatching" in some markets and "UncrossTrade" in others.

Most every market tries to open up at the same time every day… although both Australia and Brazil provide some randomization of that time in an attempt to mitigate gaming. (Australia has the added bonus of doing an alphabetically-staggered open. Ask 20 Australians "why" and you will get 20 different answers.) The Tel Aviv stock exchange also presents an interesting challenge for traders new to its opening times: securities are divided into two groups that open at two different times. Group A, which consists of the TA 100 (the 100 most highly capitalized companies), opens randomly between 9:45 and 9:46. Group B, consisting of the rest, doesn't open until 10:15. Almost all markets make

accommodations to get a solid opening price in the face of excess volatility due to news.

To make this even more interesting, different markets have other unexpected exceptions to auction times, like in Israel, where a general strike in Tel Aviv may delay the opening of the whole exchange, including auctions.

What happens when you have multiple light venues trading the same name? In the US, with its fifteen exchanges, you can have multiple open auctions for the same name, which gets complicated quickly. The basic tenet, though, is that any exchange can begin trading a security at 9:30 AM, so the primaries have put tremendous resources behind opening as fast and as close to 9:30 AM as possible. Auctions are exempt from trade-through protections for those prints in order to allow for competition. In contrast to the US, Europe's MTFs wait to trade until after the primary market opens a stock. (**Note:** the MTFs do not routinely halt trading when the primary exchange halts trading.)

Different exchanges have different rules for what kinds of orders you can use in the opening auction. Many markets allow both market and limit orders. Hong Kong, for example, which allows only limit orders during continuous trading, allows both market and limit in the opening auction, but forbids shorting in it. Other markets, like Brazil, only allow limit orders in the opening auction. Your tradable size also depends on the market. For example, in Canada, opening auction orders are board lots only; you cannot trade in odd lots. In Israel, odd lots can only be traded in auctions.

Bottom line: unfortunately there are no hard and fast rules that cover all markets' opening auctions. If you want to trade well in a given market, you need to familiarize yourself with its individual rules and patterns.

The first tier global algo vendors have customized their algos to play each market's opening auction well for the typical order. However, the best vendors will also give you the explicit option of including a Market on Open or Limit on Open (MOO or LOO) in your order. Making the right choice for your order can materially improve your trading performance.

Two final notes:

1. MOO orders are much less popular than LOO orders for good reason: you never know what price might come out of the auction. Limit prices provide simple smart protection.

2. In most markets, large opening auction orders leak information. If you are trading in size, the prospect of information leakage at the open needs to be a key part of your auction strategy.

Closing Auction

The closing price provides the universally accepted reference price for all institutional equity products. Investors buy into and cash out of managed portfolios at this price. Mark-to-market accounting uses the primary exchange's closing price. Because of this, equity players need to transact a lot of shares at or near the closing price; hence the importance and impressive liquidity of the closing auction.

If you read the previous chapter on the opening auction, much of the information about the closing auction will sound familiar to you. Almost all markets try to close at the same time each day, with the exception of Brazil, which randomizes its closing auction time the same way it does with its opening auction. Israel's exchange is another exception, as it has a dynamic time frame for its auctions.

While opening auctions tend to be more popular in the Asia-Pacific region than in Europe, closing auctions are the opposite. Traders from western European markets tend to lean very hard into the closing auction. However, this can be an expensive mistake, depending on the market. Paris, London, Amsterdam, Lisbon, and many other markets do 10-20% of their daily volume at the close. This represents tons of liquidity. However, in Toronto, this figure is more like 5%. It gets worse: in Tel Aviv and Prague, maybe 2% of the days' volume gets done at the close. Double and triple witching days cause unusual volume at the closing in Mexico. And Hong Kong doesn't even have a closing auction.

It helps to put the global markets into a few different camps based on the timing of their closing auctions:

- No closing auction, like in Hong Kong
- Closing auction done at the exact end of continuous trading with no lock-up period, like Canada, Japan, Mexico, and NASDAQ in the US (in fact, due to its lunch break, Japan gets to have two closing auctions)
- Closing auction done at the exact end of continuous trading with a lock-up period, like NYSE in the US
- Separate closing auction occurring after the end of the continuous trading, as in most exchanges, including much of Europe
- Brazil, where the closing auction time for each stock is dynamic each day. Three times per year, the index rebalances, so the closing auction starts five minutes earlier those four times a year.

This is one place where Europe's market structure has a strong advantage over the US.

One of the hardest calls in all of trading is how much of a large order to reserve for execution at the closing auction. Good information to inform the MOC/LOC decision comes late, if at all. Meanwhile, the amount of volume done at the close in a given stock on a given day is shockingly volatile. It is common to find today's closing volume to be 25% of yesterday's closing volume or even 10 times yesterday's closing volume for a given stock.

Markets span the range on the quality and amount of "indicative" information they provide for their closing auctions:

- No indicative information for electronic traders (e.g. Mexico, New Zealand, Hungary)
- Indicative price only (e.g. Poland)
- Indicative size (imbalance; the other side of the order that is not matched) and price (e.g. Australia, Canada, and most of Europe. Only the US & Canada have imbalance)
- Brazil, which provides both indicative size and price but, since the auction is at a random time, the information is almost impossible to use.

You can use Bloomberg's QR function to gauge the price and size of a specific closing auction by pulling all trade records. Bloomberg normalizes indications and auction trade conditions. Trade condition T means theoretical/indicative price and volume. AU means auction trades. Other market data vendors have other coding schemes. For example, IDC uses "AuctionMatching" in some markets and "UncrossTrade" in others.

Some exchanges have multiple closing prints (like Australia, the US, and Scandinavian markets), while others, like Germany and London, have a singular print. Identifying the closing prints is easier than with the open auction in many cases, however, as many markets have a break between continuous trading and the closing auction. The break lasts 5 minutes in most European countries.

Most closing auctions follow their markets' guidelines for order types, so if the exchange allows both market and limit orders, the auction does too. A few exceptions to this are Israel, Hungary, and New Zealand, where you can only trade limit orders in the closing auction. Mexico is also an exception for the opposite reason: you can only trade market orders in the closing auction there. To participate in the closing auction for most markets, you send your market or limit order during the auction. However, for the countries that have no gap between continuous trading and the closing auction (like Canada, Japan, and the United States), you need to send specific Market on Close or Limit on Close (MOC/LOC) orders to be clear.

Global exchanges will move heaven and earth to make sure MOC orders get executed. However, MOCs do not provide guaranteed execution. If there is a regulatory halt, exchanges often cancel rather than postpone the closing auction. Plus, because the closing auction is so dependent on "primary exchange" status, they are subject to technical and system halts. Finally, the closing imbalance may simply be too great to find an acceptable clearing price. (Generally, "clearly erroneous" closing auctions are nipped in the bud.)

Board Lots

In many global markets you can forget you ever heard of a board lot. However, in other markets, board lot restrictions can get in the way of even block trading. In these markets, board lots are a trading problem waiting to happen.

A board lot is the minimum order size that an exchange would prefer to see you trade. What's more, the exchange would really like to see you trade in multiples of board lots. In Canada and the United States, board lots are called round lots. Confusingly, a round lot is also the name everyone gives to a multiple of a board lot. Odd lot orders are for fewer shares than a board lot. Mixed lots are orders for fractional multiples of board lots (a multiple of a board lot plus change). Note that the leaves portion of a round lot order can easily become a mixed lot or odd lot order if the market allows fractional-lot fills.

In the last decade, many markets have been walking away from board lots. US markets are a typical case in point.

Exchanges demonstrate their preference for round lots in many ways. At one extreme, an exchange can forbid all odd-lot orders and executions. They can also provide odd-lot orders with poor execution quality and/or order standing. Exchanges may be willing to accept a few odd lots but will then subject a pattern of repeated odd lots to sizable fines. Exchanges can also promote round lots by having a minimum ticket charge for exchange transactions. Finally, exchanges can exclude non-round lots from auctions and/or they can make some order types unavailable to odd and mixed lots.

Historically, in manual trading, there was ample justification for board lots. It was in the interest of both the exchange and institutional investors to make trading productive, and individual transactions were costly and error prone. Board lots helped ensure that all transactions were material. With the dawn of decimalization and smaller ticks, board lots provided the added value of ensuring that at least your order couldn't get "pennied" by a tiny order.

However, in the last decade, many markets have been walking away from board lots. The US markets are a typical case in point. America still has board lots, set nominally at 100 shares for almost every stock you will ever hear of. However, there's a famous counterexample: Berkshire Hathaway (BRK A) which, at this writing, is going for nicely north of $100,000. A normal 100-share board lot would sell for well above $10M. Therefore it makes more sense to set the board lot for BRK A at 1 share.

While the US still has board lots, there is almost no practical impediment to odd and mixed lots in US trading. There are no longer any fines for repeated odd-lot trading. Transaction fees are all done on a per-share basis, so there is no minimum or fixed component to the transaction charge. These days, odd lots have exactly the same standing in the book as if they were round lots. The sole vestige of the old odd-lot discrimination is that they are not displayed as quotes. Board lots in the US now serve about the same useful function as an appendix for humans.

Many markets have stopped even the pretense of board lots, especially in Europe. For example, Hungary, Ireland, Spain, and South Africa all have board lots of 1. Many other European countries only have board lots above 1 for a handful of securities.

Some markets have dropped the notion of board lots but maintain a "minimum ticket charge." Because of this minimum charge, trading many small odd lot orders can get expensive, so many brokers set up their own required board lots to avoid losing money on a transaction. You'll find the majority of markets like this in Europe: the Euronext markets (Belgium, France, Portugal, the Netherlands) and Germany are examples of places where the charges to trade in small lot sizes often drive brokers to require board lots of 100 or 200.

Even in nominally no-board-lot markets, there are some exceptions. In the United Kingdom, for example, trading in a different currency may trigger some lot size requirements. In London, many GDRs and ADRs that trade in Hong Kong dollars, Japanese Yen, or US dollars trade in multiples of 50 shares.

Canada, Mexico, and the Philippines are good examples of markets where the notion of board lots is still powerful. In these countries, the board lot for each stock is determined by its price: the lower the price, the larger the board lot. The notion is that a proper transaction ought to represent material economic value. For example, here is a sample of the table from the Philippine Stock Exchange:

Stock Price (in PHP)	Board Lot
0.01 to 0.001	1,000,000
0.011 to 0.1	100,000
0.105 to 1	10,000
1.02 to 10	1,000
10.25 to 100	100
Greater than 101	10

A 1-million share board lot seems impressive until you look at the accompanying price.

Exchanges are not always responsible for setting board lots. In Hong Kong, board lots are determined by the board of directors of the listed company. As such, board lot values can vary greatly, with 56 distinct values ranging from 1, 5, 10 to 50,000, 60,000, and 80,000 in Hong Kong. Similarly, in Japan, board lots are also determined by listed companies, but these sizes are more standardized; trading units are set at 1, 10, 50, 100, 500, 1000, and 3000 shares.

Israel fills a "board lot" niche of its own. While there is no board lot per se, there is a rule where the quantity of the order has to be more than the "minimum order size." The minimum order size is the nominal price divided by the previous month stock closing price. Due to price fluctuations, the minimum order size for each stock changes daily. The exchange publishes a new list for all securities each month to help traders keep up.

With lot sizes as varied as they are, it can be difficult to know just how much of something you're allowed to trade.

Global traders need to be aware that odd lot rules for auctions do not always follow the continuous trading pattern. In Israel, lots less than the minimal lot size are only allowed in auctions, not during continuous trading. Conversely, in Canada, odd lots are only allowed during continuous trading, not in auctions.

Some markets go so far as to have a separate book for odd lot trading. A few of them, like Canada, have electronic odd lot books (though Canadian exchanges discourage odd lots). The Czech Republic also has its own electronic trading system, KOBOS, that allows odd lots. Singapore also has a separate trading system for odd lots. Finally, Mexico plans on bringing out an electronic odd lot system, though in the meantime, all odd lots have to be entered manually.

No discussion of board lots would be complete without mentioning that a few markets have the opposite concept of a board lot, a size too big to trade. For example, in Hong Kong, an order has to be less than 3000 board lots. Other countries (like South Africa) also have maximum lot sizes, but their limits are so high that it is unlikely anyone would reach them.

With lot size rules as varied as they are, it can be difficult to know just how much of something you're allowed to trade. If in doubt about the board lot for an individual stock or market, we recommend you use the DES function under the equity to see round lot or board lot under Stock Data in Bloomberg. In Reuters, bring up the quote window and type your value (for example, 0001.HK), to see Lot Size (1000, in this example).

Circuit Breakers

In a perfect trading world, we wouldn't need to explain anything about circuit breakers because in a perfect trading world, markets would never be volatile enough to need them. However, we live in the real world, where many exchanges have found it necessary to implement circuit breakers to protect markets and investors from too much volatility.

Circuit breakers are restrictions or halts that an exchange or regulatory body sets on trading when a security or market becomes too volatile. The enforced halt in trading allows the market (and traders) time to calm down. In this way, trading circuit breakers work a little like the circuit breakers in a house, which cut off electrical flow if it could cause an overload. The introduction of circuit breakers in trading came after Black Monday in 1987, when markets around the world crashed. Over the years following Black Monday, many exchange authorities decided that there should be regulations in place to stop markets from declining or rising too sharply in a short amount of time.

While not every market has circuit breakers in place, most have them in some capacity or another. The most common types of circuit breakers fit into one of two categories: Market-Wide Circuit Breakers or Single-Stock Circuit Breakers.

- **Market-Wide Circuit Breakers** (sometimes abbreviated as MWCBs, and sometimes referred to as Exchange-Wide Circuit Breakers) cause the entire market to halt or close if a market or index starts declining rapidly. Each market sets its own thresholds for triggering circuit breakers, and the percentages and halt lengths vary widely around the world. For example, in the US, if the S&P 500 drops past a 7% threshold (Level 1), the entire market shuts down for 15 minutes. If it then drops past a 13% threshold (Level 2), the market shuts down for another 15 minutes. If later that day the S&P 500 were to drop by 20%, the market would shut down for the rest of the trading. In Thailand, if the index falls by 10%, the market closes for 30 minutes. If it falls by 20%, it closes for an hour. These different levels of triggers are intended to help keep declining markets from going into freefall.

- **Single-Stock Circuit Breakers** are trading halts issued on one stock or security if its price fluctuates too rapidly. Many exchanges set trading bands around the price of a security, and any order placed outside of this trading band can cause a Single-Stock Circuit Breaker. For example, the London Stock Exchange places a 5-minute halt on orders that are 5% above or below the last automated book trade (so we would call that a 5% trading band). Among the exchanges that have single-stock circuit breakers, trading bands can be set for all stocks or determined by a security's sector or trading segment. Some exchanges reject outright orders that are too far outside a trading band. *(Please note that trading halts can be issued on securities for a plethora of reasons, such as the release of big news about a company or industry, a company's failure to meet listing requirements, or a business issue such as nonpayment of exchange fees. However, halts like these do not count as circuit breakers, which are halts triggered by price fluctuations, and they are beyond the scope of our discussion here.)*

Global exchanges vary greatly on which kind of circuit breakers they have, if they have any at all. Some markets have both market-wide and single-stock circuit breakers, while others have only one of the two. There are even markets with no specific circuit breaker regulations in place.

The differences between markets' circuit breaker rules do not end there. Once you know what kind of circuit breakers an exchange has in place, you should also find out whether they're **static** or **dynamic**. **Static** limits are determined at either the start of the trading day or the end of the previous day's trading. For example, in the US, the S&P 500's previous day's closing price is the price used to calculate the 7%, 13%, and 20% thresholds for the trading day. That initial number—the previous day's closing price—does not change throughout the trading day, so it is static. **Dynamic** limits change along with the price in real time, as in London's single-stock circuit breaker (mentioned above), which is a 5% trading band around the last automated book trade. As the price of the security changes, so do the upper and lower price limits.

As you may have noticed, it is almost impossible to discuss any hard and fast rules about circuit breakers, as the regulations differ so radically from market to market. There are a few other ways markets' circuit breaker rules vary:

- In several exchanges, such as the US's NYSE, Canada's TSX, and Brazil's BOVESPA, circuit breakers do not apply in the last 30-60 minutes of trading. If the index crosses the thresholds late in the day, trading continues as normal.

- Some exchanges allow each circuit breaker level to trigger only once (as in the US) whereas others can be triggered multiple times if trading remains volatile.

- Some markets hold volatility auctions after a single-stock trading halt to determine the new price of the halted security.

These are all elements to look up and keep in mind if you are trading in a new market. While if all goes well, you may never need to know an exchange's circuit breaker regulations, it's still handy to have an idea of the rules in place just in case the market ever gets too volatile. To help get you started, we offer a brief summary of each market's circuit breaker rules in the "Exchange Guides" section of this guide, starting on page 78.

Tick Size

In simplest terms, tick size is the smallest amount that the price of a security can move. While those are the simplest terms, an example is clearer: Euronext markets (Belgium, France, the Netherlands, and Portugal) have a tick size of EUR 0.01. That is, the minimum amount a security's price can change on Euronext Paris is 1 cent. If a price is at EUR 10.12, you can't post at 10.115; the exchange will only allow movements of 1 cent, so you'd have to post at 10.11. On the surface, this seems pretty straightforward, but of course global exchanges can make even the simplest things feel labyrinthine. In this chapter, our goal is to provide a basic understanding of how tick sizes work across various markets.

Our goal is to provide a basic understanding of how tick sizes work across various markets.

Tick sizes are set by exchanges, and come in two flavors: **static** and **dynamic**. (These terms are probably familiar to you if you've read our chapters on auctions or on circuit breakers—the trading world loves separating things into "static" and "dynamic!") **Static** tick sizes are a fixed amount, regardless of the price of the security. The Euronext tick size in our example above is static—no matter the price of the security, the tick size is EUR 0.01. Other examples of markets with static tick sizes include Brazil, South Africa, and the US.

Dynamic tick sizes change based on the price of the security. Usually, the higher the price of a security, the higher the tick size. As an example, let's look at the price and tick size table from our exchange guide for Hungary (also found on page 102). The tick size in Hungary is technically dynamic, but very simple: if the price of a security is less than HUF 2000, the tick size is 1; HUF 1 is the smallest amount by which you can change the price. If the security costs more than HUF 2000, the tick size increases to 5.

Price	Tick Size
< 2000	1
> 2000	5

Now that you're more comfortable with the concept of dynamic tick sizes, let's look at a slightly more common price and tick size table, from our Italy exchange guide (page 110). The values are different (more prices and tick sizes, and the tick sizes are a lot smaller on the low-priced securities), but by now it should make some sense: if the price of a security is less than EUR 0.25, the tick size is relatively small: 0.0001 cent; if greater than EUR 50, the tick size is 1 cent.

Price	Tick Size
Up to 0.25	0.0001
0.2501-1	0.0005
1.0001-2	0.001
2.0001-5	0.0025
5.0001-50	0.005
> 50	0.01

Dynamic tick sizes are more common across global exchanges than static ones. If you're curious about any one exchange in particular, you can find price and tick size information on each of our exchange guides, starting on page 78.

Easily the most confusing piece of information about tick sizes is that in many exchanges, the tick size—static or dynamic—is not consistent across segments, indices, or different types of securities. Futures and ETFs also frequently have different tick sizes from single-stock securities. Different segments can also have different tick size rules; an example is in London, whose chart is below (and also found on page 145).

LN	Price	Tick Size
LN	0	0.01
LN	10	0.25
LN	500	0.5
LN	1000	1
LN_EURO	0	0.0001
LN_EURO	0.1	0.0025
LN_EURO	5	0.005
LN_EURO	10	0.01
LN_SET1	0	0.0001
LN_SET1	0.5	0.0005
LN_SET1	1	0.001
LN_SET1	5	0.005
LN_SET1	10	0.1
LN_SET1	50	0.5
LN_SET1	100	1
LN_SET1	500	5
LN_SET1	1000	10
LN_USD	0	0.01

Most securities on the exchange follow the basic ("LN" on the chart) price and tick size rules. However, different segments and trades can have different tick size rules. Notice that trades conducted on the exchange in Euros and in US dollars have different tick sizes, even though they're on the same exchange as other securities. The London Stock Exchange separates some securities into segments, some of which have their own tick size rules. We've included SET1 on this chart because it is a heavily-traded segment; there are other segments on the exchange as well.

Similarly, on some exchanges, different indices can have different tick size rules, such as in South Korea's KRX, where KOSPI and KOSDAQ have slightly different tick size rules. Some global markets even have different tick sizes based on whether you're trading in the electronic or non-electronic system. MTFs, for the most part, follow the main exchange's tick size rules for a security.

You may be asking yourself, why do markets go through all these complicated rules and regulations? What's the point of setting tick sizes? Well, competition for pricing would be complicated and intense if there were no tick size rules; you could out-price someone by one millionth of a cent, and they could react by changing their price to two millionths of a cent, and so on, until the pricing resembles children on a playground arguing that they have "infinity plus one!" more toys than the other kids.

There is talk among global markets of simplifying tick size rules; it has been mentioned that European exchanges may someday have consistent tick size rules across all Euro-zone markets. Other exchanges weigh the pros and cons of implementing more "granular" (smaller) tick sizes, which may increase market efficiency and encourages high frequency trading, but may also drive out non-HFT participants. Whatever direction tick size rules go, we'll be sure to follow—and keep you updated in the process.

Dark Pools

Willie Sutton famously robbed banks because "that is where the money is." In a parallel vein, traders need to care about dark pools because that is where the liquidity is.

Three types of venues allow you to automatically execute trades: traditional exchanges (like NYSE, LSE, or HKEX), exchange alternatives like Electronic Communication Networks (ECNs) and the light European Multilateral Trading Facilities (MTFs), and dark pools.

In a nutshell, dark pools are trading venues that allow traders access to anonymous liquidity, do not publish quotes, and do all prints at or better than the NBBO of the primary market. While orders placed in dark pools are secret, prints generally go immediately to the tape and are not secret. Depending on the regulatory framework, the prints on the tape may or may not be attributed to a specific dark pool.

To make this all more confusing, many lit exchanges now offer dark orders as well. These orders are a natural evolution of exchange reserve orders. But now, instead of showing one board lot, you can show nothing at all. The benefit of using exchange dark over dark pool orders is that you get to interact with light orders. This is a mixed blessing. If you're vacillating between the two, use both to access the most liquidity.

One useful way of viewing the dark pool universe is by who owns them:

- Consortium-owned dark pools (e.g. Level)
- Large-bank-owned (e.g. Goldman/Sigma and CS/Crossfinder)
- Market makers (e.g. KCG)
- Independent/agency firms (e.g. ConvergEx* and ITG)

You will find that the execution characteristics of these types of dark pools are largely consistent with the mission of their owners.

Almost all pools fall into a category known as "streaming" dark pools, where the average execution size is a few hundred shares or less. In contrast, dark pools like POSIT and Liquidnet in the US are designed to attract block orders.

All of the different flavors of dark pools evolved over time, and regulations have had to evolve with them. The first successful dark pool, POSIT, was created in the US in 1987 as an anonymous alternative to upstairs block trading. Many dark pool ideas were tried under a variety of regulatory regimes until finally the US's SEC introduced Reg ATS (Alternative Trading System) to formalize the rules under which dark pools operated. Dark pool trading has expanded around the world since then, leading the European Union to introduce parallel regulation with MiFID (Markets in Financial Instruments Directive) in 2004.

* ConvergEx Group companies do not engage in market making or investment banking, but may operate in a riskless principal and/or net trading capacity as well as in an agency capacity. In connection with certain ETF transactions requested by clients, ConvergEx Execution Solutions may act as a principal or engage in hedging strategies in connection with such transactions.

Dark interactions account for about 20% of trading in the US, around 10% in Europe and about 2% in the Asia-Pacific region, and have been on the rise in recent years. Despite the increase in dark pool trading, the number of dark pools is stagnating—at least in the US. With 30+ dark pools already running, the US doesn't need another one. Indeed, several US dark pools are essentially out of business. No recently-introduced pool not tied to a large bank (which can provide resident flow and market making) has gotten any traction. Meanwhile, in Europe and the Asia-Pacific region, the field will undoubtedly grow even as many pools continue to flounder.

The bottom line: if your orders demand a high portion of the available liquidity or if your orders have a lot of short term alpha, then you will benefit from leveraging dark pools. You have the information advantage that dark pools can help you maintain as long as possible.

Be aware that leakage can occur even in the dark. Dark pools offer less leakage than light reserve orders, and the other side has to trade to learn anything… but that is not the same as no leakage. How does it happen? Let's first review how leakage happens in light markets:

- In the old days of trading, there were no reserve orders. If you wanted to trade size, you had to display an appalling look at your own hand.
- With the advent of reserve orders, this got better. You wanted to buy 250k, but you only had to show 100 shares. The size you chose to show became an element of gamesmanship.
- However, people soon learned to read the tape while watching the montage display. *For example, if only 100 shares showed at the bid, but when you hit it again and again and it never changed, you could be near certain that somebody had a large reserve order parked there.*

Dark Pools have no quote display, but they are still subject to the same intelligence finding by anyone willing to trade. If every time you send an order to a dark pool, you get filled immediately, you can be pretty sure that there is a large resting order there in size. Small orders intended to ferret out hidden liquidity are known as pings.

Be aware of gaming in the dark pools. The nature of dark-pool derived prices makes them a very fat target. For example, if Evil Bob correctly guesses that there is a large resting mid-cap order to buy in a dark pool, he can buy 2000 shares in the light market, spike the price up and short the resting dark order 10k shares at the stupid high price. He can then cover the short in the open market 10 minutes later. By the way, pegging orders in the lit market have exactly the same weakness, which is why they are the favorite target of day traders everywhere. Your best defense: use tight limit prices.

Owners of quality dark pools spend a lot of effort on anti-gaming and on limiting abuse. Good dark pools police the participants (systematic short term price reversion is a sure sign of gaming), and a good dark pool will let you decide what kinds of participants you want to play with.

One final word of caution: dark trading in highly volatile markets will remind you of the meaning of adverse selection. If you are buying and the markets are falling, you will be filled immediately at the high prices before the market drops. If you are selling, you will not be filled at all and you will get to sell later at a horrible price.

Many brokers provide direct access to their own dark pool. Some provide direct connects to a few others. However, no dark pool has more than a small percent of the total market liquidity. It is dangerous and ineffective to post in only one pool.

One of the best ways to trade in the dark is to use a dark aggregation tool. Think of it as a smart router for the dark. A good tool will let you get to many pools at once. A great tool will give you transparency into where it is finding liquidity and full control over just how it operates. A strong dark aggregation tool puts strict, ever-evolving limit prices on any order it puts into the market. It will make sure that no one dark pool has very much of the order and it will allow the trader to set a minimum dark fill to 200 shares or more.

Meanwhile, pretty much every algorithm from every major vendor touches the dark now. To the algos, dark pools are just one more place to fish for liquidity. Beyond that are what are labeled "dark themed" algos, for want of a better name. These algos either trade exclusively in the dark or, at a minimum, do as much as possible before they resort to the light markets. The performance of these algos is all over the map. TCA is ultimately your best guide to quality.

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Dark Liquidity in Europe

Now that you know the gory details of trading in the dark from our chapter on dark pools, let's narrow our focus to discuss dark liquidity in Europe. While interest in dark pools originated in the US, dark liquidity is on the rise across Europe. In fact, dark pool trades in Europe hit a record high at the beginning of this year, coming in around 10% of market volume.

Dark pool trades in Europe hit a record high at the beginning of this year.

Before we get into the major categories of dark liquidity in Europe, we should talk a bit about Broker Crossing Networks. **Broker Crossing Networks,** or BCNs (sometimes called BCSs), are firms' internal dark pools, such as Deutsche Bank's SuperX. Currently, these are the heavyweights of dark liquidity in Europe. Like dark pools in the United States, BCNs use the listed market NBBO quote to determine the prices at which they can execute. Buying and selling liquidity in a BCN will not directly move the public quote, and orders execute anonymously. Typically, a firm's dark algorithms and dark aggregation tools turn to their BCNs for liquidity first.

This is a little painful, but stay with us. MiFID created three major categories of dark liquidity in Europe:

- Systematic Internalisers (SIs)
- Multilateral Trading Facilities (MTFs)
- Exchange-run venues (or regulated markets)

MiFID regulations require BCNs to register as one of the first two categories. If BCNs provide customers with direct access to their dark pools instead of routing the orders for clients, MiFID rules state that the BCNs must register as an MTF—which we get to later. In contrast, if a firm in a BCN crosses its own clients' orders, or if it allows clients to execute trades in its own book, and regularly uses its own capital to make trades, it has to register as a systematic internaliser.

A **Systematic Internaliser,** or an SI, is a firm that often trades with its own capital, and executes clients' orders against its own book or against other clients. MiFID regulations treat SIs as small exchanges: they must follow pre- and post-trade transparency regulations. Like BCNs, they use the public quote to determine prices, but all trading is done in their private books; they don't post to an exchange. A few examples of SIs in Europe are Citigroup Global Markets, BNP Paribas, and Credit Suisse's Crossfinder. As with BCNs, MiFID has rules against SIs becoming too large: if a Systematic Internaliser becomes too big under MiFID standards, it must go on to register as an MTF.

We touched on the subject of **Multilateral Trading Facilities,** or MTFs, in our Dark Pools chapter, and you'll find more about them in the Trading in Consolidated Markets chapter. But for the sake of finding dark liquidity in Europe, it is useful to know a few things about MTFs. MTFs are required to display quotes, and, like SIs, are held to pre- and post-trade transparency rules. They use the primary exchange's opening price to

set prices at the start of the day, but throughout the day, trades do not have to execute within the primary exchange's best quotes. Many MTFs, including Chi-X Europe, BATS Europe, and Turquoise, operate an integrated book and a separate dark book. People seeking dark liquidity will find advantages to both: posting only in dark books allows you to place orders completely anonymously, and there is no size restriction on your order. Integrated books allow you to access both displayed and non-displayed liquidity, so you can get the best of both worlds, and you can use a hidden order type to interact anonymously. However, hidden order types often have a minimum order requirement. Some examples of MTFs with dark books are Chi-X's Chi-Delta, Turquoise Dark, BATS Dark, Goldman Sigma X MTF, and Euronext Smartpool.

Venue	Type
CS Crossfinder	SI
Goldman Sachs Sigma X	MTF
Deutsche Bank SuperX	BCN
CitiGroup Global Markets	SI
Chi-X Chi-Delta	MTF
UBS MTF	MTF
ITG POSIT	MTF
BATS Dark	MTF
Turquoise Dark	MTF
Liquidnet Negotiation	MTF
Nomura NX	MTF
Euronext Smartpool	MTF
Instinet BlockMatch	MTF
SLS (SIX Swiss/Liquidnet)	Exchange-run
Xetra MidPoint	Exchange-run
ICAP BlockCross	MTF
Nordic@Mid	Exchange-run

Finally, outside the whole BCN-SI-MTF continuum, we have **exchange-run venues,** venues run by regulated markets. Some exchanges run their own dark venues where the book is closed and orders are anonymous and matched at the mid. This category will sound especially strange to people used to dark trading in the US, where exchanges are not permitted to run dark pools. Xetra Midpoint, Nordic@Mid, and SLS (SIX Swiss Exchange Liquidnet Service) are all exchange-run dark venues. At the time of this writing, exchange-run venues account for a very small portion of overall market volume; combined, they make up less than .05%. In addition to exchange-run dark venues, many lit exchanges can also offer anonymous access to liquidity through hidden order types. Hidden order types allow you to send completely hidden orders to the exchange order book without displaying either price or volume to other participants. They interact both with displayed orders and other hidden orders on the order book. The only catch is that under MiFID, hidden orders must be "large in scale." "Large in scale" is a criterion based on a stock's average daily turnover, and ranges from stock to stock. It can range as widely as EUR 50,000 to EUR 500,000 depending on the stock.

The table above shows the major dark venues in Europe by type.

Hidden order types are helpful for accessing dark liquidity on lit exchanges, but what kinds of order types should you use in dark venues? Order types in European dark pools are generally the same as what you would use elsewhere, with pegged orders being especially popular. While pegged orders are supported in almost all dark venues, some only support midpoint pegging, while others allow you peg to the mid, bid, or offer, so be sure you know the regulations of your specific dark pool of choice.

When you've executed orders in dark pools, how can you find the prints on the tape?

As you can see in our Auto Volume chapter, we discuss which kinds of orders go on the tape and how varied exchanges across the world are in their reporting of different kinds of prints. In the US, dark volume is generally considered Auto Volume, so we can find it there. In Europe, there is no consistent rule as to how to classify dark executions on the tape. Hidden orders at exchanges in Europe are generally reported as Auto Volume. MTFs like Chi-X Europe, BATS Europe, and Turquoise flag orders executed in their dark books with a dark trade print condition, and count all dark volume as Auto Volume. Exchange-run venues publish their dark volume as midpoint dark trade conditions, but they do not consider dark volume to be Auto Volume; they count it as "irregular" volume. Finding dark trades on the tape can be a subtle art, but it will inevitably become easier to figure out as dark trading becomes more popular in European exchanges.

Dark liquidity in Europe is still in its infancy, but it already accounts for a substantial amount of average daily volume. **As the volume in European dark venues increases, we're likely to see more regulation in the future.** The face of dark trading will change as MiFID II comes into effect. The buy-side is becoming savvier about using dark liquidity, and more demanding in their use of it—this too will drive necessary change.

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Dark Liquidity in the Asia-Pacific Region

The advantages to dark trading in the Asia-Pacific region are the same as in other parts of the world: it allows you to access liquidity without displaying your hand to the market. Trading in the dark often means opportunities for price improvement, and you can work large orders there without the risk of other parties seeing what you're doing. This is especially valuable in Asia-Pacific markets, where liquidity is sometimes scarce. While these markets have been a little slower to warm to dark interactions than the US and European markets, the trend is growing. Dark liquidity accounts for about 2% of trading in the Asia-Pacific region now, and that percentage will probably rise over the next few years.

Remember Broker Crossing Networks, or BCNs, from our chapter on Dark Liquidity in Europe? The vast majority of dark trading in Asia-Pacific markets is also done on BCNs. Some examples include Credit Suisse's Crossfinder, Morgan Stanley's MS POOL, and UBS's dark venue. BCNs' popularity is on the rise in Asia-Pacific trading, and many traders find that the most convenient way to access many of those BCNs at once is through dark aggregators (which you may remember from the Dark Pools chapter).

The vast majority of dark trading in Asia-Pacific markets is done on BCNs.

One of the main reasons that most dark interactions take place in BCNs is that the Asia-Pacific region lacks the large offering of dark venues that we see in the US or in Europe. Asia-Pacific markets are more cautious about new dark offerings, which is why dark trading has been adopted there slowly and why dark volumes are typically rather low. In fact, Chi-X's Chi-East closed early in 2012 because its trading volumes failed to meet expectations.

Chi-East opened in 2010 as a joint venture between Chi-X Global and Singapore's SGX. It was the only non-broker pan-Asian dark venue, and the only non-BCN to provide access to dark liquidity in Hong Kong and Singapore. Unfortunately, while global trading volumes have been on the rise, that rise was slower than Chi-East was counting on, and Chi-East representatives cited lower-than-expected trading volumes as the reason for its closure in May of 2012.

Now that Chi-East is no longer a contender, dark venues outside of BCNs are hard to come by in the Asia-Pacific region. Australia's ASX has an exchange-run dark venue called CentrePoint, and… well, as of this writing, that's pretty much it for non-broker dark pools in the Asia-Pacific region. You can access alternative liquidity through Chi-X Australia and Chi-X Japan. Though these venues are lit, they do provide non-exchange-based liquidity, and Chi-X Australia even offers a hidden order type. In Japan, alternative trading systems (ATSs) like Chi-X Japan and SBI Japannext are known as Proprietary Trading Systems, or PTSs. These resemble Europe's SIs and MTFs, and though they are all lit venues, they do offer Iceberg and MaxFloor order types. They are becoming increasingly popular; for example, market-maker Getco has been trading on both Chi-X Japan and SBI Japannext PTS, raising the volume traded on each.

Large dark venues that serve multiple markets are going to be slow to emerge in the Asia-Pacific region, as the market structures and regulations in Asia-Pacific countries vary much more dramatically from nation to nation than in the US and Europe. Chi-East's closure will likely deter other dark pools from opening for the time being. However, with dark liquidity's increase in popularity over the past few years in other markets, we hope to see more options and more convenience for traders looking for dark liquidity in the Asia-Pacific region.

Auto Volume

"Auto Volume" belongs in the category of "shouldn't the world have figured this out already?" Unfortunately, the world hasn't, but understanding the concept of Auto Volume is vital for effective global trading.

Traders know that the difficulty of executing an order is primarily driven by the size of the order relative to the available market liquidity. An order demanding 4% of the available liquidity is easily handled, whereas managing an order that demands 40% of the available liquidity is extremely challenging. But what exactly is the "available liquidity?" In many global markets, looking at raw ADV (average daily volume) figures can be misleading. Not every print on the tape represents a genuine opportunity to trade. So how can you tell what volume to track on an exchange? What volume counts? What doesn't?

Auto Volume is comprised of prints that an electronic trader (DMA or algo) has a chance of interacting with on an exchange.

Enter what is called "automatically executed electronic volume," or Auto Volume for short. Auto Volume is comprised of the prints that an electronic trader (DMA or algo) has a chance of interacting with on an exchange. Please remember this simple definition, because the "how sausage is made" side of this story is a bit ugly.

Before we get into the ugly bit, let's review some kinds of prints that don't belong in the Auto Volume camp. Big block crosses done away from the market (upstairs prints), trading corrections, and hold-over trades from yesterday's post-market are not part of the liquidity available for an electronic order and are therefore not part of the Auto Volume.

Exchanges recognize that not all prints are created equal, so they've created "print condition codes" and the notion of regular/irregular print indicators. You see these codes and indicators on any proper "time and sales" tape display. Most irregular prints come from some process other than the normal continuous/open/close auctions. Ideally, Auto Volume would be the simple aggregate of all the regular trades. And in a perfect world, the print condition codes would be clear and consistent across all exchanges and markets. But in practice, print condition codes are a mess of conflicting systems. Israel has fewer than 10 print condition codes while Australia has over 100. Some exchanges have a very rigorous and commonsensical approach to flagging trades as irregular; others label every trade as regular.

