Inter-Dealer OTC E-markets

Iosif ZIMAN
Nomura Principal Investments Hong Kong Ltd
iosif.ziman@gmail.com

The global OTC markets have been very active in the past decade as many institutions have chosen to rely on growth in the OTC issuance to facilitate deal-making outside of the exchange regulated avenues. Products included in this category are bonds, converts, volatility and variance swaps, CDS contracts. This paper introduces the financial instruments used in connection with the OTC markets, presents and offers suggestions for setting up generic sell and buys side RFQ and market making systems and introduces the main concepts and components that need to be taken into account when developing such systems when targeting the growing E-Business focus of the market.
Keywords*: E-Business, OTC, Bond, Convertible Bond, CDS, Inter-Dealer Market, RFQ*

1 Introduction

OTC instruments have become the largest traded securities by volume and notional value globally. The financial products traded OTC include effectively any financial product that is not traded on a regulated venue, such as an exchange, but they are traded between usually two parties who effectively sign a contract, which may be a one off or part of a series of deals. To illustrate the point, current estimates suggest that the size of the global bond market is $82 trillion vs. the size of the global stock market which is $40-$50 trillion. And this is just one of the instruments traded OTC. Clearly the size of this market has become very large and there is recently, even before 2008 but clearly after Sep 2008, an effort to capture the information distribution and deal making flows on channels that are more transparent than the current way of executing them. As part of this analysis in this paper we will concentrate on a few markets, most specifically on bonds, convertible bonds and the various RFQ (Request For Quotes) mechanisms that exist currently as well as the trends manifested recently towards opening up new markets, which we may dear calling E-Markets, for price distribution mostly at this time, but which may evolve later into a more electronically assisted means for deal making.

On a general note, bonds are largely well documented with well identified terms and conditions, with information available to any market participant with access to any of the major information aggregators/distributors, for ex Bloomberg or Thomson/Reuters. However, the price distribution for bonds is still done through broker quotes being sent to a limited number of market participants and not generally publicly available. At the same time, due to the fragmentation of the market, the quotes presented by various brokers may vary significantly from one another, to the extent that some may be considered valid while other may actually be considered invalid (or non-tradable).

Convertible securities (converts) are bonds or preferred stocks that can be exchanged (converted) into a fixed number of common stock shares of the issuing company. Converts combine the capital appreciation potential of equities with the higher income and safety of fixed income instruments. When considering liquidity, this parameter is always an issue in evaluating different investment asset classes, specifically the global convertible securities market is large, diverse, and liquid. With a capitalization of over $400 billion, the global convert market is bigger than the equities markets of Australia or Hong Kong. The Japanese convertible securities market is the largest, with capitalization of approximately $160 billion or 38% of the total global market. U.S. is second with about 31% of the market or $130 billion. Europe is third with about 24%, and the remaining 7% comes from emerging market nations. Among these regions Europe is the fastest growing segment of the market. In general institutions are using converts to monetize assets in the restructuring process in a tax efficient manner. In this context securities being issued by parent companies or large corporate stockholders are convertible into common stock of the companies being sold or spun-off. The reason why these products are attractive is that capital gains taxes are deferred until the convertible privilege is exercisable, generally five years after it is issued. To put things in context it is important to note that markets no longer act in isolation. An event such as a Russian debt default or Taiwanese earthquake will send financial tremors around the world. Increased volatility, or the extent to which prices fluctuate over time, is now a fact of life. From the perspective of risk management and diversification convertible securities reduce portfolio risk. Over the last 25 years, U.S. convertibles have provided about 86% of the return of the S & P 500 with about two-thirds the risk. Convertibles have been even less risky than corporate bonds as measured by the standard deviation of their returns [1].

Convertibles demonstrate a low degree of correlation in terms of returns with both equities and bonds. This low degree of correlation, especially with bonds, explains why convertibles can be used to reduce volatility in a portfolio. Studies indicate that the optimal amount of convertibles in a portfolio is about 5% of total assets [1], [5].

There are four main benefits to investing in convertibles. First, converts offer upside potential when the stock rises. Typically, convertible investors hope to gain two-thirds of the upside of the common stock with only one-third of the downside risk. Second, convertibles pay a higher current yield than the dividend yield on the underlying stock. The average current yield in the U.S. convertible market is 4.3% versus only 1.3% on the S & P 500. Third, convertibles provide downside protection. If the stock price falls and the right to convert into the common stock becomes worthless, the convertible will trade solely on its fixed income characteristics. This price, known as the bond "floor", sets a minimum value for the convertible. Finally, they enjoy superior ranking to common stock in a company’s capital structure [2], [4].

