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# FAIR VALUATION OF GOVERNMENT SECURITIES IN PAKISTAN

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## Acronyms

BPA	Bond Pricing Agency
BPAM	Bond Pricing Agency, Malaysia
DFI	Development Finance Institution
FMAP	Financial Markets Association of Pakistan
MUFAP	Mutual Funds Association of Pakistan
NBFC	Non-Banking Finance Company
NDS	Negotiated Dealing System
NIFT	National Institutional Facilitation Technologies Pvt. Limited
SBP	State Bank of Pakistan
SECP	Securities & Exchange Commission of Pakistan

## Introduction

Commercial and investment banks, asset management companies, and insurance companies invest and trade bonds to make returns for their institutions and investors. These instruments provide risk free return to the investor, at least with regards to the credit risk. As part of regulations, and in some cases, industry best practices, the investments are valued on daily basis to calculate the net value of investments generally referred to as NAV or Net Asset Value in the industry. For this mark-to-market exercise, each instrument needs to be valued irrespective of the fact that the trading in that instrument has taken place or not. In order to make the exercise impartial and fair for all investors, a mechanism is put in place to arrive at the fair price of each instrument. Pakistan is in need of a robust fair valuation process to boost investor confidence and bond trading in the country.

The average monthly trading in Pakistan's securities market amounts to less than twenty percent of the outstanding value of securities. During the first nine months of 2018, the average monthly trading in government securities by all the financial institutions in the secondary market, as reported by SBP, amounted to PKR 2,154 billion. The Government of Pakistan's total debt under government securities including Treasury Bills, PIBs and Ijarah Sukuks amounted to PKR 12,688 billion as of June 2018. Compounding this issue, nearly 40 percent of the monthly trade takes place in one or two instruments on average out of the available fifty instruments.

This paper will study the present pricing mechanism of government bonds and analyze its effectiveness to provide fair valuations of investment and will also provide recommendations to improve the pricing mechanism to increase investors' confidence in the market which shall be reflected through increase in trading volume and number of participants. For the purpose of this paper, meetings were held with trade bodies like FMAP and MUFAP, inter-bank brokerage houses, banks' treasuries and fixed income fund managers at asset management companies. These interactions helped achieve a holistic view of the process and the market dynamics.

## Background of Government Bond Market

Locally issued government securities include the short-term bills known as Market Treasury Bills with tenors of three, six and twelve months; PIBs of three, five, ten and twenty years; and Ijarah Sukuks catering to the liquidity in the Islamic market. State Bank has in the past issued fifteen- and thirty-year bonds too but those issues have been intermittent. Pakistan's government bonds market has come a long way since 1990s through introduction of different types of securities along with formalization of an auction setup in the form of Primary Dealer System. State Bank of Pakistan, on behalf of Government of Pakistan, is responsible for the entire process of issuance and redemption of debt securities in the primary market. It also regulates the primary dealers, institutions who are eligible to purchase securities through the competitive bidding process during the auction. While regulating the Primary Dealer System, SBP also focuses on improving the secondary bond market.

Once the bonds are issued to the primary dealers at auction, the primary dealers then become responsible for creating a secondary market for the bonds. In Pakistan's secondary bond market, brokerage houses play a crucial role. While an Electronic Bond Trading System portal on Bloomberg is in place, most of the market players prefer to carry out the trades through brokerage houses. The primary reason for carrying out trade through brokerage houses is that the buy sell spreads get reduced and transactions are completed efficiently. However, for some smaller institutions, cost of Bloomberg is also an issue. These brokerage houses being at the center of the trading process are also the price-makers in the market. At the end of each trading day, Financial Markets Association of Pakistan (FMAP) uploads the closing rates of government securities based on data received from selected brokerage houses. The PKRV curve is the industry's benchmark to carry out mark-to-market of government securities for calculation of Net Asset Value (NAV).

## Present Bond Pricing Mechanism:

The present pricing mechanism for government securities in the secondary bond market is managed by FMAP. FMAP is a professional body of the money market, foreign exchange dealers and staff of the scheduled banks, Development Finance Institution (DFI), NBFCs, and accredited interbank brokerage houses. FMAP is led by senior treasury personnel of leading banks and mutual funds in Pakistan who are elected to office of Executive Committee for a period of one year. There is also a technical committee which is comprised of treasury heads of the top five local banks, two foreign banks, and one from DFI. This technical committee in coordination with Domestic Market and Monetary Management Department (DMMD) of SBP guides the technical aspects of treasury dealings including the pricing mechanism of bond market. Any changes proposed by any participating institutions to the technical committee is reviewed and implemented, if found to improve the market.

Under the present system and in order to work in the interbank market, brokerage houses need to be accredited by FMAP. Accreditation criteria for brokerage houses was issued by FMAP and approved by SBP in late December 2010. The criteria include adequate financial resources, technological systems, and staff educational qualifications. The criteria also require brokerage houses to conduct their business with

integrity, prudence, and competence. These requirements are meant to ensure that brokerage house conduct business without undue influence of market participants and ensure confidentiality of transactions carried out. Presently a total of 23 brokerage houses are accredited. However, for the purpose of day-end valuation, a few brokerage houses are selected based on an annual survey done by FMAP. As informed by the Additional Secretary of FMAP, previously each individual member of FMAP had one vote but that led to more weightage of larger institutions like the top five banks hence, a mechanism of cap and floor was introduced recently, which limits the weightage of an institution to ten percent of total votes. A minimum weightage of one percent is given to the votes cast from a single institution even if there is only one FMAP member in the company.