In Mexico, Hungary, and Japan's JASDAQ, all trade conditions are considered automatic trades. On the other hand, London and Australia have so many different trade conditions that it's hard to tell if anything is regular. MTFs don't have irregular volume, so all is Auto Volume. In the US, dark pools are considered regular, and it's mostly errors that are out. Auctions are almost always part of Auto Volume. New Zealand excludes international marriage but includes ordinary and off-market marriage. Married trades are essentially

cross trades, but certain other cross trades are excluded while still others are included. In Singapore, married trades are also excluded while auction, buy-in, and unit share trades are included. In London and Johannesburg, cross and block trades are excluded, and automatic and auction trades are included.

Exchange	Auto Volume as a percent of Total Volume
Irish Stock Exchange	32.24%
London International Order Book	63.17%
London Stock Exchange	87.85%
Tokyo Stock Exchange	88.52%
Australia Stock Exchange	94.91%
New Zealand Stock Exchange	95.07%
Hong Kong Stock Exchange	96.79%
Spanish Stock Exchange	96.80%
Oslo Stock Exchange	98.44%
Korea Stock Exchange	98.63%
Johannesburg Stock Exchange	98.72%
KOSDAQ	98.89%
Euronext	95.69%
Brazil Stock Exchange	99.87%
Chi-X Europe	100.00%
BATS Europe	100.00%
Turquoise	100.00%
Mexico Stock Exchange	100.00%
Canada Venture	100.00%
Osaka	100.00%
JASDAQ	100.00%

Dizzy yet? There's more: Exchanges provide lots of different volume measures. Examples include session, order-book, off-book, uncrossing, block, and trade volumes. Some of these come very close to the spirit of Auto Volume, but every exchange makes up what trade conditions are regular and what aren't.

For the sake of consistency, the real distinction between what is and isn't Auto Volume is made by data vendors and/or algo providers. Market data vendors like Bloomberg examine the conditions and decide what to include or exclude when it comes to Auto Volume. Bloomberg is considered the industry standard for providing Auto Volume… mostly because it's the only data vendor that does. Others (like Reuters and NYSE Euronext) are working on similar functionality. While they try to be consistent with their rules across markets, vendors and algo providers aren't always consistent with each other. So if you compare Bloomberg with another vendor, or two algo providers, you may find that they don't agree on whether certain trades belong in the Auto Volume category.

The table at left provides some sense of how big the discrepancies can be between apparent market volume and real available liquidity.

No discussion of available liquidity and Auto Volume would be complete without mentioning the need for a consolidated view. In the US, liquidity is available at fifteen exchanges and more than thirty dark pools. The notion of primary exchange volume is dead. In Europe, it's getting there. In many names, the MTF volume is just as important as the volume from primary exchanges.

Getting Auto Volume right is just as important for algo trading as it is for conventional DMA trading. The number one global algo mess-up is probably weak POV (percentage of volume) algos that chase the wrong volume. These weak POV algos tailgate block

crosses creating impressive market impact. They trade in the wrong places and trade too slowly because they ignore off-primary exchange volume. Other algos are not immune either. For example, in Initiation Price algos, the number one driver of order trading rate is the available liquidity (now and available until the end of the order). Getting Auto Volume right is essential.

ConvergEx has spent a huge amount of time and effort getting Auto Volume right for all the global markets in which we trade. Our customers tell us that it shows up in the quality of our algos and our trading performance—no foolish chasing of chimera volume; no ignoring valuable liquidity. Many days, knowing exactly what, when, and where meaningful liquidity is available seems like half the battle in delivering high performance global algorithmic trading results.

TCA Benchmarks

TCA (Trading Cost Analytics) enjoys roughly the same popularity among traders as Brussels sprouts among preschoolers—a few fans do exist, but they have to keep their preferences quiet if they want to be invited to all the right parties.

As traders, we all know why we are *supposed* to embrace TCA:

- Bad trading creates slippage. Slippage destroys alpha. Alpha is the lifeblood of investment.
- Our job is to deliver execution quality; we shouldn't be against measuring it.
- Best Execution is a fiduciary duty just about everywhere in the world.
- We all want to learn from our successes and failures.

However, we also know that TCA in the real world has some real practical problems:

- Traders' trading costs are as much driven by the orders they get as by their skills. Small VWAP orders for a large cap American stock are quite different from large Hong Kong orders in names that trade by appointment.
- Luck, good and bad, colors almost every order. (Often, the answer to the question "Why did you crush VWAP today?" is "Because we were buying, not selling.")
- Order-to-order variability in trading results is so high that drawing meaningful conclusions from data is a real trick.
- There is always *someone* trying to draw convenient conclusions from too-slim data.

For better or worse, TCA is here to stay. Trading Cost Analytics will become an increasingly important reference point for anybody who trades. The challenge is to make TCA as practical and valuable as possible.

To use TCA effectively, you should to pick a benchmark or combination of benchmarks by which to measure your trading performance. So which TCA benchmark(s) do you want to use?

- Historically, the most popular benchmark has been **Full Day VWAP (Volume Weighted Average Price).** It is probably still the most widely used measure, and it has wonderful face validity: did you buy for less or sell for more than the average trader today? VWAP offers the substantial joy of subtracting out market movements from the reference price.

  However, there are three main problems with full day VWAP. They are:

  - **Annoying:** Which prints should we include in defining the market average price? Large arranged crosses? Probably not. MTF trades? Probably so. The answers vary by vendor.
  - **Troubling:** When, during the trading day, should we start and stop calculating market average price? Using full-day VWAP is an expedient answer, but not a compelling one.

- **Fundamental:** Trading in size moves the market average price. In fact, some trading styles deliver strong VWAP performance by magnifying market impact—pretty much the opposite of what we're trying to achieve.

Debates over the duration question (above, under "Troubling") have spawned three different alternative VWAP answers:

- Interval VWAP: measures the market VWAP from when the trader got the order until she finished. If ending an order before the close is the trader's decision, this measure is kind of hard to defend.
- Available VWAP: measures from the time order was received until the end of the trading day. If you are just measuring traders as opposed to the investment process, this measure offers a substantial upgrade in defensibility.
- PWP (Participation Weighted Price) is the high-water mark for VWAP benchmarking. The benchmark period begins when the trader gets the order and ends when the market has done enough volume to trade the order several times over. *For example,* if the reference participation rate is 20% and the order is for 40,000 shares, then the benchmark period ends when the market has done 200,000 shares since order origination (40,000 / 0.2). The huge strength of PWP is that it primarily solves the "Fundamental" problem above, burying market impact. Study after study finds that market impact is largely a function of the portion of market volume an order consumes. By setting a reference participation rate for PWP calculations, an organization effectively accepts an implicit optimal market impact. The right reference POV rate is somewhere near 20% for organizations with high short-term alpha trades and more like 3% for organizations with long-term strategies. The Reversion measure discussed below is invaluable for optimizing the choice of reference POV rate.

- The popular non-VWAP benchmark is IP (Initiation Price or Arrival Price), the mid-point of the market just before the order began trading. (The initiation price of an order initiated at/before the open is the previous trading day's closing price.) The compelling benefit of the IP benchmark is that the order cannot affect the reference price. IP is prized for its purity over VWAP, but that purity has its price: the IP benchmark yields far more variability in results than the VWAP benchmark.

- Benchmarking against the Opening Price has strong face validity. However, if the order is large and participates in size at the open, the market impact of the order gets buried. This is probably the most game-able benchmark for large orders. Using the Previous Night's Close is often a better choice.

- Benchmarking against the Closing Price enjoys wide currency for the simple reason that the closing price serves as a reference price for publically traded managed portfolios (unit trusts, mutual funds, etc). In markets that offer MOC

(Market on Close) orders, this benchmark is easy to achieve, but nonetheless problematic. Huge orders into the close will get the closing price, but by almost any other measure, those orders will look horrible.

- **Reversion** is the final benchmark that deserves your attention. It measures your order's average or last price against the market price of the stock after your order is done participating in the market. Usually, 15 or 30-minute periods are used in these calculations (substituting the next day's open if the order went to the end of the day). The interpretation of Reversion is straightforward: if, when you are buying, the market price of your stocks routinely drops after you finish trading, slow down. If the market price routinely continues to rocket, speed up. Reversion is typically measured against both the average price and last fill price of an order.

People make strong arguments for using different benchmarks in different markets. These arguments usually boil down to avoiding doing something market-inappropriate in pursuit of a given benchmark. Two classic examples:

1. Leaning hard against the Closing Price benchmark in thin stocks in markets that have no closing auction is asking for trouble.
2. VWAP benchmarks invite trading confusion in many Asia-Pacific markets where order queues are hours deep and 80% of the day's volume is done in a few very short trading volume spikes. A US-style VWAP volume slicer algo isn't going to get the job done.

In neither case is the benchmark inherently wrong, but the benchmark does invite mischief.

For the most part, the war over the choice of benchmarks is over. We no longer have to suffer the battles between "VWAP monkeys" and "IP propeller heads." **IP** and **PWP** have both won. We know of no case where the two different measures, applied rigorously, paint a substantially different picture of the relative performance of brokers, trading strategies, algos, or individual traders. (If you know of one, please contact us. Our quants would love to dissect the trades with you.) Meanwhile, measuring against the close is inherently problematic, and that problem is not going away as long as unit trusts exist.

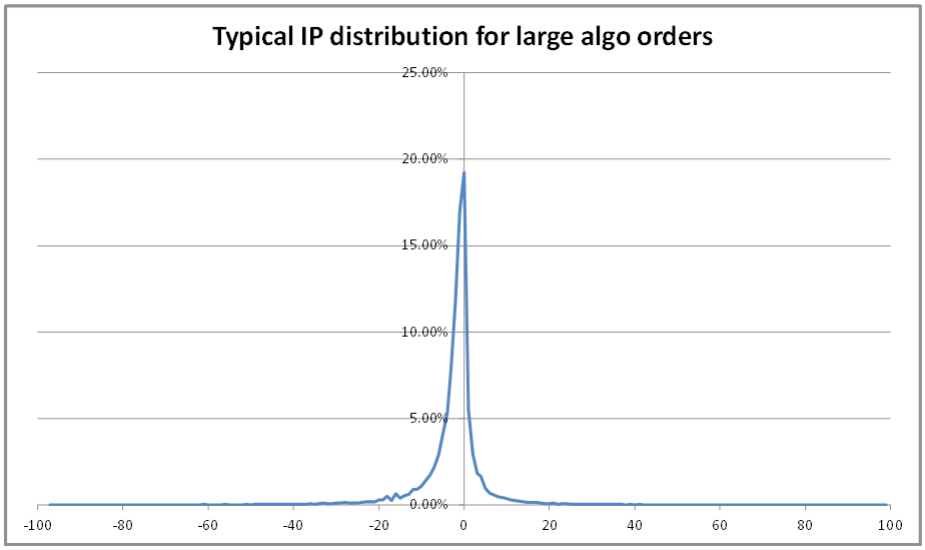
Choosing the right TCA Benchmark for your trade is only the beginning of using TCA effectively. See our next chapter, "Retrospective and Real-Time Uses of TCA," for more insight into how—and why—to make TCA work for you.

Retrospective and Real-Time Uses of TCA

After reading our TCA Benchmarks minefield chapter, you probably know what benchmark you prefer. With that out of the way, it is time to actually use TCA. As far as we're concerned, there are two main uses:

- Retrospective: How well did you/your brokers/your traders/the tools you use trade, and what does that say about how you can trade better in the future?
- Today: How can TCA help you with your trade blotter, right now?

Let's start with **Retrospective.** As you look at a TCA report for one quarter, the first thing that you'll notice is the high volatility in trading performance. The graph below, from a typical quarter, depicts all US domestic algo trades with over 10k shares filled. Extreme results range from losing about 100 bps to gaining about 100 bps. On average, performance was about -2 bps, and the standard deviation of performance was about 7 bps. *(Please note: this is for executed shares only. This data includes limit orders and dark orders where performance on executed shares tends to be quite strong.)*



Source: ConvergEx internal data: USA desk-algo trading H1-2012, size > 10k shares, ADV > 100k

As broad as this distribution appears, it actually quite narrow for a typical multiple-approach global trading operation. The US is a comparatively predictable place. Algo trading yields tighter (but not necessarily better) performance results than DMA trading.

Suppose that Broker A appears to be 1 bps better than Broker B in the quarterly report. Is that luck or skill? Unfortunately, you would need each broker to have done at least 300 trades before you could safely come to a conclusion. If you have an internal TCA group or an external TCA vender, insist that all results/conclusion come with "confidence" statistics. This isn't the time or place for going into these measures, but confidence statistics are easy to interpret and invaluable if your TCA supplier takes the time to create and explain them.

Speaking of variability, here is the most important word in TCA: **Winsorising.** Haven't heard of it? It comes from statistician Charles P. Winsor (1895-1951). A quick visit to Wikipedia gives you the following definition:

> **Winsorising:** *The transformation of statistics by limiting extreme values in the statistical data to reduce the effect of possibly spurious outliers*

The need to Winsorise trading results becomes quickly apparent to anyone who cares about measuring trading performance. For example, a trader with a full day order to buy on a stock that suddenly gaps up on huge volume with 45 minutes to go in the trading day is going to look like a genius, having bought 80% of the order at the day's lows. A trader selling that same stock is going to look like an idiot. If you don't Winsorise these sorts of trades, the fat tails of trading will unfairly color your results. The challenge is to keep the process rigorous so that you don't end up throwing out trades to make the results more flattering.

Some firms use retrospective TCA just to satisfy their Best Ex committee. Other firms, on the other hand, use it as a core tool for trading management: driving their broker choices, limiting the list of algorithms available to its traders, defining trader operational latitude, setting trader compensation, and guiding trader tenure. In our experience, as long as the traders involved see the process as disciplined, fair, and transparent, you are ahead of the game. If your firm is not there yet, our advice is to talk to the buyside firms famous for using TCA well. See how they built it into their culture and how they deal with the inevitable conflicts.

Peer information lets you know how your brokers, algos, and traders compare to their counterparts in other organizations.

The reality is that for a firm doing only a few dozen trades per day, TCA is hard to use meaningfully, as there isn't enough data to support valuable conclusion. At best, you get a sense of how your firm's trading stacks up in aggregate to other comparable firms. More trading—and therefore more data—means more robust, valuable conclusions, such as which broker serves you best, which algos work well under what circumstances, whether traders err on the side of trading too passively or aggressively, if your firm's triage/assignment process is getting the right orders to the right traders and whether those traders give the most important orders the attention they deserve. We could go on; there are many such questions TCA can help you answer.

Should you do the TCA internally or with an external vendor? The best argument for using a popular external TCA vendor is access to peer data. To some extent, every firm's orders are unique; direct comparison to other firms' results is bound to be misleading. A firm routinely trading large orders relative to ADV is going to have much higher reported trading costs than a firm that plays small. However, a competent TCA provider can adjust for these differences. Peer information lets you know how your brokers, algos, and traders compare to their counterparts in other organizations. It is nice to know if you

are at the top of the heap, and it is invaluable to know if you are not. If somebody else enjoys substantially better performance in equivalent circumstances, you have every motivation to look for better trading answers.

Quarterly TCA reports are all well and good. However, TCA's role in day-to-day trading is a far more compelling topic for most traders. They want today's, not just retrospective, information. To borrow from Teddy Roosevelt, they are the men and women in the arena:

> *It is not the critic who counts; not the man who points out how the strong man stumbles, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood; who strives valiantly; who errs, who comes short again and again, because there is no effort without error and shortcoming; but who does actually strive to do the deeds; who knows great enthusiasms, the great devotions; who spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement, and who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who neither know victory nor defeat.*

You are in the arena; how can real-time TCA help?

The simplest, most powerful use of real-time TCA is helping a busy trader add the most possible value to a too-long trade blotter. Studies show that a competent trader can trade three names really well; a great trader can trade ten names really well. If you have 30-100 orders in your blotter, it is essential to pick the right names to focus on. A decent EMS with embedded TCA makes it easy to screen for the difficult orders right in the blotter. Once trading begins, in our experience, just seven numbers can tell 90% of the story. Here are our favorite seven:

- Average price
- Market VWAP
- Last price
- Market POV rate on filled shares
- Estimated market POV required to complete by the end of the day
- IP performance on realized profit
- IP performance on unrealized profit

From this summary, the orders demanding your attention are readily apparent. The point is not that these are the be-all-and-end-all seven measures, but that basic TCA tools and a few well-chosen measures can greatly enhance trader productivity.

The sky is the limit for the other end of the spectrum. The challenge is to get all the information traders need to understand and manage their trades. *This "trade intel" snapshot illustrates the possibilities:*

Let's say you've put in a buy order with ConvergEx's Abraxas[SM] algorithm. The uppermost chart on the trade intel page shows what the stock was doing up to 10 minutes before you entered the order into the algo (represented by the vertical line at 10:40 am that appears in all charts). It clearly defines where you put your limit (the red zone) and your IWould price (green zone). The chart also shows the market VWAP (yellow line, adjusted for your limit price) and your average price (the light blue line).

The middle chart depicts when the algo traded and how many shares traded every minute. Using the limit-adjusted market volume and the shares traded by the algo, it shows a real-time POV rate (the red dotted line). Now you can see when the algo sped up or slowed down based on price movements in the stock. The bottom chart shows the market volume adjusted for your limit price.

So, from a quick look at that trade intel page, you can see that the price hit your IWould after 11 am, at which point the algo aggressively bought shares. The stock then rallied beyond your limit price. You also see that the algo is currently beating VWAP and that currently you are 40% of the total volume.

Finally, after the trade is complete, the trade intel page will print an additional 10 minutes of data so that you can see what affect you had on the stock while the algo was trading. This page not only provides many points of valuable information during trading, but continues to help after you've finished.

TCA is a hot topic these days, with many angles to consider and discuss. Rather than rambling on until your eyes glaze over, we end this chapter with our answers to a quick list of **Frequently Asked Questions:**

- **TCA numbers never seem to be consistent across vendors. Why do two different vendors disagree? Why does neither agree with Bloomberg? Who's right?**

  While Bloomberg is the standard for most people, other vendors may have different opinions and numbers and not necessarily be wrong. For instance, one vendor may include trades on MTFs in Europe while another doesn't. Neither would give you *wrong* information, but you'd get different numbers from each.

- **If I choose a VWAP benchmark, am I just shooting to be average?**

  The short answer is no, but it's a little more complicated than that. On average, good algos and buyside traders miss VWAP by about 1 bps (a bit more in thinner markets), which means that technically speaking, shooting for VWAP is shooting to be just above average. However, VWAP trading has its detractors as well as its proponents. We discussed the obvious problems with using a US-style VWAP algo in a "trade-by-appointment" market back in the "TCA Benchmarks" section. To VWAP's credit, there is evidence that introducing new traders to the VWAP benchmark is helpful: it focuses their minds on the bets they make as it drives out core mistakes like hugely overweighting the open or consistently waiting for reversion. Ultimately, the real behavioral problem with VWAP benchmark is for great traders. Experience suggests that it is very hard for even great traders not to lock in a small win relative to VWAP on a trade and move onto the next order. This benchmark game does not maximize traders' value.

- **How have ever-evolving market landscapes affected TCA?**

  Market fragmentation in Europe, the Asia-Pacific region, and Canada can cause TCA numbers to look different across different brokers (as we touched on above). Brokers have to create their own "consolidated tape" against which to compare their performance. Some brokers want to compare their performance only against

the primary exchange, others care about including MTFs and ATSs along with the primary exchange, and still others want to track their performance against all liquidity sources. Dark liquidity is becoming increasingly popular around the world—should dark liquidity appear in TCA numbers? How? The wide variance in liquidity sources and how clients want to count them forms one of the biggest challenges for TCA providers. Because markets are fragmented and sometimes confusing, real-time TCA is taking more of a center role.

A consolidated tape would eliminate gaps in data collection and provide more consistency.

- **Why doesn't TCA analysis cover ancillary costs such as settlement and margin fees?**

  Settlement costs range so broadly by broker and by market that they could skew results. And since you have to pay these costs no matter how you trade, results that incorporate them don't tell you anything useful about your trading decisions.

- **What are the big new themes, trends, and developments in TCA?**

  Real-time TCA and peer review, both of which we discussed earlier, are seeing increasing popularity in the TCA world. But perhaps one of the most important developments that TCA providers and users look forward to is consistency across TCA providers and numbers, the logistics of which will take quite a while yet to figure out.

ConvergEx Group

Transparency

In recent years, trader jargon has taken on a life of its own. The language of trading has shifted from basics like "hit the bid/take the offer" to terminology and buzzwords centering on nuanced concepts cloaked in plain language. (Which of the smartest among us can define "best execution" in less than one hundred words?)

"Transparency" has become one of the biggest, newest buzzwords in the trading world, and it has been tossed around by so many people in so many different ways that it's easy to lose track of just what it is and why it's a good thing. The increased interest in transparency is due in no small part to the fact that so many trading systems are automated these days.

"Transparency" has become one of the biggest, newest buzzwords in the trading world.

To understand the quest for transparency in modern electronic markets, it helps to understand a bit of the evolution that got us to this point.

In the last twenty years, stocks have gone from trading at a single point of execution (like the NYSE floor) to what is now more akin to a network of market centers (electronic exchanges, ECNs, dark pools, etc). Block trades that used to be consummated publicly between two guys in brightly colored jackets are now fractured into multiple tiny orders and executed electronically at near light speed through thirty or more different electronic venues.

In the past, traders needed to trust that the person handling their orders would only expose their intentions to trustworthy counterparties. Today, orders delivered electronically to brokers mainly circumvent any human interaction. In many cases, machines (like order management systems) deliver trades to other machines (algorithms) which break orders up into palatable sizes (smart orders), which then blast out to up to thirty other machines (electronic trading venues). Although this compartmentalization originally came about as an effective way to reduce information leakage, traders now face the challenge of knowing where their orders are routed and if those decisions were the best choices relative to their performance.

While many folks believe that the electronic evolution of markets leads to more transparency, all of the complicated steps and components can help make automated systems seem confusing and harder to grasp than the simplicity of people shouting on an exchange floor. Good transparency tools disclose any and all information you need to understand your trade, effectively clearing away the confusion and helping to build trust between traders and brokers. More and more trading systems and firms are offering transparency tools to ensure that you can see all the information you need and to help build trust that your trade will do what you want it to do, in the way you want it to do it.

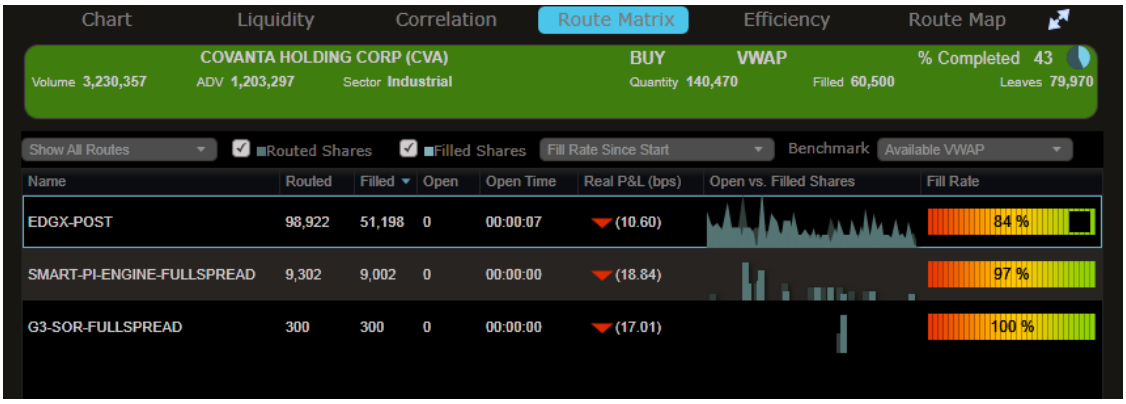
Of course, there are many different levels of transparency, and everyone has a different opinion on what level is most important to them. Two of the biggest reasons we think transparency is important are:

- **Transparency allows you to better understand the process.** For example, when you order a sandwich at a deli, the glass partition in front of the counter is designed to allow you to watch as they make your sandwich. You know the end product will be just what you ordered because you were able to see it happen.
- **Transparency puts you more in control of the process.** Sticking with our deli example, because you can see your sandwich being made, you can make changes or adjustments based on what you see. You can ask for extra onions or leave off the lettuce—and see right away that it actually happens. You are in control of the process, and if something goes wrong (like having onion breath), you can explain how it happened and hopefully avoid the problem next time.

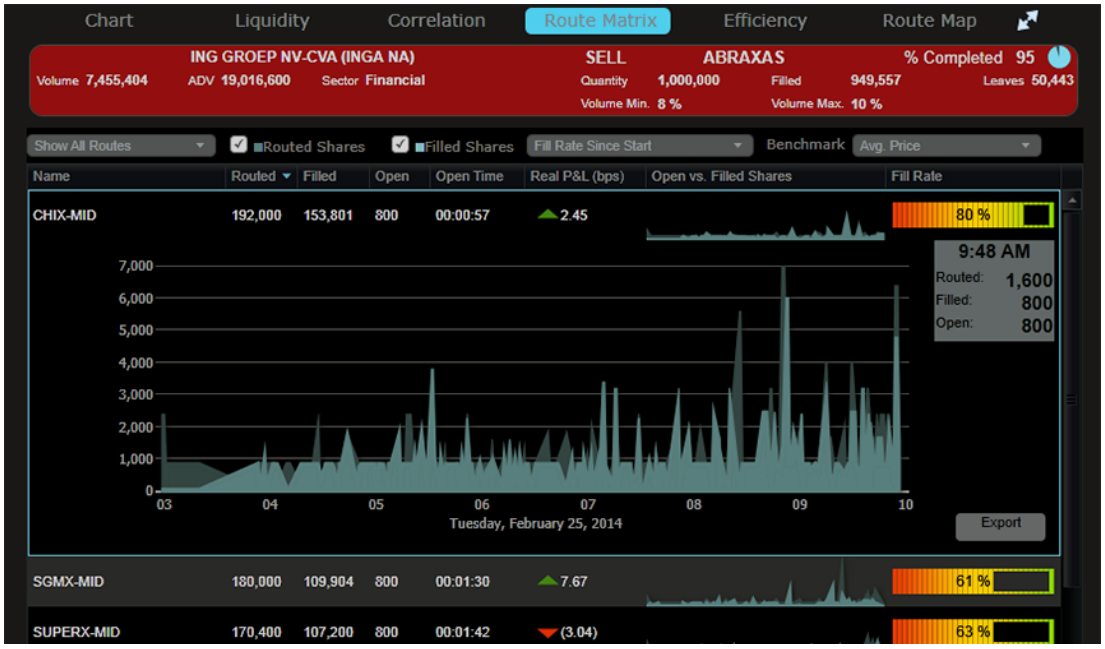
While transparency is important, it is only helpful to a certain degree. Too much information makes you feel like you're being flooded with details when all you wanted was a basic understanding of what happened with your trade. When people are overwhelmed, they tend to shut out information—so in some ways, being provided with too much information at once can be worse than not getting much at all. Transparency providers often have to walk a fine line between offering you a lot of information and overwhelming you with too much. **You may not want or need every exact detail, but at the same time, if you can't look at or figure out any one part of your trade, you're going to start wondering what it is you can't see—and why.** Some of the best transparency tools make the information you want available to you without overwhelming you with additional data you don't need.

As an example, ConvergEx provides clients with varying levels of transparency on their orders through our web-based TCA platform called PerformEx. From pre-trade estimates to intra-trade P&L and fill rates by venue as well as easy-to-follow post-trade tree maps, our goal is to provide traders with clear and concise execution details which complement their trading experience.

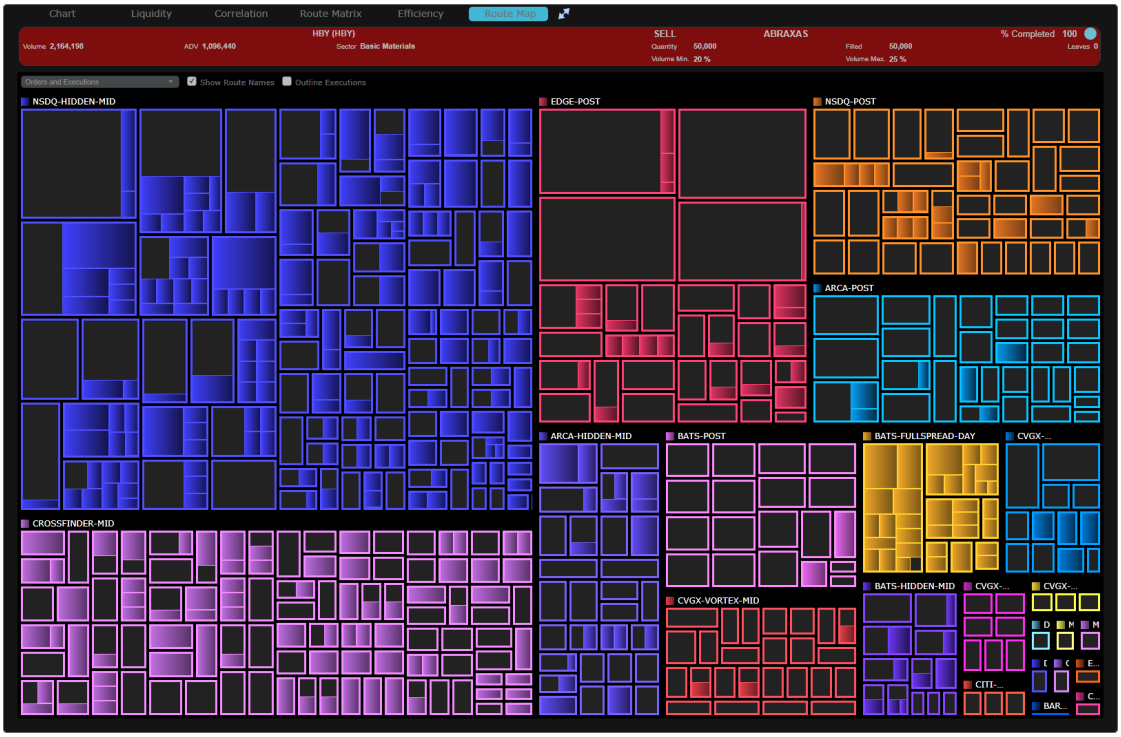
Before you launch an algo order, our **pre-trade estimator**, below, shows the likely venues your order will be posted in and the potential fill rates in those venues. The key to transparency is seeing not just where an order is filled, but also where it's routed.



Then, once you place an order, you can track performance across varying execution venues in real time, as in the chart below. An algorithm's dynamic decision making is in full view.



After your trade is finished, you can use tree maps like the ones below to get a visual representation of the size and number of orders routed to an execution venue as well as the amount of shares filled at those venues. You can easily eyeball venues to see how they compare to each other.



When looking to execute larger orders, traders need to be aware of the challenges in accessing liquidity from so many available venues and the opportunity costs and information leakage that may degrade their quality of execution. As algorithm usage continues to grow and more execution venues enter the marketplace, traders are likely to require all their brokers to provide relevant and timely information about their electronic orders. No matter how far the markets move toward automation, how many slices orders are split into, and how many machines speak to one another, the degree a trader can trust his broker remains the cornerstone of their relationship.

ConvergEx Group

Algos for Quantitative Trading Shops

Trading is an art for most traders. They work for shops where humans generate orders. Success depends on traders' market insight, unique judgment, and their command over their trading tools. Each trading day and each order represent a new challenge demanding a unique interpretation and judgment. All of a trader's experience provides a valuable base to inform his or her judgment, but it does not point to one clear choice of trading approach, timing, tools and/or settings. If you'll allow us a sports analogy, trading is like playing three rounds of golf every day, each time at an unfamiliar course.

Even if you are not working for a quantitative trading shop, it is valuable to understand how trading in this world works.

While trading is an art for a majority of traders, in the most mature markets, trading is a science for over 50% of the flow. In these mature markets, quantitative trading strategies generate over 50% of trade volume. Even if you are not working for a quantitative trading shop, it is valuable to understand how trading in this world works.

For the sake of this discussion, let's agree to gloss over the pure high frequency market-making shops. These firms have trading reflexes measured in microseconds (one millionth of a second) and holding times measured in milliseconds (one thousandth of a second) on fast moving stocks and seconds for mid and small caps. They trade with very little capital. For any firm moving size, high frequency shops simply do not matter that much because they do not have material liquidity to offer. They are your broker's or algo's problem when it comes to successfully placing and pricing each slice of your order.

Depending on the mature market, maybe 30% of trades are driven by quantitative trading strategies with holding periods between, say, fifteen seconds and one week. A typical quantitative trading strategy involves hundreds or thousands of orders at a time. Even smaller shops can easily trade ten million shares per day. At that size, a trader has no chance to manage every order. The mission becomes finding the right method to trade them all.

Thousands of orders, the great curse of quantitative trading strategies, become the traders' best friend. Remember our golf analogy? Optimal execution of orders from quantitative strategies is like playing exactly the same holes a thousand times every day. You have infinite opportunities to perfect each element of your game.

In our view, the best way to optimize execution for a new quantitative trading strategy is set up a "horse race" between a handful of promising algos—say "pure dark aggregation" versus "10 minute IP" versus "30 minute VWAP" versus… etc. These algos should reflect trading styles ranging from the most passive to the most aggressive. Set up a randomized trial among these algos and collect enough data to see what works best. This requires a comprehensive TCA suite with a full complement of metrics including implementation shortfall; full day, available and interval VWAP; PWP; opening price; closing price; order ending price; and various reversion metrics.

Now slice and dice the results by all the usual suspects. In the jargon of quantitative trading, you "bucket" trading results by the factors that drive trading performance.

- **Bucket by Buy, Sell, Sell Short, Buy to Cover.** Typically each requires a separate approach.
- **Bucket on Liquidity Requirements.** Typically entry strategies are much more demanding of the available liquidity than exiting strategies.
- **Bucket by ADV.** High and low ADV orders can almost never be handled identically.
- **Bucket by Spread.** Quantitative strategies on wide spread stocks are especially demanding.
- **Bucket by Volatility.** This can be hard because the quantitative trading strategies are often keying on volatility, which confuses cause and effect.
- **Bucket on Time of Trading Day.** A lot of quantitative trading strategies try to pick off opening mispricing, which can make it a nightmare to trade well.
- **Bucket on Market Conditions – both volume and direction.** Figuring out how to trade when you are trading with or against momentum is usually central to strategy profitability.

All the bucketing of all the trades gives you a collection of trading problems to solve and a good idea of what sort of trading strategies will work best. Be careful to manage the outliers. Now you can tune, tune, tune for each trading setup—say buy-to-cover on high-spread stocks. We advise clients always to run two trading strategies on every trading setup. In practice, this means taking the best trading strategy you have so far and pitting it against your best alternative idea.

In this arena, every broker is different. Our collaborative approach is to provide full analytical support to our quantitative trading clients. We will help set up every horse race and provide the bucketing analysis. We offer full transparency into each trading strategy alternative, and we place a huge premium on creativity. The best trading approaches are born of rigorous analytics and some clever thinking about how to handle difficult trading situations. We like horse races because we think we know how to win them—and we figure that if our tools can't win a horse race, we don't deserve the business.

So what does all this have to do with life for a trader not working for a black-box firm? A lot. While you don't get the same repeated trials as your quant-shop brethren, the same techniques can inform your choice of trading tools. You need intuition to choose the right trading tools for each trading situation. The criteria of available liquidity, order alpha, market conditions, etc, all apply. The only difference is that you have to substitute your traders' intuition and judgment for statistical tools. Your job is frankly harder.

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Optimal Trading Tactics

In the previous chapter, "Algo Trading for Quantitative Shops," we discuss the selection and development of quantitative trading strategies. Now that you understand that world a little better, let's talk about how it's possible to use similar concepts to trade better—and to build better algos.

When you trade manually, you know where to send your orders and how to do it efficiently. You learn a little from each trade, figuring out where (and where not) to post or take, what kinds of orders and times of day work best for you. You optimize your trading tactics intuitively. Electronic trading tools can't intuit situations the way a human can; to come to the same conclusions, they require a lot of research into what venues, order types, and parameter settings work best for different kinds of orders. Here's how some of that research is done.

The last chapter mentioned that letting different brokers' trading strategies compete in a "horse race" can help show you the top trading strategy. Finding optimal trading tactics works much the same way, but on an internal level: the best way to find the best tactic is to run different alternatives against each other in a horse race and see which one wins. To optimize how an order trades means looking at a wide variety of factors—to what venue the order goes, what type of order it is, and how it trades within its own parameters. Because so much can vary in the market from day to day, you can't really try to change one factor one day and another the next day, because if you get different performance, it would be hard to tell what is correlation and what is causation. You have to set up rigorous randomized trials between competing tactics.

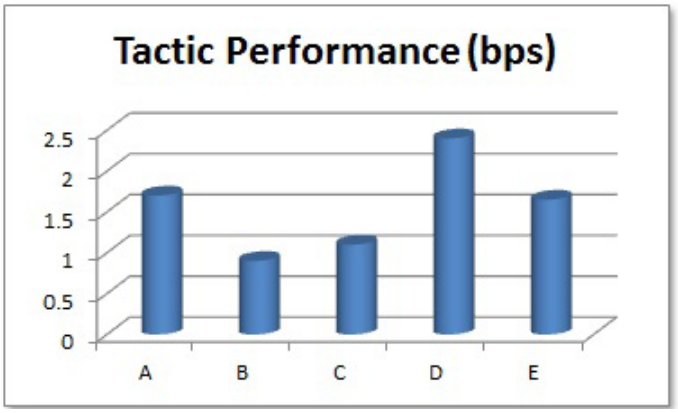
Remember the factors that drive trading performance that we mention on page 45? These "bucketed" groups, or groups of similar items, are useful for bucketing trades, but some of the most important ones for determining optimal trading tactics are:

- **ADV.** High- and low- volume securities trade very differently and require different tactics.
- **Volatility.** If a stock is very volatile, the optimal posting strategy is likely to be passive. You have a very good chance of getting a (say) "bid-1 tick" limit order hit with a highly volatile stock. In contrast, if you want to buy a low volatility stock, you often have to be prepared to join very long, slow queues or offer some price improvement to the market.
- **Spread.** A stock's spread can change widely within the same day. A trading strategy that works great when a security has a 1-cent spread could work badly if the spread moves to 2 cents, and vice versa.
- **Momentum.** For some stocks, optimal trading tactics can usefully exploit observed momentum (and reversion) either in the stock itself or momentum in related stocks in the same sector. This does not work for all stocks or all market conditions. The trick is to recognize the right regimes in the market.
- **Quoting Behavior.** A good trader can watch the quoting behavior in the market and form an impression of the buying/selling pressure on a stock. As an extreme example, with 1,000 shares showing on the bid and 55,000 showing on the offer, a good trader would probably bet that the stock is going down. In the U.S., with the growth of dark pools and the prevalence of hidden and pegging order types, this isn't a very useful indicator for the purposes of optimizing tactics, but it remains invaluable in many European and Asian markets.