Convertible securities are generally issued at about a 25% premium to conversion parity (the common stock for which the convert can be exchanged must appreciate 25% before the convertible bond holder can make a profit by converting into the common). Out in the open market however, converts behave in a variety of ways. In case the underlying common stock drops significantly, the conversion privilege loses value and, in some cases, may become almost worthless. These are “out of the money” and generally provide very high yields. If the underlying common remains within hailing distance of its conversion price, the convertible issue is referred to as “at the money”. These converts continue to enjoy a yield advantage over common shares and retain capital appreciation potential. If the underlying common shares soar, putting convertible shareholders "in the money", the convert will trade like the underlying common stock. The chart in Fig. 1 shows the attractive performance characteristics of convertible securities [9]:

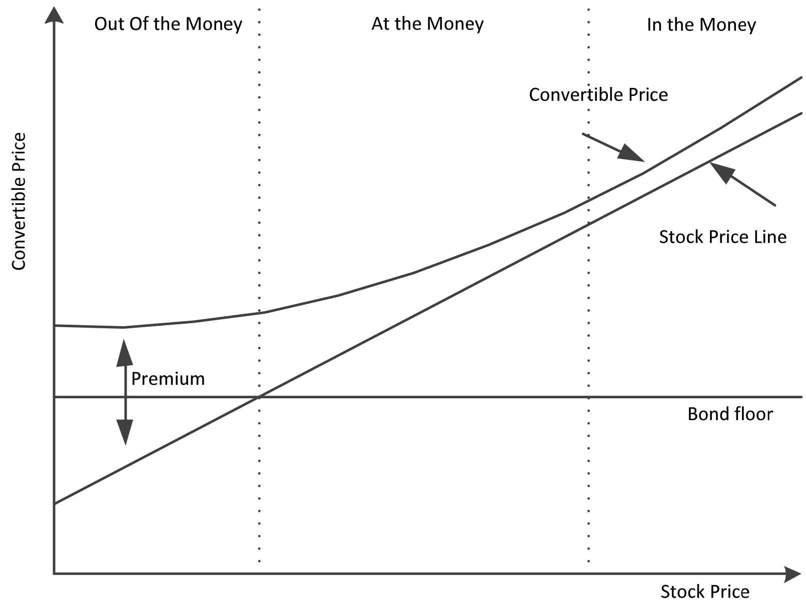

Fig. 1. Convertible Bond Behavior

Assuming interest rates and credit spreads remain unchanged, the bond floor represents the minimum value of the convertible. If the stock price falls dramatically the conversion option will become worthless and the convert will trade just like a straight bond. Its value will hold at the bond floor even if the stock price continues to fall. The stock price line represents the value of the convert if it were converted into stock. The difference between the stock price line and the convertible price is the conversion premium. This premium is the additional amount the investor pays to own the convertible rather than just the underlying stock. The investor is willing to pay a premium in exchange for higher current income and downside protection. As the stock price falls, the convert will outperform the common stock and the premium will expand. As the stock price rises, the convert price will behave more like the equity and the premium will contract.

2 The Problem of Pricing and Price Discovery in Convertible Bond Markets

Given the hybrid nature of a convert, valuation of a convertible bond requires a model that captures both its exposure to credit risk and the upside potential from its equity-like behavior. Models for credit risk are generally classified within two categories: structural models and reduced-form models. Most structural models assume that the value of a firm is continuous in time and, given the dynamics of firm value through time and appropriate terminal and boundary conditions, derive the value of the firm's debt. Models developed to date include a variety of approaches and have evolved to be ever more complex. (Merton, 1974) developed one of the first models for valuing risky debt within the Black and Scholes (1973). Despite its simplicity and intuitive appeal, Merton's model has a number of limitations. First default is allowed only at the maturity of the debt, a scenario that is not realistic. Second, when the model is used to value debt instruments for firms with complex capital structures, i.e., cases where the firm has more than one classes of debt, instruments with higher priority/seniority have to be valued first. Furthermore, some of the parameters needed in the valuation formula i.e., firm value and firm value volatility, are either unobservable or extremely difficult to quantify making the practical application of the model very challenging. Subsequent structural models relax some of the unrealistic assumptions of the Merton model, namely that default can occur only at maturity of the debt. Instead it is assumed that default can occur anytime during the life of the bond and default is triggered when the value of the firm reaches a certain threshold level. However, the problems arising from unobservable variables and complex capital structure still limit the practical application of such models. Structural models for convertible bonds were initially developed by Ingersoll (1977a, 1977b) and Brennan and Schwartz (1977). They follow the same principles as the structural models for the valuation of regular bonds, and allow for the possibility of equity conversion through a set of appropriate terminal and boundary conditions. Brennan and Schwartz (1980) extend their previous work and allow for the uncertainty inherent in interest rates by introducing the short-term risk-free interest rate as an additional stochastic variable. Empirical investigations of structural convertible bond valuation models are limited. King (1986) examines a sample of 103 American convertible bonds and concludes that when market prices are compared with model valuations, the means are not significantly different. Carayannopoulos (1996b), using a structural model that allows for the stochastic nature of interest rates, in a study of monthly data for 30 US convertible bonds finds that market prices are significantly lower than model prices when the conversion option is deep-out-of the-money, i.e., when the conversion value of the convertible bond is low relative to the straight bond value of the security. However, the study does not provide any insight as to whether the observed results are due to model specific biases or general biases inherent in the observed market prices of these instruments. Furthermore, the usual drawbacks of structural models are present during the practical application of these convertible bond valuation approaches and some of the simplifying assumptions may be restrictive enough to distort some of the empirical results obtained.