The survey requires FMAP members to evaluate all the accredited interbank brokerage houses on the criteria of pricing charged by brokerage houses, certainty of volume handling and order execution, ensuring confidentiality and availability of market research and timely market updates. The survey is used to select the best brokerage houses and it also serves to select brokerage houses for PKRV contribution. The track record of those brokers who are already contributing PKRV rates is also taken into account. Instances where they have not contributed, or their rates have been identified as outliers are considered while selecting brokerage houses for PKRV contribution. At present, there are a total of eight brokerage houses selected for PKRV and other bond valuations. These brokerage houses chalk out the PKRV curve along with prices of floating rate bonds and Ijarah Sukuks and upload the rates on online portal made available to them by the FMAP in coordination with NIFT. FMAP takes the average of these eight inputs and provides the yield/prices for the valuation of bonds.

This paper will mostly emphasize the pricing mechanism behind the PKRV curve, which determines pricing for approximately 40 instruments (T-Bills and PIBs). There are only 7 other instruments outstanding: four Ijarah Sukuks and three floating rate bonds issued to date. The findings and solutions provided for the PKRV curve will be relevant for other instruments. The data is published on Reuters and MUFAP's website at each day end. A typical day end yield curve data is as follows:

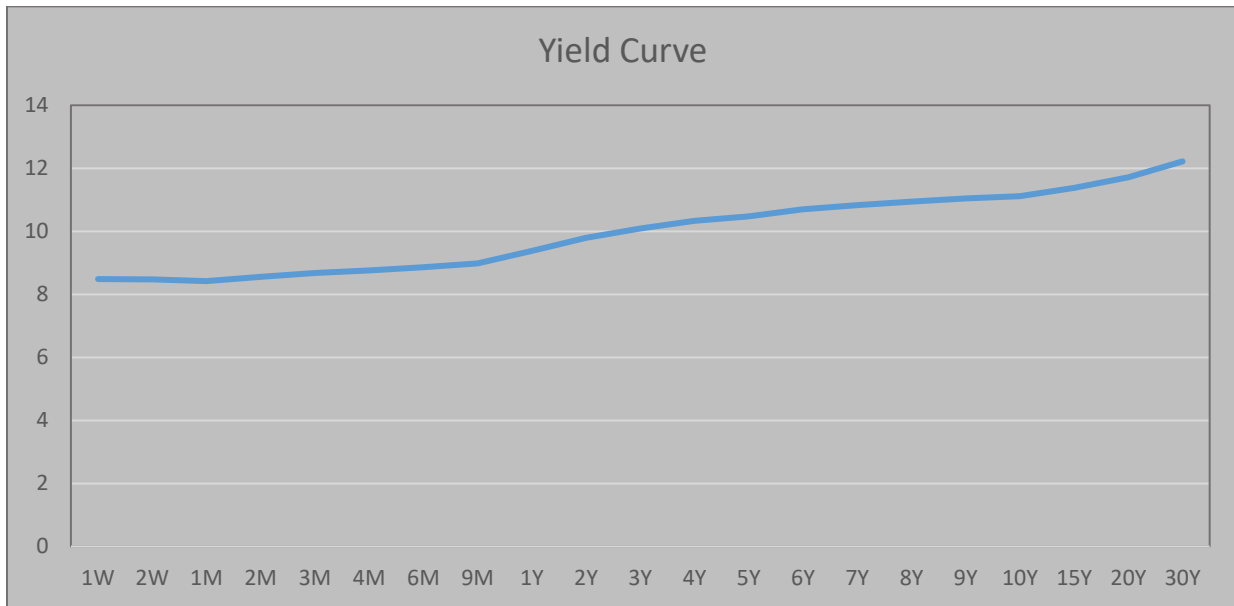
Tenor	Mid-Rate	Change
1W	8.49	0.05
2W	8.47	0.11
1M	8.42	0.07
2M	8.56	0.01
3M	8.68	0.00
4M	8.76	0.01
6M	8.86	0.03
9M	8.98	0.06
1Y	9.38	0.21
2Y	9.79	0.17
3Y	10.09	0.25

Tenor	Mid-Rate	Change
5Y	10.47	0.26
6Y	10.7	0.38
7Y	10.83	0.38
8Y	10.94	0.36
9Y	11.04	0.35
10Y	11.11	0.30
15Y	11.38	0.19
20Y	11.71	0.16
30Y	12.22	0.12
20Y	11.71	0.16
30Y	12.22	0.12

This table shows the expected yield on each tenor of government securities and percentage change in those yields from last trading day. These yields are then put into formulas for bonds held for respective maturities to come up with the specific bond prices by the institutions.



The above table when plotted on a line graph looks as follows:



As per the discussion with leading brokerage houses, there are no specific and thorough guidelines or parameters provided by any of the regulatory bodies for carrying out the valuation of government securities. Hence, a general mechanism is being followed by the contributory brokerage houses based on PKRV rules provided by FMAP via the circular dated June 09, 2004. The referred rules deal with the selection process of PKRV contributors and rates contribution process. The selection process of PKRV contributors have already been provided above. The brief guidelines provided for rates contribution process are provided in the diagram below.