You can use any or all of the characteristics to define a trading situation, or bucket, to optimize tactics. For example, you can ask the question, "What is the best way to buy 1000 shares of high ADV stock, low volatility stock trading with 1 tick spreads, when the momentum is against me but the quoting behavior seems pretty balanced?" This leads you to question, "What are my options for trading tactics?" Assuming you want to try posting first, you can use limit orders or pegging. You have to price the initial order. You can be lit or dark. You can choose which destinations to use. You must decide how long you want to remain with your initial posting strategy if it doesn't work. If at some point the tactic fails to get the order done without paying the spread, where should it take and how? The challenge for taking tends to be how best to find price improvement without bleeding information.

This is where horse races (randomized trials) come in. You don't have to be omniscient, but you do have to have a few good ideas, the right technology, tons of order flow, and some skill at experimental statistics. For a given situational bucket, identify five or so of your best ideas for alternative trading tactics. Tell your trading engines to run randomized trials between them (i.e., when the trading engine sees a given situational bucket, it randomly chooses which alternative tactic to run).

In very little time, the engines will have employed each tactic thousands of times. Now you can see which tactics are winning and which are losing. In the graph below, for example, the lowest number is the winner, so Tactic B is the clear winner. You then pull out the losing tactics (like Tactic D in the graph at right), using statistical tools to make sure that they really are losers, and replace them with new ideas for how to handle the trading situation. Then run the race again. The basic idea is that simple.



So what makes this process difficult?

- The characteristics that define a bucket are not at all obvious. Valuable distinctions depend on the stock, the market, and the tenor of current market conditions. These distinctions work for a time, but have to be re-thought continually.
- It takes a huge amount of high performance technology to implement randomized trials in real time trading systems... and then a bunch more technology to properly analyze results of the randomized trials.
- It takes a hugely sophisticated routing infrastructure to provide global, flexible, comprehensive trading tactics. Without this, you have nothing to optimize.

ConvergEx has put tremendous resources into building our optimal tactics infrastructure. We make it all visible with our transparency tools in PerformEx. We have a team of people constantly tuning it, all in an effort to improve your trading performance.

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Trading in Consolidated Markets

On the face of it, creating fragmented markets sounds like a really bad idea. Fragmented markets introduce latency, impede price discovery, and complicate securing liquidity. Consolidating fragmented markets requires copious regulation and extraordinary technology. Fragmented markets demand inter-market arbitrage that, while performing a valuable service, seems a little like breaking glass just to provide work for glass-repair companies. However, we put up with all this in the name of creating innovation and competition. Reasonable people can disagree about the trade-offs of competitive/fragmented markets, but in the meantime, traders need to navigate the modern world of trading in fragmented markets.

The US should be the poster child for fragmented markets with its fifteen exchanges, two flavors of the NYSE (traditional and Arca), and more than thirty dark pools. However, a few key regulatory features keep the competing markets well integrated. Every print has to go to consolidated tape immediately upon execution. Since the late 1970s, the Consolidated Tape Association (CTA) has the regulatory mandate to manage the Consolidated Tape System (CTS). The dark pools all get to tape via FINRA's Trade Reporting Facility (TRF) which is why all dark pools show up with an identical market code. CTA also has the mandate to maintain the Consolidated Quote System (CQS), which ensures that there is one authenticated NBBO (National Best Bid & Offer) for the US market. CTS and CQS take care of the information dissemination portion of the consolidation challenge.

The trading rules portion of the US consolidation challenge is assured by a long history of regulation. (Reg NMS and ATS are the most visible.) The top of the book at all exchanges are protected quotes, which means that the market cannot trade through these orders without executing the displayed orders. (Two important details: only the top of the book is protected and only the displayed portion of a reserve order is protected.) The dark pools do not have to display a quote (hence the name dark) but all dark trades have to go off within the light markets' NBBO.

Together, the three features: 1) statutory, immediate trade and quote dissemination combined; 2) displayed order trade-through protection, and; 3) forcing dark pools to trade within the light NBBO, make the US consolidated market work.

At right is a summary of US prints for MSFT for a typical day. Remember that the ADF numbers represent maybe thirty dark pools. For traders who are new to the US market, it is hard to believe just how fragmented the market has become.

Code	Source	Share	Type
UQ	NASDAQ GM	29.67%	Exchange
UD	FINRA ADF	25.10%	Dark Pools
UF	BATS	12.91%	Exchange
UP	NYSE ARCA	11.27%	Exchange
VK	EDGX	6.07%	Exchange
UB	NASDAQ OMX BX	3.90%	Exchange
VJ	EDGA	3.76%	Exchange
VY	BATS Y	3.34%	Exchange
UX	NASDAQ OMX PS	2.88%	Exchange

In Europe, specifics of consolidation are different from those of the US. The European markets are composed of primary exchanges, more than four MTFs, OTC trading, and several dark pools. Unlike in the US, there is no one regulated source of consolidated quotes. Instead, firms' in-house systems or vendors like Bloomberg or Reuters piece together quotes from primary exchanges and from MTFs to create a single source of streaming quotes. There are also no trade-through rules (which state that an order for a stock that is on more than one exchange must happen via the best-priced exchange) that protect an order. Arbitrage is the only way that the prices in MTFs are coupled to the primary exchanges.

MiFID requires that dark pools use the (primary and MTF) consolidated quote to price their trades and post the trades on a trade reporting facility (like BOAT, which is similar to the US's FINRA ADF). While the primary exchange is still the largest single source of liquidity in Europe, MTFs, like dark pools, are gaining traction. If a primary exchange goes down during the day due to technical issues, trading continues on the MTFs, though at a slower pace. Note: If an exchange goes down for technical reasons before the open, MTFs still continue to trade, but slower and with larger bid/ask spreads.

VOD is a good example of a stock traded across various liquidity sources. Here are the trading results from a typical day.

Code	Source	Share	Type
LN	London Stock Exchange	33.00%	Exchange
XB	BOAT	37.66%	TRF
IX	Chi-X Europe	17.69%	MTF
TQ	Turquoise	5.44%	MTF
EB	BATS Europe	4.52%	MTF
OTC	OTC Markets	<1.00%	MTF
S1	Sigma X	0.40%	Dark Pool
BQ	Equiduct	< 0.10%	MTF
QM	Quote MTF	0.01%	MTF

Currently, for VOD, if you are routing to the top four destinations (not including BOAT, which is a trade reporting facility, not a destination), you have almost full access to liquidity. Europe is not yet nearly so fragmented as the US.

Finally, Asia-Pacific markets are just now beginning to open up competitive execution destinations. The regulatory frameworks owe more to MiFID (best-ex driven) than to NMS (prescriptive market structure driven). Chi-X has established a toehold in Australia, Japan, Singapore, and Hong Kong. At this writing, alternative volumes are still well below 5% of total market volumes. However, there is every reason to think these markets, too, will become ever more fragmented. It is not clear how far the push will go. Asia-Pacific stock exchanges generally understand the mistakes the European exchanges made (slow technology, high fees) and are working proactively to close these shortfalls in hopes of maintaining their dominant positions.

ADR Conversion Trading

Since the first ADR (American Depositary Receipt) was established in 1927, both ADRs and the marketplace have evolved significantly. Today there are over 3,500 ADR programs from more than 75 countries, with almost USD 3 trillion traded in 2012. ADRs are US securities that trade in US dollars in the listed markets and Pink Sheets and settle through the DTCC, the US's centralized clearing system.

Institutional money managers invest in ADRs for a host of reasons: to diversify their domestic portfolios while keeping their current trading and custody infrastructure, to manage international ADR wrap mandates, or to gain cost efficiency in emerging markets where local trading, settlement, and custody can be difficult or expensive.

Today there are over 3,500 ADR programs from more than 75 countries.

On the surface, the steps in ADR conversion trading may seem fairly straightforward: trade equities on local exchanges, execute a foreign exchange contract, interface with an ADR bank, and settle the trade in the US. But there are many moving parts in ADR trading, with which come a few minefields that a good ADR conversion trader should be aware of. In this chapter, we discuss four of the major minefields to watch out for when it comes to ADR trading: measuring performance, corporate actions, understanding conversion ratios, and buy-in markets.

The first potential stumbling block is measuring performance. Should you measure the performance of an ADR conversion trade against the ADR market, or should you measure the ordinary share component of the trade versus the ordinary share market? Establishing a relevant benchmark will help you better gauge your trading performance. Although the trade may start from the portfolio manager as an ADR trade, it is likely that the majority of the ADR conversion will take place when the ADR market is closed—or there could be limited hours to trade when both markets are open. We believe that except for some potential outlier situations, an apple-to-apple measurement is to compare the performance ordinary trade to the ordinary share market. For instance, a better comparison would be the average ordinary share price versus ordinary share VWAP, rather than the ADR conversion trade price versus ADR VWAP.

Measuring your foreign exchange (FX) performance is also tricky. When doing an ADR conversion, FX trading is a critical component to the final ADR price. We recommend a couple ways to manage the FX portion of the trade to help ensure that your FX price is competitive. *First,* if you have multiple FX liquidity providers instead of one, you can better ensure price discovery. *Second,* it is helpful to execute multiple FX contracts throughout the life of the ordinary trade rather than all at one time. *Third,* make sure you understand the tenor of your FX contract. Is it a spot (T+2), or forward contract (T+3, T+4, etc)? A good understanding of these foreign exchange pointers can help you improve the price of your ADR conversion trade. For instance, if you were doing a six-hour, $10 million VWAP trade, would you rather do an FX contract at the end of the equity trade, or multiple FX deals throughout the equity trade? We think spreading out the FX will almost always help your ADR price.

The second potential pitfall of ADR trading is the complications that can ensue with corporate actions. Trading and settling trades in two markets means you have to be especially aware of corporate actions, including cash dividends, stock dividends, ratio changes, spin-offs, stock splits, books closed, etc. Not understanding exdates and record dates in overseas and ADR markets can create a messy claims situation and turn a good trade into a bad one. Sometimes the easiest option is simply to avoid trading around corporate actions.

A simple example of a corporate action where you should avoid doing a conversion trade if you do not want to be involved in a claims process is where the local market is ex-dividend and the ADR market is cum-dividend. Buying the ordinary shares in the local market is not necessarily a price advantage since once the ADR conversion trade settles, you will be claimed for the dividend you are not entitled to from the ordinary share purchase. Depending on certain markets, the potential penalty for being subject to a claims process can be expensive. The process can be lengthy and subject to the rules of non-US tax authorities and associated foreign exchange exposure. At ConvergEx, we have set up a process (dependent on available information) to close our books to ADR conversion trading in advance of corporate actions.

The third minefield within ADR trading is understanding conversion ratios. Many ADRs have ratios associated with their trading program. For instance, one ADR can represent ten ordinary shares, or 100 ADRs can represent one ordinary share. Before doing an ADR conversion trade, using the correct ADR:ORD ratio will prevent expensive trading errors by either under or over executing your trade. Confusing a 10:1 ADR for a 1:10 ADR could be a very expensive mistake.

The final pitfall to watch out for in ADR trading is buy-in markets. In a number of countries with strict buy-in market regulations, the penalties for failing to settle a trade in a buy-in market can be harsh. When doing ADR conversion trading in buy-in markets, it is essential to borrow the security prior to the settlement date in the local market in case there are settlement fails during the conversion process. A good example of where this is important is in Hong Kong, where the settlement cycle is T+2 but the ADR settlement cycle is T+3. If you borrow on the trade date, the ordinary shares should be in good order for settlement in HK on T+1, leaving a one-day buffer prior to the normal T+2 settlement.

One last note about ADR liquidity: many ADRs enjoy strong trading liquidity in the US markets. However, not all ADRs have sufficient liquidity in the US markets. Because ADRs represent the underlying security, you can use the overseas market to tap into the more liquid trading market. Depending on your objective, you may wish to find additional liquidity in overseas markets.

ConvergEx offers a comprehensive suite of patented electronic ADR execution tools designed to help you achieve best execution for your ADR conversion trades. The ConvergEx ADR product suite features ADR Direct® and Reverse ADRs℠. We also have a dedicated 24-hour ADR desk available to help guide you through ADR conversion trading.

Trading Illiquid ETFs in Size

Exchange-traded funds (ETFs) are the most popular type of exchange-traded product. An ETF is an investment fund traded on stock exchanges, much like stocks. It holds assets such as stocks, commodities, or bonds, and trades close to its net asset value over the course of the trading day. Most ETFs track an index, such as a stock index or bond index. ETFs may be attractive as investments because of their low costs, tax efficiency, and stock-like features.

Only large broker-dealers that have entered into agreements with the ETF's distributor, called ***Authorized Participants (APs),*** actually buy or sell shares of an ETF directly from or to the ETF, and then only in ***creation units*** (large blocks of tens of thousands of ETF shares, usually exchanged in-kind with baskets of the underlying securities). Authorized Participants may wish to invest in the ETF shares for the long-term, but they usually act as market makers on the open market: they use their ability to exchange creation units with their underlying securities to provide liquidity of the ETF shares and help ensure that their intraday market price approximates the net asset value of the underlying assets. Other investors, such as individuals using a retail broker, trade ETF shares on this secondary market.

Institutional investors are increasingly adopting ETFs as a key component of their investment strategies. It is not hard to see why. ETFs like SPY (large caps), Q's (technology) and XLF (financials) give investors the ability to rapidly gain or lose exposure no matter how much money you have to spend. Given the proliferation and variety of ETFs, designing almost any exposure profile using only ETFs is easy. However, if you trade in size, you quickly discover the limitations of this approach. Most ETFs simply do not offer adequate daily trading volume to build (or lose) large positions rapidly. Trading costs quickly erode all of your strategy's alpha.

Fortunately, there is a ready alternative. ETFs can be readily created and redeemed. The example below illustrates the benefits of the creation/redemption process and how it is used to achieve additional market liquidity efficiently.

An asset manager has identified an ETF to gain exposure to a certain market segment. The ETF (let's call it EXYZ) trades around $25 per share at an Average Daily Volume (ADV) of 25,000 shares. The manager wants to commit around $5 million, which translates into roughly 200,000 shares of EXYZ. What are the choices for trading this ETF?

- **Execute on the Exchange.** The manager could execute the entire order on the exchange, but then the manager would likely pay a significant penalty in performance. If the ETF trades at 800% of ADV, the market impact could be anywhere between 300 and 3,000 basis points. This level of market impact is unacceptable for most managers.
- **Execute on secondary market using a broker.** The manager could use a broker to execute in the secondary market at a low participation rate to minimize market impact. The broker could execute about 15% of ADV or 3,750 EXYZ shares each day.

At that rate, it would take 53 trading days to execute the entire trade. This method would reduce the market impact cost but would expose the trade to significant market timing risk. This is not a feasible option for most money managers.

- **Execute via the ETF creation/redemption process.** Only an Authorized Participant (AP) has the ability to create and redeem ETFs as needed. So, for example, ConvergEx is an AP for all major fund families and can buy the underlying basket and deliver it to the ETF Provider. In return, the ETF Provider delivers the ETF to ConvergEx, which we transfer to the client.

Let's keep this simple: suppose the EXYZ basket consists of 3 securities (X, Y and Z) in the proportions listed in the table at right.

Security	Need to Create 1 Unit EXYZ	Share in 4 Units
X	472	1888
Y	488	1952
Z	620	2480

EXYZ's creation unit size is 50,000 shares. This means that the ETF provider will only accept enough underlying shares from the AP to create 50,000 shares of EXYZ at a time. In our example we will create 4 units for a total of 200,000 shares.

The structure of most ETFs ensures that the underlying constituents can be readily traded throughout the day to accommodate for creation and redemption. The pre-trade on doing this trade demonstrates the power of accessing all the underlying liquidity.

Security	# of Underlying Shares in 4 Units of EXYZ	20-Day ADV	% ADV	Market Impact BPST
X	1888	26500	7.12	32
Y	1952	32000	6.10	28
Z	2480	41200	6.02	24

For large trades of illiquid ETFs, trading the underlying basket can often save 90% of the market impact of the trade.

Now that the underlying basket has been exchanged for the ETF, your AP broker needs to provide you with an ETF price. If your AP broker engages in proprietary trading/market making, that pricing mechanism is typically quite opaque and worth negotiating carefully up front.

ConvergEx Group

Clearing and Settlement

Many, maybe most, traders dedicate their lives to knowing only their particular niche in the trading process, studiously avoiding all conversations about clearing and settlement: transaction taxes, ID markets, ownership restrictions, buy-in rules, etc. Here's our take on the least you can get by with.

After you've executed your global trade, it needs to be booked and settled. There are many things that can trip you up, as the global trading and settlement world is a complex one, but to keep this to a short overview, we focus on a small handful of important and often complex areas that are unique to global markets: Ownership Restrictions, ID Markets, Transaction and Stamp Taxes, Settlements and Buy-Ins.

Ownership Restrictions and ID Markets

Many markets around the world place restrictions on how much or what kind of stock an investor can own. Not all of these restrictions deal with foreign investment. Poland, for example, requires all investors seeking majority stock in a company to receive prior approval, and South Africa forbids any investors, foreign or domestic, from exceeding certain ownership percentages of bank or insurance stocks. However, the vast majority of exchanges' ownership restrictions are to prevent foreign investors from owning too large a share of any given stock, or to block them from owning too much (or any) stock in sensitive industries. We see restrictions most often on transportation, utilities, media/telecommunications, weapons/defense, and banking industries. We list each market's ownership restrictions in our Exchange Guide section, starting on page 78.

There are also a handful of exchanges that require foreign investors to have a locally-issued investor ID in order to trade. In these markets, traders get preapproval with the exchange or some other local regulatory body, which then assigns them an investor number. In some of these markets, that investor ID must be reported to the exchange on the execution. If you get the number wrong, you can't always amend it post execution. Some exchanges will even require a cross in the market to effect such a change. A few examples of markets that require IDs are Korea, India, Indonesia, and Taiwan. Similarly, a few markets like Spain require that all trades identify the end buyer or seller by way of a registration number that must be attached to trades. Again, if you give an incorrect number on a trade, it may be very costly to amend and you may face a close out of your trade or other penalties. Violating ownership restrictions, an incorrect trade allocation, or other errors in the booking of a trade may result in the trade failing to settle on time. We discuss what happens with failures in the Settlement section of this chapter.

Transaction and Stamp Duty Taxes

Many global markets levy taxes or fees in connection with transactions that take place on their exchanges or settle within their depositaries. Exchange taxes vary greatly from one market to the next, from Dublin's 1% Stamp Duty tax to Johannesburg's 0.0002% investor protection levy. Determining and correctly accounting for the

correct taxes and fees on a trade is a large part of the clearing process. The two most infamous varieties of transaction taxes are local fees and levies and Stamp Duty taxes. Local fees and levies are generally charges levied by a particular exchange or clearing system. You can check our Exchange Guides for transaction taxes for our algo markets, and the chart at the end of this chapter for a list of taxes and fees for all of our other markets. Local fees can be levied on buys, sells, or both, depending on the market. While some markets (including many in Europe) don't charge any local taxes or fees, the recent introduction of the French Transaction Tax (FTT) may change that. The FTT sets taxes on buying specific securities (identified by their ISINs), and while it is a French tax, you must still pay it on those securities even if you're buying them on, say, Germany's Deutsche Börse. France introduced this tax in 2012, and we're likely to see other European markets following suit. Stamp Duties are another very important transaction cost. Stamp duties are taxes collected on the transfer of a security from one owner to another. Exchanges that charge stamp type taxes include China, Hong Kong, Ireland, Malaysia, and the United Kingdom. In some markets, stamp duty taxes can be avoided through the use of derivatives—note the very active CFD (Contract for Difference) market in the UK, a country with 0.5% stamp tax of stamp tax.

Settlement and Buy-Ins

After you've executed a trade and taken care of the booking, the trade settles. That is, money and securities change hands. Depending on the parties involved, it can sometimes take a bit of time to get everything ready to settle, even up to a of couple days. Most exchanges recognize this, and the majority of markets allow for this by mandating a particular "settlement cycle" for exchange trades. We list exchanges' settlement cycles in the Market Guide section of this book. Most markets in the world follow a T+3 settlement cycle. That means you have three business days from the time your trade completes (T) before you must settle. This gives you time to get your affairs in order. Note that while the average settlement date is T+3 days, different exchanges have different settlement cycles (for instance, Germany's settlement date is T+2, while South Africa's is T+5), so be careful about taking any more time than necessary.

Most trades settle on time, without issue. But if anything goes wrong (for example, one counterparty to the trade doesn't have the money or the securities), the trade fails to settle. When sellers fail to deliver their end of the trade by the settlement date, a process called buying in can occur. The buy-in process is a way for the buyer to force settlement of the trade and pass any costs incurred to the seller who did not meet their end of the trade. Each market has its own regulations around buy-ins and these are often complex (see the Market Guide section for a breakdown by country), but in general, a buy-in works like this:

- The buyer alerts the exchange as to the nondelivery.
- The exchange performs the buy-in.

- The exchange locates and gets the stock for the buyer.
- The seller must reimburse the exchange for the stock, paying any difference in the stocks' price since the failed trade. Most exchanges also tack on fees or a fine of some sort that the seller must pay.

Some markets have very strict buy-in rules. For example, Hong Kong enforces an automatic buy-in on all failed trades on the settlement date (T+2). Some markets impose very high costs on the failing seller. Germany, for example, allows the buy-in price to be up to 200% of the prior day's close. That fail could be *very* expensive. In other markets, members who consistently fail to make good on their trades can be fined or even suspended. While a strict buy-in regime contributes to the orderly settlement of trades in the market and reduces risk for all, it can prove a painful lesson to traders where a genuine mistake is made. Some markets impose fines for late settlement of trades. These can be costly. Examples are Australia, South Africa, and almost all of Europe. Some markets are less strict, but sellers should always be aware that failure to deliver shares exposes them to risk.

Sellers should always be aware that failure to deliver shares exposes them to risk.

Some firms handle all aspects of the clearance and settlement process in-house, while others appoint a prime broker, clearing broker or custodian to take care of it. The global landscape is complex and constantly changing, and it can prove difficult and costly for a firm to maintain the necessary infrastructure and personnel to process and settle their trades. It is often more cost effective and less risky to outsource this process to brokers and custodians with the necessary infrastructure and expertise.

Because each exchange has its own regulations for clearing and settlement, it is a difficult task to try to round up anything more than a very general overview when it comes to discussing the process across all global markets, but this chapter should give you an idea of what happens after the trade is done—and an appreciation for the complicated work done by people in the back office.

The chart opposite this page provides a list of exchange taxes and fees for non-algorithmic markets we access as of Spring 2014. For taxes and fees associated with our algo markets, check the exchange guides starting on page 78. Unless otherwise indicated, the fees listed are for both buys and sells.

Exchange Taxes and Fees

Country	Type of Fee	Rate
Bahrain	Stock exchange fees	5.5 bps
Botswana	BSE Fee and 12% VAT	16.24 bps
	CSD Fee and 12% VAT	1.68 bps
	Handling Fee and 12% VAT	16.8 BWP
Chile	19% VAT	19%
China/Shangai	Stamp Duty	10 bps
	Exchange Levy	2.6 bps
	Settlement Fee	5 bps
	Admin Fee	0.4 bps
China/Shenzhen	Stamp Duty	10 bps
	Exchange Levy	3.4 bps
	Settlement Fee	5 bps
	Transfer Fee	50 HKD[1]
Colombia	16% VAT Comission	16%
Cyprus	Cyprus Central Securities Depositary Fee	3 bps
	Cyprus Stock Exchange Fee	1 bps
	Clearing House Transaction Levy	0.5 bps
	Sales Tax	15 bps on sells
Egypt	Exchange Fees	5 bps
	Stamp Duty	10 bps
Ghana	Stamp Duty	70 bps
India	Trading Fee	10 bps
Kenya	NSE/CMA/CDS levies	34 bps
Kuwait	Stock Exchange Fees	2.9 or 3.63 bps[2]
	Clearing Company Fee	0.13 or 0.1 bps[3]
Lebanon	Local Market Fees	10 bps
Mauritius	SEM Fee	25 bps
	CDS Fee	20 bps
	FSC Fee	5 bps
Morocco	Exchange Fee	10 bps
	VAT on Exchange Fee	1 bps
	VAT on Commissions	10%
Nigeria	VAT of/on Commissions	5%
	Stamp Duty	7.5 bps on buys; 7.5% on sells
	SEC Fee	30 bps on buys
	CSCS Trade Changes & VAT	6.3 bps on buys; 37.8 bps on sells
	NSE/SEC Fee & VAT	31.5 bps on sells
Oman	Stock Exchange Fee	15 bps
Pakistan	FED	6.4 bps
Peru	7.445 Tax + 18% VAT on Tax	8.7851 bps
	VAT on Comissions	18%
	SMV fee	1.35 bps
Philippines	Taxes	4 bps on buys; 54 bps on sells
Qatar	Stock Exchange Fees	5.5 bps
Serbia	Stock Exchange Fees	10 bps[4]
	Central Registry Fee	5.669 bps
Sri Lanka	CDS/CSE/SEC/Govt Cess	48 or 41.25 bps[5]
Taiwan	Taiwan Transfer Tax	30 bps
Tunisia	Exchange Trading Fee	20.00 bps
	VAT on Commissions	24.00%
UAE	Executed Order Fee	10 AED
Ukraine	Exchange Fee/FTT	10 bps
Vietnam	Taxes	10 bps on sells

(1) per ticket flat rate (2) B/S-Less than KWD50,000 is 3.63; More than 50,000 is 2.9
(3) B/S-Less than KWD50,000 is .13; More than 50,000 is .1 (4) With max of 1000 RSD
(5) 48 on trades below 50mm, else 41.25

ConvergEx Group

Social Media and Trading

Love it or hate it, social media has become a huge part of everyday life. Even if you don't have an account with Facebook, Twitter, LinkedIn, or any other social network, chances are you know well what they are—and that you have at least one person hounding you to join so they can show you pictures of their pets or see how many friends you have in common. A new use for social media is emerging, one that comes with even weightier benefits and downsides: social media as a predictor and driver of capital markets.

As social media has taken on a larger role in day-to-day life over the past few years, it naturally began to interest traders. Investors are definitely interested in social media enterprises as investments, but they're also noticing that the value in social media lies not only in the networks themselves, but also in the information they provide and disseminate.

Traders can use social media to make trading decisions in many ways, but four particular ways that social media can provide information have received the most attention in recent market news and research.

1. Businesses with accounts on social networks often post information about themselves that can help give traders an idea of how that business is doing. For example, in 2012 the CEO of Netflix used his personal Facebook page to report that Netflix's monthly online viewing had exceeded one billion hours for the first time. However, Netflix had not reported the same information to investors through either a press release or a filing with the SEC prior to the post on Facebook. A subsequent filing with the SEC by Facebook later that same day did not include this information. Shares in Netflix rose after the post on Facebook. As a result, the SEC launched an investigation. Ultimately, the SEC chose not to initiate an enforcement action or allege wrong doing by Facebook or its CEO, citing market uncertainty about the application of Reg FD to social media. In its related investigation report,[1] the SEC stated that companies can use social media report information provided that such reports comply with Reg FD and investors are alerted to which social media outlets will be used to disseminate such information.[2] Even if a company doesn't share market information directly on social media, you can often find other relevant information through their social media postings. You may notice that a company you follow is writing about new products and new locations—these details would suggest that business is booming. Another company might write a post about reducing its hours of operations—however optimistic their presentation of this information might be, you could take it as a sign of financial trouble. Even if the information isn't market specific, a sharp eye can tell a lot about that company from its social media content.

[1] Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: Netflix, Inc., and Reed Hasting, Securities and Exchange Act of 1934 Release No. - 69279 (April 2, 2013)

[2] SEC Says Social Media OK for Company Announcements if Investors Are Alerted, SEC Release 2013-51 (April 2, 2013).

2. The interaction between a business and consumers on social media platforms can say a lot about the company's well-being. A company may not tweet often or post many status updates that let you know how they're doing, but if hundreds of thousands of people start or stop following that company, you know something's going on. Even seemingly small issues can change a lot about a company's perception. For example, say a dissatisfied customer writes about her bad experience on a fast-food chain's Facebook page. If the company responds negatively in a public post on the page, other customers may be turned off of the business—and the company could start losing consumer confidence. If the company responds in a positive or witty manner, people may like and support the business—and are more likely to spread the word by sharing the post with friends.

Used correctly (and cautiously), an understanding of social media is a great tool to have in your trading tool belt.

3. This category may seem more nebulous than the previous two, but it attracts the most interest from researchers. Social media allows people to track consumer moods and market trends and patterns regardless of whether a specific business or industry even has a social media presence. You can track trends across social media platforms. As an example, you may notice that your online friends post quotes from news websites instead of news they've read in the paper, and you notice that a few of your LinkedIn contacts who used to work at newspapers now work in companies whose names end in ".com." You could conclude that print news media is quickly falling behind online news. This example is a little oversimplified, but you get the idea: the things people post on social media allow us to track and predict trends before they become market news. Researchers have noticed that looking at random (not market-related) tweets or Facebook statuses and posts for positive or negative language can actually show how the market is moving. If the vast majority of people are posting "happy" words, the market is generally moving up; if people are posting more negative statuses, the market is generally in a downward trend. There is a lot of research still to be done in this area, but the existing research shows that social media can alert us to market trends even without specific market news.

4. Social media disseminates important news and information very quickly, allowing traders to make decisions before or as things happen instead of after the fact. Although social media reports usually come to us in the form of headlines without many other details, they spread news faster even than televised news or news websites can. (This has its upsides as well as downsides, which we discuss below.)

There are, of course, already enterprises capitalizing on the usefulness of social media when it comes to trading. Bloomberg terminals have a feature that delivers market-relevant tweets to users throughout the day. Some companies have developed algorithms that search social media platforms and blogs for the trend-predicting information we discussed above in category 3. Other companies and firms hire social media analysts whose job is to sift through relevant social media to determine moods and trends.

Social media can be a powerful tool for making trading decisions. However, "with great power comes great responsibility," as Voltaire (or Spider-Man) would say. With so many people relying on social media for their news, fake or hacked accounts become a danger, especially to the trading world. Several news outlets have had their accounts hacked over the past few years, with various effects on markets. The most significant recent example comes from April of 2013, when someone hacked the Associated Press's Twitter feed. The tweets reported explosions at the White House, and the S&P 500 index dropped sharply in response. The AP reported that it had been hacked and the statements were false, and the markets slowly went back to normal. Though the whole ordeal lasted only minutes, it was still a wake-up call for traders who rely on social media for trading decisions.

Many people believe that the "#hashcrash," as it came to be known, was exacerbated by electronic trading, thinking that the algorithms that read news articles were much more gullible than a human trader would be. Others argue that the 20-second delay between when the tweet came out and when the markets declined is too long for an automated trading machine, but just about the right amount of time for a human to read a headline and panic. The speed with which information on social media travels can hurt traders who are caught unaware—whether their trades are done electronically or not. However, for the downsides that social media presents, there are also upsides: the information that the tweets were false spread online minutes before TV news agencies reported that information. Traders following social media may have seen the false information first, but they also received the corrections before anyone else, and the market made a full recovery.

How could #hashcrash-like disasters be prevented? Right now, the answer is unclear. But it is important to note that while the market did drop significantly at the news, it also bounced back within minutes, and even ended the day up 1%. Greater improvements in technology, from more secure accounts for important agencies to smart algorithms that can read social media posts and make intelligent decisions, will definitely improve the landscape as well as help resolve problems like the ones presented by #hashcrash-type situations.

After the #hashcrash and other reports of social media hacking, you may be wondering if using social media to make trading decisions is worth it. The fact is that social media technology is on the rise, and we suspect that its use will not only become more prevalent, but more reliable with time. Improvements are definitely needed, and more events like those of April 2013 will provide the impetus to improve not only social media, but trading technology. It may not be "the" answer to getting accurate and adequate trading information, but used correctly (and cautiously), an understanding of social media is a handy tool to have in your trading tool belt.

Witching Days

On some days the markets are more volatile than others. There's often no way to predict volatility unless you know for sure that something is going to happen on a specific day, like news of a company going public. But there are special days when volatility is predicted to be high every quarter: they're called witching days.

While a witching day sounds like something out of a Halloween special, it's simply a phrase for when certain classes of futures and options expire on the same day. When an asset's contract "expires," it means it's the last day the contract can be bought or sold, and the last day to honor the terms of the contract. There are several kinds of witching days: the double, triple, and quadruple.

A witching day is simply a phrase for when certain classes of futures and options expire on the same day.

The moniker itself refers to a bit of old superstition regarding midnight, the witching hour, a time of night when supernatural creatures supposedly appear and are at their most powerful. In modern context, the phrase still refers to any time that may be associated with bad luck or when something bad is likely to occur, which, in the trading world, can be when there is high volatility in the markets. Higher volatility means higher risk and a greater chance of decreased returns. But don't let witching days spook you; witching days are not really a huge cause for concern, and knowing about them can help you prepare.

Double witching occurs when option and futures contracts expire on the same day; this happens every third Friday of every month—except at the end of each financial quarter in March, June, September, and December. On those months, triple witching occurs. Triple witching, also sometimes referred to as "Freaky Friday," is the expiration of stock index futures, stock index options, and stock options. This happens on the third Friday at the end of every quarter (March, June, September, and December). Witching days can also be called (or contain) witching hours. The last hour of trading on those days is referred to as the witching hour in the US (3:00 to 4:00 PM EST) because during this hour the stocks are at their most volatile; this is the last chance for traders to close out of their positions before the expirations takes place.

Single-stock futures expire every month; when this coincides with the expiration of stock index futures, stock index options, and stock options (i.e., when it coincides with triple witching), it's called quadruple witching. Triple witching and quadruple witching are often used interchangeably since they happen to fall on the same day.

Because futures and options investors must close out of their position prior to the expiration dates, trading volume increases both during the preceding week and on the expiration day, although not always. It's up to a trader to decide how they want to trade on those days, since some traders may not be affected at all, while others greatly. If you're using algos to trade, especially volume-tracking algos, you may want

to watch the market volume carefully on those days in case you need to adjust how the algo trades.

The great thing about witching days is that they happen consistently every quarter. While you may not be able to predict just how volatile the market is going to be on other days, you can at least be ready for higher volumes on witching days and trade accordingly.

Similar events exist in other global markets. In Japan they are known as "SQ Days" (Special Quote Days) about which we talk about on page 64. Index rebalances can exert a similar impact on trading volume in London, and in Brazil, when Bovespa equity index rebalances four times a year, the closing auction starts five minutes earlier.

Type of Asset	Expires
Stock Futures	January, February, April, May, July, August, October, November
Stock Options	January, February, April, May, July, August, October, November
Market Index Futures	March, June, September, December
Market Index Options	March, June, September, December
Single-Stock Futures	Every month

Mini Minefields: Lunch Breaks, SQ Days, DST

After reading some of our longer minefield chapters, you'll be glad to know that some trading minefields do not require lengthy discussions. There are three that we fit into in this short section: Lunch Breaks, SQ Days, and Daylight Saving Time. They may be quick topics, but any trader new to Asia-Pacific markets in particular should know the following details about Lunch Breaks and SQ Days, and most of us can use a bit of help when it comes to remembering daylight saving time.

Lunch Breaks

During an exchange's lunch break, the order book closes and all trading stops for one to two hours, depending on the exchange. Historically, only a few of the Asia-Pacific exchanges have had lunch breaks, with very few other lunch-break markets around the world, and as these countries see the competitive advantage to staying open throughout the trading day, the list is getting smaller. Singapore, for example, eliminated their 90-minute lunch break in 2011. At the time of this writing, the exchanges that currently support lunch breaks are in:

- China
- Hong Kong
- Indonesia (which has a longer lunch break on Fridays to allow time for religious observances)
- Japan
- Malaysia
- Thailand
- Turkey

Even in these last holdout markets, change is on the horizon. Between 2011 and 2012, both Japan's TSE and Hong Kong's HKEx shortened their lunch breaks from 90 to 60 minutes, and we wouldn't be surprised if they phased out lunch breaks completely in the next few years.

While lunch breaks generally operate as a simple pause in trading, the lunch break in Japan makes trading there a little more interesting. The morning session (the trading period before the lunch break) and the afternoon session (the trading period after the lunch break) each have opening and closing auctions. This is especially important to remember if you enter Market on Close (MOC) orders in the morning in Japan—they'll trade at the morning session's close, not at the close of the day. After the lunch break, the afternoon opening auction usually results in a spike of trading volume. You can enter a DMA order 30 minutes before the end of the lunch break. For algo orders, it is ideal if your algo automatically participates on the second opening auction; if not, be careful about it chasing the spike of volume. Malaysia, Thailand, and Turkey also have opening auctions after their lunch breaks.

SQ Days

There are certain days in Japan known as SQ Days, or Special Quote Days, during which we see unusually high volume levels on the exchanges caused by the expiration of securities. There are two kinds of SQ Days in Japan: big SQ Days, on which futures, indices, and options expire all on the same day, and mini SQ Days, on which any two of those three occur on the same day. SQ Days move a huge amount of volume to the day's open, which could cause traders caught unawares to start their day off very badly. You can see a list of this year's SQ Days in our Japan guide on page 112. If you do a lot of algo trading in Japan, it's a good idea make sure your algorithm is designed to handle SQ Days, or you might have some surprising results.

You can see a list of this year's SQ Days in our Japan guide on page 112.

Similar events happen globally, in the U.S. for example, we usually call them "Witching Days" about which we talk about on page 62.

Daylight Saving Time

In countries that observe it, daylight saving time (DST) can help conserve fuel and electricity and can help people make the most of daylight hours. It can also really trip us up in trading if it catches us unaware, as it can be hard to know which countries observe DST and when.

Daylight saving time, which is the practice of advancing clocks by one hour in the spring and setting them back one hour in the fall (or the reverse in the Southern Hemisphere) began in Germany to conserve coal during World War I. Germany's allies in the Central Powers also adopted the measure, soon followed by the Allies. For the most part, DST, or summer time, was considered (and sometimes called) "war time," and almost all participating countries dropped the practice after the war ended. It saw a brief resurgence in World War II, but the policy didn't have any staying power in times of peace until the energy crisis of the 1970s, when conserving fuel again became an important issue. After the 1970s, daylight saving time became an annual practice in many countries around the globe.