Most of the problems associated with the practical application of structural models are circumvented with the use of what are known as reduced-form models. Unlike structural ones, reduced-form models do not condition default exclusively on firm value, and parameters associated with firm value need not be estimated for model implementation. These models also view risky debt as paying off a fraction of each promised dollar if bankruptcy occurs. However, the time of bankruptcy is treated as an exogenous process and does not depend explicitly on firm value. A typical reduced-form model assumes that an exogenous variable drives default, and the probability of default (also called hazard or intensity rate) during any time interval is nonzero. Furthermore, it is assumed that, upon default, bondholders receive a fraction of the bond's face value, known as the recovery rate that is known a priori. In general, the value of a corporate bond is equal to the present value of its future cash flows discounted at a risky rate. The risky rate has two components: the risk- free short-term rate and a credit risk premium while one or both components may very through time. The credit risk premium is assumed to be a function of the (risk-neutral) probability of default and the recovery rate, if default occurs. One set of reduced models employs a credit-rating based approach in which default is depicted through a gradual change in ratings driven by a Markov transition matrix3. Others depict the default process through the evolution of default spreads or equivalently, the joint evolution of probability of default and recovery rate. Given the equity-like behavior of convertible bonds, their reduced-form pricing models need to incorporate both the stock price and credit spread behavior over time. Since the convertible bond behaves more like equity rather than debt as the equity value of the bond issuer increases, practitioners often guess an appropriate adjustment to the credit spread to account for the hybrid nature of the convertible bond. The adjustment is usually ad hoc and depends on the probability of conversion i.e., as the probability of conversion approaches one the credit spread approaches zero, while as the probability of conversion approaches zero the credit spread approaches that of an equivalent nonconvertible bond.

Tsiveriotis and Fernadez (1998) propose a valuation model that decomposes the convertible bond value into two components: one component arises in situations where the bond ends up ultimately as equity and the other component in situations where the bond ends up as debt. The first component is discounted at the risk-free rate while the second component is discounted at the risk-free rate plus the (unadjusted) credit spread. Ammann, Kind, and Wilde (2001) test a form of the Tsiveriotis and Fernadez (1998) model using a sample of daily prices of 21 French convertible bonds observed during the period from February 19, 1999 through September 5, 2000. Findings suggest that the model generally overprices convertible bonds for which the embedded option is out-of-the money although the degree of overpricing is considerably lower than the one observed by Carayannopoulos (1995) in the US market. Again, however, the study does not provide an insight as to whether the model is responsible for the observed overpricing or biases inherent in the observed market prices of the convertible bonds in the sample.

Takahashi, Kobayashi, and Nakagawa (2001) develop a reduced-form convertible bond valuation model in a Duffie and Singleton (l999) framework. They demonstrate the model using four Japanese convertible bonds. This limited sample, however, does not allow for any meaningful conclusions with respect to the accuracy of the model.

The model examined in this paper is developed within the Duffie and Singleton (1999) framework and along the lines described by Takahashi, Kobayashi, and Nakagawa (2001). Similar to previous work, we find that the model provides prices that are significantly higher than observed market prices when the conversion option is out-of-the-money while it underprices convertible bonds when the conversion option is in-the-money. Unlike previous studies, however, we provide evidence that at least in the case of deep out-of-the-money convertible bonds differences between actual and model prices are not the result of biases inherent in the pricing model used but rather due to a systematic underpricing of these bonds in the market place when the conversion value of the bond is low relative to the instruments' straight bond value.

3 Elements of a Convertible Bond Market Making Engine

A convertible bond market making engine is a system with a number of core components that collaborate and react to external events and perform required actions. The system continuously receives data from the markets, processes these prices and, using relevant pricing and risk models, generates corresponding buy/sell orders for the relevant instruments. At the same time the system needs to be able to execute commands coming from users. As an effect the convertible bond market making system carries out the corresponding actions such as estimating hedge points for delta and/or gamma, eventually executing auto-hedging algorithms and changing the quoted prices by continuously generating cancel/replace orders to keep in line with the changing underlying prices and associated volatility market.

Several types of existent events contribute to a convert market making engine: market information events such as quote data (bid/ask/last/high/low/close), trade events (order placement/order cancellations/order amendments/execution fills), user driven events (clicking the buy/sell order button, changing the parameters for example the trade volatility or the spread value), system events (market status, system health states, network links).

In general the actions taken by the system in response to these events include: pricing of fair values and implied volatilities, cancel and replace bids/offers in the market, computing individual and overall exposures, trade misprice opportunities in the market, update the latest status to the user, start/stop the quoting mechanism.