**Rates Contribution Process:**

1. The contributors will submit the rates by using the FMA/NIFT portal.
2. The contribution time on the Portal will be from 4:30 PM till 5:00 PM.
3. The contributors will be required to quote the rates which are the most reflective rates of the securities for various tenors. The contribution should be based on last traded prices or quoted levels not averages for the day or stale prices. However, the contributor should ensure that the rate quoted is truly representative of market and available for a reasonable lot size e.g. a trade of PKR 5.0 million should not form basis of PKRV contribution rather the last rate available for PKR 50.0 million lot size should be considered.
4. Since the PKRV is a tenor based benchmark, therefore, all contributors may interpolate the rates for specific tenors. For this purpose contributors should derive rates of different tenors based on the quotation of various issues of PIBs/Treasury Bills.
5. Mid of bid and offer should be taken in respect of any issue used for computing PKRV rates.
6. Where any issue is available on “cash” basis and also being traded on “when issued basis” the cash price should be used.
7. Any contributor which fails to submit rates for 4 Business Days during any calendar month would be required to justify the reason of non-contribution. Otherwise it could be potentially suspended by FMAP for the next 1 month from the list of PKRV contributors.
8. SBP will monitor the outlier rates among PKRV rate contributors and will share its results with FMAP on quarterly basis with recommendation on possible removal or temporary suspension from PKRV contributors list, in case of persistent outlier quotes.
9. In case of suspension or removal of a contributor, FMAP will nominate a replacement contributor as per the aforesaid ranking of money market brokers.
10. The FMA portal will calculate the average rate for each tenor after excluding outlier as per following table:

Number of Contributors	Outlier Rates to be Excluded
Less than or Equal to 6	None
Equal to 7 or 8	1 Highest and 1 Lowest

11. A minimum of three brokers must contribute to make a representative price valid for revaluation purposes. Otherwise, the rates of previous working day will be used for revaluation purposes.
12. After compilation of data, the average rates will be available on FMA portal to the vendors at 5:10 PM.

It can be seen that the guidelines provided above are not thorough and only require contributors to use interpolation and provide rates for sizeable trading. These guidelines do not deal with such issues as lack of trading for a number of days in any specific tenor or outliers in actual trading. The process of interpolation has not been explained in detail and has been left to brokers’ discretion. Moreover, the criteria of outliers has not been detailed. Upon discussion with the contributory brokerage houses, it was revealed that they follow a market practice for providing PKRV rates. The method described below was

shared by some of the leading brokerage houses and it is assumed that the rest follow a similar model. This pricing methodology is specific to the PKRV curve and will differ a little from the mechanism followed for floating rate bonds and Ijarah Sukuks.

### **Data Collection Methodology**

1. If there has been any trade in a security of a particular tenor irrespective of the amount, that trade is considered as the benchmark for pricing and the yield derived from that trade is reported for that particular tenor.
2. If the broker finds out about a trade done in market through another brokerage house or investor, that trade is also considered for the pricing.
3. If no trade has taken place during a day in a particular tenor but trades have taken place in tenors below or above the specific tenor, then interpolation without giving weight to the value of trade is carried out to arrive at the yield for the specified tenor.
4. If there has been no trade in even the closest tenor bonds, the last day's yield is used unless using that yield distorts the yield curve in which case, brokerage house will arbitrarily change the yield proportionately to abide by the yield curve.

### **Pricing Methodology**

For the purpose of determining the PKRV curve, an Excel-based model is used by the brokerage houses whereby, for every specific T-Bill/PIB, a bid and ask offer is input based on the data collection methodology mentioned above. Moreover, a simple mathematical average of bid and ask is taken as the market rate. Once bid and ask spread based on yield is filled for each security, the securities are classified based on years to maturity. As it is rarely the case that a bond's time-to-maturity is exactly equal to specific points on yield curve, to arrive at the specific yield for tenors on PKRV curve, interpolation is used. For the purpose of interpolation, only those securities are selected where time-to-maturity falls closest to the tenor points on PKRV curve. For example, if there is a bond with 18 months left to maturity and another with 21 months left to maturity, only the one with 21 months to maturity will be considered as it is closest to the two-year tenor. Yields of two bonds are interpolated to arrive at the yield for a specific tenor. Sometimes, there are instances where trading prices in specific bonds distort the yield curve in which case, brokers amend the specific yield calculation to rectify the yield curve.

When all the PKRV curves reach the FMA, they check the data and remove outliers, if any. Average of all the yield curves is taken for each individual point minus the outliers and same is the final valuation for the government bond.

### **Drawbacks of Current Pricing Mechanism:**

While looking at the pricing mechanism for the government bond market, it becomes clear there are issues of independence, transparency and conflict of interests. Most of the market participants interviewed also agreed that the present mechanism is not ideal however, none of them would prefer radical changes in the present pricing mechanism stating that the current mechanism has been developed overtime and shall be continuously improved. During this research, issues such as independence of brokerage houses and FMA in the pricing mechanism were raised with the participants however, these participants were

reluctant to address these concerns based on the premise of high ethical standards set by FMA and demanded from the brokers.

### **Lack of Pricing Framework**

For the valuation of corporate bonds in Pakistan, SECP has provided guidelines vide circular 33 of 2012 which not only provides comprehensive guidelines but also unifies the approach for pricing. Though that pricing approach has its flaws, however, the pricing mechanism of government bonds lacks clarity. The lack of a common framework allows brokerage houses to use discretionary approaches to arrive at bond prices. While, the yield curve that is published only reflects the mean of the data provided, prices of floating rate bonds and Ijarah Sukuk reflects each broker's individual quote along with the mean of eight quotes. It can be observed from the individual quotes mentioned that there is sometimes sizeable difference in valuations by different brokerage houses with difference between the minimum and maximum quote going as far as PKR 1/- in terms of bond prices. This raises the question of whether similar differences would exist in PKRV curve if each brokers' curve is also reflected along with the mean.