Many countries observe daylight saving time, but not all. Almost all of Europe observes DST, with Iceland, Belarus, and Russia being the only exceptions. North America and parts of Oceania observe it as well. Outside of those regions, the practice is not as wide: the closer a country is to the Equator, the more consistent the day's length is, and changing the clocks doesn't help conserve energy. As a result, only a handful of countries in Asia, Africa, or the Middle East observe daylight saving time, and only the more southerly regions of South America do. To make things even more complicated, some regions *within* countries that observe DST still don't observe it. For example, only the southeastern states and territories in Australia observe DST. In Canada, the province of Saskatchewan does not observe it, nor do the states of Arizona and Hawaii in the US. Since Brazil is an equatorial country, only the southernmost parts observe DST.
Another one of the more confusing aspects of DST is that it never begins and ends on a fixed calendar date. For example, in Europe, DST starts on the last Sunday of March

and ends on the last Sunday of October. In Canada and the US, DST begins on the second Sunday of March and ends on the first Sunday of November. In Mexico, DST starts on the first Sunday of April and ends on the first Sunday of October (though some areas on the border of Mexico and the US observe the same dates as the US, to make border issues easier to manage). Confusing, right?

The chart below provides DST dates for this year. A completely comprehensive chart would take up more space than we have room for, so we include only the countries for which we have exchange guides (starting on page 78). As we've said above, certain regions in DST-observing countries below may not observe DST. However, for trading purposes, if the country's primary exchange is in a region that does observe it, we count it as a country that observes DST in the chart.

Country	Daylight Saving Time
Australia	April 6, 2014 - October 5, 2014
Austria	March 30, 2014 - October 26, 2014
Belgium	March 30, 2014 - October 26, 2014
Brazil	February 16, 2014 - October 19, 2014
Canada	March 9, 2014 - November 2, 2014
Czech Republic	March 30, 2014 - October 26, 2014
Denmark	March 30, 2014 - October 26, 2014
Finland	March 30, 2014 - October 26, 2014
France	March 30, 2014 - October 26, 2014
Germany	March 30, 2014 - October 26, 2014
Greece	March 30, 2014 - October 26, 2014
Hong Kong	Does not observe DST
Hungary	March 30, 2014 - October 26, 2014
Indonesia	Does not observe DST
Ireland	March 30, 2014 - October 26, 2014
Israel	March 28, 2014 - October 26, 2014
Italy	March 30, 2014 - October 26, 2014
Japan	Does not observe DST
Korea	Does not observe DST
Malaysia	Does not observe DST
Mexico	April 7, 2014 - October 26, 2014
Netherlands	March 30, 2014 - October 26, 2014
Norway	March 30, 2014 - October 26, 2014
Poland	March 30, 2014 - October 26, 2014
Portugal	March 30, 2014 - October 26, 2014
Singapore	Does not observe DST
South Africa	Does not observe DST
Spain	March 30, 2014 - October 26, 2014
Sweden	March 30, 2014 - October 26, 2014
Switzerland	March 30, 2014 - October 26, 2014
United Kingdom	March 30, 2014 - October 26, 2014
United States	March 9, 2014 - November 2, 2014

Market Profile Metrics

"Assume nothing" is a good mantra for anyone with years of experience in global equity trading. It seems like every time someone says "It works this way in country A, so it probably works the same way in country B," the markets prove them wrong. Each market demands custom solutions.

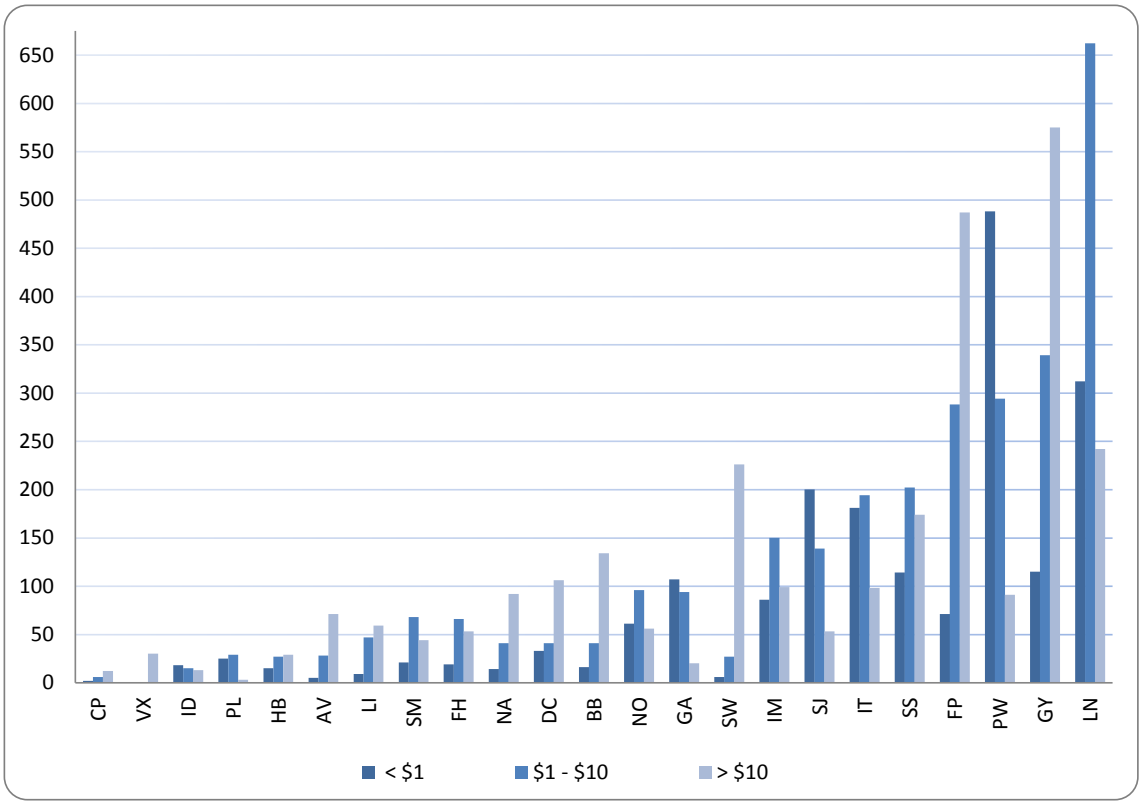
You might think that good market-vs-market comparisons would be readily available, but they are not. A lot of the information that is available elsewhere is not really focused on the needs of traders. In this section, you can find important standard trading metrics for many key global markets. (If you need a refresher on the exchanges' two-letter market codes, turn to the inside front cover of this guide.) Please let us know what other metrics you would like to see. We would love to expand it to meet your particular needs and interests.

How Many Symbols are on Each Global Exchange?

Knowing the number of symbols that trade on an exchange can give you an idea of what it will be like to trade in that market. The following charts depict the number of symbols (as of Fall 2013) per market, sorted from least to most symbols. We also include price ranges of the symbols. In these charts, the more established the market is, the more likely it is to have more symbols. In general, many of the exchanges with fewer symbols, the ones on the left side, have seen a lot of volatility or are in countries that have had financial difficulties in recent years. These are not hard and fast rules, however; you'll see some outliers below.

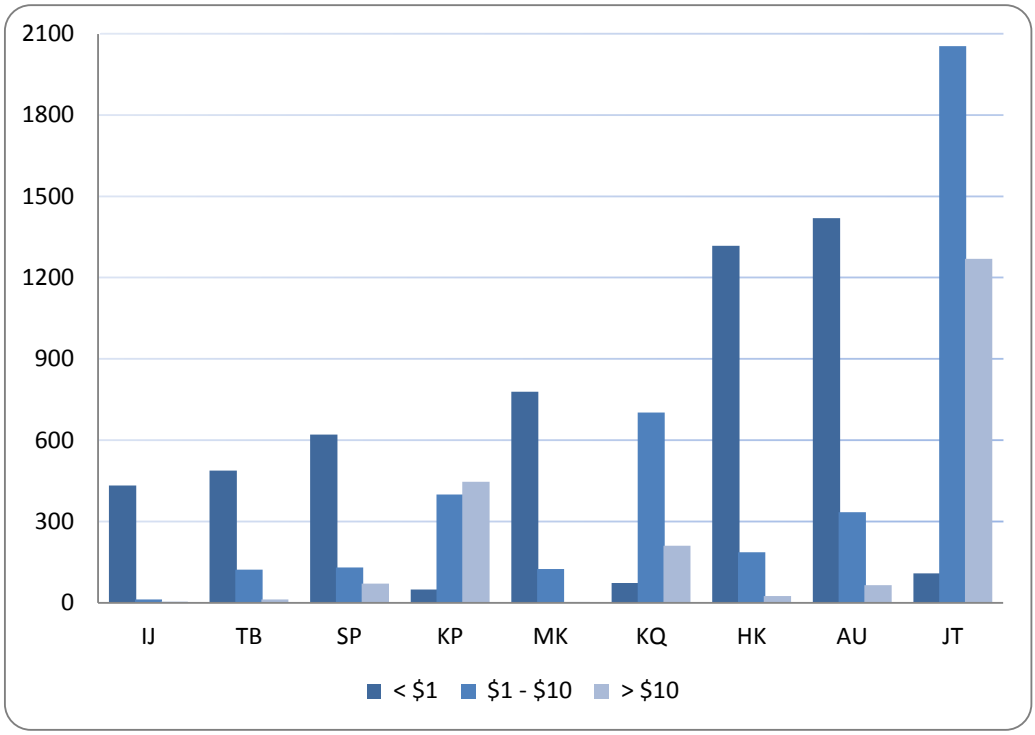
Europe

It is interesting to note that while most Central and Eastern European markets have fewer symbols, Poland's Warsaw Stock Exchange (PW) is a notable exception; it has a larger number of symbols than most European exchanges. Most of its activity, however, seems to be concentrated in inexpensive stocks.



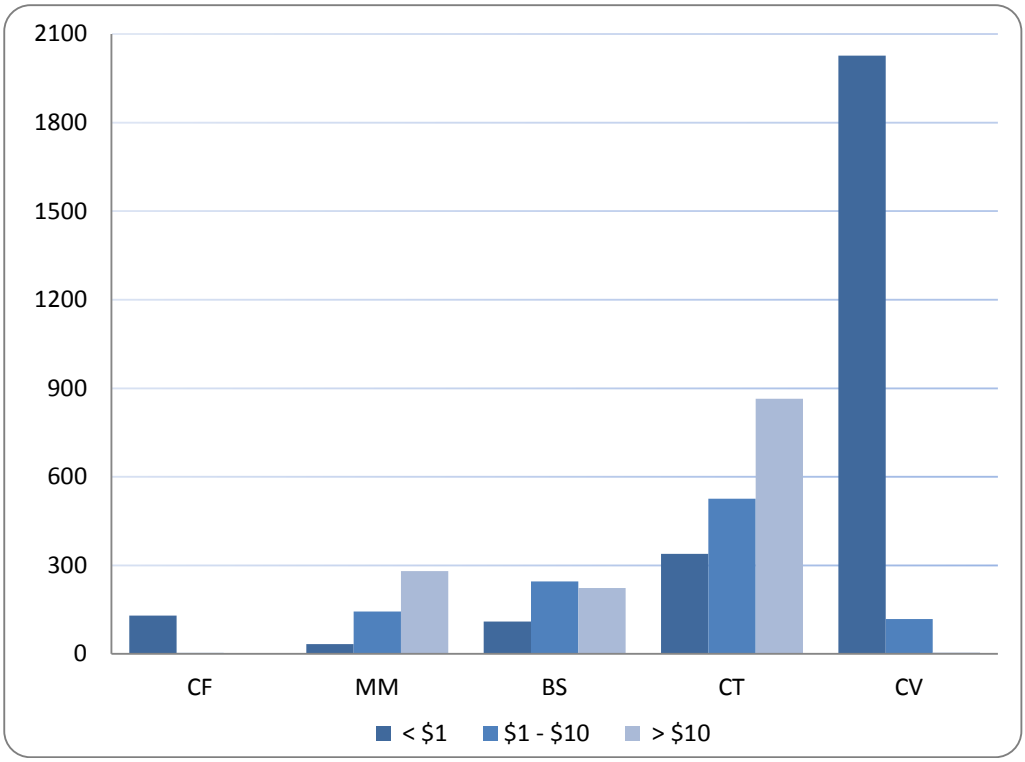
Asia-Pacific

The Asia-Pacific chart shows what you would expect from this region: the more established the market, the more symbols it has. The up-and-coming markets, like Thailand Stock Exchange (TB), have fewer, mostly inexpensive symbols.



Americas

The different Canadian exchanges (Canada National, or CF; Toronto, or CT; and TSE Venture, or CV) have strikingly different numbers of symbols.



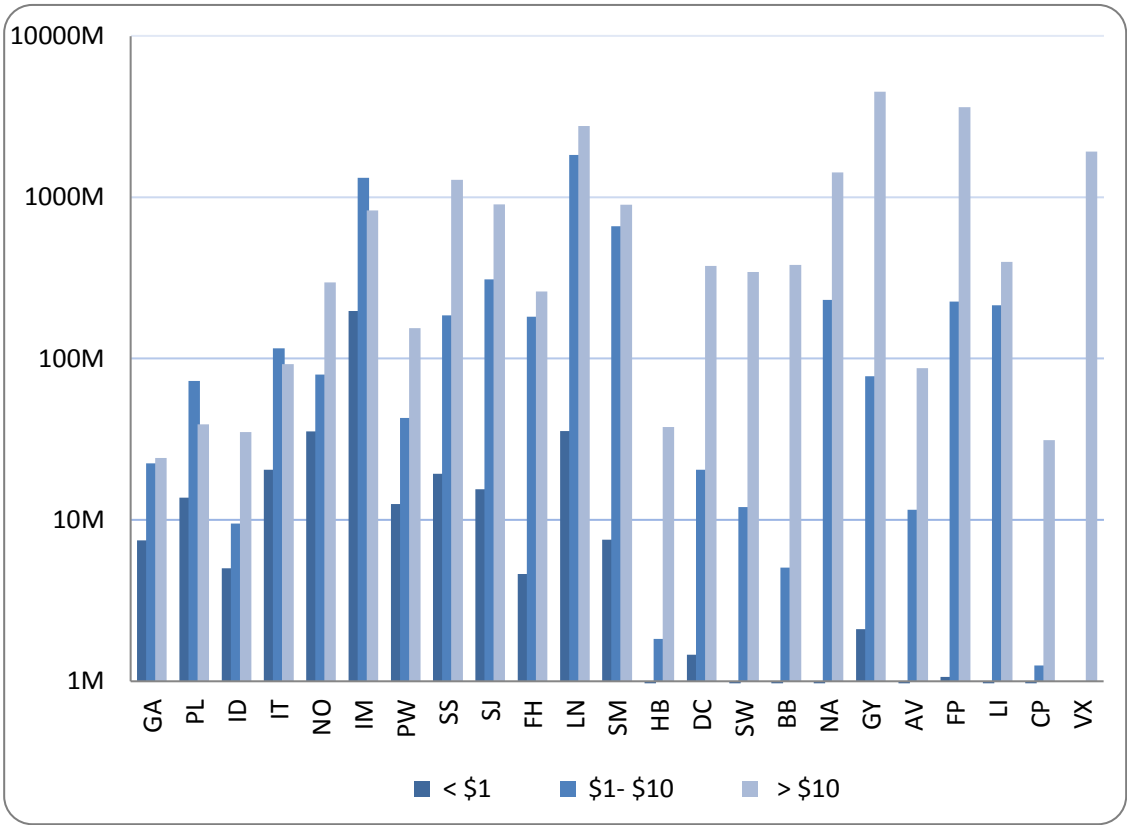
Market Profile Metrics

Where Is the Money Going?

The number of symbols in a market is useful information, but it is also important to follow the money. The following charts depict the average daily notional value of trades, from the market that trades the most inexpensive stocks to the market that trades the least inexpensive stocks. As in the charts above, more volatile markets tend to have more inexpensive stocks than pricier ones.

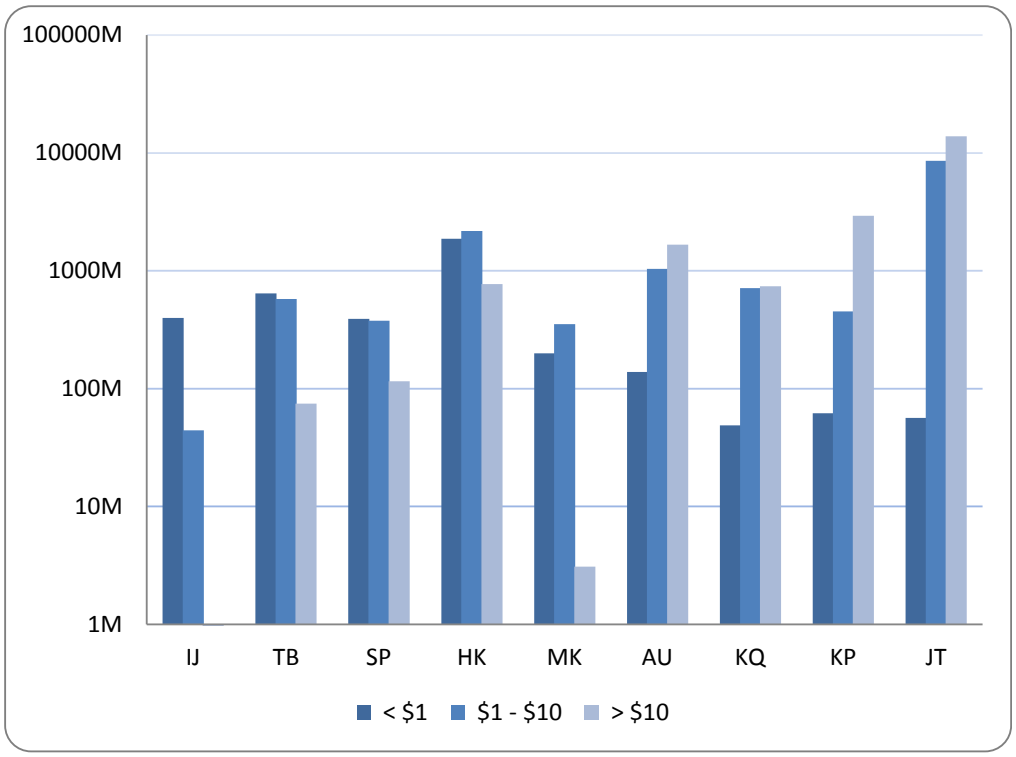
Europe

Note that Switzerland's SIX VX segment only trades expensive stocks. Trading in these markets can be tricky; though a 100-share order of a, say, $3 stock sounds negligible, a 100-share order of a $700 stock can move the stock. To deal with these complications, it's a good idea to tune your trading tools to trade expensive names without making a big dent in the market.



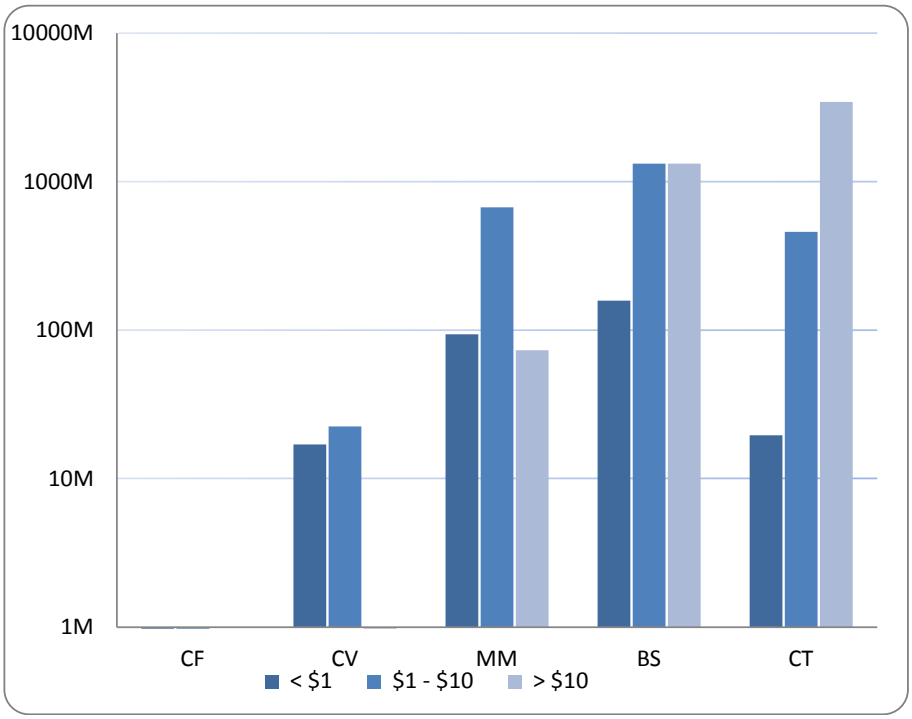
Asia-Pacific

Again, the Asia-Pacific charts show us about what you'd expect in this region. Japan is an advanced market, where most of the spending goes into higher-priced stocks. In markets that trade more inexpensive stocks, like Hong Kong, you may actually see trades for hundreds of millions of shares that don't even move the market.



Americas

Canada's Toronto and Brazil's Sao Paolo exchanges have the more expensive stocks in the Americas, whereas Canada's other exchanges have very few.



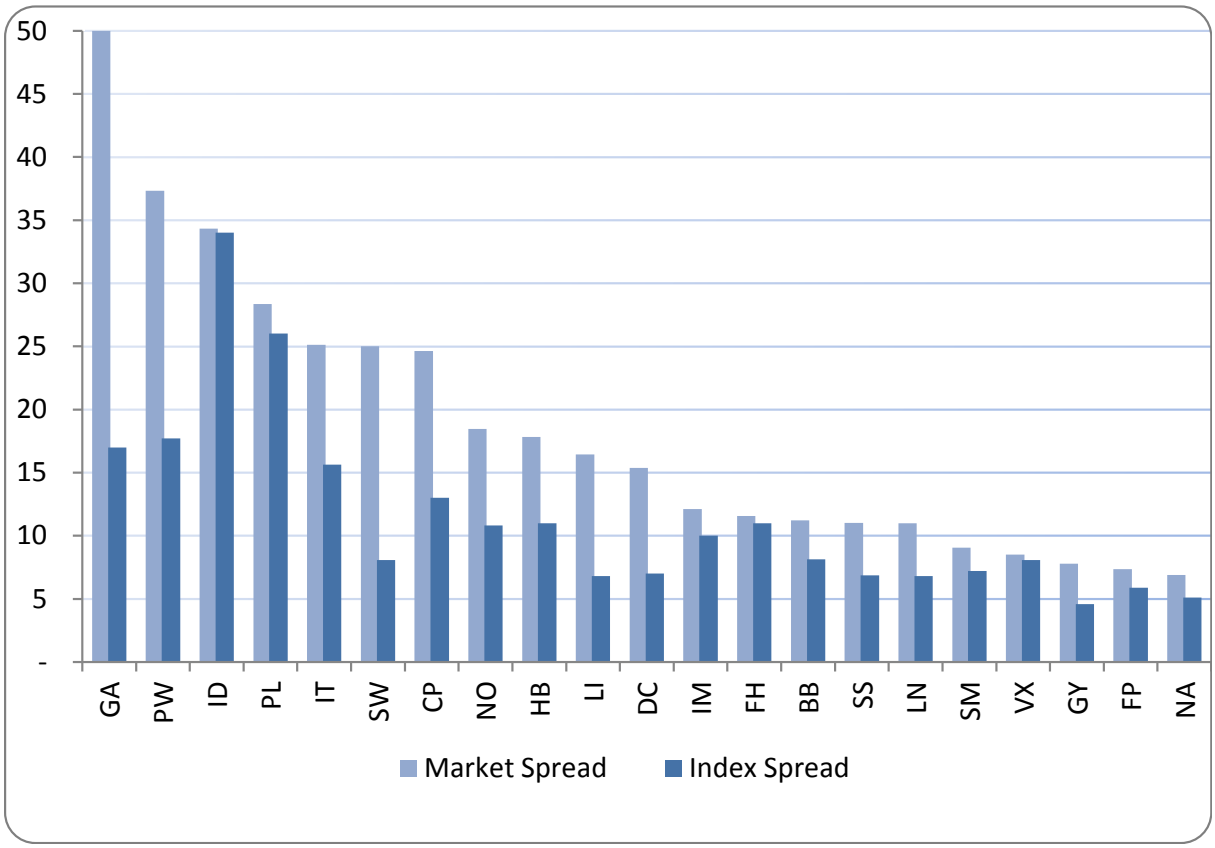
Market Profile Metrics

Which Market Has the Tightest Spread?

The following charts depict the average bid-ask spread in each market, as well as the spread of the market's largest index, in basis points (bps). In general, smaller spreads make for more efficient trading. However, notice that some exchanges have quite a difference between the market spread and the index spread. In these markets, trading a non-index symbol can be tricky and will need more of your time and attention than trades done on the index.

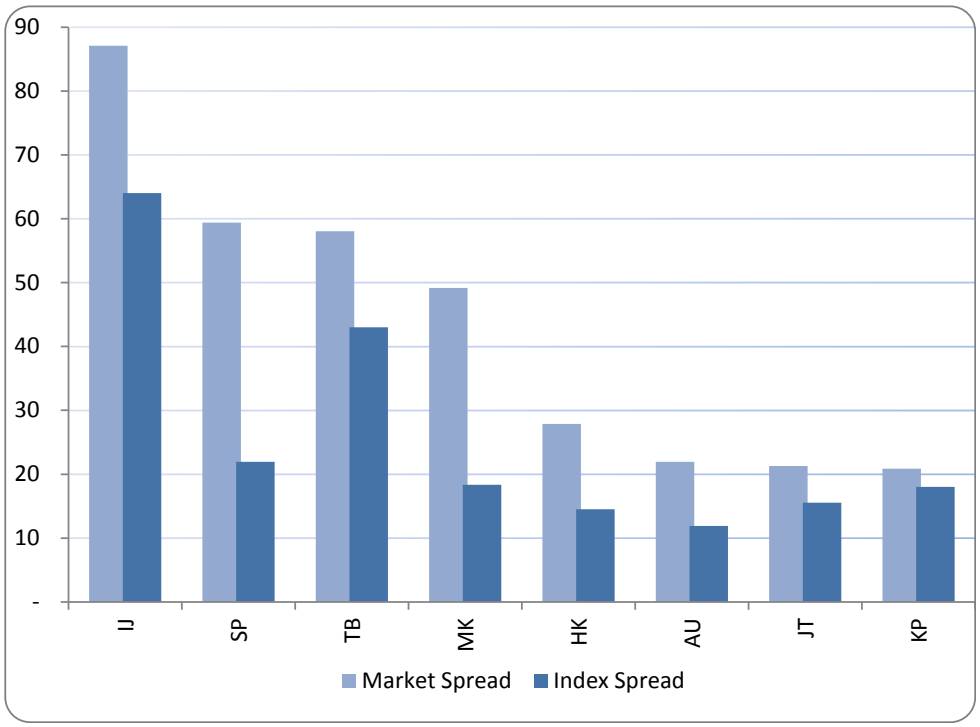
Europe

By now, you're familiar with the common theme in the European region charts: the more volatile markets are on the left, and the more established markets are on the right. Notice that in Greece, on average, the spread for a non-index security can be almost three times the spread of a security on their main index. The Irish Stock Exchange (ID) has the largest index spread.



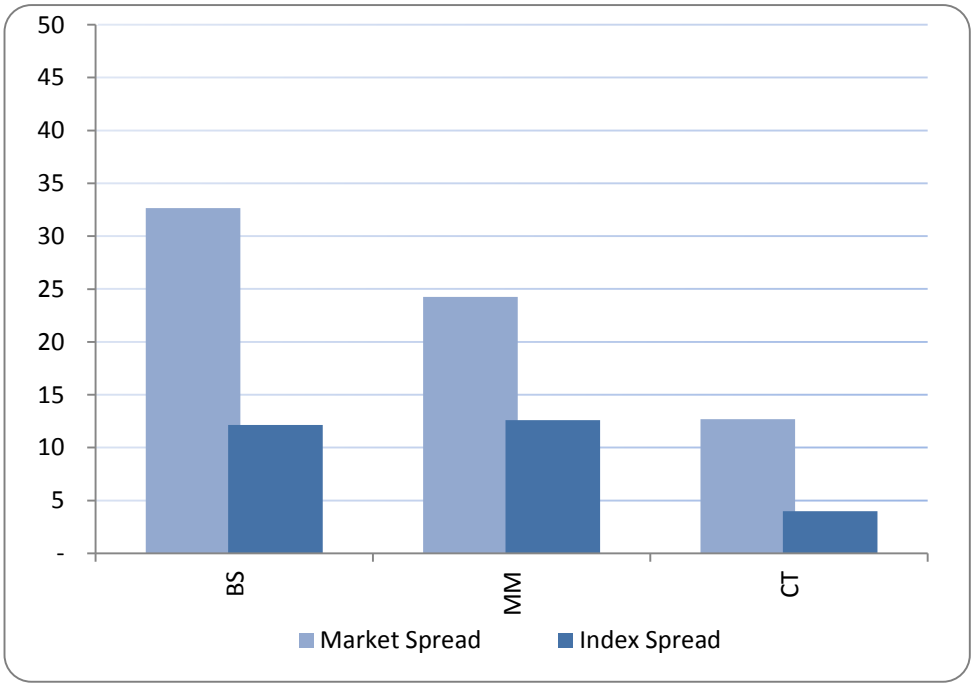
Asia-Pacific

Even though Japan's Tokyo Exchange has more symbols and higher trade values than Korea's KOSPI, on average, Korean securities have smaller spreads.



Americas

No surprises here: Canada's Toronto exchange has the lowest spread compared to Mexico and Brazil.

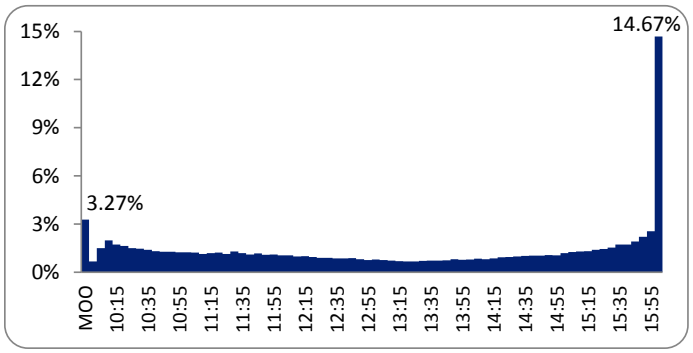


Market Profile Metrics

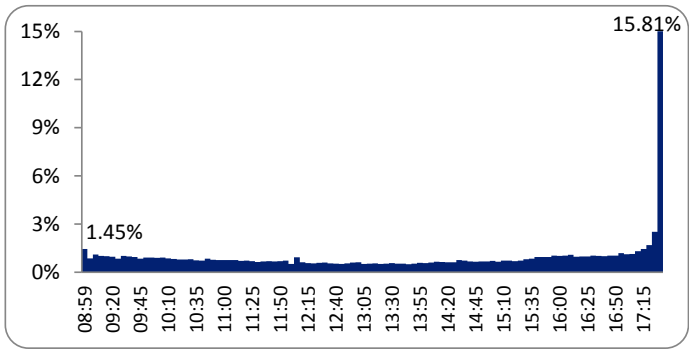
Volume Curves by Market

Long-time Traders' Guide readers will recognize the good old VWAP Curves on the following pages; we have updated them with the most recent data available to us. They depict the percentage of Average Daily Volume (ADV) over time for each market. We have labeled the volume percentage at each market's open and close.

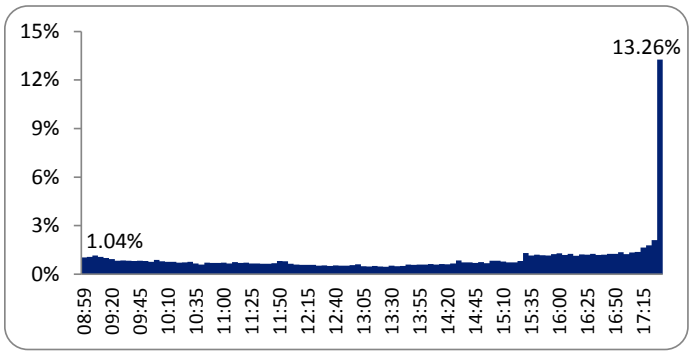
Australia



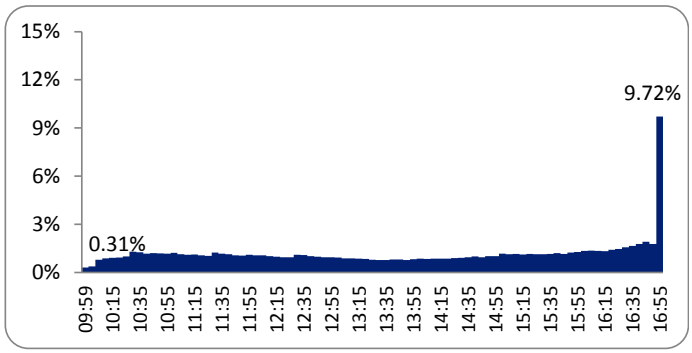
Austria



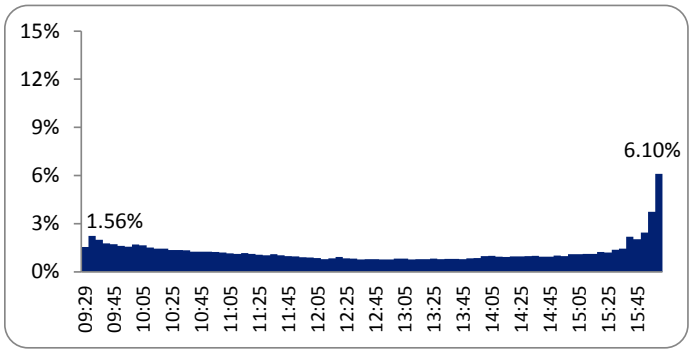
Belgium



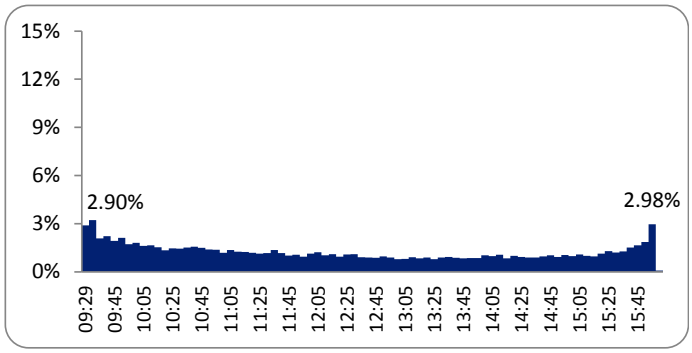
Brazil



Canada - Toronto

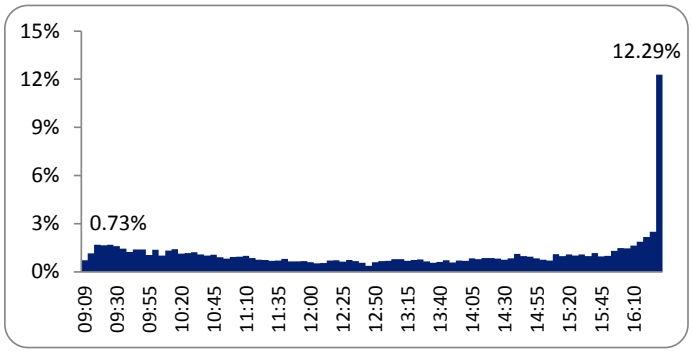


Canada - Venture

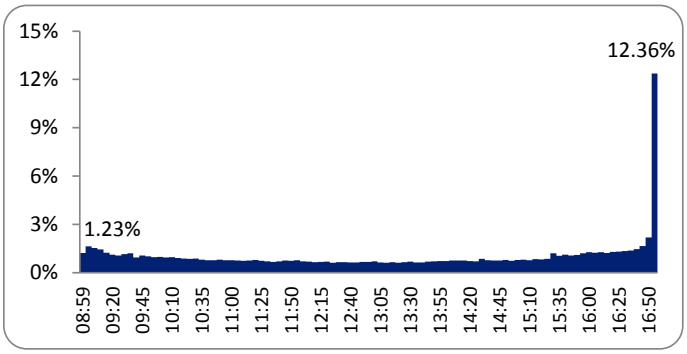


Volume Curves by Market Charts depict percentage of ADV (Average Daily Volume) over time.