Some of the features required in a convertible market making engine include: the ability to process large amounts of data efficiently without slowing other system components, the ability to compute fair values and/or intrinsic values for large amount of converts instantly in real-time, accessing and processing 'low-latency' market data from exchange connectivity, support high volume trading such as placing tens and thousands of orders in a burst, an architecture to support various placement strategies, a responsive GUI front end for the traders monitoring and adjusting market making strategies, a customizable GUI allowing traders to select what they want to see and control, the system must process safety features to avoid potential huge losses. This may include the control of limits and order size, a panic control to withdraw all active orders in the market, or stop quoting when it detects the possible mispricing of its own converts, the ability to monitor 'Greeks' and react with auto-hedging actions and warning alerts ability to withdraw and place new orders without self-matching own orders that comply with exchange regulations and trading rules.

4 Convertible Bond Market Making System Architecture

The architecture of a convertible bond market making system may be designed is such a way that it can support both institutional as well as retail client [10], see Fig. 2.

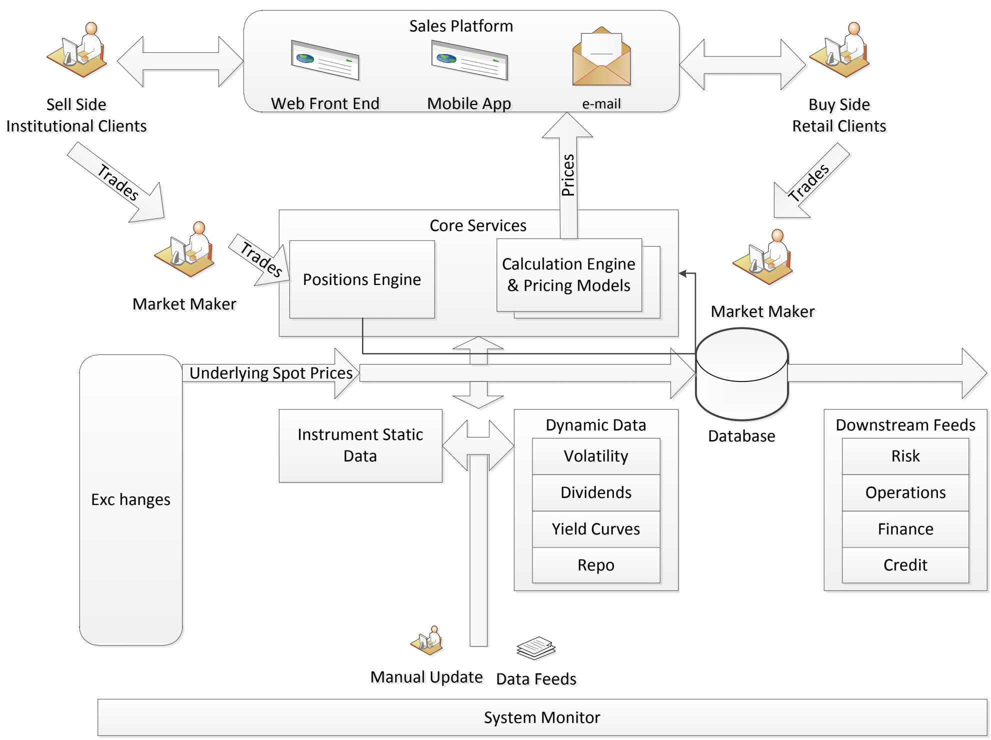

Fig. 2. System Architecture

Calculation Engine & Pricing Models are responsible for aggregating all the data required (instrument static & dynamic data) in order to calculate the fair values of the converts being quoted on.

Position Engine is responsible for ensuring that an accurate account of the current positions is maintained during the life of a convert. The engine maintains all positions and marks for the entire trading period, records each trade accounted for during the day, and end of day position information needs to be saved in the database in order to be loaded again the next day.

Instrument Static Data service is responsible for storing all the data parameters that represent the contractual details for the converts transacted. The data is generally defined by the firm and being presented to investors in various ways including flat file feeds, web interface or through the exchange.

Dynamic Data: Volatility represents the volatility surfaces for each of the underlying instruments on which there are converts defined. The volatility data may be maintained either by using external feeds from vendors or manually with reference to inter-broker quotes.

Dynamic Data: Dividends represents the cash dividend information or the dividend yields being used to price the converts.

Dynamic Data: Yield Curves represents the yield curves for each of the currencies for which there are converts listed in. The data is generally expressed as yield curve term structures.

Dynamic Data: Repo Curves represents the repo curves for each of the instruments for which there are converts listed in. The data is generally expressed as repo curve term structures.

The implementation of convertible making system of this nature will be able to support business models that cater to both institutional clients as well as retail clients using an E-Business model. The requirements for the two businesses are somewhat different, with the exchange driven one being more regulated from a service level agreement and price quotation point of view than the E-Business model. However, current standards tend to bring the E-Business model towards requirements that are very close in terms of stringency to the exchange driven one. As a result the dedicated systems tend to be able to cater for both.

Price formation is a very important component of the convertible bond market making system and requires a high degree of attention and scrutiny from outside the actual trading group. All parameters that feed into the pricing models need to be *verified*. Pricing models themselves need to be validated through thorough testing. The *accuracy and latency* of the entire *price flow* for underlying instruments from exchanges, through the internal distribution layers and into the pricing engine requires great attention. Price formation is one of the areas where a great deal of attention and time is spent when implementing converts market making systems.