The following are some of the questions that remain unanswered in the present pricing rules of FMA.

1. If securities of a particular tenor are not being traded for a period of 15 days, how should the issue be priced?
2. If securities of a particular tenor are thinly traded during the given period, how much weightage should that be given to that traded price?
3. If an issue has been heavily traded during a day, should the closing mark-to-market value based on weightage average price of the day or of the last significant trade?
4. If there is more than one issue in a particular tenor, how should the brokerage houses come to a specific yield of that tenor?
5. If there are no issues of specific tenors in the market, how do the contributory houses ascertain expected yield?

### **Independence of Brokerage Houses**

As there is no holistic pricing framework available and brokerage houses use their subjective approaches in matters not covered under PKRV rules to quote mark-to-market prices for the securities, it leads an independent investor to question the independence of brokerage houses. While none of the research participants raised this issue, it was understood from their responses that good relations with brokerage houses is necessary to smoothly carry out trading.

As mentioned, total value of government securities floating in the market as of June 2018 were PKR 12,688 Billion. Almost all this is held with banks, mutual funds, and other financial institutions, with few institutions having a majority share of the securities due to their large size. Moreover, there are multiple institutions in each segment of the financial industry and competition is tough for this flourishing fund management business. Hence, bank treasuries and asset funds are focused on higher profits for their respective portfolios. Bond valuations becomes an important criterion for this goal, especially the month- and quarter-end valuations, which get published in reports and accounts. Given that brokerage houses are also keen to land maximum trading business from these institutions, it is possible that the bond yields of some or all tenors is altered a little given that the pricing rules leave room for discretion. Hence, there is an

incentive available in the current system for manipulation of the bond valuations and resultantly the profitability of financial institutions and funds. Given the amount of bond holdings with some large institutions, even a slight change in pricing would affect valuation in millions of rupees. However, none of the research participants agreed to this line of reasoning with one suggesting that it would be difficult to manipulate as at least 3-4 brokerage houses will need to alter their quotes to have any sizeable impact on the market price.

### **FMAP's role in the bond valuation**

The responsibility of FMAP to accredit brokers and calculate the PKRV curve on daily basis is a lot of responsibility for a body whose members are the managers of those exact funds whose valuations are being carried out by the brokerage houses. This raises another question of conflict of interest. While for the purpose of selection of brokerage houses for PKRV submission, a survey is conducted from all banks and mutual funds on annual basis however, its results are not published and only the selected brokerage houses are announced. This paper doesn't intend to create doubts on intentions of the body or its members however, this conflict of interest needs to be removed and more transparency in the process needs to be achieved to ensure greater confidence in the market. Research participants rejected this notion outright stating longstanding practice and ethical standards maintained by the body. The necessary ground work for coordinating stakeholders and securing buy-in to achieve consensus in this respect will be needed.

### **Interpolation and yield curve**

Interpolation, where unknown prices are estimated based on known prices of bonds, is an approach actively used in Pakistan as there is not sizeable trading volume in the bonds. This method of pricing bonds is easy to understand however, it doesn't necessarily give a fair picture and neither does it reflect the characteristics of an individual security. Moreover, for arriving at yields for specific points on the PKRV curve, only the instruments with time-to-maturity closest to the specific tenors on the PKRV curve are given weightage, irrespective of the trading volume in that security. This is in contradiction to the general market principle that an instrument is priced better with a higher trading volume. By following this approach, not only are the characteristics of an individual instrument lost but also trading data of some of the securities is ignored.

The curve pricing model also creates uncertainty as only yields for specific points on the curve are known while bonds held may not necessarily fall on those specific points in terms of time-to-maturity. Hence investors use the interpolation technique to arrive at bond prices. Moreover, two bonds with different issue size, holding patterns, and market liquidity but same time-to-maturity will receive the same price under the model if both coupons are also same. Hence, this pricing model only takes the time-to-maturity in account as the main factor affecting the pricing of government securities. The following hypothetical example provides further insight into the issue at hand.

Assume a bond with remaining tenor of two years and four months on a given day with trading of nearly PKR 50M. The weighted average traded price for the trades results in a yield of 7.4%. If there are no further bonds in the two to 3-year category, this yield along with other trades in neighboring categories will be used to arrive at rates for 2 years and 3 years point on the yield curve. Let's assume, the rate for

these yield curve point comes out to be 7.1% and 7.6% respectively. Now the respective fund managers in possession of that two-year-four-month bond will again use interpolation to price the specific bond at hand and, given no guidance of weightage to be applied to each of the points on yield curve, time value method will be used. This scenario provides an insight as to why the yield curve method is fraught with issues of consistency even when considerable value of trade was at hand to arrive at the price. The trust on this pricing methodology would have further eroded had there been no or very little trade in the given bond.

The banks and fund managers acknowledged that the problem exists however, according to them, given the number of instruments in the market it is the most viable solution. Further, according to them, the mark-to-market valuation prices are not indicative of next day's trading prices as market participants carry out trading based on each day's demand supply dynamics. The present method leaves room for some manipulation both for the brokerage houses and the fund managers. While the room available for manipulation is small, it carries significance for large institutions.