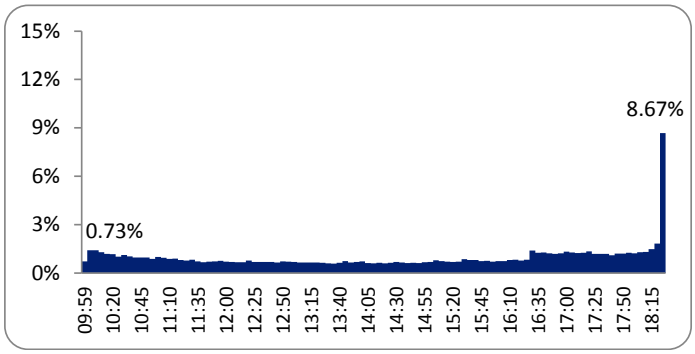
Czech Republic



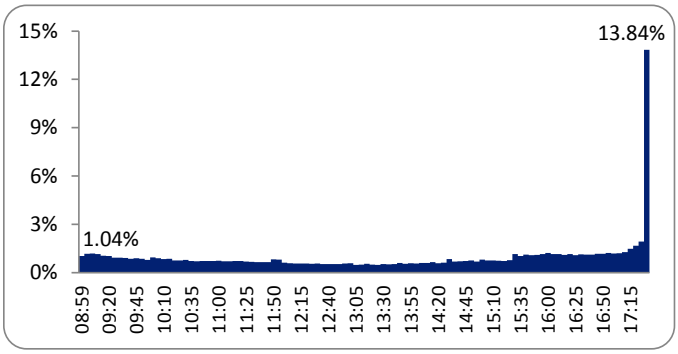
Denmark



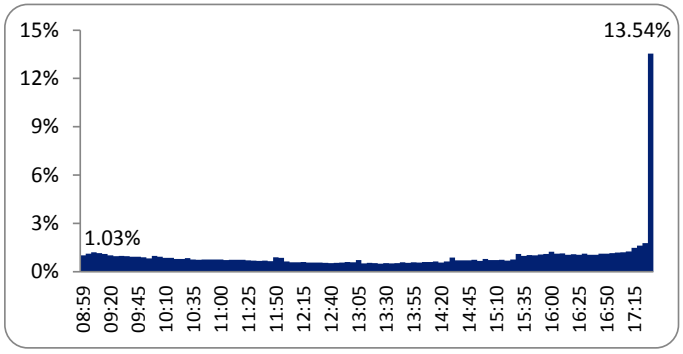
Finland



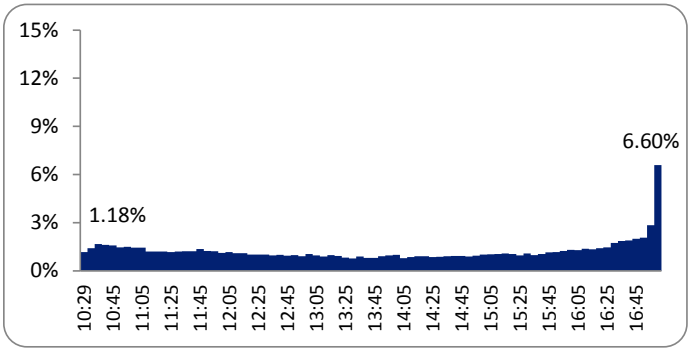
France



Germany

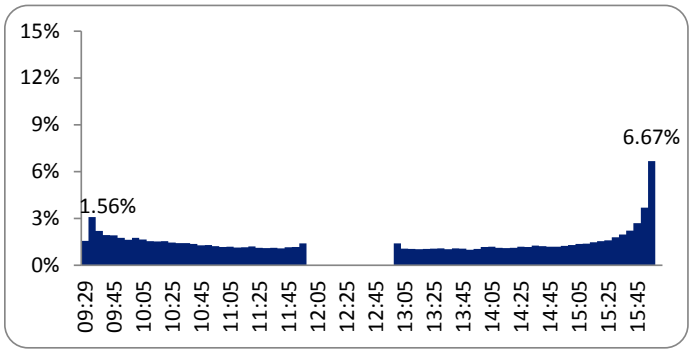


Greece

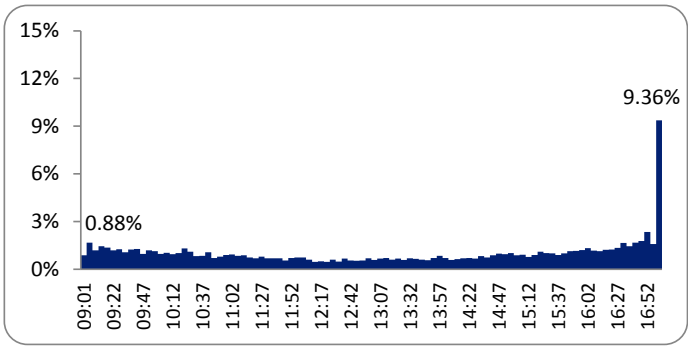


Volume Curves by Market Charts depict percentage of ADV (Average Daily Volume) over time.

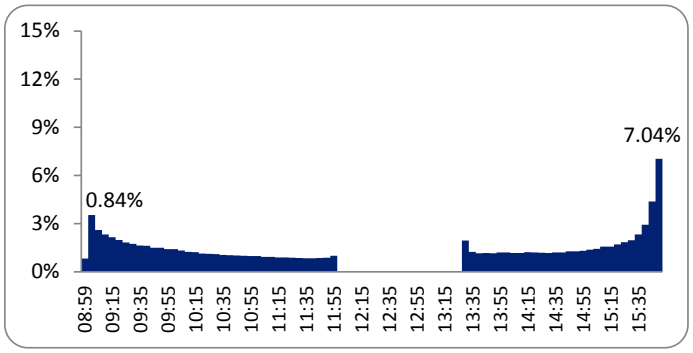
Hong Kong



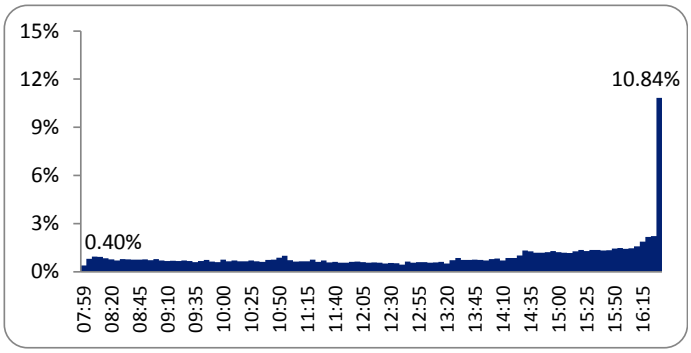
Hungary



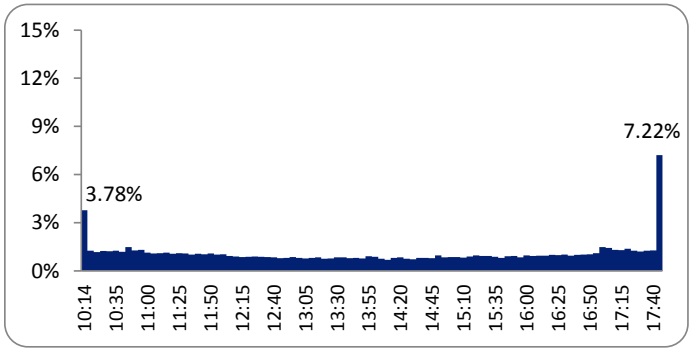
Indonesia



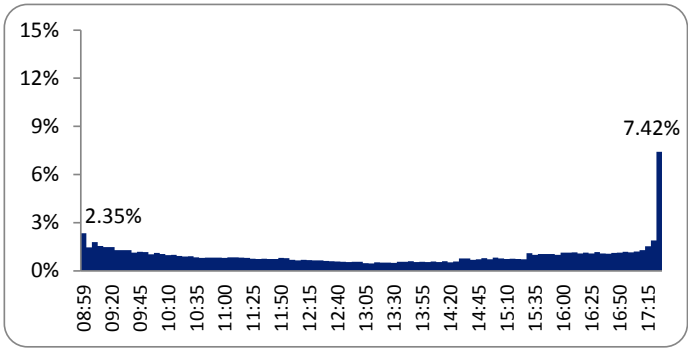
Ireland



Israel

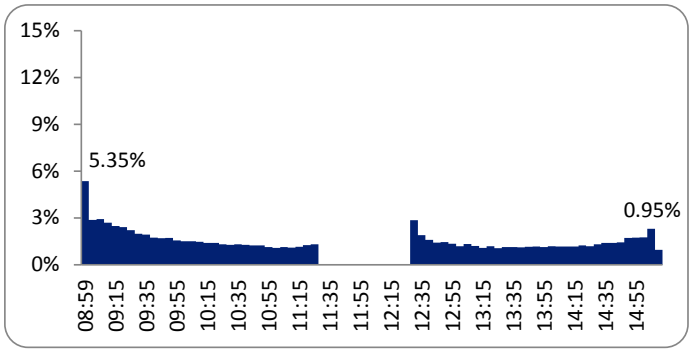


Italy

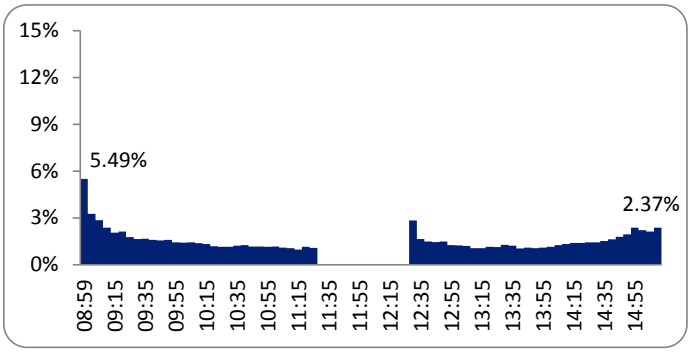


Volume Curves by Market Charts depict percentage of ADV (Average Daily Volume) over time.

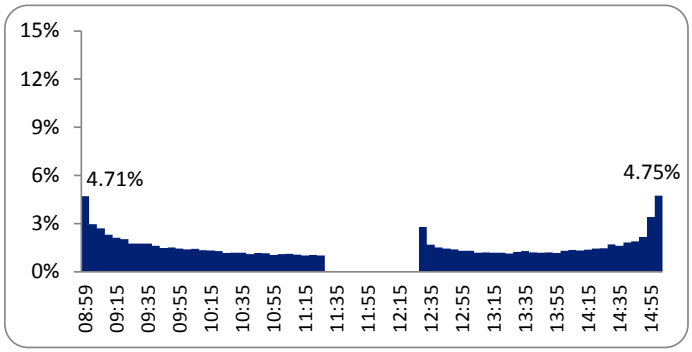
Japan: JASDAQ



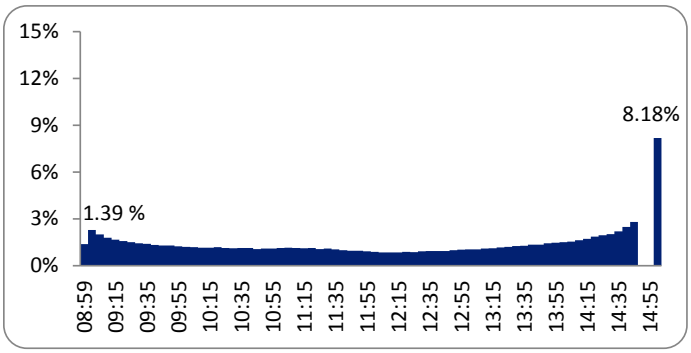
Japan: Osaka



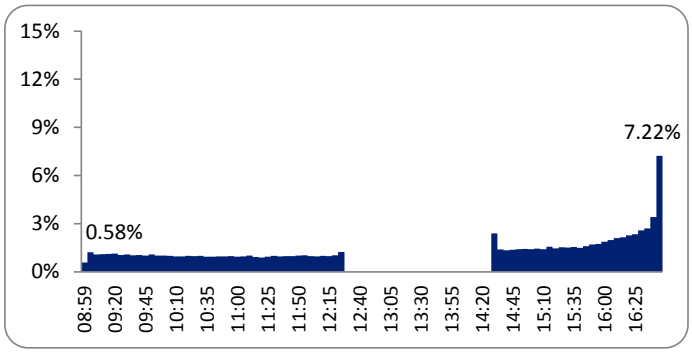
Japan: Tokyo



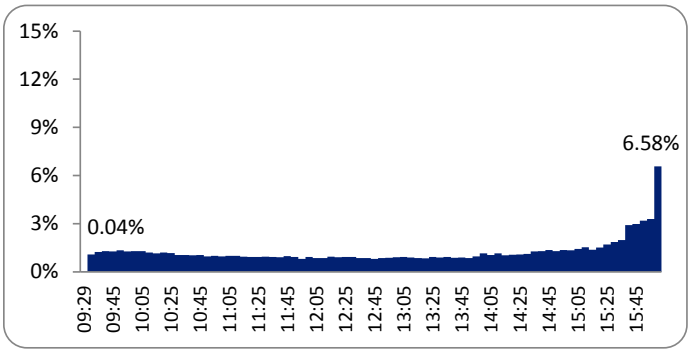
Korea



Malaysia

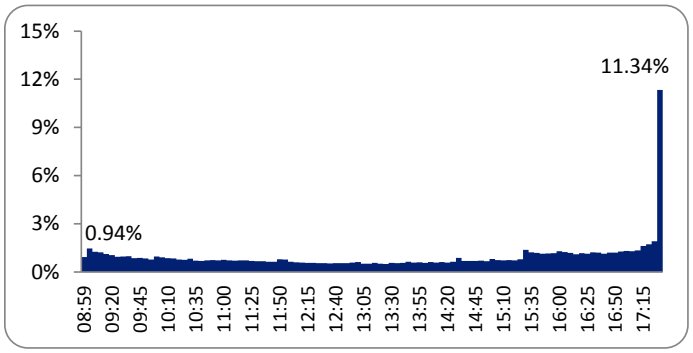


Mexico

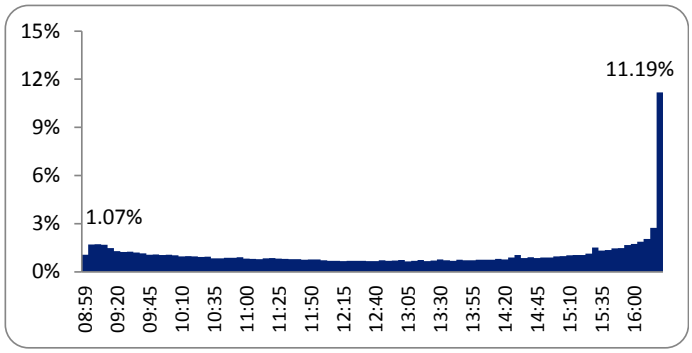


Volume Curves by Market Charts depict percentage of ADV (Average Daily Volume) over time.

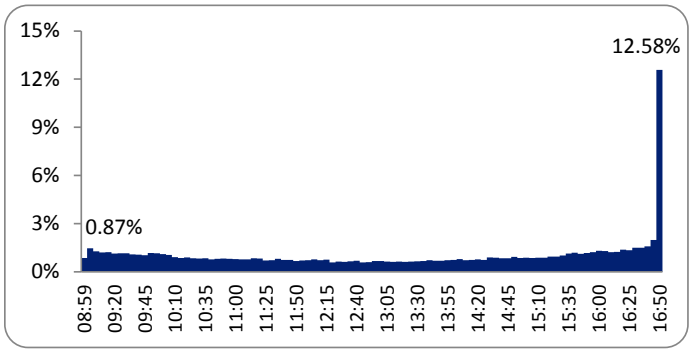
Netherlands



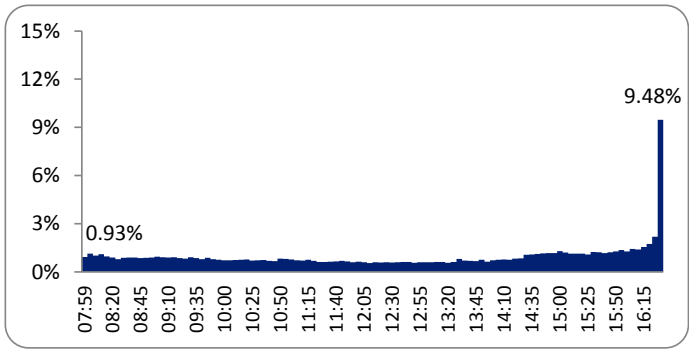
Norway



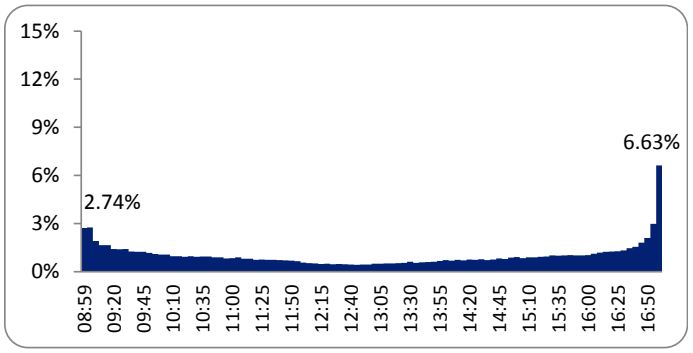
Poland



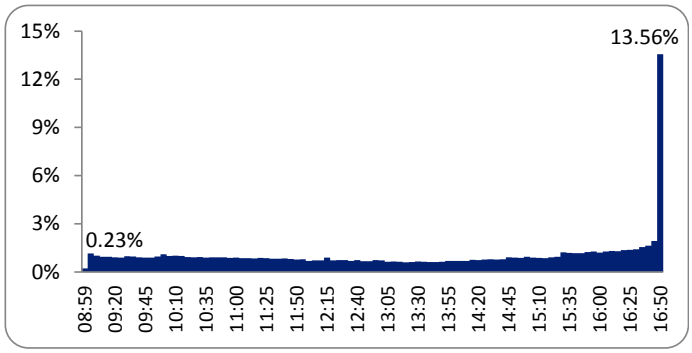
Portugal



Singapore

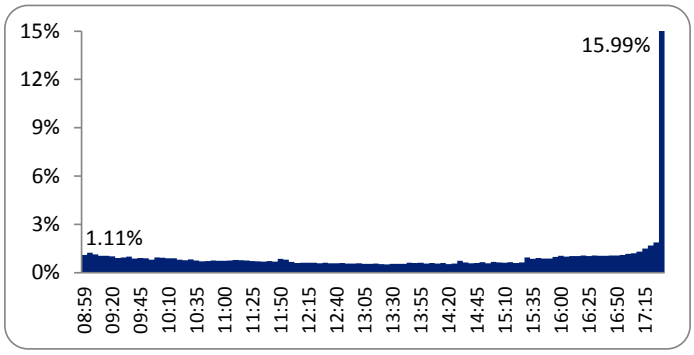


South Africa

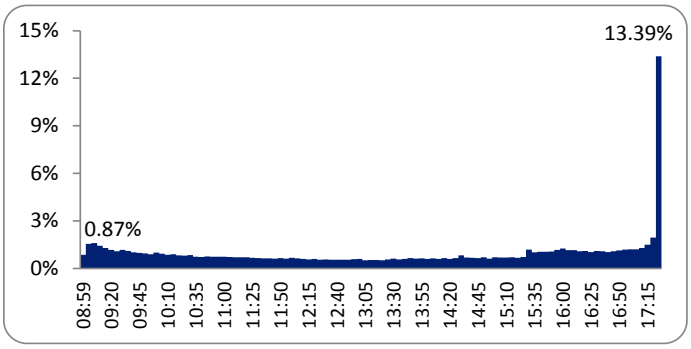


Volume Curves by Market Charts depict percentage of ADV (Average Daily Volume) over time.

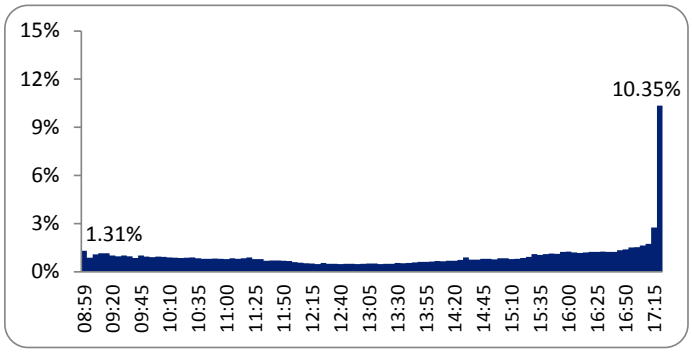
Spain



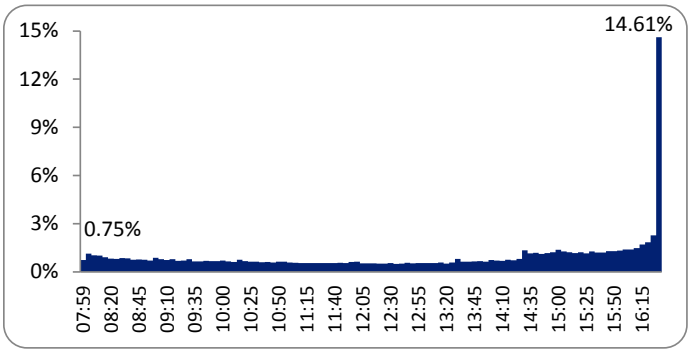
Sweden



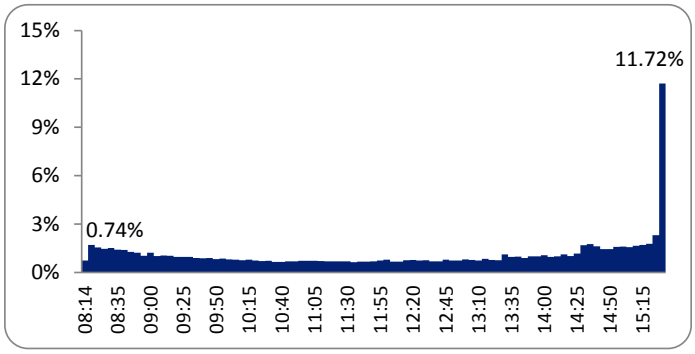
Switzerland



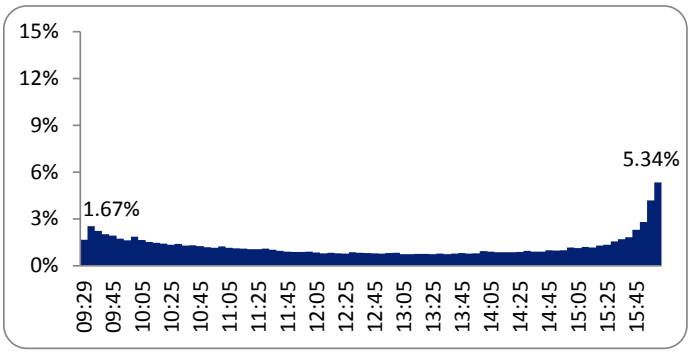
United Kingdom: London



United Kingdom: London International



United States



Australia (AU)

Australian Securities Exchange

Address: Exchange Centre
20 Bridge Street
Sydney, NSW, 2000

Telephone: +61 2 9338 0000

Internet: www.asx.com.au

Time Zone: GMT +10

Currency: Australia Dollar (AUD)

Settlement Cycle: T+3

Buy-Ins: Sellers must either buy back the shortfall by T+6 or borrow the shortfall to deliver. A penalty system exists for each failed day until the stock is produced.

Taxes: None

Foreign Ownership: Individual foreign ownership is restricted to 15%; more than 15% requires approval from the Foreign Investment Review Board. Aggregate limit is 40%. Specific industries (gaming, ASX, telecommunications) have other restrictions.

HOURS OF OPERATION

Pre-Open	7:00-10:00
Opening Auction	10:00-10:09:15 (staggered, see below)
Continuous Session	10:00-16:00
Pre-Close	16:00-16:10
Closing Auction	16:10-16:12

AUCTION INFORMATION

Opening Auction

Time to Submit LOO .....**30 seconds before each group open**

Staggered open in groups from 10:00-10:09:15 based on alphabetical order:

Group 1 (A-B): 10:00:00 +/- 15 seconds
Group 2 (C-F): 10:02:15 +/- 15 seconds
Group 3 (G-M): 10:04:30 +/- 15 seconds
Group 4 (N-R): 10:06:45 +/- 15 seconds
Group 5 (S-Z): 10:09:00 +/- 15 seconds

Closing Auction

Time to Submit LOC.....**16:30:01**

Pre-Close 16:00-16:10; Closing Single Price Auction 16:10-16:12.

2014 MARKET HOLIDAYS

Jan 1, 27 **Apr** 18, 21, 25 **Jun** 9 **Dec** 25-26

Half Days: Dec 24, 31

CIRCUIT BREAKERS

No official type of Circuit Breakers, but the exchange can halt a symbol from trading following significant news about the underlying. The exchange can also call a halt to general trading.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lot is 1 for almost all securities.

ORDER TYPES

Limit Order
Centre Point Order
Centre Point Crossing
Undisclosed orders
Iceberg Order

SHORT SELLING

All shorts are treated as sell. Public disclosure must be made on certain conditions.

PRICE AND TICK SIZE

Price	Tick Size
0-0.10	0.001
0.10-2	0.005
> 2	0.01

ORDER PRECEDENCE

Price-Time Priority

TRADER TIP

While venues run by big local banks often have more liquidity, internal broker pools often offer significant price improvement.

Austria (AV)

Weiner Borse AG

Address Wallnerstraße 8
P.O.Box 192
A-1014 Vienna

Telephone +43 1 531 65-0

Fax +43 1 532 97 40

Internet http://en.wienerborse.at
info@wienerborse.at

Time Zone GMT +1

Currency Euro (EUR)

Settlement Cycle T+3

Buy-Ins Buy-in procedures begin on Settlement Date (SD)+3; automatic settlement occurs on SD+4.

Taxes Stamp Duty approximately 4 bps (basis points) for both sides.

Foreign Ownership No general restrictions.

HOURS OF OPERATION
(all times local)

Pre-Open	8:00-8:55
Opening Auction	8:55-9:01
Continuous Session	9:02-17:30
Intraday Auction	12:30-13:30
Closing Auction	17:30-17:35

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:55-9:00**

Closing Auction

Time to Submit MOC/LOC.....**17:30:01**

Intraday Auction

Takes place from 12:30-13:30. Auction for odd, mixed, and unfilled round lots takes place from 13:00-13:02.

Volatility Auction

Activated when the maximum price range deviation is exceeded, decided by the exchange. Generally ends after 3 or 5 minutes, depending on security. The change to the next scheduled trading phase is carried out whether or not a price occurs.

Single volatility interruption occurs if the expected auction price deviates less than twice the value of the dynamic price range. An extended volatility interruption occurs if the expected exchange price deviates by less than 10% from the last price for at least 1 minute. If the expected exchange price differs by more than 3 times the dynamic price range and if the expected exchange price is not a market-driven price, no further price determination takes place that day. Trading continues on the next trading day.

2014 MARKET HOLIDAYS	**Jan** 1, 6 **Apr** 18, 21 **May** 1, 29 **June** 9, 19 **Aug** 15 **Dec** 8, 24-26, 31
CIRCUIT BREAKERS	Volatility Interruption Auction is triggered if either a static or dynamic price range is exceeded (exchange does not publish thresholds) and is adjusted after an auction price determination. Auction lasts approximately 2 minutes, with random ends. If price lies outside defined range, volatility interruption is extended until terminated manually.
SUPPORTED CONVERGEX ALGOS	Abraxas℠ Initiation Price Momentum Reserve VWAP Darkest Inline Peg TWAP Grey IQx® POV Value
ADR ELIGIBILITY	Eligible for ADR Direct® and Reverse ADRs℠.
LOT SIZES	Board lot is 1.
ORDER TYPES	Market Order Limit Order Iceberg Order
SHORT SELLING	Prohibition on naked short selling.
PRICE AND TICK SIZE	

Price	Tick Size
0	0.001
10	0.005
50	0.01
100	0.05

ORDER PRECEDENCE	Best price, Time, Order size. Midpoint orders are executed according to volume/time priority.
TRADER TIP	Take care not to miss out on the brief odd/mixed lot auction that takes place in the middle of the day from 13:00-13:02.

Belgium (BB)

Euronext Brussels

Address: Palais de la Bourse/Beurspaleis
Place de la Bourse/Beursplein
1000 Bruxelles/Brussel
Belgique/België/Belgium

Telephone: +32 (0)2 509 12 11

Internet: www.euronext.com

infobrussels@nyx.com

Time Zone: GMT +1

Currency: Euro (EUR)

Settlement Cycle: T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins: Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes: None

Foreign Ownership: No general restrictions.

HOURS OF OPERATION
(all times local)

Pre-Open	7:15-9:00
Order Matching	8:55-9:00
Continuous Session	9:00-17:30
Closing Auction	17:30-17:35
Trading At Last	17:35-17:40

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**7:15**

Closing Auction

Time to Submit MOC/LOC.....**17:30-17:35**

In Trading At Last, shares can be traded at their respective closing prices. This only applies for certain securities.

Special Auction

Double fixing stocks trade from 11:30 to 16:30. Single fixing stocks trade at designated auction periods depending on the trading group it belongs to. After each fixing, the stock trades for another 30 minutes at the fixing price.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 19 **May** 1 **Dec** 25-26 Half Day: Dec 24, 31

CIRCUIT BREAKERS

+/- 10% (6% for BEL 20 stocks) from the dynamic reference price, which is reset every time the market breaks its upside/downside threshold (last closing price for the opening). If the traded price deviates more than +/- 5% (3% for BEL 20 stocks) from the last traded price, the market stops for 2 minutes.

SUPPORTED CONVERGEX ALGOS	Abraxas℠ Darkest Grey	Initiation Price Inline IQx®	Momentum Peg POV	Reserve TWAP Value	VWAP
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.				
LOT SIZES	Board lot is 1, but for some specific instruments Euronext can decide to implement a trading lot size.				
ORDER TYPES	Market Order Limit Order Stop Loss / Stop Limit Order Pegged Order Reserve (Iceberg) Order				
SHORT SELLING	Reporting requirement for short positions greater than 0.25% of share capital and a request to abstain from lending financial company shares.				
PRICE AND TICK SIZE	0.01. Some trading groups have dynamic tick sizes.				
ORDER PRECEDENCE	Central order book orders are executed according to strict price priority. Changes in the order quantity or limit price cause forfeiture of time priority.				
TRADER TIP	Huge cross trades occur often in Euronext markets, so make sure your trading tools don't cause you to chase that volume. Although the book may look thin in comparison to other markets, Euronext has a lot of hidden liquidity in the book, perhaps due to the comparatively lax iceberg rules.				

Brazil (BS)

BM & F Bovespa

Address: Praça Antonio Prado, 48
Rua XV de Novembro, 275
Centro - São Paulo (SP)

Telephone: 55 11 2565-4000

Internet: http://www.bmfbovespa.com

Time Zone: GMT -3

Currency: Brazilian Real (BRL)

Settlement Cycle: T+3

Buy-Ins: On T+4, BOVESPA announces a buy-in order and the seller has until T+6 to deliver or the buy-in is executed. The seller pays any extra costs and fees.

Taxes: Exchange fee 0.0325% for both sides.

Foreign Ownership: Certain sectors and industries have restrictions, including transportation, financial institutions, energy, insurance, agriculture.

HOURS OF OPERATION
(all times local)

Pre-Opening Fixing	9:45-10:00
Continuous Session	10:00-16:55
Closing Call	16:55-17:00
After Market	17:30-18:30

AUCTION INFORMATION

Opening Auction

Time to Submit LOO **10:45-11:00**

Closing Auction

Time to Submit LOC.....**17:55-18:00**

Auction is postponed by 1 minute if the size or price changes in the last 30 seconds.

Intraday Auction

Auction for odd, mixed, and unfilled round lots: 13:00-13:02.

Volatility Auction

Traders may hold regular auction tradings as long as they have the permission of the Exchange´s Trading Official and of the traders who are buying or selling the assets. Regular auction tradings may be executed even without the consent of traders. During regular auction tradings in an Open Outcry Session, electronic trading of the security is suspended. Special auction trading is executed with priority over others and only buying traders may intervene.

2014 MARKET HOLIDAYS	**Jan** 1 **Mar** 3, 4 **Apr** 18, 21 **May** 1, 30 **Jun** 19 **Jul** 9 **Nov** 20 **Dec** 24-25, 31
CIRCUIT BREAKERS	Three rules, although they do not apply during the last half hour of the trading session: If Ibovespa (Bovespa Index) falls 10%: 30 minutes. If it falls 15%: 1 hour. If it falls 20%: Exchange may determine the suspension of trading.
SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct®.
LOT SIZES	Odd lots supported on cash market; round lots (most of which are at 100 shares) on exchange-supported markets.
ORDER TYPES	Limit Order Protection Price Order Market with Leftover as Limit Order Stop Limit Order Stop Order Iceberg Order Day: Immediate Or Cancel/Fill And Kill Fill or Kill Good Till Date Good Till Cancel
SHORT SELLING	Naked short selling is prohibited.
PRICE AND TICK SIZE	0.01. Stocks are quoted in BRL.
ORDER PRECEDENCE	Price/Time priority.
TRADER TIP	Three times in a year, the index rebalances, which causes the Closing Auction to start five minutes early on those days.

Canada (CT, CN, CV, CF)

Toronto Stock Exchange (TMX), Venture Stock Exchange (CV), Canada National (CF)

Address	The Exchange Tower 130 King Street West Toronto, ON M5X 1J2
Telephone	(888) 873-8392
Fax	(416) 947-4662
Internet	http://www.tmx.com info@tmx.com
Time Zone	GMT -5
Currency	Canadian Dollar (CAD)
Settlement Cycle	T+3
Buy-Ins	The receiving broker may buy-in the securities on the open market and charge the cost to the defaulting party. In October 2012, related to the repeal of its downtick rule, Canada introduced a locate requirement for any counterparty that has been previously responsible for an "Extended Failed Trade," a trade that has failed beyond SD+10. Any counterparty responsible for an extended failed trade is now required to mark their locate on all future short sells.
Taxes	None
Foreign Ownership	Investment in certain industries (finance, telecommunivations, transportation, and utilities) is monitored and limited.

HOURS OF OPERATION (all times local)

Opening Auction	7:00-9:30 (order entry)
Continuous Session	9:30-16:00
Closing Auction	15:40-16:00

AUCTION INFORMATION

Only round lots are permitted during auctions.

Opening Auction

Time to Submit MOO/LOO.....**7:00-9:30**
Pre-order Matching: **9:30**
Blackout Period .....**9:30, lasts ~30 seconds**

Closing Auction

Time to Submit MOC **7:00-15:40**
MOC Match **16:00**
Price Movement Extension.....**16:00-16:10**
Cancel Session .....**16:10-16:15** **(any open orders can be canceled)**
Permissible order types during closing include Anonymous and MOC types.

2014 MARKET HOLIDAYS

Jan 1 **Feb** 17 **Apr** 18 **May** 19 **Jul** 1 **Aug** 4 **Sept** 1 **Oct** 13 **Dec** 25-26

Note: Settlement dates can be affected on US holidays.

CIRCUIT BREAKERS

Coincides with NYSE. 7%, 13%, or 20% decline in the S&P 500 will cause a circuit breaker. If Canadian exchanges are open, but US exchanges are not, halts are triggered if the S&P/TSX composite declines 7%, 20%, or 30%.

If the price of a single security swings 10% or more within a 5-minute period, trading in that security will halt for 5 minutes. Further, all trades executed at more than 5% beyond the price that initially triggered that circuit breaker will be cancelled.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Inline	Peg	TWAP
Darkest	IQx®	POV	Value
Initiation Price	Momentum	Reserve	VWAP

ADR ELIGIBILITY

Not ADR eligible.

LOT SIZES

Odd lots have their own book and can be executed only during continuous trading (not at closing auction).

Board lot sizes vary:

Price	Lot Size
0-.10	1000
0.10-0.99	500
1.00 +	100

ORDER TYPES

Market Order
Limit Order
Iceberg Order (must be board lot)
Anonymous
At Auction Order
Market on Close
On-Stop
Dark Mid-point and Dark Limit order
Day: Good Till Date/Good Till Canceled/Fill Or Kill

SHORT SELLING

The downtick rule was repealed in October 2012 for all Canadian listed securities. A short marking exempt ("SME") designation was introduced for trades executed that are "directionally neutral." In broad terms, market makers and high frequency traders can mark orders which are technically short as SME orders. Please refer to IIROC Notice 12-0300 (October 11, 2012) for more detailed guidance regards "short sale" and "short-marking exempt" order designations.

PRICE AND TICK SIZE

Price	Tick Size
0	0.005
0.5	0.01

ORDER PRECEDENCE

Disclosed orders are executed prior to undisclosed ones. Board lots have higher priority.

TRADER TIP

You can enter MOC orders into the MOC book from 7:00 to 15:40, but not after that. *LOC* orders are only allowed if the symbol has an imbalance: you can enter them between 15:40 and 16:00 to offset the imbalance (or until 16:10 if there's a price movement extension).

Note: ConvergEx offers USD settlement in this exchange.

Czech Republic (CP)

Prague Stock Exchange (has two parallel systems: SPAD and KOBOS)

Address: Prague Stock Exchange
Rybna 14
Prague 1
110 01

Telephone: + 420 221 831 111

Internet: http://www.pse.cz

info@pse.cz

Time Zone: GMT +1

Currency: Czech Koruna (CZK)

Settlement Cycle: T+3

Buy-Ins: Buy-in procedures may be enforced on SD+6. Brokers are liable for settlement failures and their resolution.

Taxes: None

Foreign Ownership: Foreign ownership in weapons companies must be less than 50%.

HOURS OF OPERATION (all times local)

Order Collection	8:00-8:45
Auction Regime	8:45-9:10
Continuous Session	9:10-16:20
Closing Auction	16:20-16:27 (selected securities)

AUCTION INFORMATION

Closing Auction

Transactions may be concluded within the allowable spread, which is for the entire period of this phase defined by the best quotation valid as at the end time of the open phase, increased by 10% in each direction.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 1, 8 **Oct** 28 **Nov** 17 **Dec** 24-26, 31

CIRCUIT BREAKERS

If the midpoint of the allowable spread deviates by more than 20% from the midpoint at the beginning of the open phase and does not return to within the spread within 2 minutes, trading is suspended for 5 minutes. During the break, transactions of the issue in question cannot be concluded in SPAD. If at least 3 market makers apply for quotation during the suspension, the allowable spread is extended by 10% after the break, up to a maximum of +/- 50%. Trading is suspended every time the next 10% spread level is exceeded.

SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Not ADR eligible.
LOT SIZES	Size of lot fixed at 1 unit for all securities. Mixed lots allowed only on KOBOS.
ORDER TYPES	Market Order Limit Order Iceberg Order At Best Market on Open
SHORT SELLING	Short selling is supported.
PRICE AND TICK SIZE	Price: < 200 — Tick Size: 0.01 Price: 200-1000 — Tick Size: 0.10 Price: ≥ 1000 — Tick Size: 1.00
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	There are two trading systems: KOBOS, which is electronic, and SPAD. KOBOS has a lower volume of trades, but it is the system to turn to if you want to track auto volume.

Denmark (DC)

OMX Copenhagen

Address NASDAQ OMX Copenhagen A/S
Postbox 1040
1007 Copenhagen K

Visiting address: Nikolaj Plads 6

Telephone +45 33 93 33 66

Fax +45 33 12 86 13

Internet http://www.nasdaqomxnordic.com

Time Zone GMT +1

Currency Danish Krone (DKK)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes None

Foreign Ownership No general restrictions.

HOURS OF OPERATION (all times local)

Pre-Open	8:00-9:00
Opening Auction	9:00
Continuous Session	9:00-16:55
Closing Auction	16:55-17:00

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**30 minutes before open**

Closing Auction

Time to Submit MOC/LOC.....**1 minute after close**

Volatility Auction

Triggered when the price deviates more than a certain percentage from the reference price. (See "Circuit Breakers" below for these percentages.) Static volatility auction ends after 60 seconds, dynamic volatility auction ends after 180 seconds.

No Volatility Auction in the last 4 minutes of trading.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 17-18, 21 **May** 29 **Jun** 9, 30 **Dec** 24-26, 31

CIRCUIT BREAKERS

Static limit: 15% (10% for OMXC20) from the opening; dynamic limit: 5% (3% for OMXC20). Suspension is 3 minutes for static and 1 minute for dynamic. See "Auction Information" above for more information.