Order execution is another area where the accuracy and timing of the information is very important as this is the area where all the market making quotes are being sent out to the exchange or E-Business platform, and any errors not detected up until this stage will have a direct impact on investors and the market making agent. Mistakes in this area may bring monetary costs that can be more or less significant, and in extreme cases may even lead to a market maker losing their license for a determined or even undetermined length of time in a given market.

5 Buy Side Client System Implementation

On the buy side we have a similar implementation that tends to concentrate mainly on aggregating all the price sources (web, mobile app, emails) into a single cohesive price database. This task consists of building tools to scrape the data, which in some instances, mainly in the case of e-mails, may be at best indicative (no common identifiers and such) and attempts to replicate the market from these disparate sources. The effort may be a significant one if we consider that any given buy side client may have tens of sell side counterparts with each one having potentially multiple sales people who send data with inconsistent formats. As a result for the buy side the price discovery task is very important and represents a complex task which may require significant resources.

The systems required generally include mail parsing components, web – parsing components, convert pricing analytics (including calculation engines with load balancing and distribution), dynamic data storage and maintenance, as well as historical risk data management. Additional requirements include reporting to corporate functions such as operations, product control, risk and compliance, as can be seen in Fig. 3.

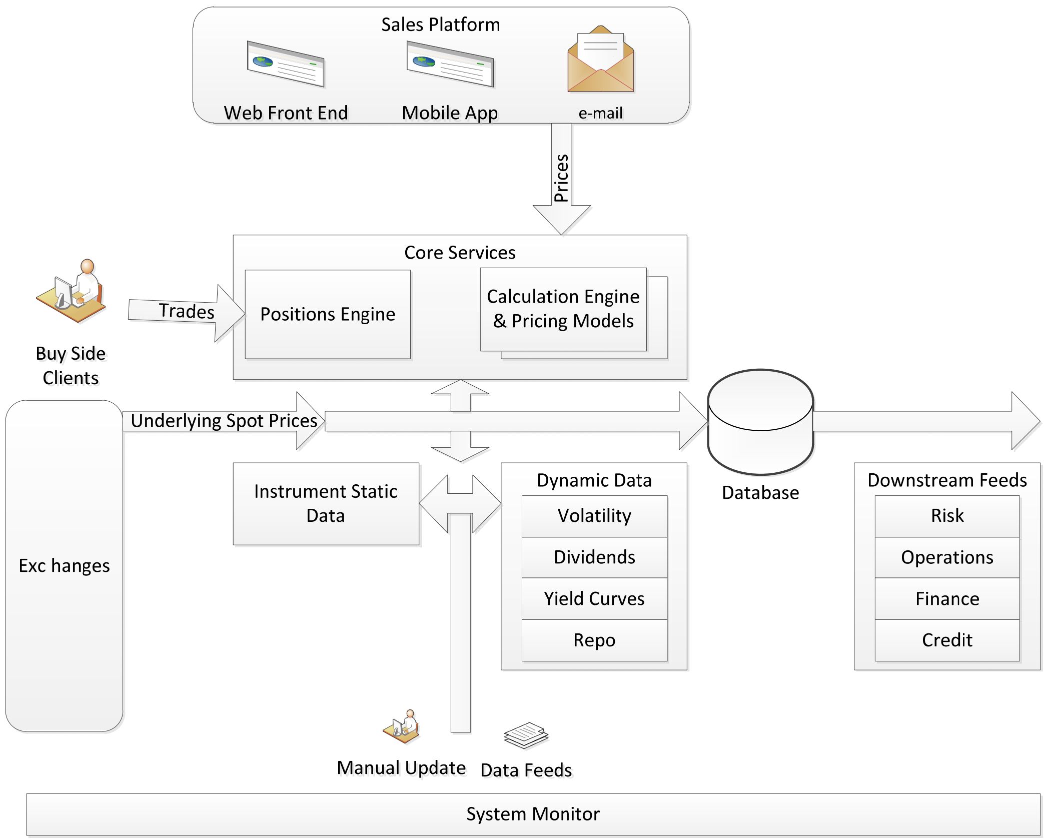

Fig. 3. Buy-Side System Architecture

In Fig. 4 we show a sample user interface components showing some of the sample data captured from various market participants in the Asian market.