### **Invisibility of OTC market**

As mentioned earlier, most of the trading in government securities takes place through inter-bank brokerage houses accredited by FMAP. Although an electronic trading system is available, apart from some of the trades by Primary Dealers, no one else uses electronic trading. Due to this, the OTC market becomes opaque as the trades are not fully reflected in the Electronic Bond Trading System. This creates an information asymmetry, as brokerage houses are the only party with the complete information of trades. Even all the eight brokerage houses do not have the full information. For example, if a trade in a 10-year bond maturing in 2022 was traded through broker X and broker Y during a single trading day, then the remaining brokerage houses including rest of the brokerage houses who will provide the PKRV data are not going to have the trading price available to them to quote the PKRV rate. It is not only possible but highly probable that some of the brokerage houses will quote a different price on the PIB10010122 for the PKRV curve and hence, the day end mark-to-market valuation will be different from the actual traded price of the bond.

Market participants interviewed during the research felt that it is more important to keep the trade information secret in order to avoid market manipulation by players than to disclose the actual price of the bond. They said if the market were to know that one of the participants is selling a particular bond in large quantity they will use that information to their advantage. However, disclosure of trading price and volumes is very common in bond markets globally, while it is also possible to hide the institutions involved in the trade.

### **Alternative Pricing Framework**

Pricing is only one issue in the Pakistani bond industry. Structural issues are created by the fact that the government is the single biggest borrower in the local market. The rate of interest on government loans is comparatively higher, for instance. For the last four months, the government has been borrowing from banks under the floating rate mechanism at 50-70 bps above the rate at which private banks lend to each other. This makes corporate bonds either expensive for the issuer or unworthy of the risk for the investor and, hence, negatively affects the corporate bond markets. Further, prize bonds and issuance of certificates and bonds under the national saving schemes at much higher interest rates than comparable bank deposits



or even treasury bills make government borrowing unnecessarily expensive. Furthermore, with Pakistan's economy in development, there is a continuous flux in interest rates which makes the fixed coupon bonds without put or call options untradeable in the market. While a change in the pricing mechanism of government securities will not immediately help the bond market until the above mentioned issues are resolved, improving the current pricing mechanism will certainly help boost investor confidence and provide impetus for more trading by the bond holders. Some market participants are reluctant to trade long term bonds and prefer to hold bonds until maturity as trading becomes too costly for illiquid securities.

In order to safeguard investor interest and to regain confidence in the bond market, it is imperative that the current bond pricing mechanism is amended in favor of a more transparent and effective pricing mechanism. There are different bond pricing models followed around the world. In the US, UK, and Europe, there are specialist pricing companies and their valuations are used by investors voluntarily to comply with corporate governance and reporting requirements under the accounting standards. Another model followed by some of the more developed markets in Asia including China, Japan, Philippines and Thailand is the Self-Regulatory model where the industry participants create a self-regulatory body which focuses on ensuring adaptable regulation to market dynamics and prevention of unfair activities. The bond prices are determined by industry participants as per regulations enforced by the self-regulating body. These regulations are not only transparent but also make the data available for scrutiny by a third party creating confidence in the pricing mechanism. Though, it may be difficult to comprehend how such a model can work in the face of collusion. However, the regulations cover the conflict of interest and the moral hazard problem in order to ensure fair market dynamics. This model can work alone as well as in conjunction with government regulations and requires compliance with highest ethical standards by the market participants. While both the specialist pricing companies and self-regulated organization models of bond pricing are ideal to implement as it removes or at the very least, reduces government's role in this exercise and lets the market forces to work out the best possible bond pricing mechanism to help market sustain and grow. However, these models can only be used in a well-developed market where both investors and financial institutions understand the risk and reward of having best practices for financial markets in general and bond valuation in particular.

In the context of Pakistan, there is a third model which is more relevant. Malaysia, Indonesia, and Korea have implemented the Bond Pricing Agency (BPA) framework. In this model, the country regulator creates a framework whereby private bond pricing agencies are setup and operate under the regulations by the Securities Commission. This is a hybrid model that requires a government body to make the regulations while private companies with capital and infrastructure can create the institutions in view of these regulations and carry out fair valuations of the bonds in return for fair prices. Malaysia has greatly benefited from this pricing model, which was implemented there in 2006. The country has developed into the largest bond market in ASEAN countries and the largest Sukuk market globally. In Malaysia, the Securities Commission issued the Bond Pricing Agency Guidelines which allowed the private investors to form a bond pricing agency and requires the agency to make the pricing process transparent and verifiable. All financial institutions needing mark-to-market valuations are required by law to use prices quoted by the bond pricing agency for each individual issue. Given that Pakistan's bond market is under development, the BPA model will suit well however, the market players showed apprehension in changing to a new system due to multiple reasons. The primary concern of the investors, and fund managers specifically, was

the cost associated with a bond pricing agency and how that cost will impact the return generated by asset management companies.

SECP has already taken steps to implement a BPA system. In 2012, SECP initiated the process by issuing draft bond pricing agency regulations on its website. Feedback and suggestions were solicited for finalizing the regulations. After five years of consultation and discussions, Bond Pricing Agency Rules, 2017 were finalized. The regulation addresses licensing requirements and procedures for a BPA and outlines its duties and responsibilities, while also mentioning disciplinary actions in the case of violations. However, to date no bond pricing agency has been formed in the country. It was surprising to note that none of the research participants had any idea about this development and were completely unaware of this initiative by SECP.