SUPPORTED CONVERGEX ALGOS	Abraxas℠ Darkest Grey	Initiation Price Inline IQx®	Momentum Peg POV	Reserve TWAP Value	VWAP

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lot is 1 for almost all securities.

ORDER TYPES

Market Order
Limit Order
Imbalance Order for Open and Close Auctions
Hidden Limit Order
Minimum Execution Quantity
Nordic@Mid Order

SHORT SELLING

Ban on selling bank stocks.

PRICE AND TICK SIZE

Price	Tick Size
0	0.01
5	0.05
10	0.1
50	0.5
500	1
5000	10
20000	100

ORDER PRECEDENCE

Price-Internal-Display-Time.
("Internal" means the incoming order is executed against the member's own order.)

TRADER TIP

As a NASDAQ OMX market, this is one of the few world markets with an exchange-run dark pool, called Nordic@Mid.

Copenhagen has a few really expensive stocks, like MAERSKA:DC and MAERSKB:DC, that will require extra care when trading.

Finland (FH)

OMX Helsinki

Address NASDAQ OMX Helsinki Oy
P. O. Box 361
FIN-00131 Helsinki

Visiting address: Fabianinkatu 14

Telephone +358 9 616 671

Fax +358 9 6166 7368

Internet http://www.nasdaqomxnordic.com

Time Zone GMT +2

Currency Euro (EUR)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes None

Foreign Ownership No general restrictions.

HOURS OF OPERATION
(all times local)

Pre-Open	9:45
Opening Auction	9:45-10:00
Continuous Session	10:00-18:30
Closing Auction	18:25-18:30

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**30 minutes before open**

Closing Auction

Time to Submit MOC/LOC.....**1 minute after close**

Volatility Auction

Triggered when the price deviates more than a certain percentage from the reference price. (See "Circuit Breakers" below for these percentages.) Static volatility auction ends after 60 seconds, dynamic volatility auction ends after 180 seconds.

No Volatility Auction in the last 4 minutes of trading.

2014 MARKET HOLIDAYS

Jan 1, 6 **Apr** 18, 21 **May** 1, 29 **June** 20 **Dec** 24-26, 31

CIRCUIT BREAKERS

Static limit: 15% (10% for OMXC20) from the opening; dynamic limit: 5% (3% for OMXC20). Suspension is 3 minutes for static and 1 minute for dynamic. See "Auction Information" above for more information.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lot for most securities is 1.

ORDER TYPES

Market Order
Limit Order
Imbalance Order for Open and Close Auctions
Hidden Limit Order
Minimum Execution Quantity
Nordic@Mid Order

SHORT SELLING

Short selling is supported.

PRICE AND TICK SIZE

Price	Tick Size
0	0.01

ORDER PRECEDENCE

Price-Internal-Display-Time.
("Internal" means the incoming order is executed against the member's own order.)

TRADER TIP

As a NASDAQ OMX market, this is one of the few world markets with an exchange-run dark pool, called Nordic@Mid.

Helsinki is the only Nordic market where stocks are listed and traded in euros.

France (FP)

Euronext Paris

Address NYSE Euronext Paris
39 rue Cambon
F 75039 Paris Cedex 01

Telephone +33 1 49 27 10 00

Internet www.euronext.com
infoeu@nyx.com

Time Zone GMT +1

Currency Euro (EUR)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes French Transaction Tax: 0.2% on the transfer of ownership of specific securities, listed by the exchange authorities.

Foreign Ownership Restrictions on a few specific sectors that the French government considers sensitive (defense, healthcare, public safety).

HOURS OF OPERATION (all times local)

Pre-Open	7:15-9:00
Order Matching	8:55-9:00
Continuous Session	9:00-17:30
Closing Auction	17:30-17:35
Trading At Last	17:35-17:40

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**7:15**

Closing Auction

Time to Submit MOC/LOC.....**17:30-17:35**

In Trading At Last, shares can be traded at their respective closing prices. This only applies for certain securities.

Special Auction

Double fixing stocks trade from 11:30 to 16:30. Single fixing stocks trade at designated auction periods depending on the trading group it belongs to. After each fixing, the stock trades for another 30 minutes at the fixing price.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 1 **Dec** 25-26

Half Days: **Dec** 24, 31

CIRCUIT BREAKERS	10% (6% for BEL 20 stocks) from the dynamic reference price, which is reset every time the market breaks its upside/downside threshold (last closing price for the opening). If the traded price deviates more than +/- 5% (3% for BEL 20 stocks) from the last traded price, the market stops for 2 minutes.
SUPPORTED CONVERGEX ALGOS	Abraxas℠ Initiation Price Momentum Reserve VWAP Darkest Inline Peg TWAP Grey IQx® POV Value
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.
LOT SIZES	Board lot is 1, but for some specific instruments Euronext can decide to implement a trading lot size.
ORDER TYPES	Market Order Limit Order Stop Loss/ Stop Limit Order Pegged Order Reserve (Iceberg) Order
SHORT SELLING	Reporting requirement for short positions greater than 0.25% of share capital and a request to abstain from lending financial company shares.
PRICE AND TICK SIZE	0.01. Some trading groups have dynamic tick sizes.
ORDER PRECEDENCE	Central order book orders are executed according to strict price priority. Changes in the order quantity or limit price cause forfeiture of time priority.
TRADER TIP	Huge cross trades occur often in Euronext markets, so make sure your trading tools don't cause you to chase that volume. Although the book may look thin in comparison to other markets, Euronext has a lot of hidden liquidity in the book, perhaps due to the comparatively lax iceberg rules.

Germany (GY)

Deutsche Boerse AG

Address Deutsche Böerse
60485 Frankfurt Am Main
Telephone +49-(0) 69-2 11-0
Fax +49-(0) 69-2 11-1 20 05
Internet http://deutsche-boerse.com
info@deutsche-boerse.com
Time Zone GMT +1
Currency Euro (EUR)
Settlement Cycle T+2
Buy-Ins The clearing house may initiate a buy-in on failed trades at its discretion and will generally enforce a buy-in on trades that remain unsettled 5 days after contractual settlement date. Buy-ins occur in a separate auction open to buy-in members of the exchange and can occur at prices up to 200% of the prior day closing price.
Taxes None
Foreign Ownership No general restrictions.

HOURS OF OPERATION
(all times local)

Pre-Open	7:30-8:50
Opening Auction	8:50-9:00
Continuous Session	9:00-17:30
Intraday Auction	13:00-13:02
Closing Auction	17:30-17:35

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:50-9:00**

Closing Auction

Time to Submit MOC/LOC.....**17:30:01**

Intraday Auction

Auction for odd, mixed, and unfilled round lots: 13:00-13:02.

Volatility Auction

Activated when the maximum price range deviation is exceeded, decided by the exchange. Generally ends after 3 or 5 minutes, depending on security. The change to the next scheduled trading phase is carried out whether or not a price occurs.

Single volatility interruption occurs if the expected auction price deviates less than twice the value of the dynamic price range. An extended volatility interruption occurs if the expected exchange price deviates by less than 10% from the last price for at least 1 minute. If the expected exchange price differs by more than 3 times the dynamic price range, and if the expected exchange price is not a market-driven price, no further price determination takes place that day. Trading continues on the next trading day.

2014 MARKET HOLIDAYS

Jan 1 Apr 18, 21 May 1 Dec 24-26, 31

CIRCUIT BREAKERS

Volatility Interruption Auction is triggered if either a static or dynamic price range is exceeded (exchange does not publish thresholds) and is adjusted after an auction price determination. Auction lasts approximately 2 minutes, with random ends. If price lies outside defined range, volatility interruption is extended until terminated manually.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lot is 100, though most securities trade at a board lot of 1. Mixed and odd lots allowed only during intraday auction.

ORDER TYPES

Market Order
Limit Order (rejected if it could cause a volatility interruption)

SHORT SELLING

Naked short selling of German companies is banned globally. Naked short sales in government bonds is also banned. Intraday naked short selling is permitted.

Net short positions of 0.2% or more in selected financial companies must be reported to BaFIN (Federal Financial Supervisory Authority) as of the close on the next trading day. Further notifications are required when such positions change by 0.1%. Positions of 0.5% or more are anonymously published on the home page of BaFIN.

Only positions held at the end of the day are relevant.

PRICE AND TICK SIZE

Price	Tick Size
0	0.01
10	0.05
50	0.1
100	0.5

ORDER PRECEDENCE

Best price, Time, Order size.

TRADER TIP

This is one of the few exchanges with its own trading facility and dark pool, called Xetra MidPoint.

Note: ConvergEx offers USD settlement in this exchange.

Greece (GA)

Athens Stock Exchange

Address 110 Athinon Avenue
10442 Athens

Telephone +30-210 33 66 800

Fax +30-210 33 11 975

Internet http://www.helex.gr/
information-services@helex.gr

Time Zone GMT +2

Currency Euro (EUR)

Settlement Cycle T+3

Buy-Ins A buy-in occurs if a trade fails to settle by 13:30 on T+3. The exchange uses a local broker to buy the required shares. The cost could be high to the defaulting party if brokers push up the price.

Taxes Transfer fees: 0.2% on all sales.
Levy: 0.0325% for all deals.

Foreign Ownership Interministerial committee approval is required to raise holdings above 20% in strategically sensitive companies (e.g., telecommunications).

HOURS OF OPERATION
(all times local)

Opening Auction	10:15-10:30
Continuous Session	10:30-17:00
Closing Auction	17:00-17:09
Aftermarket Session	17:10-17:20

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**10:15-10:30**

Closing Auction

Time to Submit MOC/LOC.....**15:00**

Intraday Auction

Occurs on the 3rd Friday of every month for derivatives expiry. Orders for the intraday auction can be entered from 11:45 onwards. The auction print occurs randomly any time between 11:59 and 12:00.

Volatility Auction

Static or dynamic price limits are set to avert sudden fluctuations in the prices of transferable securities. Price limits are determined as percentages of divergence from their reference prices. A price tolerance level of +/-30% from the previous day's closing price is set for most securities.

Volatility auctions occur within the day if a stock moves static +/-10% from last close and dynamic +/-2% from previous trade. They last approximately 5 minutes.

2014 MARKET HOLIDAYS	**Jan** 1, 6 **Mar** 3, 25 **Apr** 18, 21 **May** 1 **Jun** 9 **Aug** 15 **Oct** 28 **Dec** 24-26 Half Day: **Dec** 31
CIRCUIT BREAKERS	Triggered when the price of a stock crosses the limit of 18% in either direction. Price limits do not apply in the first three days of a company's listing.
SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct® and Reverse ADRs℠.
LOT SIZES	Board lot is 1, though a few select securities are 10.
ORDER TYPES	Market Order Limit Order Stop Order
SHORT SELLING	Uptick rule applies. Naked short selling prohibited.
PRICE AND TICK SIZE	**Price** / **Tick Size** 0.01-59.99 / 0.01 60.00 + / 0.05
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	After the three-minute closing auction, the Aftermarket session begins. Closing orders generally participate into the Aftermarket phase instead of only in the closing auction, so you'll need to send a market order during the closing auction itself if you want to participate in it.

Hong Kong (HK)

HKEx

Address	12/F One International Finance Center 1 Harbor View Street Central, Hong Kong
Telephone	+852 2295 3106
Fax	+852 2295 3106
Internet	http://www.hkex.com.hk info@hkex.com.hk
Time Zone	GMT +8 (no DST)
Currency	Hong Kong Dollar (HKD)
Settlement Cycle	T+2
Buy-Ins	Buy-in occurs on T+3 if order is not settled by 15:45 on T+2. Penalties on defaulting brokers include buy-in price, default fees and suspension of repeated offenders.
Taxes	Stamp Duty: 0.1% (rounded up to nearest HKD) Transaction levy: 0.003% (rounded to nearest HK cent) Trading fee: 0.005% (rounded to nearest HK cent) Italian Financial Transaction Tax: 22 bps (basis points) on buys only.
Foreign Ownership	Investments are restricted in certain industries (e.g., broadcasting).

HOURS OF OPERATION
(all times local)

Pre-Open	9:00-9:30
Morning Session	9:30-12:00
Lunch Break	12:00-13:00
Afternoon Session	13:00-16:00

AUCTION INFORMATION

Volatility Auction

No specific volatility auctions, but stocks can be suspended intraday at HKEx's discretion.

LUNCH BREAK

Order book is closed during the lunch break. Any orders that are not canceled are held in the book during lunch. Replaces are not allowed, but you can cancel orders 30 minutes before the lunch break ends.

2014 MARKET HOLIDAYS

Jan 1, 31 **Feb** 3 **Mar** 29 **Apr** 18, 21 **May** 1, 6 **Jun** 2 **Jul** 1 **Sept** 9 **Oct** 1, 2 **Dec** 25-26

Half Days: Jan 30 Dec 24, 31

CIRCUIT BREAKERS

No specific regulations, but the exchange has the right to suspend trading of a security on its discretion.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lots only. Board lot sizes vary: examples include 400, 500, 1000, 2000, up to 5000000.

Maximum of 3000 board lots per order.

ORDER TYPES

Limit Order
Enhanced Limit Order
Special Limit Order
At Auction Limit Order
At Auction Order

SHORT SELLING

Only certain securities are eligible for short sales. Shorting is allowed in continuous trading (not in auction); traders must peg to the offer and cannot hit the bid. ETFs can hit the bid. Uptick rule applies.

PRICE AND TICK SIZE

Price	Tick Size
0	0.001
0.26	0.005
0.51	0.01
10.01	0.02
20.01	0.05
200.01	0.1
100.01	0.2
500.01	0.5
1000.01	1
2000.01	2
5000.01	5

Price/Precision rounding: 4 decimals.

ORDER PRECEDENCE

Price-Time priority.

TRADER TIP

There are no alternative trading platforms in Hong Kong. Liquidity comes only from the primary exchange and from brokers' internal pools.

Hungary (HB)

Budapest Stock Exchange

Address 1H - 1364 Budapest
Pf. 24

Telephone +36-1-429-6700

Fax +36-1-429-6800

Internet http://www.bse.hu

info@bse.hu

Time Zone GMT +1

Currency Hungarian Forint (HUF)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins No official rules.

Taxes None

Foreign Ownership No general restrictions, but issuers may have their own restrictions in their articles of association.

HOURS OF OPERATION (all times local)

Open Order Collection	8:30-9:00/9:01
Open Order Matching	9:00/9:01-9:02
Continuous Session	9:02-17:00
Closing Order Collection	17:00-17:05/17:06
Closing Order Matching	17:05/17:06
Closing Price Trading	17:06-17:10

AUCTION INFORMATION

Limit Orders only for auctions.

Opening Auction

Time to Submit LOO **8:30-9:00/9:01**

Closing Auction

Time to Submit LOC.....**17:00-17:05/17:06**

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 1, 2 **June** 9 **Aug** 20 **Oct** 23, 24 **Dec** 24-26, 31

CIRCUIT BREAKERS

If the change in the transaction price exceeds 10% in comparison with the previous day's closing price, the trading halt limit is reached and trading in that security stops for 2-15 minutes. The Exchange applies a halt only once within one trading day for each product.

SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct® and Reverse ADRs℠.
LOT SIZES	Board lot is 1.
ORDER TYPES	Market Order Limit Order Stop Order
SHORT SELLING	Short selling is supported.
PRICE AND TICK SIZE	Price: < 2000, Tick Size: 1 Price: > 2000, Tick Size: 5
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	This exchange has seen a real decrease in trading volume since 2011, when the government encouraged transferring private pension fund assets to state pension funds.

Indonesia (IJ)

Indonesia Stock Exchange (IDX)

Address Indonesia Stock Exchange Building, 1st Tower
Jl. Jend. Sudirman Kav 52-53
Jakarta Selatan 12190

Telephone +6221 5150515

Fax +6221 5150330

Internet http://www.idx.co.id/index-En.html
callcenter@idx.co.id

Time Zone GMT +7

Currency Indonesian Rupiah (IDR)

Settlement Cycle T+3

Buy-Ins Occur on T+3 for all deliveries to the clearing house that remain unsettled by noon on T+3. The failing member firm is penalized by being required to pay cash equal to 125% of the highest price over the previous 3 days.

Taxes Exchange levy: 4.3 basis points payable on both buys and sells.
Transaction tax: 10 basis points payable on sells.

Foreign Ownership No restrictions on foreign ownership except in relation to banking and broadcasting industries. Banks may list for foreign ownership shares representing up to 99% of their total capital. Foreign investors may not invest in private broadcasting companies unless the investment is in newly-issued shares, capped at 20% of total capital.

HOURS OF OPERATION (all times local)

Pre-open	8:45-8:55
Morning Session	9:00-12:00
Lunch Break*	12:00-13:30
Afternoon Session	13:30-15:49:59
Pre-closing Session	15:50-16:00
Post Trading Session	16:05-16:15

*-Note: On Fridays, the lunch break lasts from 11:30 to 14:00.

AUCTION INFORMATION

Opening Auction

Time to Submit LOO **8:45-8:55**

2014 MARKET HOLIDAYS

Jan 1, 14, 31 **Mar** 31 **Apr** 18 **May** 1, 15, 27, 29 **Jul** 28–**Aug** 1 **Dec** 25-26, 31

CIRCUIT BREAKERS	If the index moves down 10% from the previous day's close, trading is suspended for 30 minutes (or until end of session). If it moves 15%, trading is suspended until the end of the day. For individual stocks, the exchange rejects orders that are 10% below or 20% above the reference price.
SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct®.
LOT SIZES	Board lot is 500.
ORDER TYPES	Limit Order
SHORT SELLING	Short selling is supported for certain shares.

PRICE AND TICK SIZE

Price	Tick Size
< 200	1
200-500	5
500-2000	10
2000-5000	25
>5000	50

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	While the lunch break is 90 minutes long betwen Monday and Thursdays, it is longer (150 minutes) on Fridays to allow for religious observances.

Ireland (ID)

Irish Stock Exchange

Address 28 Anglesea Street
Dublin 2

Telephone +353 (1) 617 4200

Fax +353 (1) 677 6045

Internet http://www.ise.ie

finance@ise.ie

Time Zone GMT

Currency Euro (EUR)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes Stamp duty tax: 1% on purchases for registered stocks.
Brokers Levy: EUR 1.25 on contract over EUR 12,500.

Foreign Ownership No general restrictions, but issuers may have their own restrictions in their articles of association.

HOURS OF OPERATION (all times local)

Pre-Trading Phase	6:30-7:50
Opening Auction	7:50-8:00
Continuous Session	8:00-16:28
Closing Auction	16:28-16:30
Post Trading Phase	16:30-17:15

AUCTION INFORMATION

Start times for the opening and closing auctions are staggered and vary from security to security and from day to day. The timeframe for all securities to enter into the auction phase is typically no longer than 5 seconds, but the delay may be longer when exceptional volumes of orders are present on the order book.

Opening Auction

Time to Submit MOO/LOO.....**7:50-8:00**

Closing Auction

Time to Submit MOC/LOC.....**16:28-16:30**

Volatility Auction

Can occur during auctions and continuous trading and can be initiated where the potential execution price lies outside the dynamic price range and the static price range. Static and dynamic price ranges may be extended in a fast market. Volatility interruptions may be extended in certain circumstances.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 5 **Jun** 2 **Dec** 25-26

Half Days: **Dec** 24, 31

CIRCUIT BREAKERS	See "Volatility Auction," opposite.
SUPPORTED CONVERGEX ALGOS	Abraxas℠ Initiation Price Momentum Reserve VWAP Darkest Inline Peg TWAP Grey IQx® POV Value
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.
LOT SIZES	Board lot is 1.
ORDER TYPES	Market Order Limit Order Market to Limit Order Hidden Order Midpoint Order Iceberg Order Stop Market Order Stop Limit Order
SHORT SELLING	Short selling supported. Only market makers can short Irish financial company securities.
PRICE AND TICK SIZE	<table><tr><th>Price</th><th>Tick Size</th></tr><tr><td>9999</td><td>0.001</td></tr><tr><td>49995</td><td>0.005</td></tr><tr><td>99990</td><td>0.01</td></tr><tr><td></td><td>0.05</td></tr></table> Precision rounding: 3 decimals.
ORDER PRECEDENCE	Price-Time priority. Market orders enjoy priority over limit orders in the order book. Between market orders, time priority also applies.
TRADER TIP	A large percent of trades are OTC and cross trades, so auto volume is sometimes scarce. It can be hard to find natural liquidity, especially when trading with algos. The closing auction only lasts for two minutes, so you'll have to act fast if you want to participate in it.

Israel (IT)

Tel Aviv Stock Exchange

Address 54 Ahad Ha'am Street
Tel Aviv 65202

Telephone +972 3 567 7411

Fax +972 3 510 5379

Internet http://www.tase.co.il/Eng/Pages/Homepage.aspx

Time Zone GMT +2

Currency Israeli New Shekel (ILS)

Settlement Cycle T+2 (T+0 for domestic investors)

Buy-Ins If the investor does not have sufficient funds, the broker will not submit the trade. The exchange states that buy-ins should start on T+5 for securities.

Taxes None

Foreign Ownership Limits in some industries and state-controlled companies (banking, insurance, asset management): investments over a certain amount are subject to authorization.

HOURS OF OPERATION (all times local)

Exchange is open Sunday through Thursday.

Pre Opening	9:00
Opening Auction	9:45-9:46 (random) for Group A, 10:15 for Group B (see note)
Continuous Session	9:45-9:46 (random) for Group A, 10:15 for Group B
Pre Closing	Sun: 16:14-16:15 (random) Mon-Thur: 17:14-17:15 (random)
Closing Auction	Sun: 16:24-16:25 (random) Mon-Thur: 17:24-17:25 (random)

Note: Securities are separated into Group A (made up of the TA 100, Tel Aviv's 100 most highly capitalized companies) and Group B (the rest).

AUCTION INFORMATION

Only Limit Orders permitted in auctions.

Opening Auction

Time to Submit LOO **9:00**

Limit orders that do not complete during the opening phase are transferred to the continuous session at the original price limit and time priority. For Limit Opening orders, the remaining part is cancelled and deleted from the books.

Closing Auction

Time to Submit LOC.....**16:14**

2014 MARKET HOLIDAYS

Mar 16 **Apr** 14-15, 20-21 **May** 5-6 **Jun** 3-4 **Aug** 5 **Sep** 24-26 **Oct** 3, 8-9, 15-16

CIRCUIT BREAKERS	To prevent typos and orders made in error, the Exchange requires orders where the price is off by 35% or more from the last transaction to be submitted through a trade supervisor. In Continuous Trading , if the TA-25 index fluctuates by 8% in relation to the basic index, it is interrupted for 45 minutes. If the TA-25 index fluctuates by 12% in relation to the basic index, trading is halted until the end of the trading day.
SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct® and Reverse ADRs℠.
LOT SIZES	Board lot is 1 for almost all securities. Trade in odd lots takes place once a year.
ORDER TYPES	Market Order (only in continuous session) Limit Order Limit Opening Order
SHORT SELLING	A short sale is permitted only if the security sold is not a derivative. Naked short selling is prohibited.
PRICE AND TICK SIZE	Tick size is 0.01
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	This is the only market we know that has lot sizes based on trade value: the minimum order size for each stock changes as the price of the stock changes.

Italy (IM)

Borsa Italiana

Address Piazza Affari 6
20123 Milan

Telephone +39 02 72 42 61

Fax +39 02 72 00 43 33

Internet http://www.borsaitaliana.it

Time Zone GMT +1

Currency Euro (EUR)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins The Central Counterparty can give notice of a buy-in on trades which remain unsettled 4 days after contractual settlement date. The buy-in occurs on SD+5.

Taxes Italian Financial Transaction Tax: 0.22% on the transfer of ownership of specific securities domiciled in Italy with a capitalization equal to or greater than EUR 500 million. The rate is reduced to 0.12% if the transaction is executed on a Regulated Market or MTF.

Foreign Ownership No general restrictions, but issuers may have their own restrictions in their articles of association.

HOURS OF OPERATION (all times local)

Opening Auction	8:00-9:00 (ends randomly between 9:00 and 9:00:59)
Continuous Session	9:00-17:25
Closing Auction	17:25-17:30 (ends randomly between 17:30 and 17:30:59)
Trading at Closing Price	17:35-17:40
After-hours Trading	18:00-21:00

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:00-9:00/9:00:59**

At the end of the auction, incomplete orders are cancelled and given an out.

Closing Auction

Functions the same way as the opening auction. The only difference is that validation and auction phases take place in just 5 minutes for Blue Chip, Star and Ordinary 1 segments.

Incomplete orders are transferred to the following day's opening auction as orders with price limit (if entered) or as opening price orders if they had been entered the previous day as closing price orders.

Volatility Auction

If the indicative auctions do not result in a valid price, the volatility auction is triggered (repeated for opening auction and once only for closing auction).

2014 MARKET HOLIDAYS	Jan 1 Apr 18, 21 May 1 Aug 15 Dec 24-26, 31
CIRCUIT BREAKERS	Both static and dynamic price tolerance level applies. This is determined by sector for each market segment.
SUPPORTED CONVERGEX ALGOS	Abraxas℠ Darkest Grey Initiation Price Inline IQx® Momentum Peg POV Reserve TWAP Value VWAP
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.
LOT SIZES	Board lot is 1 for almost all securities.
ORDER TYPES	Market Order Limit Order Iceberg Order Executable Quote Stop Orders
SHORT SELLING	Short selling is supported. Ban on naked short selling.
PRICE AND TICK SIZE	

Price	Tick Size
Up to 0.25	0.0001
0.2501-1	0.0005
1.0001-2	0.001
2.0001-5	0.0025
5.0001-50	0.005
> 50	0.01

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	The aftermarket session in this exchange has a lot of retail flow.

Japan (JP, JO, JQ)

Tokyo Stock Exchange, Osaka Securities Exchange/JASDAQ

	Tokyo Stock Exchange	Osaka Securities Exchange/JASDAQ
Address	2-1 Nihombashi Kabuto-cho, Chuo-ku Tokyo 103-8224	8-16 Kitahama 1-chome, Chuo-ku Osaka 541-0041
Telephone	+81 3 3666 1361	+81 6 4706 0800
Fax	+81 3 3665 1412	+81 6 6227 5272
Internet	http://www.tse.or.jp	http://www.ose.or.jp

Time Zone: GMT +9

Currency: Japanese Yen (JPY)

Settlement Cycle: T+3

Buy-Ins: Local member firms are subject to buy-in on trades open after contractual settlement date and are subject to fines for failing to make deliveries to the Central Counterparty.

Taxes: None.

Foreign Ownership: Limits of 20% for broadcasting shares and 33.3% for airline and telecommunications (NTT) shares. Some restrictions exist around certain banking stocks.

HOURS OF OPERATION (all times local)

Tokyo Stock Exchange	
Opening Auction	9:00
Morning Session	9:00-11:30
Lunch Break	11:30-12:30
Afternoon Session	12:30-15:00
Closing Auction	15:00

Osaka/JASDAQ	
Order Submission	8:00
Opening Auction	9:00
Continuous Session	9:00-15:10
Closing Auction	15:10

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**9:00 TSE, 8:00 OSE**

Order Matching **9:00**

Special Quote (SQ) days can result in significant opening volume spikes. This is particularly true for "Big SQ Days" (Mar 8, Jun 14, Sep 13, Dec 13 in 2012), when equity index futures expire, and "Small SQ Days," when stock options expire.

Closing Auction

Time to Submit MOC/LOC.....**Any time after the start of the second session**

On TSE, if you send MOC and LOC orders before 11:00, it becomes an order at morning session closing. If you send them after 11:00, it becomes an afternoon session closing order.

There are also auctions before and after the lunck break on TSE.

2014 MARKET HOLIDAYS	**Jan** 1-3, 13 **Feb** 11 **Mar** 21 **Apr** 29 **May** 3-6 **Jul** 21 **Sep** 15, 23 **Oct** 13 **Nov** 3, 23-24 **Dec** 23, 31
CIRCUIT BREAKERS	TSE allows for two circuit breakers of 15 minutes each, triggered by extreme price moves. If the price moves a certain percent after the first circuit breaker ends, a second circuit breaker will be triggered. OSE has a 2000-point absolute limit.
SUPPORTED CONVERGEX ALGOS	Abraxas℠ Initiation Price Momentum Reserve VWAP Darkest Inline Peg TWAP Grey IQx® POV Value
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.
LOT SIZES	TSE: Board lots range 1, 10, 50, 100, 500, 1000, depending on security. OSE: Board lots range 1, 10, 50, 100, 500, 1000, 2000, 3000, depending on security.
ORDER TYPES	Market Order Limit Order Immediate Or Cancel Fill Or Kill (Market orders only)
SHORT SELLING	Uptick rule applies. Shorts and short sell exempt order types. Starting November 5th, 2013, the uptick rule will only apply once the market has moved -10% from the previous day's closing price. Once the uptick is applied, it will be effective until the end of the next trading day.
PRICE AND TICK SIZE	

Price	Tick Size
up to 3000	1
5000	5
30000	10
50000	50
300000	100
500000	500
3000000	1000
5000000	5000
30000000	10000
50000000	50000
>50000000	100000

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	Because of the lunch break, there are four different auctions throughout the day: an open and close in the session before the break, and an open and close in the session after. You can enter orders in the lunch break starting 30 minutes before the afternoon open.

Malaysia (MK)

Bursa Malaysia (MYX)

Address 10th Floor
Exchange Square Bukit Kewangan
50200 Kuala Lumpur

Telephone +(603) 2034 7000

Fax +(603) 2732 5258

Internet http://www.bursamalaysia.com
customerservice@bursamalaysia.com

Time Zone GMT +8

Currency Malaysian Ringgit (MYR)

Settlement Cycle T+3

Buy-Ins Occur on the morning of T+3 for all deliveries to the clearing house that remain unsettled by 16:00 on T+2.

Taxes Transaction levy: 3 basis points (bps) on buys and sells with a cap of MYR 1000 per settlement.
Stamp duty: 10 bps payable on buys and sells, with a cap of MYR 200.

Foreign Ownership Foreign ownership in certain industries is restricted and subject to caps on the level of that foreign ownership. These industries include brokerage, insurance, manufacturing, shipping, and telecommunications.

HOURS OF OPERATION
(all times local)

Pre-open	8:30-9:00
Morning Session	9:00-12:30
Morning Closing	12:30
Lunch Break	12:30-14:30
Afternoon Pre-open	14:00-14:30
Afternoon Session	14:30-17:00
Pre-close	16:45
Trading at Last	16:50
Market Close	17:00

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:30 for morning session, 2:00 for afternoon**

Closing Auction

Time to Submit MOC/LOC.....**16:45 for afternoon session**

2014 MARKET HOLIDAYS

Jan 1, 14, 17, 31 **Feb** 1 **May** 1, 13 **Jun** 7 **Jul** 28-29 **Sept** 1, 16 **Oct** 6, 23, 25 **Dec** 25

Half Day: Jan 30

CIRCUIT BREAKERS	If the composite index falls by more than 10% from previous close, trading is suspended for 1 hour or the rest of the trading session. If the index falls by 20% or more, the trading is suspended for the rest of the day.
SUPPORTED CONVERGEX ALGOS	Initiation Price Inline IQx® Momentum Peg POV Reserve TWAP Value VWAP
ADR ELIGIBILITY	Eligible for ADR Direct®.
LOT SIZES	Board lot is 100 for most stocks.
ORDER TYPES	Market Order Limit Order Market To Limit Order Market Filll And Kill Fill And Kill Minimum Quantity
SHORT SELLING	Short selling is supported for certain approved securities. Uptick rule applies.
PRICE AND TICK SIZE	See table below
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	The opening auction here tends to be very light, so work MOO orders carefully to help minimize market impact. The closing auction can be quite tricky: while continuous trading ends at 16:45, the auction doesn't start until 16:50, and then the stock can only trade at the last traded price. Orders may not complete, since there has to be liquidity on the other side of the book at that price.

Price	Tick Size
< 1	0.05
1-9.99	1
10-99.99	2
100+	10

Mexico (MM)

Bolsa Mexicana de Valores (BMV)

Address Reforma 255
Col. Cuauhtemoc
06500, Mexico DF

Telephone +52 53 42 90 00

Fax +52 53 42 95 52

Internet http://bmv.com.mx
cinforma@bmv.com.mx

Time Zone GMT -6

Currency Peso (MXN)

Settlement Cycle T+3

Buy-Ins No official rules.

Taxes None

Foreign Ownership Foreign investors can hold type B, C, L, and N shares, but not A shares. For foreign investors to purchase restricted shares, they may place a portion of their shares in a neutral trust and receive a CPO, which strips the foreign investors of voting rights.

HOURS OF OPERATION (all times local)

Pre-Open	9:00-9:25
Pre-order Matching	9:25-9:30
Continuous Session	9:30-16:00
Closing Auction	16:05

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**9:00-9:25**

Pre-order Matching **9:25-9:30**

Cannot enter orders from 9:25-9:30. Open double and triple witching can cause unusual volume.

Closing Auction

Time to Submit MOC/LOC.....**Any time before 15:40**

From 15:40-16:00, the exchange calculates the price. Must use Market Order in Closing Auction.

Short sells treated as sell in auction.

2014 MARKET HOLIDAYS

Jan 1 **Feb** 3 **Mar** 17 **Apr** 17-18 **May** 1 **Sept** 16 **Nov** 17 **Dec** 12, 25

CIRCUIT BREAKERS

If a stock moves by 15% from the previous closing price, trading is halted at the discretion of the exchange.

SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.
LOT SIZES	Board lot varies (1, 5, 100). On the main market, for >200 pesos, a board lot is 5. Below 200 peso, a board lot is 100 shares. On SIC segment, all board lots are 5. Orders for less than 1 Board Lot are permitted. A separate odd-lot Electronic Book is established for them. Mixed lots are split and routed to two different exchange books.
ORDER TYPES	Market Order Limit Order At the Close Order Cross Order Iceberg Order Pegged Order
SHORT SELLING	Short selling is supported. Pre-borrow must be in place.
PRICE AND TICK SIZE	Price: 0.001-1, Tick Size: 0.001 Price: 1.01 +, Tick Size: 0.01
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	Double or triple witching (discussed on page 64) can cause unusual volume on the open or on the close.

ConvergEx Group

MTFs

	BATS (EB)	Chi-X Europe (IX)	Turquoise (TQ)
Address	BATS Exchange HQ 8050 Marshall Dr Lenexa, KS 66214	10 Lower Thames St London EC3R 6AF	10 Paternoster Square London EC4M 7LS
Telephone	913-815-7000	+44 20 7012 8900	+44 (0) 20 7382 7600
Fax	913-815-7119		+44 (0) 20 7382 7690
Internet	http://batstrading.com cinforma@bmv.com.mx	www.batstrading.co.uk InfoEurope@bats.com	www.tradeturquoise.com sales@tradeturquoise.com
Time Zone	All trade in GMT		
Currency	All trade in the currency of the primary exchange.		
Settlement Cycle	Not applicable.		
Buy-Ins	Not applicable.		
Taxes	Not applicable.		
Foreign Ownership	Not applicable.		

HOURS OF OPERATION
(all times local)

Continuous Session 8:00-16:30

Note: At Chi-X Europe, there is no opening and closing auction, and you can trade until 16:30 no matter what. For example, while the Danish exchange closes at 15:55, you can still trade at Chi-X Europe until 16:30.

AUCTION INFORMATION

Opening Auction

Stocks can be traded during the opening auction phase at the primary exchange. Not all order types are available during auction phases.

Closing Auction

Stocks can be traded during the closing auction phase at the primary exchange. Not all order types are available during auction phases.

Volatility Auction

At Chi-X Europe, a stock can still be traded even if a volatility auction happens on the primary exchange or if there is a trading halt at the primary exchange.

2014 MARKET HOLIDAYS

Securities are not traded on local public holidays. All 3 of these MTFs are closed on:

Jan 1 **Apr** 18 **Dec** 25

CIRCUIT BREAKERS

BATS

No official halts. If there is a trading halt by the Exchange, BATS halts the symbol if it was due to regulatory or compliance. If the halt is due to a volatility halt or technical default, BATS continues trade.

Chi-X Europe

No circuit breakers.

Turquoise

If the primary exchange suspends or halts trading of a security, Turquoise also halts it.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Not applicable.

LOT SIZES

Board lot is 1 for almost all securities. Odd and Mixed lots are not supported on Chi-X Europe.

ORDER TYPES

BATS	Chi-X Europe	Turquoise
Market Order	Limit Order	Market Order
Limit Order	Iceberg Order	Limit Order
Iceberg Order	Peg Order	Iceberg Order
Discretionary Order	Non-Displayed Order	Pegged Order
Pegged Order		
Post-Only or Partial Post-Only At Limit		

SHORT SELLING

Short selling is supported.

PRICE AND TICK SIZE

BATS

Identical to that of the primary exchange.

Chi-X Europe

Has a dynamic tick table, which is the same as the majority of stocks on the primary exchange.

Turquoise

Follows tick sizes defined by the primary exchange, with the possibility of amending tick sizes through a high-liquid model.

ORDER PRECEDENCE

Price-Time Priority.

TRADER TIP

While BATS owns Chi-X (and the London Stock Exchange owns Turquoise), you won't see the same information across the MTFs. Everything is listed separately.

Netherlands (NA)

Euronext Amsterdam

Address NYSE Euronext Amsterdam
Postbus 19163
1000 GD Amsterdam

Telephone +31 (0) 20 550 4444

Internet www.euronext.com

infoeu@nyx.com

Time Zone GMT +1

Currency Euro (EUR)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes None

Foreign Ownership No general restrictions.

HOURS OF OPERATION (all times local)

Pre-Open	7:15-9:00
Order Matching	8:55-9:00
Continuous Session	9:00-17:30
Closing Auction	17:30-17:35
Trading At Last	17:35-17:40

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**7:15**

Closing Auction

Time to Submit MOC/LOC.....**17:30-17:35**

In Trading At Last, shares can be traded at their respective closing prices. This only applies for certain securities.

Special Auction

Double fixing stocks trade from 11:30 to 16:30. Single fixing stocks trade at designated auction periods depending on the trading group it belongs to. After each fixing, the stock trades for another 30 minutes at the fixing price.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 1 **Dec** 25-26 Half Day: Dec **24, 31**

CIRCUIT BREAKERS

+/- 10% (6% for BEL 20 stocks) from the dynamic reference price, which is reset every time the market breaks its upside/downside threshold (last closing price for the opening). If the traded price deviates more than +/- 5% (3% for BEL 20 stocks) from the last traded price, the market stops for 2 minutes.