NAME	IDENTITY	BLOOMBERG	VOL_BID	BID	ASK	VOL_ASK	REF_PRICE
SK Telecom/ Posco 0.000% 19-Aug-2013	Posco/SKM	SKM US		96.125	96.875		126,500.000
Lotte 0.000% 5-Jul-2016 (JPY)	Lotte JPY	023530 KS	43.4	94.750	95.250	45.6	308,500.000
Lotte 0.000% 5-Jul-2016 (USD)	Lotte USD	023530 KS	42.3	94.500	95.000	44.3	308,500.000
Hynix Semiconductor 2.65% 14-May-2015	Hynix '15	000660 KS	36.1	103.750	104.250	37.7	24,250.000
	advisor under Sect				975.000		
STX Pan Ocean 4.500% 20-Nov-2014	STX	028670 KS		94.250	95.250		4,535.000
SK Telecom 1.750% 07-Apr-2014	SK Tel '14	017670 KS	24.9	102.000	102.750	27.9	12.100
Olam International 6.00% 15-Oct-2016	Olam '16	OLAM SP	25.2	103.750	104.750	27.3	1.810
Noble Group 0.000% 13-Jun-2014	Noble '14	NOBL SP	31.5	139.750	140.750	34.6	1.115
Keppel Land 1.875% 29-Nov-2015	Keppel '15	KPLD SP	29.8	96.500	97.000	32.3	3.220
Keppel Land 2.500% 23-Jun-2013	Keppel '13	KPLD SP	34.1	100.000	101.000	44.0	3.220
	advisor under Sect				975.000		
Wilmar International 0.000% 18-Dec-2012	Wilmar '12	WIL SP	28.6	116.150	116.300	32.9	3.610
Suntec REIT 3.250% 20-Mar-2013	Suntec '13	SUN SP	32.5	105.875	106.375	36.0	1.350
Sound Global 6.00% 15-Sep-2015	Sound Global '13	SGL SP	29.1	100.500	102.000	35.4	.570
Ascendas REIT 1.600% 01-Feb-2017	AREIT '19	AREIT SP	14.8	104.875	105.375	15.6	2.150
Capitamall 2.125% 19-Apr-2014	Capmall '14	CT SP	19.0	100.000	100.500	20.4	1.910
CapitaMall Trust 1.000% 2-Jul-2013	Capmall '13	CT SP		106.750	107.250		1.910
CapitaCommercial Trust 2.700% 21-April-2015	CCT '15	CCT SP	19.2	107.875	108.375	20.1	1.265
CapitaCommercial Trust 2.000% 06-May-2013	CCT '13	CCT SP	61.6	109.375	109.875	68.2	1.265
CapitaLand 2.875% 20-Aug-2016	Capland '16 NEW	CAPL SP	22.0	98.250	98.750	23.8	2.700
	Capland '16 OLD			99.750	100.250		2.700
CapitaLand 3.125% 5-Mar-2018	Capland '18	CAPL SP	36.6	105.250	105.750	39.7	2.700
CapitaLand 2.950% 20-Jun-2022	Capland '22	CAPL SP	35.2	95.875	96.375	39.5	2.700
	advisor under Sect				975.000		

Fig. 4. Quote Aggregator User Interface

6 RFQ Based Price Distribution

There are some platforms that are working on establishing OTC hubs for price requests and distribution and eventually deal making as well (RFQ-Hub, 2011). The reasons why such providers are coming into this market after 2009 is basically the thesis of this paper, which is that such requirements have become essential to the way the financial markets are perceived to evolve i.e. become more transparent exactly in the market areas that are currently difficult to explore and which also carry a massive amount of risk, considering the notional sizes of these markets.

The premise for creating such public venues, and basically building a business out of it, are well established ones, but they only really become accepted now, after 2008, under the pressure of the regulatory framework as well as public opinion. What such platforms intend to do is to offer an alternative to the way that OTC deals are generally being conducted, which is email, IB chat or phone. This results in a very manual process where a quote request is created manually on the buy-side (or potentially not documented at all, eventually recorded) and then the sell-side captures the same deal manually as well. Because of this tedious process the accuracy of the data captured is doubtful, which generates further problems and work for operations and downstream functions, as well as significant risk to trading as PnL may be incorrect until all transactions are double-checked, a process that may take days to complete.

As an alternative, on platforms such as Bloomberg VCON (BLOT), or the newer and less developed RFQ-Hub platform, the deal may be negotiated using any medium, or indeed the platform itself, and at the end of the process usually the sell-side captures the deal on the platform, the buy-side confirms the deal electronically, and since all the data is now captured in a machine readable form, it can then be booked electronically. This way the possibility of error is greatly reduced and the entire flow is significantly optimized for all participants.

Therefore these platforms are useful in establishing an STP for the data flow. However, once such a platform takes hold in an institution, or indeed a circle which includes dealers and traders, the platform may be used to negotiate deals (by using indicative bid/offers or IOI's), may be used internally as well within an institution between fund managers and dealers/traders and sales. More value added services are also available, such as the ability to generate documentation for the deals. The platforms allow the capturing of competing quotes for both deal-making as well as audit. Such data records can then be used for ex. by buy-side participants to provide dealer marks for some of the products they trade to their fund administrators, which allow consistency in marking and PnL.

To provide a summary of the benefits for buy-side market participants we observe that these are the streamlining and standardization of the trading processes; ability to organize OTC trading in line with internal fund investor and regulatory requirements; integration with pre and post-trade systems; generation of electronic tickets, quotes and facilitation of electronic transmission; best execution and access to liquidity. Some of the compliance benefits include added transparency; trade monitoring and post-trade reporting; audit trail; a controlled environment. In terms of middle and back office benefits these are increased speed and efficiency through STP.