### **Benefits of the Bond Pricing Agency Concept**

Pakistan's government bond market will benefit greatly from implementation of the bond pricing agency as BPA valuations will enable price discovery in the secondary market. By having a transparent and independent price setting mechanism in place for government bonds, investor confidence will increase and trading volumes will rise as more investors would prefer to trade instead of abiding by the traditional strategy of hold-to-maturity. As the trading volumes increase, price discovery will be easier for bonds that are not frequently traded at present. Further, buy-sell spreads will also reduce, which will help small investors to participate through the IPS accounts.

A healthy and liquid secondary market also helps in price discovery for the primary market. Both the issuer and the primary dealers would have a fair idea of valuations and that will make the auction process more efficient. Presently, auction results for longer tenor bills and bonds frequently reflect status of 'no bids received' or 'bids rejected' as the issuer and investors are not on the same page with regards to valuation of these issues. However, a transparent valuation process and high-volume trading in the secondary market, will help the issuer and the investor in arriving at the correct price for the new issues. Hence, creating efficiency in the primary market. A BPA also increases public's confidence in the financial institutions and markets. Reliable and fair valuations improve the financial reporting along with compliance of international standards and regulatory requirements for the financial institutions. Moreover, risk management practices within organizations will improve based on consistent valuations.

In Pakistan, implementation of a BPA will resolve the issue of conflict of interest with the inter-market brokerage houses and FMAP. The presence of conflict of interest creates investor doubt and affects confidence in the market. Brokerage houses will, at most, be providing trading data to the BPA. Hence, their role will be very minimal in the bond valuation. Moreover, FMA will no longer be involved in monitoring and compilation of bond valuations.

### **BPA Framework:**

A strong and reliable BPA framework is necessary for actualizing the benefits of bond pricing agencies. In this regard, best practices demand implementation of the following guidelines in the formulation of BPA framework. These guidelines have been obtained from the BPAM framework. The Bond Pricing Agency Rules 2017 in Pakistan are also in line with the below mentioned guidelines.



1. For an unbiased BPA, there should not be a controlling interest in the agency. It should be a multi-party endeavor with diverse interests. The framework should restrict maximum ownership in the agency and also put in place requirement for minimum number of owners. The agency should ideally be a public limited company and shall have at least three independent directors to oversee the agency's performance.
2. The agency should use only publicly available information to value the bonds. If there is any conflict of interest with regards to any or some bond valuations, it should be specifically disclosed.
3. The methodology and process of bond valuation shall be regularly audited to ensure that the model is implemented across the board without any exceptions. Further, the audit shall ensure that model remains compatible to market dynamics whereby prices determined by the model can be checked against actual trades taking place in the market. A strong audit framework will increase reliability of market participants on the bond prices.
4. For a reliable system, technological requirements are a must. There should be adequate security in place for BPAs to ensure safety and security of data. The security measures should also cover cybercrimes. To safeguard against any possible disaster like fire, earthquake, riots etc., adequate back-up arrangement should also be in place.
5. Bond Pricing Agencies should have professional indemnity insurance of a certain amount to cover legal suits by investors and market participants.
6. Directors and top management of BPA should have cleared a fit and proper test similar to one carried out by SBP for scheduled banks. Integrity, knowledge and commitment of the directors and management should not come under question.
7. There should be a minimum capital requirement for BPA. The regulators should also ensure that the agencies remain solvent and without excess leverage.
8. Fees charged to the customers for providing valuation should be reasonable

## Pricing methodology under a BPA:

The Bond Pricing Agency Rules 2017 require that a BPA regularly provides 'fair' prices for bonds on an independent and objective basis and is licensed with the Securities and Exchange Commission of Pakistan in accordance with these rules. Under the rules, however, SECP is empowered to form an advisory committee comprising of members from SECP, SBP, and market experts. This committee will advise SECP on the pricing methodology to be used by the BPA among other things. Moreover, for the purpose of government securities, State Bank of Pakistan shall approve the pricing methodology and any changes therein before implementation by BPA. While the rules are in place, no agency has yet started operations in the bond market. For the purpose of this paper, pricing methodology is being proposed based on feedback received from market participants along with best practices observed in international markets.

BPAM defines fair valuation as the act of using recent arm's length market transactions and relative comparison with peers and benchmarks in deriving an instrument's estimated current price. This definition has several key points. First, the "arm's length market transaction" means all such transactions which cannot be justified as arm's length will need to be removed from the data points for arriving at the price. Secondly, valuation is determined through relative comparison with peers and benchmarks and not just through the theoretical formula of bond pricing which means trading activities is taken into consideration. Hence, this model doesn't preempt prices rather reacts to the market conditions. Thirdly, this price is an

estimation and not a definitive value of instruments, hence they can be used for mark-to-market purposes but shouldn't be taken as an indicative value of securities for transaction purposes.

## Data Gathering

Pricing methodologies of government bond markets in India and UK provide the blueprint for better pricing mechanism. While there are differences in approach used in both markets because of trading volumes and market depth however, both markets make substantial effort to base the prices on trading data instead of interpolation. A majority of trades in India and all of the inter-bank trades in UK take place on the online trading platform made available by the respective country's regulatory authority. It is because of this trading data that the pricing mechanism becomes more transparent and based on actual trades. Hence, first and foremost, the issue that needs addressed is the availability of verifiable trading data to the bond pricing agency. This can be achieved in multiple ways:

1. The most effective solution will be to make it compulsory for all market participants to register their trades on the online trading system. An option can be provided to participants to hide their identity while carrying out the trade. All the trading prices will be made available for the Bond Pricing Agency to use and also for investors to ensure that mark-to-market prices are as per the trade data. The issue of high cost of trading system on Bloomberg can be resolved through development of an alternative local trading system specifically for the local bond market. During the course of this research, it was discovered that one of the reasons market participants prefer trading through brokerage houses as compared to online platforms was to hide the identities of buyer and seller from other participants who could use that information for their advantage. However, the Negotiated Dealing System (NDS) that is presently in place in India and introduced and managed by their central bank allows anonymous trades on the system. Even their commercial banks have made systems available to respective account holders for making online trades in government securities.
2. Another option to obtain trading data can be through the National Clearing Company of Pakistan Limited (NCCPL), where all the trades are settled. NCCPL can provide data to the BPA for mark-to-market purposes. In this way, authenticity and confidentiality of data can be ensured. However, this system will not provide BPA with bond quotes (i.e. prices at which a single party was willing to buy or sell however the deal didn't take place as no other party was interested to carry out the transaction at that rate). This information is important as it provides a floor or a ceiling of a specific instrument.
3. If the above-mentioned options cannot be implemented, then the last resort shall be to make it necessary for brokerage houses to provide the trading data to BPA. Further, BPA can also request quotes data from brokerage houses where actual trades have not taken place to establish the floor and ceiling for a specific security. However, data received through this mechanism will not be verifiable.
4. Another platform to obtain data is through the Primary Dealers. As per the SBP circular ref. no. DMMD Circular No. 12 dated July 03, 2012, Primary Dealers are required to quote two-way prices to the market. The circular also restricts the spread that the banks can quote on MTBs and PIBs. These quotes can be useful for securities where there is no or very little trading.

More than one system from the aforementioned options can be used to streamline the data gathering process and to remove any discrepancy in one approach.

## Pricing Mechanism

As discussed earlier, the pricing mechanism to be adopted by BPA needs to be verifiable and should also aim to protect investors from manipulation. For this, the valuations need to be based on trading data as much as possible. For this purpose, securities will need to be divided into four categories

1. **Heavily traded:** Those instruments whose average daily trading volume was greater than PKR 5B during the last week.
2. **Traded:** Instruments where average daily trading volume was greater than PKR 1B during the last calendar week.
3. **Thinly Traded:** Instruments with average daily trading volume of PKR 100M during the last calendar week.
4. **Non-Traded:** Instruments where average trading volume during the last week has been below PKR 100M.

New instruments issued during the current month will be classified as heavily traded for the month of the issue and later on as per the above-mentioned criteria. Instruments which have matured since the start of the last month will not be accounted for. The purpose of categorizing the bonds into the above four categories is to create a hierarchy in case yields of two or more bonds contradict each other in terms of providing a logical PKRV curve. For example, if the yield of two securities with similar time-to-maturity are considerably different, then the security classified as heavily traded will supersede in finalization of the yield curve.

## PKRV Curve

The major difference between the existing approach and this proposed methodology is the focus on deriving prices and yields through trading data. It is equally important to identify which trades to consider for price determination. Presently, the minimum tradeable lot is considered PKR 50M. Hence, for determining the curve, only those day trades will be considered that have a total volume (Quantity \* Price) of at least PKR 50M.

For the heavily traded securities, it is likely that the yield may change significantly during a day. The day-end yield for a security is required to be close to where it can be traded next morning and hence, the trades done towards the end of day should have greater weightage than the ones done earlier in the day. For this purpose, the following grid is proposed:

Criteria	Implication
If trades during the last hour exceed PKR 500 M	Weighted average yield of last hour trades to be considered
If trades done during the day equals to or exceeds PKR 500 M but not within the last hour	Weighted average yield of whole day's trades to be considered
If trades during the day are less than PKR 500 M but greater than PKR 250 M	Weighted average yield for trades carried out during last three working days (including the day under discussion) to be considered

If daily trade in a single security is less than PKR 250 M however, total trading volume during last five working days has equaled or exceeded PKR 250 M	Weighted average traded yield up to an amount of PKR 250 M worth of trading to be considered for PKRV determination. Trades summation shall be done going backwards from the revaluation date.
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There are other scenarios that also need addressed. These include:

**1. Trading less than PKR 250 M**

If daily trade in a single security is less than PKR 250 M and total trading volume during last five working days has also been less than PKR 250 M while quotes were provided by the Primary Dealers for the subject security as per the SBP regulation, then average of the buy-sell spread shall be taken as the yield for subject security. Securities that fail the above-mentioned trading criteria and where quotes by Primary Dealers are also not available, then these securities will be valued on the basis of interpolation. However, under this methodology, interpolation is the last option instead of first under the present system.

**2. For New Issues**

As discussed earlier, new issues will be treated as heavily traded however, the above-mentioned criteria will also apply to the recently issued securities.