SUPPORTED CONVERGEX ALGOS	Abraxas℠ Darkest Grey	Initiation Price Inline IQx®	Momentum Peg POV	Reserve TWAP Value	VWAP
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.				
LOT SIZES	Board lot is 1, but for some specific instruments Euronext can decide to implement a trading lot size.				
ORDER TYPES	Market Order Limit Order Stop Loss/ Stop Limit Order Pegged Order Reserve (Iceberg) Order				
SHORT SELLING	Reporting requirement for short positions greater than 0.25% of share capital and a request to abstain from lending financial company shares.				
PRICE AND TICK SIZE	0.01. Some trading groups have dynamic tick sizes.				
ORDER PRECEDENCE	Central order book orders are executed according to strict price priority. Changes in the order quantity or limit price cause forfeiture of time priority.				
TRADER TIP	Huge cross trades occur often in Euronext markets, so make sure your trading tools don't cause you to chase that volume. Although the book may look thin in comparison to other markets, Euronext has a lot of hidden liquidity in the book, perhaps due to the comparatively lax iceberg rules.				

Norway (NO)

Oslo Børs

Address: Oslo Børs
Pb. 460 Sentrum
0105 Oslo

Telephone: +47 22 34 17 00

Internet: www.oslobors.no

Time Zone: GMT +1

Currency: Norwegian Krone (NOK)

Settlement Cycle: T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins: Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes: None

Foreign Ownership: No general restrictions, but issuers may have their own restrictions in their articles of association.

HOURS OF OPERATION (all times local)

Pre-Trade	8:15-9:00
Opening Auction	9:00-9:00:30
Continuous Session	9:00-16:20
Closing Auction	16:20-16:25
Post Trade	16:25-17:30

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:15-9:00**

There may be one or more auction extension periods (typically 1 minute each): up to two price monitoring extensions and up to one market order extension.

Closing Auction

Time to Submit MOC/LOC.....**16:20-16:25**

Volatility Auction

Triggered when the price is outside the price movement tolerance. Automatic execution suspension period (AESP) occurs. Auction ends after 3 minutes.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 17-18, 21 **May** 1, 17, 29 **June** 9 **Dec** 24-26, 31

Half Day: Apr 16

CIRCUIT BREAKERS

Circuit breakers can last for up to 4 minutes and are triggered if there are big price movements in a security. The exchange has dynamic and static circuit breakers. Oslo Bors's Market Surveillance Department sets the limits that will trigger a circuit breaker based on events affecting a company and market conditions.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lot is 1 for almost all securities.

ORDER TYPES

Market Order
Limit Order
Pegged Order
Hiddin Pegged Order
Hidden Limit
Good Till Cancel/Time
Fill Or Kill
Execute and Eliminate
At the Open/Close
Good for Auction/Day/Intra-day Auction

SHORT SELLING

Short selling is supported. Ban on naked short selling of specific financial stocks.

PRICE AND TICK SIZE

Market	Price	Tick Size
NO_OBX	0	0.0001
	0.5	0.0005
	1	0.001
	2	0.002
	5	0.005
	10	0.01
	50	0.05
	100	0.1
	500	0.5
	1000	1
	5000	5
	10000	10
	20000	20
	40000	40
	50000	50
	80000	80
	100000	100

Market	Price	Tick Size
NO	0	0.01
	10	0.05
	15	0.1
	50	0.25
	100	0.05
	250	1

ORDER PRECEDENCE

Price, Counterparty, Display Size, Time.

TRADER TIP

In August 2012, the Oslo Børs started a 6-month trial period of earlier market hours, now closing at 16:25 instead of 17:25.

Poland (PW)

Warsaw Stock Exchange

Address: Warsaw Stock Exchange
Książęca 4
00-498 Warsaw

Telephone: (4822) 628 32 32

Fax: (4822) 628 17 54

Internet: http://www.gpw.pl
gpw@gpw.pl

Time Zone: GMT +1

Currency: Polish Zloty (PLN)

Settlement Cycle: T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins: NDS arranges a buy-in with the clearing agent on the intended settlement date plus three days. In addition to the fee charged by NDS, other costs may arise from the buy-in transaction and the cost difference between the SD of original trade and the SD of the buy-in.

Taxes: None

Foreign Ownership: Any investors (domestic or foreign) who want to acquire a majority stake in a company must receive permission from the Financial Supervision Authority and the Antimonopoly Office.

HOURS OF OPERATION (all times local)

Pre-Open	8:30-9:00
Opening Auction	9:00
Continuous Session	9:00-16:50
Pre-Closing	16:50-17:30
Closing Auction	17:00
Post-Auction Trading	17:00-17:05

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:00-9:00**

Unfilled portions of orders automatically become a limit order at the opening price.

Closing Auction

Time to Submit MOC/LOC.....**17:20-17:35**

If any part of an at-the-opening market order remains unexecuted, it becomes a limit order at a price equal to the opening, closing, or single price or, if applicable, the price resulting from the balancing activities.

Min Size order type not supported in auctions.

2014 MARKET HOLIDAYS	**Jan** 1, 6 **Apr** 18, 21 **May** 1 **June** 19 **Aug** 15 **Nov** 11 **Dec** 24-26
CIRCUIT BREAKERS	If the price exceeds permissible variation limits, transactions are suspended and market balancing begins. Static and dynamic limits are used.
SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct®.
LOT SIZES	Board lot is 1.
ORDER TYPES	Market Order Limit Order Must Be Filled Order Hidden Order Min Size Order Stop Order Fill Or Kill Fill And Kill Good Till Cancel Day
SHORT SELLING	Only certain specific securities are allowed to short.
PRICE AND TICK SIZE	

Price	Tick Size
0-50	0.01
50-100	0.05
100-500	0.1
500+	0.5

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	The only order types that can be be entered during the pre-open are market and limit orders.

Portugal (PL)

Euronext Lisbon

Address NYSE Euronext Lisbon
Av. da Liberdade n. 196 ° - 7°
1250-147 Lisboa

Telephone +351 21 790 00 00

Internet www.euronext.com
infoeu@nyx.com

Time Zone GMT

Currency Euro (EUR)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes None

Foreign Ownership No general restrictions, but issuers may have their own restrictions in their articles of association.

HOURS OF OPERATION (all times local)

Pre-Open	6:15-8:00
Order Matching	7:55-8:00
Continuous Session	8:00-16:30
Closing Auction	16:30-16:35
Trading At Last	16:35-16:40

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**6:15**

Closing Auction

Time to Submit MOC/LOC.....**16:30-16:35**

In Trading At Last, shares can be traded at their respective closing prices. This only applies for certain securities.

Special Auction

Double fixing stocks trade from 10:30 to 15:30. Single fixing stocks trade at designated auction periods depending on the trading group it belongs to. After each fixing, the stock trades for another 30 minutes at the fixing price.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 1 **Dec** 25-26

CIRCUIT BREAKERS

+/- 10% (6% for BEL 20 stocks) from the dynamic reference price, which is reset every time the market breaks its upside/downside threshold (last closing price for the opening). If the traded price deviates more than +/- 5% (3% for BEL 20 stocks) from the last traded price, the market stops for 2 minutes.

SUPPORTED CONVERGEX ALGOS	Abraxas℠ Darkest Grey	Initiation Price Inline IQx®	Momentum Peg POV	Reserve TWAP Value	VWAP
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.				
LOT SIZES	Board lot is 1, but for some specific instruments Euronext can decide to implement a trading lot size.				
ORDER TYPES	Market Order Limit Order Stop Loss/ Stop Limit Order Pegged Order Reserve (Iceberg) Order				
SHORT SELLING	Reporting requirement for short positions greater than 0.25% of share capital and a request to abstain from lending financial company shares.				
PRICE AND TICK SIZE	0.01. Some trading groups have dynamic tick sizes.				
ORDER PRECEDENCE	Central order book orders are executed according to strict price priority. Changes in the order quantity or limit price cause forfeiture of time priority.				
TRADER TIP	Huge cross trades occur often in Euronext markets, so make sure your trading tools don't cause you to chase that volume. Although the book may look thin in comparison to other markets, Euronext has a lot of hidden liquidity in the book, perhaps due to the comparatively lax iceberg rules.				

Singapore (SP)

Singapore Exchange

Address 2 Shenton Way
#19-00 SGX Centre 1
Singapore 068804

Telephone (65) 6236 8888

Fax (65) 6535 6994

Internet http://www.sgx.com

Time Zone GMT +8

Currency Singapore Dollar (SGD)
Hong Kong Dollar (HKD) is also a tradable currency.

Settlement Cycle T+3

Buy-Ins SGX enforces a buy-in when the seller fails to deliver on T+3, sometimes at punitive prices. The seller pays the difference between the selling price and the buy-in price as well as fees.

Taxes Stamp Duty not fixed, but 0.04% (Maximum of SGD 600 or equivalent USD, HKD or AUD). SGX Access: 0.0075% fee on all trades, calculated trade principal, no minimum or maximum.

Foreign Ownership Some restrictions exist for media and residential property securities.

HOURS OF OPERATION (all times local)

Pre-Open	8:30-8:59
Continuous Session	9:00-17:00
Pre-Close	17:00-17:05
Closing Auction	17:06

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:30-8:59**

Closing Auction

Time to Submit MOC/LOC.....**17:00-17:06**

2014 MARKET HOLIDAYS

Jan 1, 31 **Apr** 18 **May** 1, 13 **Jul** 28 **Oct** 6, 23 **Dec** 25

CIRCUIT BREAKERS

On Feb. 24, 2014, SGX introduced an 10% dynamic limit for cash securities. A Circuit Breaker Triggered signal will also be introduced for equities.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	IQx®	POV	Value
Initiation Price	Momentum	Reserve	VWAP
Inline	Peg	TWAP	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Shares are mainly traded in board lots of 1,000 shares.

Trading of odd lots is allowed. If a complete order is not a board lot, the remaining size of the order is traded on the Unit Share Market.

ORDER TYPES

Market Order*
Limit Order
Market-to-Limit Order*
State Session Order*
Stop Order*
If-Touched Order*
Fill Or Kill*
Fill And Kill*

SHORT SELLING

Short selling is permitted. Borrow must be sourced prior to short sell date, otherwise there is a buy-in penalty. No uptick rule.

PRICE AND TICK SIZE

No orders over 30 million.

*- Available starting 31 March 2014.

TRADER TIP

Price	Tick Size
< 0.2	0.001
0.2 - 2	0.005
> 2	0.01

Price-Time Priority.

The spread is usually high and the book is often thin in this market. This can make VWAP trading tricky.

Note: ConvergEx offers USD settlement in this exchange.

South Africa (SJ)

Johannesburg Stock Exchange

Address: One Exchange Square, Gwen Lane
Sandown, 2196
Private Bag X991174
Sandton, 2146

Telephone: +27 11 520-7000

Internet: www.jse.co.za
info@jse.co.za

Time Zone: GMT +1

Currency: South African Cent (ZAc)

Settlement Cycle: T+5

Buy-Ins: No formal buy-in procedures.

Taxes: 0.25% tax on buys. 0.0002% investor protection levy.
Scaled STRATE settlement charge: < ZAR 200,000 = ZAR 10.92
ZAR 200,000-ZAR 1 million = 0.05459%
> ZAR 1 million = ZAR 54.59

Foreign Ownership: No investor (foreign or domestic) may hold more than 15% in a bank or bank holding company or more than 25% in an insurance company without approval from industry-relevant authorities.

HOURS OF OPERATION (all times local)

Opening Auction	8:30-9:00
Continuous Session	9:00-16:50
Closing Auction	16:50-17:00

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:30-9:00**

Unusual events or corporate actions may be deemed by the exchange to delay auctions.

Closing Auction

Time to Submit MOC/LOC.....**16:50-17:00**

Allowed order types are Market, Limit, and Auction.

Volatility Auction

Price changes in liquid stocks or exchange discretion trigger volatility autions; Trigered when price either changes 10% or 20% or if the exchange specifies.

2014 MARKET HOLIDAYS

Jan 1 **Mar** 21 **Apr** 18, 21, 28 **May** 1 **Jun** 16 **Aug** 9 **Sep** 24 **Dec** 16, 25-26

CIRCUIT BREAKERS	No exchange-wide circuit breaker rule.
SUPPORTED CONVERGEX ALGOS	Abraxas℠ Initiation Price Inline IQx® Momentum Peg POV Reserve TWAP Value VWAP
ADR ELIGIBILITY	Eligible for ADR Direct® and Reverse ADRs℠.
LOT SIZES	Board lot is 1.
ORDER TYPES	Market Order Limit Order Auction Market Fill Or Kill Market
SHORT SELLING	Short selling is supported. Naked short selling prohibited.
PRICE AND TICK SIZE	Tick size of 1 for every instrument.
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	The exchange trades in South African cents (ZAc) instead of in rands (much like London trades in pence instead of pounds).

South Korea (KS)

Korea Exchange (KRX)

Two main trading boards: KOSPI (main market) and KOSDAQ (small- and mid-sized Companies)

Address	33, Yoido-dong Youngdeungpo-gu Seoul 150-977
Telephone	+82 2 3774 9000
Fax	+82 2 783 4842
Internet	http://eng.krx.co.kr
Time Zone	GMT +9
Currency	Korean Won (KRW)
Settlement Cycle	T+2
Buy-Ins	No official rules.
Taxes	Transaction tax: 0.15% 0.3%, 0.5% for OTC trades (for sales only).
Foreign Ownership	No general restrictions, but certain industries have limits in place.

HOURS OF OPERATION (all times local)

Pre-Open	7:30-9:00
Opening Auction	9:00-9:05
Continuous Session	9:00-15:00
Closing Auction	14:50-15:00

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:00-9:00**

Order Matching **9:00-9:05**

Can be delayed up to 5 minutes when the potential call price deviates by more than 5% from the highest or lowest indicative price in the previous 5 minutes and the potential call price is more than 1% away from base price.

Closing Auction

Time to Submit MOC/LOC.....**14:50**

Volatility Auction

Triggered when KOSPI or KOSDAQ index falls by more than 10% from previous close for at least 1 minute. Trading is suspended for 20 minutes, then another 10 for auction.

2014 MARKET HOLIDAYS

Jan 1, 30-31 **May** 1, 5, 6 **Jun** 4, 6 **Aug** 15 **Sep** 8-10 **Oct** 3, 9 **Dec** 25,31

CIRCUIT BREAKERS	Triggered when KOSPI or KOSDAQ index falls by more than 10% from previous close for at least 1 minute. Trading is suspended for 20 minutes, then another 10 minutes for auction. The circuit breaker is limited to once per day and is not triggered during last 40 minutes of regular session.
ADR ELIGIBILITY	Not ADR eligible.
LOT SIZES	KOSPI: Board lot is 10 or 1 (if price > 50,000 KRW) KOSDAQ: Board lot is 1
ORDER TYPES	Market Order Limit Order Limit-to-Market-on-Close Immediate Executable Limit Best Limit Target Price
SHORT SELLING	Short selling is supported. Locate required. Uptick rule applies.
PRICE AND TICK SIZE	

Market	Price	Tick Size
KOSPI	0-5000	5
	5000-10000	10
	10000-50000	50
	50000-100000	100
	100000-500000	500
	500000+	1000
KOSDAQ	0-5000	5
	5000-10000	10
	10000-50000	50
	50000+	100

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	This exchange requires an investor ID for foreign ownership, which makes anonymous trading impossible for foreigners.

Spain (SM)

Bolsa de Madrid

Address: Plaza de la Lealtad, 1
28014 Madrid

Telephone: 91 709 56 10

Internet: www.bolsamadrid.es

infobolsamadrid@grupobme.es

Time Zone: GMT +1

Currency: Euro (EUR)

Settlement Cycle: T+3

Buy-Ins: If a trade is unsettled on T+4, IBERCLEAR orders a buy-in to cover the outstanding sell. The exchange charges a 2% fine and retains profits.

Taxes: None

Foreign Ownership: No general restrictions, but a limited number of industries require foreign investors to seek prior approval.

HOURS OF OPERATION (all times local)

Opening Auction	8:30-9:00
Continuous Session	9:00-17:30
Closing Auction	17:30-17:35

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**8:30-9:00**

Auction ends randomly between 9:00:00 and 9:00:30 to prevent price manipulation. Order book is partially visible when there is no auction price. (Best Bid, Ask, and Volumes are shown.)

Closing Auction

Time to Submit MOC/LOC.....**17:30-17:35**

Auctions randomly close between 17:35:00 and 17:35:30.

Volatility Auction

Static or dynamic range (calculated with the most recent historic volatilty of shares). Lasts for 5 minutes plus random close of 30 seconds.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 1 **Dec** 25-26

Half Days: **Dec** 24, 31

CIRCUIT BREAKERS

No exchange-wide circuit breaker rule. However, the exchange has both a static and dynamic price range. If a stock moves above that range, that individual stock will be suspended.

SUPPORTED CONVERGEX ALGOS	Abraxas℠ IQx® POV Value Initiation Price Momentum Reserve VWAP Inline Peg TWAP
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.
LOT SIZES	Board lot is 1.
ORDER TYPES	Market Order Limit Order Pegged Order Immediate Or Cancel Minimum Volume Order All or Nothing Order Iceberg Order
SHORT SELLING	Short selling is supported. Naked short selling prohibited.
PRICE AND TICK SIZE	

Price	Tick Size
0	0.005
1	0.01
10	0.02

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	Spain is known for strict settlement regulations, which means that most of the liquidity is on the primary exchange instead of on MTFs or other alternative venues.

Sweden (SS)

OMX Stockholm

Address NASDAQ OMX Stockholm AB
105 78 Stockholm

Visiting address: Tullvaktsvägen 15

Telephone +46 8 405 60 00

Fax +46 8 405 60 01

Internet http://www.nasdaqomxnordic.com

Time Zone GMT +1

Currency Swedish Krona (SEK)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes None

Foreign Ownership No general restrictions.

HOURS OF OPERATION (all times local)

Pre-Open	8:00-9:00
Opening Auction	9:00
Continuous Session	9:00-17:25
Closing Auction	17:25-17:30

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**30 minutes before open**

Closing Auction

Time to Submit MOC/LOC.....**1 minute after close**

Volatility Auction

Triggered when the price deviates more than a certain percentage from the reference price. (See "Circuit Breakers" below for these percentages.) Static volatility auction ends after 60 seconds, dynamic volatility auction ends after 180 seconds.

No Volatility Auction in the last 4 minutes of trading.

2014 MARKET HOLIDAYS

Jan 1, 6 **Apr** 18, 21 **May** 1, 29 **Jun** 6, 20 **Dec** 24-26, 31

Half Days: Apr 17, 30 Oct 31

CIRCUIT BREAKERS

Static limit: 15% (10% for OMXC20) from the opening; dynamic limit: 5% (3% for OMXC20). Suspension is 3 minutes for static and 1 minute for dynamic. See "Auction Information" above for more information.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lot is 1 for the majority of securities.

ORDER TYPES

Market Order
Limit Order
Imbalance Order for Open and Close Auctions
Hidden Limit Order
Minimum Execution Quantity
Nordic@Mid Order

SHORT SELLING

Short selling is supported.

PRICE AND TICK SIZE

Price	Tick Size
0	0.01
5	0.05
15	0.1
50	0.25
150	0.5
500	1
5000	5

ORDER PRECEDENCE

Price-Internal-Display-Time.
("Internal" means the incoming order is executed against the member's own order.)

TRADER TIP

As a NASDAQ OMX market, this is one of the few world markets with an exchange-run dark pool, called Nordic@Mid.

Stockholm always has many half days because of a rule that the day before a market holiday must be a half day. The exchange closes at 13:30 on half days.

Switzerland (SW, VX)

SIX Swiss Exchange

Address SIX Swiss Exchange Ltd
Selnaustrausse 30
Postfach
CH-8021 Zurich

Telephone +41 58 399 5454

Fax +41 58 499 5455

Internet http://www.six-swiss-exchange.com

Time Zone GMT +1

Currency Swiss Franc (CHF)

Settlement Cycle T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes None

Foreign Ownership No general restrictions.

HOURS OF OPERATION (all times local)

Pre-Open	8:30-9:00
Opening Auction	9:00 (within 2 minutes)
Continuous Session	9:00-17:20
Closing Auction	17:20-17:30 (within 2 minutes of 17:30)

AUCTION INFORMATION

Opening Auction

Opening is randomized to occur within 2 minutes of 9:00. The Open Auction can be delayed by 5-15 minutes if the theoretical opening price deviates sharply from the reference price, or if at the opening there are no quotes on the order book even though executable orders exist on both sides of the market. The same is done for the close.

Closing Auction

Time to Submit MOC/LOC.....**17:20-17:30**

Volatility Auction

Continuous trading is suspended for five minutes if the potential subsequent price differs by more than a certain percentage, which varies based on whether the securities are Blue Chip or Mid Cap.

2014 MARKET HOLIDAYS

Jan 1-2 **Apr** 18, 21 **May** 1, 29 **Aug** 1 **Dec** 24-26, 31

CIRCUIT BREAKERS

No exchange-wide circuit breaker rule.

SUPPORTED CONVERGEX ALGOS	Abraxas℠ Initiation Price Momentum Reserve VWAP Darkest Inline Peg TWAP Grey IQx® POV Value
ADR ELIGIBILITY	Eligible for ADR Direct®, Reverse ADRs℠.
LOT SIZES	Board lot is 1 for almost all securities.
ORDER TYPES	Market Order Limit Order
SHORT SELLING	Short selling is supported. Naked short sales are prohibited.
PRICE AND TICK SIZE	

Price	Tick Size
0.0001-0.4999	0.0001
0.5-0.9995	0.0005
1-4.999	0.001
5-9.995	0.005
10-49.99	0.01
50-99.95	0.05
100-499.95	0.1
500-999.5	0.5
1000-4999	1
5000-9995	5

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	This exchange has the widest spread of all major European markets, perhaps due to its wide tick sizes. There is more liquidity on the book here than in a lot of markets, most likely because the exchange doesn't allow iceberg orders.

Note: ConvergEx offers USD settlement in this exchange.

Thailand (TB)

Stock Exchange of Thailand

Address: Stock Exchange of Thailand Building
62 Ratchadapisek Road, Klongtoey
Bangkok 10110

Telephone: 0-2229-2222

Internet: http://www.set.or.th
SETCallCenter@set.or.th

Time Zone: GMT +7

Currency: Thai Baht (THB)

Settlement Cycle: T+3

Buy-Ins: The clearing house will force the failing member to buy-in deliveries that remain unsettled by the close on T+3. The buy-in must be executed on the morning of T+4 and the shares must be purchased for same-day settlement.

Taxes: None.

Foreign Ownership: Foreign ownership is limited to 49% of total shares issued in most companies and 25% in commercial banks, finance companies, and telecommunication companies.

HOURS OF OPERATION
(all times local)

Pre-open	9:30-9:55
Opening Auction	9:55-10:00 (random)
Morning Session	10:00-12:30
Lunch Break	12:30-14:00
Pre-open II	14:00-14:25
Afternoon Opening	14:25-14:30 (random)
Afternoon Session	14:30-16:30
Closing Auction	16:35-16:40 (random)

AUCTION INFORMATION

Opening Auction

Time to Submit LOO .....**9:30-9:55 (14:30 for afternoon session)**

Opening is randomized to occur between 9:55 and 10:00. The opening for the afternoon session is also randomized to occur between 14:25-14:30.

Closing Auction

Time to Submit LOC.....**16:30**

Closing is randomized to occur between 16:35 and 16:40. Orders may be sent in from 16:30 until the market closes.

2014 MARKET HOLIDAYS	**Jan** 1 **Feb** 14 **Apr** 7, 14-15 **May** 1, 5, 14 **Jul** 1, 11 **Aug** 12 **Oct** 23 **Dec** 5, 10, 31
CIRCUIT BREAKERS	If the index falls by 10% from the previous day's close, trading is suspended for 30 minutes. If the index falls by 20% from the previous day's close, trading is suspended for 60 minutes.
SUPPORTED CONVERGEX ALGOS	Initiation Price, Momentum, Reserve, VWAP Inline, Peg, TWAP IQx®, POV, Value
ADR ELIGIBILITY	Eligible for ADR Direct®.
LOT SIZES	Board lot is 100 for almost all securities.
ORDER TYPES	Limit Order Market Price Order At-The-Open Order At The Close Order Immediate-Or-Cancel Order Fill-Or-Kill Order Publish Order Basket Order
SHORT SELLING	Short selling is supported.
PRICE AND TICK SIZE	

Price	Tick Size
< 2	0.0001
2 up to 5	0.0005
5 up to 10	0.001
10 up to 25	0.005
25 up to 100	0.01
100 up to 200	0.05
200 up to 400	0.1
400+	0.5

ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	Since the closing auction is blind, with prints starting randomly between 16:35 and 16:40, place your closing orders between 16:30 and 16:34:59 to make sure you don't miss the closing print.

Turkey (TB)

Borsa Istanbul

Address: Borsa Istanbul
Resitpasa Mahallesi
Tuncay Artun Caddesi
Emirgan, 34467, Istanbul

Telephone: +90 212 298 21 00

Fax: +90 212 298 25 00

Internet: http://borsaistanbul.com
international@borsaistanbul.com

Time Zone: GMT +2

Currency: Turkish Lira (TRY)

Settlement Cycle: T+2

Buy-Ins: The exchange's Settlement Center grants the failing party a period of time (around three days) to right the default, collecting interest throughout that period. The failing party pays the difference between the selling price and the buy-in price as well as fees; the exchange keeps any profits. The exchange may levy fines against failing parties.

Taxes: No taxes/fees are included in net settlement.

Foreign Ownership: No foreign ownership limitations, unless ownership exceeds 5% of the capital in the listed company. You must declare your ownership to the public by sending a document showing your ownership rate in the company to Borsa Istanbul.

HOURS OF OPERATION
(all times local)

Opening Session	9:15-9:35
Morning Session	9:00-12:30
Lunch Break	12:30-14:00
Afternoon Opening	14:00-14:15
Afternoon Session	14:30-17:30
Closing Session	17:30-17:40
Trades at Closing Price	17:38-17:40

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**9:15-9:30 (14:15 for afternoon session)**

First Quotation for Market Makers is 9:30-9:34 and 14:10-14:15. First Quotation for the system is 9:34-9:35 and 14:14-14:15.

Closing Auction

Time to Submit MOC/LOC.....**17:33-17:36**

Closing Price Determination Phase occurs 17:36-17:38.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 23 **May** 1, 19 **Jul** 28-30 **Oct** 3, 6-7, 29

Half Day: **Oct** 28

CIRCUIT BREAKERS

Trading is suspended when an "abnormal price or quantity movement" on a stock occurs, as determined by the exchange. The suspension lasts for 15 minutes.

SUPPORTED CONVERGEX ALGOS

Initiation Price	Momentum	Reserve	VWAP
Inline	Peg	TWAP	
IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®.

LOT SIZES

Lot size is 1.

ORDER TYPES

Limit Order

SHORT SELLING

Short selling is supported except in the opening sessions.

PRICE AND TICK SIZE

Price	Tick Size
0.01 - 5	0.01
5.02 - 10	0.02
10.05 - 25	0.05
25.10 - 50	0.10
50.25 - 100	0.25
100.50 - 250	0.50
251 - 500	1.00
503.50 - 1000	2.50
1005+	5.00

ORDER PRECEDENCE

Price-time precedence

TRADER TIP

Turkey is the only European country whose market has a lunch break; keep this (and its two opening sessions) in mind while trading there.

United Kingdom (LN, LI)

London Stock Exchange, London International Order Book

Address: London Stock Exchange (or London International Order Book)
10 Paternoster Square
London, EC4M 7LS
CH-8021 Zurich

Telephone: +44 (0) 20 7797 1000

Internet: http://www.londonstockexchange.com

Time Zone: GMT

Currency: British Pound Sterling (GBP). Tradable currencies: GBP, USD, EUR

Settlement Cycle: T+3 (**Note:** Settlement cycle will change to T+2 in October 2014)

Buy-Ins: Buy-in notices will be issued on SD+4, and Buy-Ins occur on SD+5.

Taxes: Stamp Duty Reserve Tax (SDRT) of 0.5% is payable on all purchases of eligible securities. Deliveries of eligible securities to certain ADR depositaries, Clearstream accounts or other accounts outside of the CREST system incur an add-itional SDRT charge of 1%. Levy of 1 GBP on all trades above 10,000 GBP.

Foreign Ownership: No exchange-wide restrictions, but individual stocks may have for-eign ownership restrictions.

HOURS OF OPERATION (all times local)

London Stock Exchange	
Opening Auction	7:50-8:00
Continuous Session	8:00-16:30
Closing Auction	16:30:01-16:35

London International Order Book	
Market Open	7:00-8:00
Opening Auction	7:50-8:00
Continuous Session	8:15-15:30
Closing Auction	15:30-16:00
Post Close	16:00-17:15

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**7:50-7:59:50** (LN)

Auction open randomizes from 8:00:00 to 8:00:30. Could be delayed due to news out on the stock or if the exchange has system issues.

Closing Auction

Time to Submit MOC/LOC.....**16:30:01 (LN), 15:30-15:40 (LI)**

LN accepts market or limit orders in the closing auction.

Volatility Auction

Caused by attempts to execute at prices above or below the static and dynamic limits. Divided into the volatility auction call and the volatility uncrossing period. Exchange randomizes an uncrossing period, during which orders entered in the call period are matched if possible. During the call period, participants may enter, modify, and delete orders that contribute to the determination of the intraday auction's indicative price.

Intraday Auction

Some segments trade only in auctions throughout the day (e.g., the quotes and the crosses). Exchange determines the end times.

2014 MARKET HOLIDAYS

Jan 1 **Apr** 18, 21 **May** 1 **Aug** 25 **Dec** 25-26

Half Days: **Dec** 24, 31

CIRCUIT BREAKERS

5% to 25% tolerance levels (depending on the trading segment of the security). If these levels are breached, an intraday suspension takes place. This lasts for 5 minutes until the stock uncrosses or the offending order is removed.

An Automatic Execution Suspension Period (5 minutes plus random 30-second end period) occurs during continuous trading when an order entered exceeds 5% from the last automated order book trade.

SUPPORTED CONVERGEX ALGOS

Abraxas℠	Initiation Price	Momentum	Reserve	VWAP
Darkest	Inline	Peg	TWAP	
Grey	IQx®	POV	Value	

ADR ELIGIBILITY

Eligible for ADR Direct®, Reverse ADRs℠.

LOT SIZES

Board lot is 1 for the majority of securities. Odd lots are allowed. Mixed lots are split so that the last slice is the odd lot. Board lot is only in USD.

ORDER TYPES

Market Order
Limit Order
Iceberg Order

SHORT SELLING

All shorts are treated as sell. Public disclosure must be made on certain conditions.

PRICE AND TICK SIZE

LN	Price	Tick Size
LN	0	0.01
LN	10	0.25
LN	500	0.5
LN	1000	1
LN_EURO	0	0.0001
LN_EURO	0.1	0.0025
LN_EURO	5	0.005
LN_EURO	10	0.01
LN_SET1	0	0.0001
LN_SET1	0.5	0.0005
LN_SET1	1	0.001
LN_SET1	5	0.005
LN_SET1	10	0.1
LN_SET1	50	0.5
LN_SET1	100	1
LN_SET1	500	5
LN_SET1	1000	10
LN_USD	0	0.01

LI	Price	Tick Size
LI	0	0.01
LI	50	0.1
LI	100.01	0.25
LI	1000	1
LI_EURO	0	0.01
LI_EURO	50	0.1
LI_EURO	100.01	0.25
LI_USD	0	0.01
LI_USD	50	0.1
LI_USD	100.01	0.25

ORDER PRECEDENCE

Price-Time priority.

TRADER TIP

The exchange trades in pence instead of pounds.

Note: ConvergEx offers USD settlement in this exchange.

United States (US)

Major Exchanges: New York Stock Exchange (NYSE), NASDAQ

	NYSE Euronext	The NASDAQ Stock Market
Address	11 Wall Street New York, NY 10005	One Liberty Plaza 165 Broadway New York, NY 10006
Telephone	+1 212 656 3000	+1 212 401 8700
Fax	+1 212 656 5549	
Internet	http://www.nyse.com support@nyx.com	www.nasdaq.com

Time Zone: GMT -5

Currency: United States Dollar (USD)

Settlement Cycle: T+3

Buy-Ins: Optional in OTC stocks not settled by T+10 and in NYSE names not settled 30 days after the date of the trade.

Taxes: Sells only; SEC transaction fee is $17.40 per million dollars traded.

Foreign Ownership: No general restrictions.

HOURS OF OPERATION (all times local)

New York Stock Exchange		NASDAQ	
Opening Auction	9:30	Pre-Market Session	7:00-9:30
Continuous Session	9:30-16:00	Continuous Session	9:30-16:00
Closing Auction	16:00	After-Market Session	16:00-20:00
After-hours Crossing	16:15-17:00		

AUCTION INFORMATION

Opening Auction

Time to Submit MOO/LOO.....**7:30-9:30 (NYSE)**

Closing Auction

Time to Submit MOC/LOC.....**Before 15:45 (NYSE)**

2014 MARKET HOLIDAYS

Jan 1, 20 **Feb** 17 **Apr** 18 **May** 26 **Jul** 4 **Sep** 1 **Nov** 27 **Dec** 25

Half Days: Jul 3 Nov 28 Dec 24

CIRCUIT BREAKERS

Market-wide trading halts occur if the S&P 500 declines by 7%, 13%, or 20% (called Level 1, Level 2, and Level 3 halts, respectively). Level 1 and 2 halts can each occur only once per day. Trading halts depend on the decline and time of day, as follows:

7% decline: Before 15:25: 15-minute halt.
After 15:25: No halt.

13% decline: Before 15:25: 15-minute halt.
After 15:25: No halt.

20% decline: Market closes for the day.

SUPPORTED CONVERGEX ALGOS	Abraxas℠ Darkest Inline Peg TWAP APEX Grey IQx® POV Value Buyback Initiation Price Momentum Spectrum VWAP Closing Price
ADR ELIGIBILITY	Not applicable.
LOT SIZES	Board lot is 1 for many securities, 100 for others.. Odd lots are allowed for market orders only. Mixed lot is board lot plus odd lot.
ORDER TYPES	Market Order Limit Order MOC, LOC Orders On Close Order Immediate Or Cancel Order Good Till Cancel Order Opening Only Order Closing Offset Order Do Not Ship Order Intermarket Sweep Order Dark Reserve Block Reserve Day Order Buy Minus Order Sell Plus Order Sell Short Order Coupled Order
SHORT SELLING	Short selling is supported. Uptick rule applies.
PRICE AND TICK SIZE	Tick size is 1 cent.
ORDER PRECEDENCE	Price-Time priority.
TRADER TIP	NASDAQ has an active pre-market session, which isn't the norm in many other markets.

Algorithms

ConvergEx algorithms give you powerful technology for trading across the globe. Despite the remarkable differences between the world's markets, our algorithms give you a common set of tools that will work in a consistent fashion almost anywhere you need to trade. (We are in 40+ algo markets and counting.) If you like how an algorithm works in Germany, you will almost certainly like how it works in Australia.

This section provides you a guide to our most popular algorithms, what they are good for, and how you can best control them. All of the 15 algos we review here will run with no supplementary tags filled in. There are sensible defaults for every "broker field." If you are new to the ConvergEx algo rack or just new to one of our algos, try running with the defaults: select the strategy and go. You will learn, in broad brush strokes, what the algorithm can do for you. Then if you want to optimize the trading strategy for your specific needs, the broker fields can be invaluable.

Four of the broker fields are so common that it makes sense to just talk about them up front rather than again and again, on each strategy. (Remember: they can be left blank if the default value meets your needs.)

Start Time: The time at which you would like the algo to begin working, in local exchange time (hh:mm:ss). Default: "now" or at the market open.

Note: Start Time works differently with our Closing Price algo. Closing Price treats it as a minimum time constraint. It will not start trading before the Start Time, but may start trading later depending on market conditions.

End Time: The time at which you would like the algo to finish working, in local exchange time (hh:mm:ss). Default: the end of the day.

Duration: The amount of time you want the algorithm to trade (hh:mm:ss). Can be used instead of Start/End Time. For example, if you want the algo to trade for 2 hours and 30 minutes, starting now (or at the open), enter 02:30:00.

IWouldPrice: The price at which you would be happy to complete your order, if the market gets there.

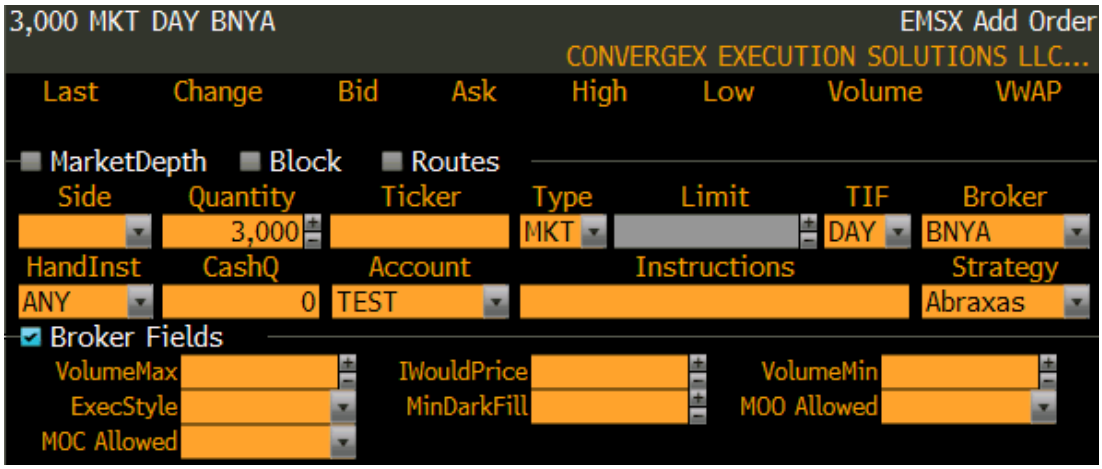
One last point worth covering up front: maybe the most important defining feature of an algo is whether it works to provide assured completion. Well-known algorithms like VWAP and Initiation Price understand their job is to complete your order in the allowed time. "Assured" is a funny word in this context. Clearly if your order is non-marketable, the stock is halted, etc., the order will not complete. However, virtually all marketable orders to assured execution algorithms complete. The Percentage of Volume (POV) algo is the classic example of an algorithm that does not target assured execution. It will happily trade along at 13% (or whatever value you tell it to use) of the market. If there is adequate liquidity in the market, your order will complete. In the write-ups that follow, we clearly mark which of our algos target assured execution and which do not.