In terms of coverage for the various financial products, while each of these platforms claims to have a comprehensive coverage, in reality the coverage is more limited. Bloomberg does have wide enough coverage for their bond, CDS and US treasury products; however coverage for other products is not widely adopted. Markit has well established coverage for vanilla OTC options as well as Variance Swap contracts. In terms of aspirations the market coverage may include the entire universe of OTC contracts, with the exception of pure bi-lateral understandings, and even those in the primary market, but may include them in the secondary market. A comprehensive list of OTC market coverage is shown in Table 1.

Table 1. OTC products covered

Equity Volatility	Listed & OTC options incl. multi-leg strategies and basket of options Light exotics – barrier options Variance Swaps, forward VS Convertible Bonds
Equity Delta One	Futures and calendar rollovers (Sector, Dividend, Single Stock Future) Total Return Swaps, Forwards on single names, indices ETFs, Cash Equity Blocks Program Trading, EFP
Commodities	Linked Notes, Total Return Swaps Listed F&O
Fixed Income	CDS indices and single names Listed bonds and money markets F&O

In terms of trading methods that are either currently available of planned to be introduced these include order routing; agency/spread; risk/principal; ETF creation/redemption; ability to merge multiple orders into single multi-leg strategy; tradable IOI (Indication of Interests) and trade axes (sell-side to buy-side); auto-quote.

In terms of integration with buy and sell side systems services included are: FTP based integration (BBG, Markit); FIX connectivity (most participants), web service API (RFQ-hub); Excel import functions to drag/drop files into platform, support client templates. The integration of these flows into the internal flows of various market participants does represent however a significant hurdle. While FIX may be used for integrating relatively vanilla products, the protocol is not yet sufficiently developed to support more sophisticated products. OTCs are generally managed in each institution by mostly proprietary systems, or possibly complex vendor systems. For this purpose the RFQ type platforms make a dedicated effort to offer these market participants various integration portals and venues.

The usage patterns of various market participants observed seem quite different as each is looking to cope with a wide field which includes a new way to look at the markets, different market behavior, a regulatory environment which seems to drive the trend towards more and more transparency.

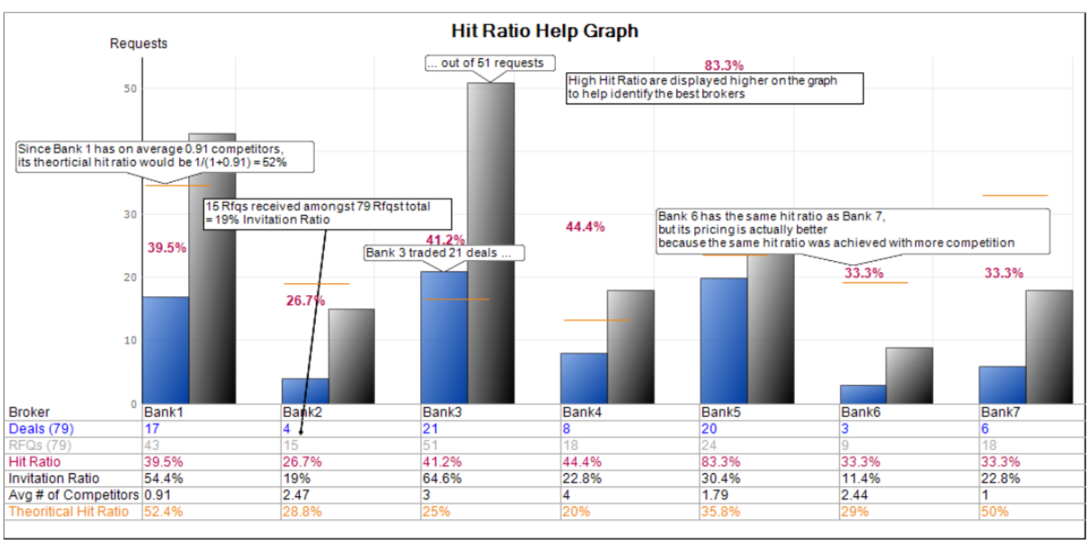

Fig. 5. Sell-Side Transaction Hit Ratio

Some statistics available based on partial data available from RFQ-hub (Fig. 5) indicates tendencies in the usage of the platforms. These statistics help provide a suggestive image over the trading and reaction habits of market participants as well as the market penetration of these RFQ based transaction platforms. It can be observed that the hit ratio currently tends to stay at a constant percentage across banks and at numbers between 30 and 40% in general. Considering the relatively short time since when such platforms have started being used this is a remarkable level of penetration.

As a corollary to these efforts it does seem that if the markets evolve in the way they have been evolving since 2008, meaning with a pronounced tendency towards additional regulation and transparency then the previous trend of de-regulation, it is quite likely that such platforms will become ubiquitous in the investment landscape and even potentially a "must do" for all participants, even if voluntarily in preparation for increased regulatory scrutiny.