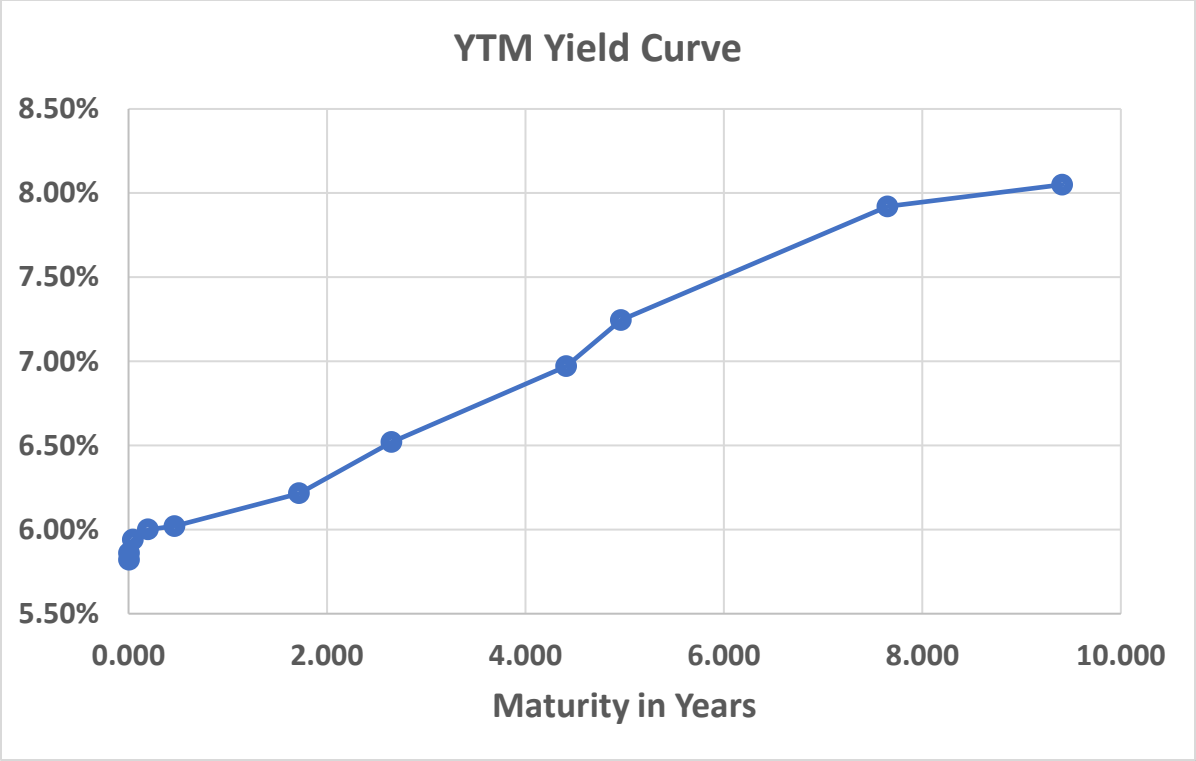
**3. Extraordinary Event**

In case of an extraordinary event like change in discount rate by SBP or some other policy changes which drastically affects the bond yields, then the impact of this event on heavily traded securities for the revaluation date will be assessed based on yields before and after the event and the difference will be added to all other securities till such time that required trading criteria post-event has been met by respective securities.

**4. Time-to-maturity greater than 10 years**

Generally, a lengthier PKRV curve reflects the strength of the bond market and the comfort that investor have, however, due to lack of stability in our economy and markets, investors rarely take a longer-term view hence, investments in tenors longer than ten years is rare except for few insurance companies. While the current PKRV curve reports yield up to 30 years, however, the trades in those maturities are few and far between and hence, it is not possible to ascertain a yield for these tenors. Presently, the only 30-year bond outstanding was issued in 2008 and has twenty years left. Hence, there will be no security available to determine the yield curve beyond 20-years. In order to solve this problem, one will need to search for trades in longer tenor bonds and compare those yields against a ten-year bond for the same day. That will provide an estimate of the premium charged for longer tenors along with illiquidity factor attached to these bonds. However, this method has its limitations and can only be solved once more longer tenor bonds get issued in the market.

The above criteria for bond valuations aims to be thorough and in line with global best-practices observed in the market. The yield curve generated by this data won't have focal points i.e. 3 Months, 6 Months, 12 Months, two years, etc. Instead, this PKRV curve will have points based on time-to-maturity of outstanding securities. However, data points for specific calendar tenors can be obtained through interpolation. The difference here is that this interpolation won't affect the bond pricing. A sample PKRV curve based on this methodology will look somewhat like the diagram below:



## Conclusion

This paper discusses current issues in the bond valuation methodology and proposes suggestions in view of feedback received from market participants along with introduction of global best practices. As discussed in the paper, there is no formal pricing methodology in place at present and it is left to the discretion of brokerage houses and FMA to provide a reliable PKRV curve and other bond prices for fair valuation.

The Following table compares fair valuation with current pricing methodology in terms of its features.

Interbank Brokerage House	BPA's Pricing Methodology
<ul style="list-style-type: none"> <li>• Yield Curve based pricing</li> <li>• Made through interpolation</li> <li>• May not be a true representation of actual yield for all tenors</li> <li>• The procedure is not transparent</li> <li>• Conflict of Interest</li> <li>• Arbitrary and inconsistent</li> </ul>	<ul style="list-style-type: none"> <li>• Provides quotes for all bonds irrespective of market conditions</li> <li>• Totally independent with no risk of biasness</li> <li>• Availability of pricing specialists to address client's queries / feedback</li> <li>• Economic Incentive</li> <li>• Specialized skills</li> <li>• Strictly Independent</li> </ul>

Investors show lack of confidence in the present mechanism reflected through lack of trading activities by smaller market players. To improve trading and investor confidence, the following recommendations have been detailed in this paper:

1. Introduction of a bond pricing framework whereby the exercise is carried out by an independent authority, a Bond Pricing Agency.
2. Strict regulations to supervise the operations of the Bond Pricing Agency.
3. Clear guidelines on bond pricing methodology from the regulators in line with best market practices.
4. Continuous development and revision of the framework and methodology to keep it investor friendly.