If you have any questions about our algorithms, please contact our trading desks. They have used all the algos countless times and are quite good at making them dance.

Abraxas℠

Efficiently seeks liquidity across all markets, light and dark. The algo engine also tactically takes advantage of favorable price movements and volatility changes.

Example Order: "Buy 100,000 shares ABC leveraging both dark pools and lit liquidity. Execute as much as you can with price improvement if possible and make sure you are more than 15% of the volume. If you find a Dark block, get me done."



Broker Fields (* indicates an optional field that may be left blank)

*VolumeMax: The maximum percentage of volume participation you will allow the algo to follow. Setting a cap on volume may impede completion.

*VolumeMin: The minimum percentage of volume participation you want the algo to follow. For example, "15" would force the algo to at least participate with 15% of the interval volume.

*Execution Style: Sets your preferred aggressiveness level. "Passive" buys at the bid in dark and light venues. "Neutral" attempts to buy at midpoint or better in dark venues and at the bid in light ones. "Aggressive" takes liquidity on all sides of the spread (Bid, Mid, Offer) in dark venues as it becomes available, and continues to post at the bid in light venues. Default: Neutral. (Note: VolumeMin settings will cause Abraxas℠ to cross the spread if necessary.)

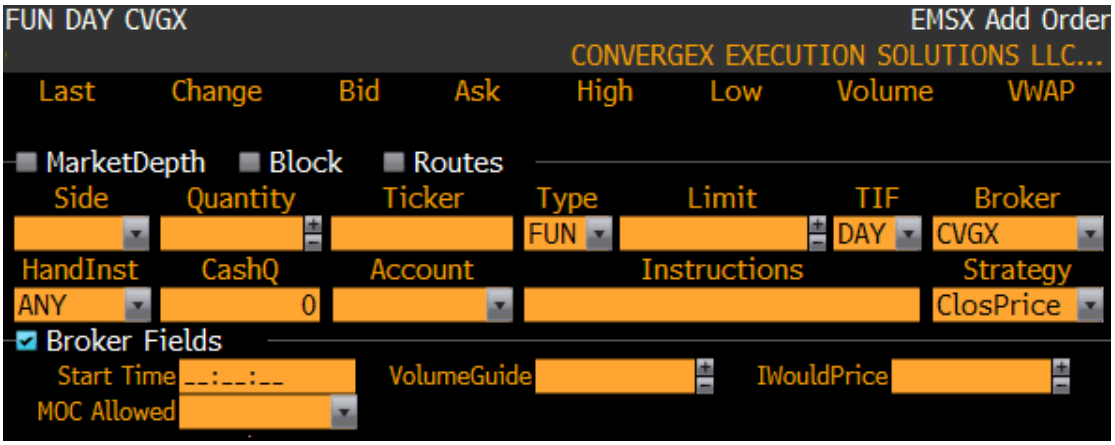
*MinDarkFill: Specifies the minimum quantity of shares you want to fill in dark venues. Default: 0.

ABRAXAS DOES NOT ASSURE COMPLETION.

Closing Price

Designed to perform well against the day's closing price. The algorithm can either maximize alpha or strictly track the benchmark price.

Example Order: "Buy 50,000 ABC into the close. Maximize alpha."



Broker Fields

(* indicates an optional field that may be left blank)

*Vol Target: (Volume Target) The percentage of volume participation you prefer the algo to follow.

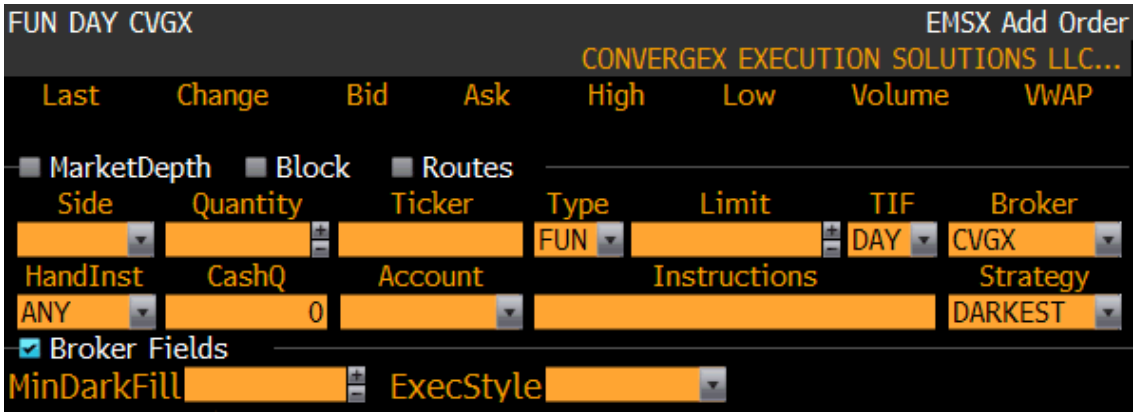
*MOC Allowed: Allows you to choose to participate in the closing auction. Default: True.

Closing Price does not assure completion.

Darkest

Dark pool aggregator designed to maximize fill rates in non-displayed venues while minimizing market impact.

Example Order: "Sell 100,000 ABC looking for liquidity across dark pools. Execute as much as you can intelligently without interacting with the displayed markets."



Broker Fields (* indicates an optional field that may be left blank)

*MinDarkFill: Specifies the minimum quantity of shares you want to fill in dark venues. Default: 0.

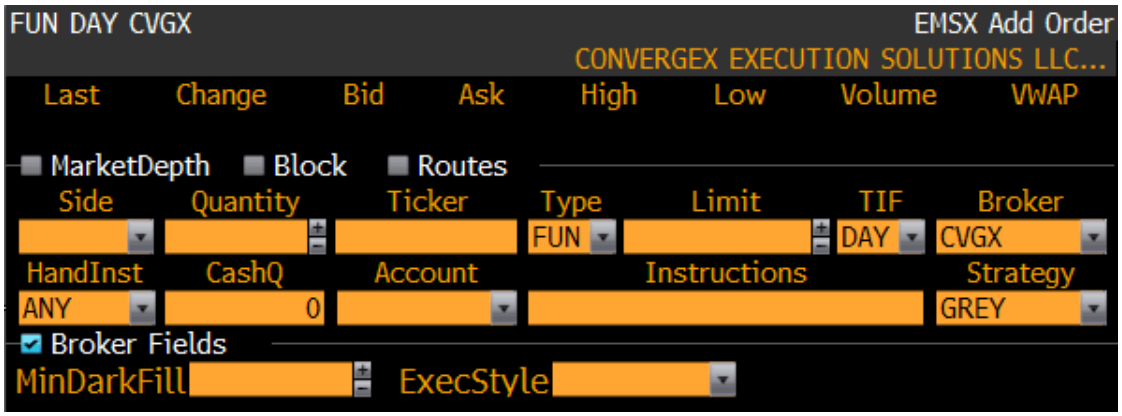
*Execution Style: Sets your preferred aggressiveness level. "Passive" buys only at the bid in dark venues. "Neutral" attempts to buy at midpoint or better in the dark. "Aggressive" takes liquidity on all sides of the spread (Bid, Mid, Offer) in dark venues as it becomes available. Default: Aggressive.

DARKEST DOES NOT ASSURE COMPLETION.

Grey

Hybrid order type that actively searches dark pools for liquidity while posting small, primary-side pegged orders in the displayed market.

Example Order: "Buy 50,000 ABC. Search the dark pools for liquidity but also post a smalll portion of my order at the best bid in case the price of the stock moves in my favor."



Broker Fields (* indicates an optional field that may be left blank)

*MinDarkFill: Specifies the minimum quantity of shares you want to fill in dark venues. Default: 0.

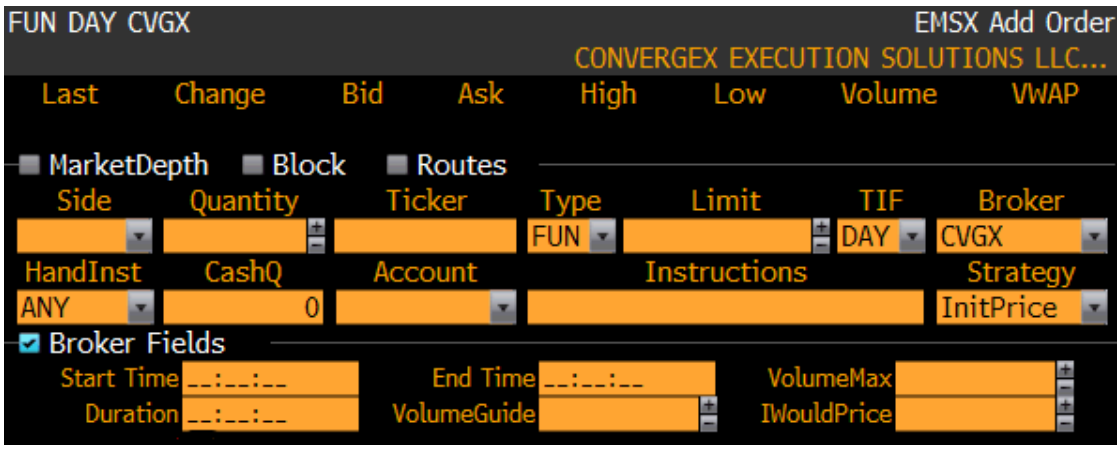
*Execution Style: Sets your preferred aggressiveness level. "Passive" buys only at the bid in both dark and light venues. "Neutral" attempts to buy at midpoint or better in dark venues and at the bid in light ones. "Aggressive"takes liquidity on all sides of the spread (Bid, Mid, Offer) in dark venues as it becomes available, and continues to post at the bid in light venues. Default: Neutral.

GREY DOES NOT ASSURE COMPLETION.

Initiation Price

Aims to minimize movement away from the initiation/arrival price. User indicates market impact tolerance by specifying target participation rate. Since order will complete, the algorithm may exceed the implied aggression level.

Example Order: "Sell 75,000 ABC, ideally at $1 or better, but I do need to complete."



Broker Fields (* indicates an optional field that may be left blank)

*VolumeMax: The maximum percentage of volume participation you will allow the algo to follow. Setting a cap on volume may impede completion. Default: 50%.

*Vol Target: (Volume Target) The percentage of volume participation you prefer the algo to follow. Default: 5%.

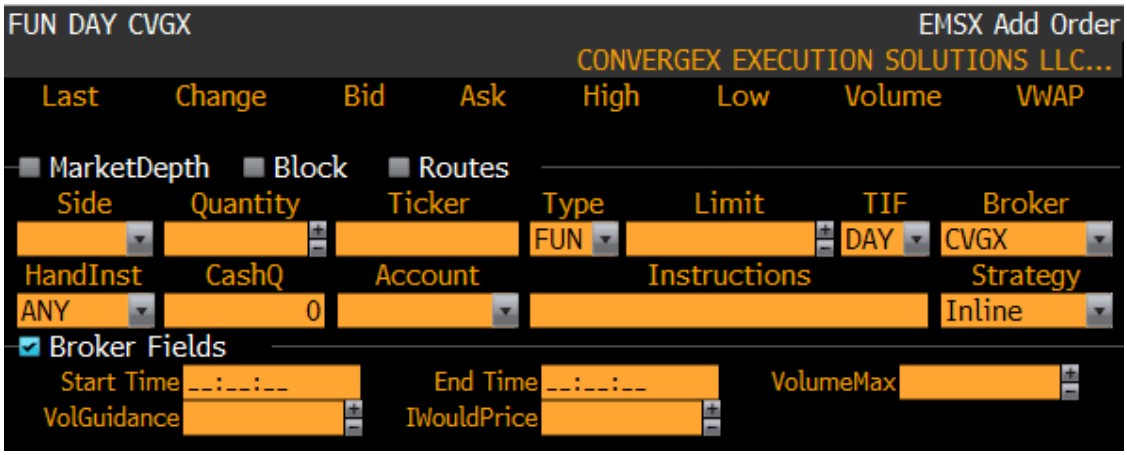
*MinDuration: (Minimum Duration) The minimum amount of time you want the algorithm to trade (hh:mm:ss). Can be used instead of Start/End Time. Initiation Price aims to complete quickly; set this if you want your order to last a certain amount of time.

Initiation Price assures completion.

Inline

Keeps a consistent participation rate but scales up its aggressiveness upon favorable price movements.

Example Order: "Buy 50,000 XYZ go along at 10%. If prices move in my direction, get more aggressive. Otherwise continue to participate at 10%."



Broker Fields (* indicates an optional field that may be left blank)

*VolumeMax: The maximum percentage of volume participation you will allow the algo to follow. Setting a cap on volume may impede completion. Default: 50%.

*Vol Target: (Volume Target) The percentage of volume participation you prefer the algo to follow. Default: 12%.

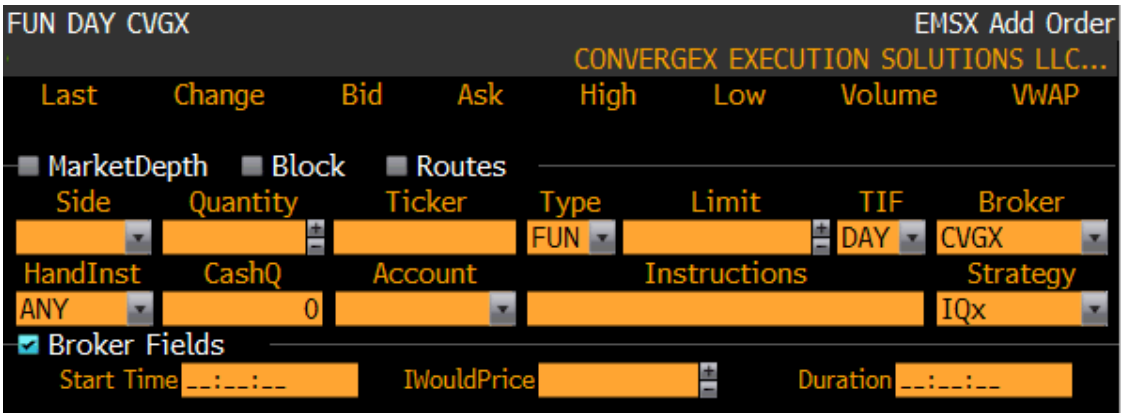
*VolumeMin: The minimum percentage of volume participation you want the algo to follow. For example, "10" would force the algo to at least participate with 10% of the interval volume (this may complete earlier than your expected time if there is enough liquidity).

INLINE DOES NOT ASSURE COMPLETION.

IQx®

Provides optimal arrival price performance for small orders. Reads market trading activity and dynamically manages its trading tactics across both light and dark markets. ConvergEx optimizes the configuration of IQx for each customer.

Example Order: "Immediately buy 6,500 ABC within the spread if possible."

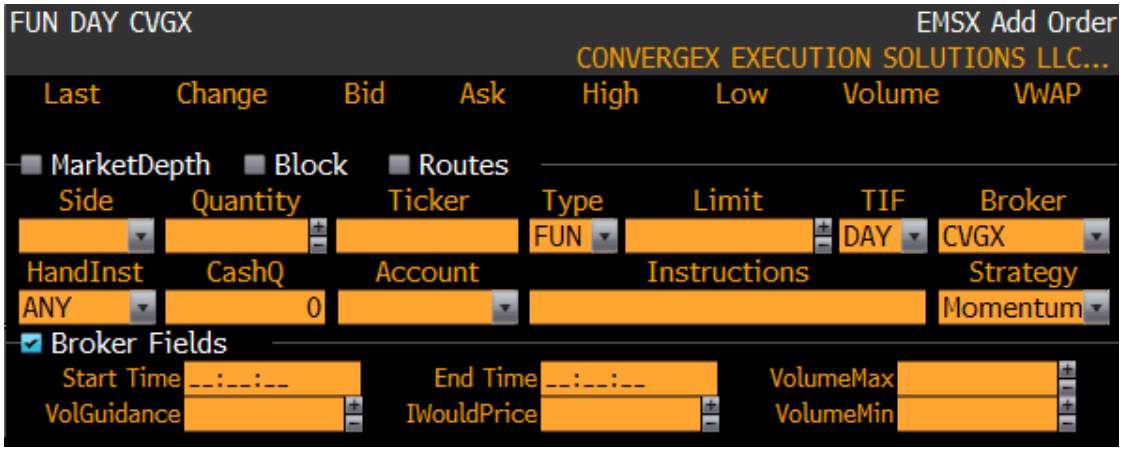


IQx® ASSURES COMPLETION.

Momentum

Scales up participation rate with adverse price movement and decreases participation with favorable price movement.

Example Order: "Buy 25,000 ABC at 15%. If it's moving against me, get more aggressive. If it's coming in, slow down."



Broker Fields (* indicates an optional field that may be left blank)

*VolumeMax: The maximum percentage of volume participation you will allow the algo to follow. Setting a cap on volume may impede completion. Default: 50%.

*Vol Target: (Volume Target) The percentage of volume participation you prefer the algo to follow. Default: 12%.

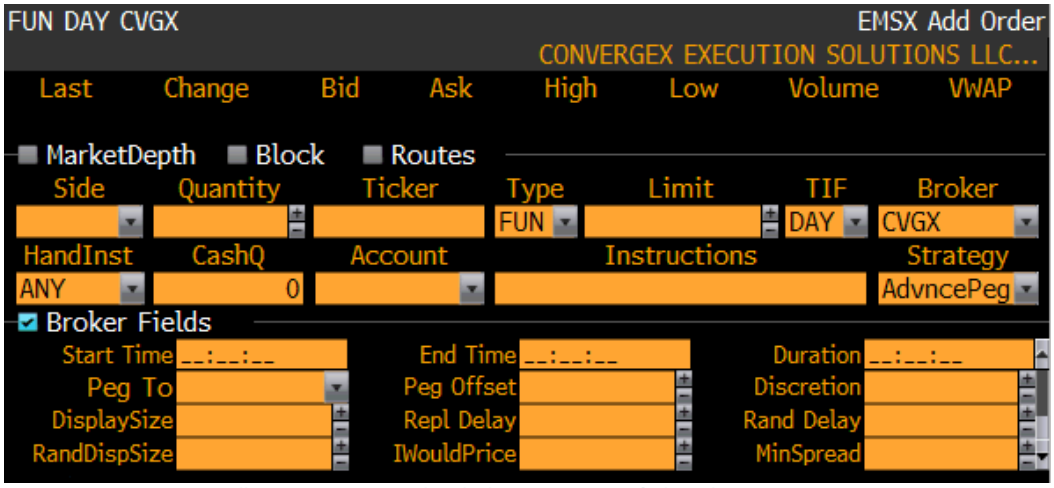
*VolumeMin: The minimum percentage of volume participation you want the algo to follow. For example, "10" would force the algo to at least participate with 10% of the day's volume (this may complete earlier than your expected time if there is enough liquidity).

MOMENTUM DOES NOT ASSURE COMPLETION.

Peg

Sends limit orders that move in tandem with the market. Aims to follow the market while never executing trades as market orders. You can customize Peg to stay a certain limit away from the last bid/ask price.

Example Order: "Buy 100k XYZ, but I want only to buy stock on the bid, so peg to the bid."



Broker Fields (* indicates an optional field that may be left blank)

*DisplaySize: The displayed size of each smaller (child) order. The algo will continue to refresh orders of that size until your entire order is complete. Default: 10% of your order.

*MinSpread: (Minimum Spread) If the spread is less than this setting, the algo will not participate in the market.

*PegTo: The price to which orders are pegged. You may select from bid, ask, last, or mid price. Default: bid for buys, ask for sells.

*PegOffset: Use this to peg at a price relative to the PegTo price. It is a signed amount that will be added to the PegTo price. For example, if you add a PegOffset of "$.001" to a buy order with PegTo set at the bid, your order will be Bid+$.001.

*Discretion: Amount that establishes a range in which the algo will take liquidity. If size becomes available at the PegTo price plus the Discretion, the algo sends IOC orders for quantity up to the displayed available size. Default: 0. NOT AVAILABLE IN THE US.

(Peg Broker Fields continue on the next page)

Peg (continued)

*ReplDelay: (Replenish Delay). How long the algorithm will wait before refreshing filled orders. Default: 2 seconds.

*RandDelay: (Randomize Delay). The algorithm will refresh child orders at time intervals randomly selected between your Replenish Delay plus or minus this percent of the Replenish Delay. Default: 0.

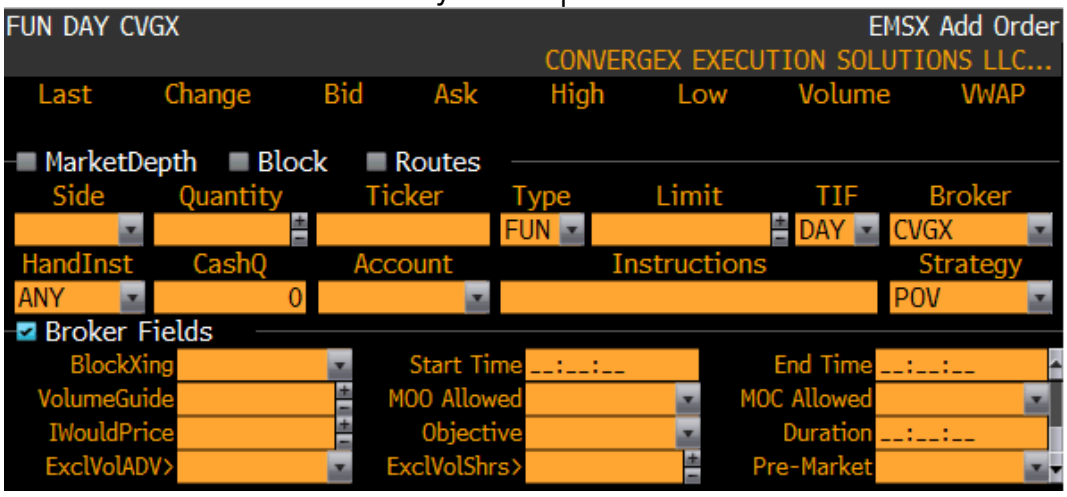
*RandDispSize: (Randomize Display Size) The algorithm will send child orders randomly sized within your DisplaySize plus or minus this percent of the Display Size. Default: 0.

PEG DOES NOT ASSURE COMPLETION.

POV (Percentage of Volume)

Strives for minimal market impact by participating at a specified percentage of volume. Ideal when consistent participation takes priority over assured completion.

Example Order: "Buy 50,000 ABC, but be no more than 10% of the volume. I understand I may not complete."



Broker Fields (* indicates an optional field that may be left blank)

*BlockXing: Allows POV to interact with, our block crossing engine. Only available in the US.

*Vol Target: (Volume Target) The percentage of volume participation you prefer the algo to follow. Default:5%.

*Objective: Allows you to choose the method the algo uses to track volume. It ranges from 1 (Max Alpha, which allows the algo to take advantage of favorable pricing and increased liquidity) to 5 (Strict Tracking). Default: Balance.

*MOOAllowed: Allows you to choose to participate in the opening auction. Default: False. Not available in the US.

*ExclVolShrs>: Instructs the algo to ignore prints over a set number of shares of a stock.

*MOCAllowed: Allows you to choose to participate in the closing auction. Default: False. Not available in the US.

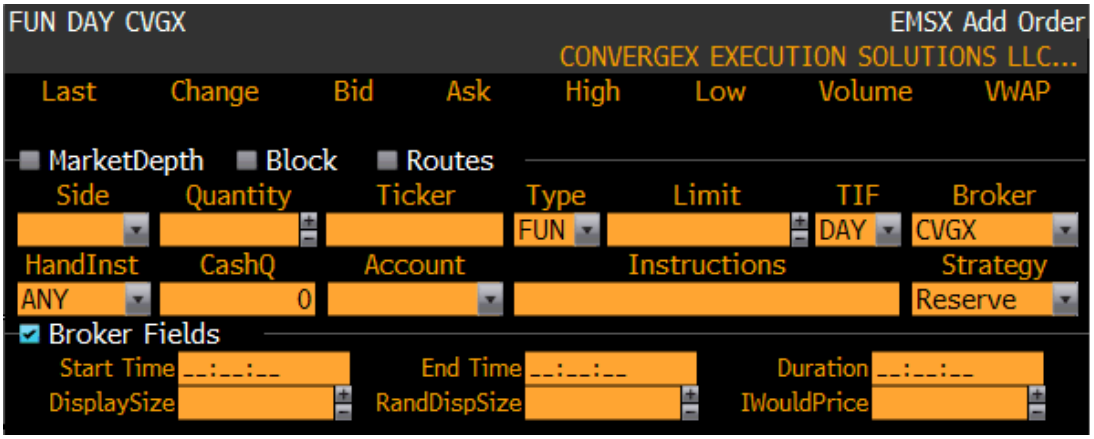
*ExclVolADV>: Instructs the algo to ignore volume prints over a set percentage of a stock's Average Daily Volume. Only available in the US.

POV does not assure completion.

Reserve

Acts like a synthetic iceberg. Prevents others in the market from assuming you are working a large order. by maintaining a reservoir of shares and using it to continuously replenish filled child orders. Helps to enhance anonymity.

Example Order: "Buy 50,000 shares of XYZ with a $15 top, display only 1000 shares at a time."



Broker Fields (* indicates an optional field that may be left blank)

*DisplaySize: The displayed size of each smaller (child) order. The algo will continue to refresh orders of that size until your entire order is complete.

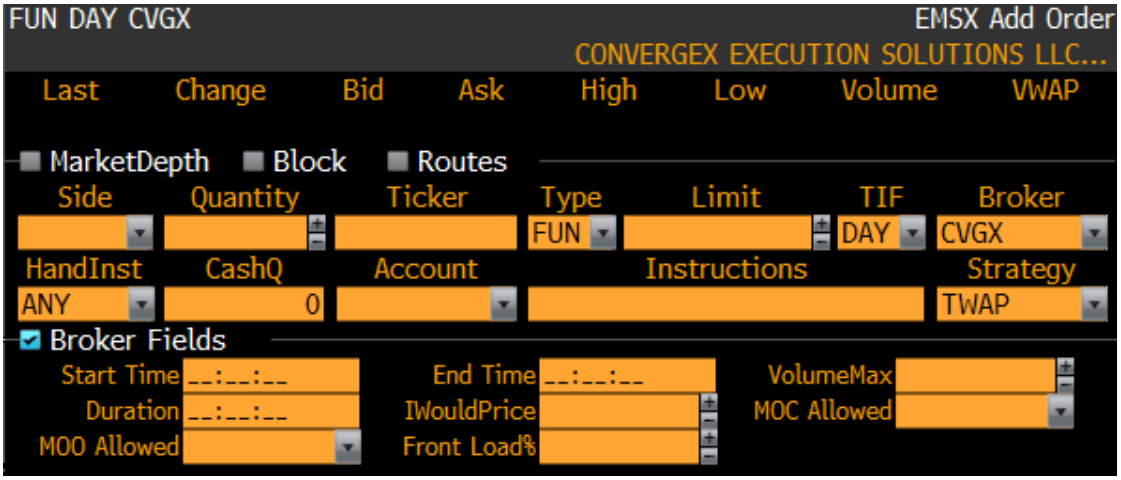
*RandDispSize: (Randomize Display Size) The algorithm will send child orders randomly sized within your DisplaySize plus or minus this percent of the Display Size. Default: 0.

RESERVE DOES NOT ASSURE COMPLETION.
RESERVE IS NOT AVAILABLE IN THE US.

TWAP (Time Weighted Average Price)

Spreads the order out evenly over the user-specified time frame

Example Order: "Sell 60,000 ABC over an hour." (I'd like to be filled on an average of 10,000 shares every 10 minutes).



Broker Fields (* indicates an optional field that may be left blank)

*VolumeMax: The maximum percentage of volume participation you will allow the algo to follow. Setting a cap on volume may impede completion. Default: 50%. NOT AVAILABLE IN THE US.

*MOO Allowed: Allows you to choose to participate in the opening auction. Default: False.

*MOC Allowed: Allows you to choose to participate in the closing auction. Default: False.

*Objective: Allows you to choose the method the algo uses to track volume. It ranges from 1 (Max Alpha, which allows the algo to take advantage of favorable pricing and increased liquidity) to 5 (Strict Tracking). Default: Balance.

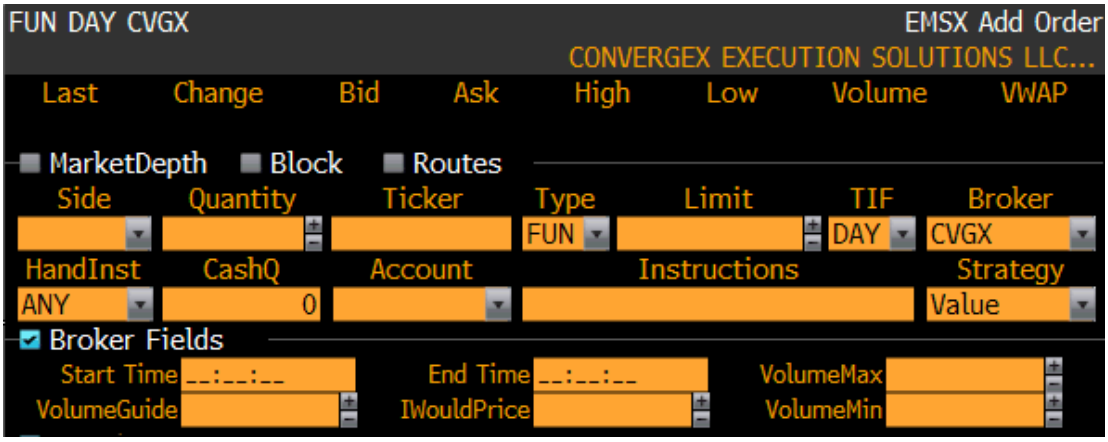
*FrontLoad%: Allows you to control the volume profile across the time window. For example, setting this field at "70" would make the algo complete 70% of the order half way through the time horizon. Default: 50.

TWAP ASSURES COMPLETION.

Value

Scales up participation rate when price is favorable and decreases participation when prices are unfavorable.

Example Order: "Buy 100,000 ABC go along at 20%. If prices move in my direction, get more aggressive. If prices move away from me, slow down."



Broker Fields (* indicates an optional field that may be left blank)

*VolumeMax: The maximum percentage of volume participation you will allow the algo to follow. Setting a cap on volume may impede completion. Default: 50%.

*Vol Target: (Volume Target) The percentage of volume participation you prefer the algo to follow. Default: 12%.

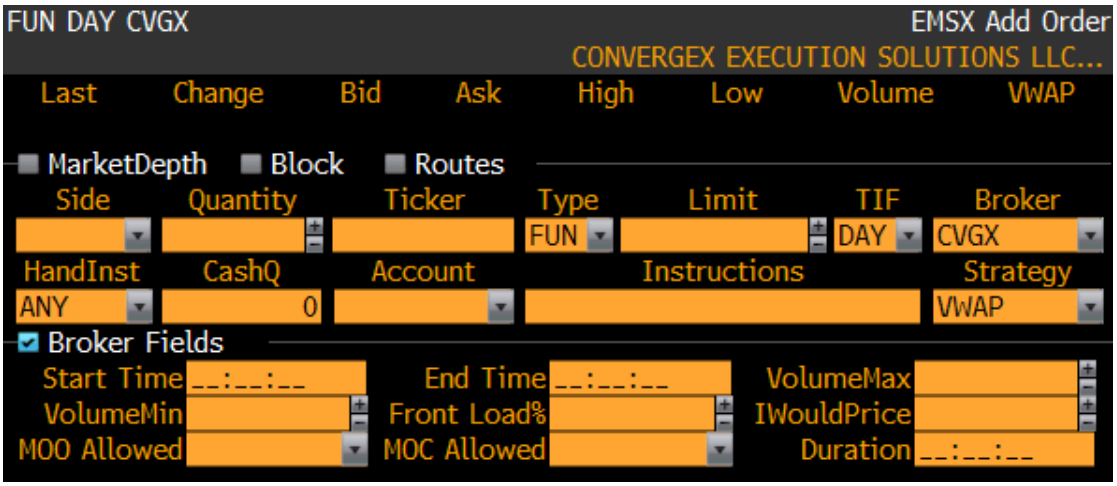
*VolumeMin: The minimum percentage of volume participation you want the algo to follow. For example, "10" would force the algo to at least participate with 10% of the day's volume (this may complete earlier than your expected time if there is enough liquidity).

VALUE DOES NOT ASSURE COMPLETION.

VWAP (Volume Weighted Average Price)

Minimizes slippage against VWAP by targeting the stock's expected volume profile within the user-specified time frame. Uses historical and real-time volume data. Order will complete.

Example Order: "Buy 100,000 ABC between now and 4pm, allocating slices of the trade throughout the day according to expected liquidity."



Broker Fields (* indicates an optional field that may be left blank)

*VolumeMax: The maximum percentage of volume participation you will allow the algo to follow. Setting a cap on volume may impede completion. Default: 50%.

*VolumeMin: The minimum percentage of volume participation you want the algo to follow. For example, "10" would force the algo to at least participate with 10% of the day's volume (this may complete earlier than your expected time if there is enough liquidity).

*MOO Allowed: Allows you to choose to participate in the opening auction. Default: False.

*MOC Allowed: Allows you to choose to participate in the closing auction. Default: False.

*FrontLoad%: Allows you to control the volume profile across the time window. For example, setting this field at "70" would make the algo complete 70% of the order half way through the time horizon. Default: 50.

VWAP ASSURES COMPLETION.

About ConvergEx Group

SOLUTIONS TO HELP ACHIEVE INVESTMENT OBJECTIVES

ConvergEx Group is a leading provider of global brokerage and trading-related services for institutional investors and financial intermediaries. ConvergEx combines client-first service with innovative products, sophisticated strategies and proprietary technology to meet the challenges of increasingly dynamic and fast-paced markets.

We service our clients through six complementary businesses:

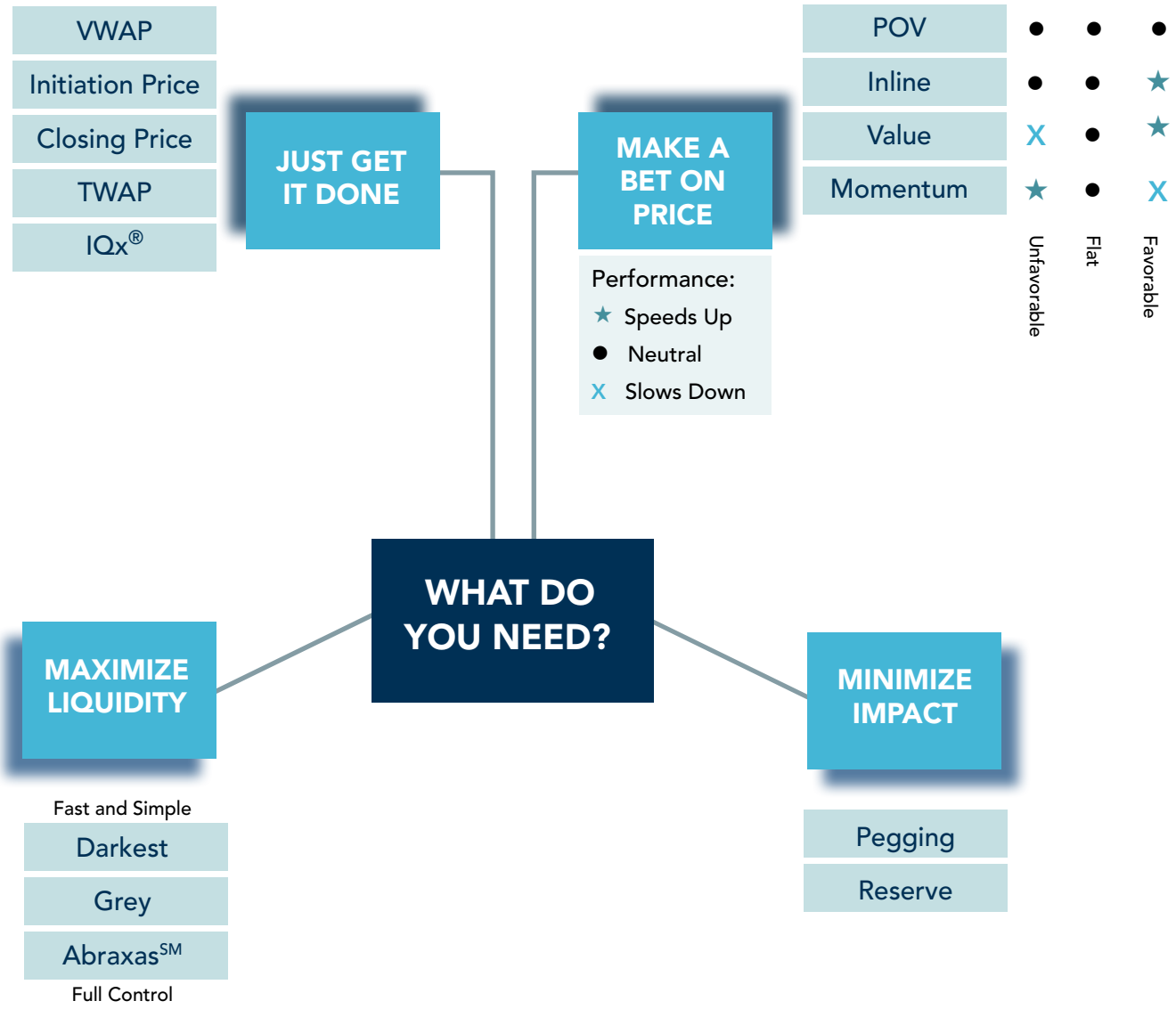
+ Execution Solutions
+ Commission Management
+ Options Technologies
+ Prime Services
+ Plan Sponsor Services
+ Broker-Dealer Services

Headquartered in New York with a presence in several other key locations including London, Chicago, San Francisco, Boston, and Atlanta, the company serves more than 3,000 clients accessing over 100 global market centers.

To learn more, please visit www.convergex.com.

v14q3.001

We offer algos to meet almost any need.



ConvergEx's proprietary algorithms are developed by our in-house Financial Engineering & Advanced Trading Solutions (FEATS) team.

Your comments are always welcome. Email us at ConvergExGlobalGuide@convergex.com

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1633 Broadway
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