To further support such considerations, it is interesting to observe that a company such as Deutche Borse has decided to acquire a minority stake in RFQ-hub, one of the providers of these services. This comes to further strengthen the argument that this trend seems to be a strong one, and that at least one of the major participants, one of the most important and innovative exchanges globally has decided to "hedge its bets" and get involved with one of the leading participants in this space.

Through the analysis of this space it can be observed that this tendency is a natural evolution, due to the current environment, and not at all a revolution. It seems that this space has become available in the wake of 2008 and found market participants with no real strong leader in terms of provisioning such services.

While one may argue that someone like Bloomberg has made strides in this area well before 2008, and that is indeed the case, by no means was the adoption at a level that would indicate a market trend toward generalizing the tendency of establishing OTC "meeting venues", one example may be the slow penetration that a company like Markit has observed with its Swapswire/Markitwire product. It was rather the opposite one may say, given that even if multiple service providers have attempted to propose a series of platforms for supporting transaction facilitation and STP in this market space, the tendency of most participants has actually been to postpone or even choose not to participate in such efforts.

7 Conclusion

This paper presents a brief description of the OTC markets including bond, convert, vanilla OTC as well as other non-exchange traded markets. The goal is to illustrate how these very large markets, in terms of notional value traded, are currently evolving, and what are some of the current trends and tendencies. It is then concentrating on the convertible bond markets, explains how sell side market making systems are implemented and what are the main requirements for such a system, presents the impact that the converts markets have had for retail investors globally and how it has created E-Business models for the financial industry and have presented brief considerations on how such models are implemented in a local, regional or global model.

The paper shows that contrary to concerns raised on occasion, convert issuers tend to trade fairly and mostly manage their inventory rather than manipulate the markets.

Deploying a convertible bond market making engine is a relatively complex task and requires careful planning to be considered by new market participants. The parameters and approaches described each have their pros and cons. A convert market making engine interprets many thousands of events and reacts with low latency based on pre-set parameters and predefined algorithms and requires in general a significant investment that needs careful consideration.

The convert market making business is currently very competitive due to the large number of firms already in the market which cover the demand among retail investors. The business has been gaining ground globally in general but also in Asia, with some markets such as Japan, becoming large convert markets. At the same time existing and new E-Business models will become increasingly adopted by participants in the global markets as they become more transparent.

We have analyzed in the paper the status of the existing RFQ type platforms and we have seen that the current regulatory environment which is pushing for additional transparency does tend to persuade many market participants to adopt multi-broker platform which facilitate both deal making as well as transparency. The penetration level observed for such platforms since 2008 suggests that this trend should be expected to continue to grow having the potential to become a market standard.

References

[1] V. Agarval, W. Fung, et al, Risk and Return in Convertible Arbitrage: Evidence from the Convertible Bond Market, *Journal of Empirical Finance*, 2011.

[2] Altman, I. Edward, "The Convertible Debt Market: Are Returns Worth the Risk?" *Financial Analysts Journal,* 45, 1989.

[3] Bloomberg VCON, BLOT Service Specifications, 2009

[4] Brennan, J. Michael, and S. Eduardo Schwartz, "The case for convertibles," *Journal of Applied Corporate Finance* 1, 55-64, 1988.

[5] W.A. Brown, "Convertible Arbitrage: Opportunity & Risk," *Tremont White Paper*, November 2000.

[6] Data from various Federal Reserve Bulletin issues. Thank to Jeff Wurgler for making it available on his website http://pages.stern.nyu.edu/~jwurgler/.

[7] Markit, Swapswire/ Markitwire Platform specification, 2007

[8] RFQ-Hub, *Press Statements*, FOW 2011

[9] H. Woodson, Global Convertible Investing: The Gabelli Way, *Wiley*, 2001.

[10] I. Ziman, Convertible Bond Price Discovery Implementation, *Lehman Brothers, Internal Documentation*, 2005.

Iosif ZIMAN is Nomura Principal Investments Hong Kong's head of technology since 2008. He has spent the past 15 years in Asia as a technology professional with a wide range of expertise across trading systems areas including order execution, risk management, operations and control areas across equities and fixed income. Mr. Ziman joined Lehman Brothers Japan in 2004 where he lead equity derivatives trading technology teams most notably implementing the suite of the company's next generation's equity derivatives structured products risk management systems. From 2000 he joined Dresdner Kleinwort Japan where he has been responsible for cash and portfolio trading technology and implemented the firm's warrant market making platform for Japan. Before 2000 he spent 3.5 years with Fusion Systems where he has been the lead for the FOX (Fusion Order eXecution) system which has been implemented by more than 15 major investment banks in Japan and Asia region (including Goldman Sachs, Morgan Stanley, JPMorgan and others) to the extent that in the early 2000's about 30% of the Tokyo Stock Exchange volumes went through the system's various implementations. Mr. Ziman holds a B.S. (1994) and a M.Sc. (1995) in Computer Science from the Technical University of Cluj-Napoca, Romania.