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EFFECT OF MACROECONOMIC NEWS RELEASES ON BOND YIELDS IN INDIA CHINA AND JAPAN

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Abstract

This paper studies the effect of domestic macroeconomic news releases on the change in the bond yields of India, China and Japan. We apply event study method to observe whether the large set of new information or surprise news is reflected immediately in bond yields. The daily yields of Government Bond with different maturity are regressed over the surprise factors. The bond yields are observed to react differently to the surprise factor of different indicators. Indian bond yield respond much more actively than bonds in China and Japan. Bonds of all the countries respond to the change in US government bonds, while Japan's response is more than China , India's response is the weakest. Testing for the existence of the weak form of market efficiency reveals that it holds for longer term bond markets in India and in Japan, but for China it holds for both short and long term bond market.

Keywords: *Bond yield, Macroeconomic news, Event study, Market efficiency*
JEL Codes*: E43, G12,G140*

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INTRODUCTION

To what extent does new unexpected information of macroeconomic news and policy announcements influence bond yields? This is a question that has been probed since the 1960s in the developed economies by Ball and Brown (1968), Fama, Fisher, Jensen and Roll (1969) who confirm that the macro news releases have a significant impact on the volatility of bond prices, although these effects may vary across different countries and for different announcements. The direction and magnitude of the reaction is diverse and can depend on the uncertainty in the market environment. Other studies find that there exists spill-over effect of these announcements into the international market. The response of bond prices to announcement of macroeconomic events or activity has significant implications. On the one hand from the policy view point, it is important to comprehend the size and direction of the response to monetary and fiscal policy news release. In the 1970s and 1980s Cornell (1983), Grossman (1981) found that the US interest rate changes with news of change in money supply announcements. Investors can anticipate bond prices if they are aware of the degree of volatility to macroeconomic news. On the other hand traders revise their trading position in response to a range of information that arrives periodically. Most literature is US centric and developed economies which are not astonishing because the US bond market is mature with both depth and width. There is however a dearth of studies on emerging markets and more so for India, since it had a nascent bond market until the end of the 20 century. The purpose of this paper is to contribute to this strand given the growing significance of the Asian markets. We examine the extent to which bond yields respond to surprise news in India, China and Japan.

The behaviour of agents trading in the financial market is influenced by the unanticipated news, consequently impacting the bond prices and yields. In an efficient market a rational investor would always make rational expectations about future rates and return. The irrational

investors often over-react to new information leading to the price fluctuations. Fresh information changes the investors' sentiments expectations. Therefore if there is a correlation between the various investors' decisions the prices vary substantially Announcements provide the market traders an insight into the economic fundamentals and thus help in building expectations about the central bank's future monetary policy or fiscal policy. Even in an efficient market unanticipated news releases influence bond price and yields. But noise traders cannot be eliminated from the market so they do lead to market inefficiency. In this paper we study the extent to which the bond markets of the three Asian countries are efficient in the weak form.

Economic statistics released by newspapers, news channels and international news agencies are published annually, quarterly, monthly or weekly. They provide information about the current state of the economy and future prospects through consensus forecasts by professional analysts. Public information concerns all economic fields, central banks policies, household sentiments, corporate profits, etc. These figures and forecasts play a key role for financial analysts and traders. It enables them to decide their trading positions in the market. The fluctuation in bond prices reflects the fact that traders revise their positions in response to the arrival of new information in the market such that a flow of orders cause a sudden adjustment. Agents do not automatically react to the macroeconomic figures itself, but more frequently to the distance that separates it from its forecast, i.e., to the surprise corresponding to the unanticipated component of news releases Ederington and Lee(1997) Balduzzi, Elton and Green (2001). This explains why investors are willing to spend considerable resources in macroeconomic forecasting services to improve their decision-making process.

Ederington and Lee(1997), Harvey and Huang (1993) explored the effect of the Federal Reserves' monetary policy announcements and macroeconomic news releases on interest rates and exchange rate.

Jones, C.M., Lamont, O. and Lumsdaine, R.L., (1998) and Fleming and Remolona (1999) found that Treasury Bond prices responded to employment data and the producers price index. Altavilla, C., Giannone, D., and Modugno, M. (2013) and Liebermann (2011) examined the volatility of bond yields to macroeconomics news. Their work is particularly significant as they cover the ongoing global financial crisis (GFC).

The studies differ with regard to the type of bond, their maturity as well as the data frequency varying from 5 minute intervals to intraday to daily as the spectrum of data announcements has expanded. Macroeconomic indicators include not only monetary policy, fiscal policy, employment and producers price index (PPI) but trade data of exports, exchange rate Advance Retail Sales, Change in Non-farm Payrolls, Initial Jobless Claims, Trade Balance, PPI Ex Food, GDP etc.

However, most literature focuses on the US bond market because of its maturity, depth and width. Interest in the emerging economies is few and far between. Andritzky, Bannister, and Tamirisa(2005) study on emerging bond markets' reaction to macroeconomic announcements find that global bond spreads respond to rating actions and changes in global interest rates rather than domestic data and policy announcements.

In our study we explore the issue of bond yield response to macroeconomic news surprise by examining the volatility of bond prices to surprise macroeconomic news and policy announcements in three large Asian economies; India, China and Japan. While selection of India and China is fairly obvious being the two largest emerging economies in Asia, Japan as an OECD country is selected to act as a benchmark being one of the most highly developed economies in Asia.

The surprise elements are identified in news release macroeconomic indicators that have major impact in the bond market. We examine the extent to which it impacts bond returns across the three Asian countries with reference to bonds of different maturities; namely 1 year, 5 years and 10 years bonds. The surprise effect or the unanticipated news is computed by assessing the forecasted values and announced values such that the divergence between existing expectation and the revised one is factored (El Ouadghiri2014).The surprise components of the announcements are then measured to check rationality by testing for unbiasedness and the event study method is applied to estimate the response of the bond market.

Our empirical exercise shows that the bond market in India is much more responsive to the surprise news releases than that of Japan and China. In line with existing literature we find that the longer term yields respond more than medium and short term bonds for all the three countries in our sample. The weak form of market efficiency is run for all the three countries. While the weak form of efficiency does not hold for short term bonds in India and Japan but for long term ones. For China we find it does not hold for the medium term but holds for both short and long term maturities.

In this study while we examine whether economic news releases have any significant effect on the bond yields of three Asian economies India, China and Japan? We also explore if bonds of different maturity respond differently to the news releases?

There is a need to understand which type of news release pertaining to macroeconomic indicators has the maximum impact on the bond market? Finally we intend to find out if the news of changes in US yields influence the bond markets of the three selected Asian countries?

In light of these broad based queries it is obvious to test for efficiency. Therefore in our paper we test for the existence of the weak form of efficient market in the Indian, Chinese and Japanese Bond markets?

Introduction in section one is followed by discussion and review of current thought as well as the research strategy in section two. The empirical analysis and the findings are reported in section three wherein the concept of surprise factor and the event study model is covered along with the results of the test for the weak form of market efficiency. Finally the conclusion and further scope for study is in section four.

Literature Survey

There is extensive literature on the impact of macroeconomic news releases on bond prices. These studies differ by the surprise in macroeconomic announcements, the financial instrument and frequency of the data. Therefore the findings about which news component moves the market and its relative importance can be different and conflicting.

Some of the earlier studies used daily data; Berkman (1978) had shown a significant effect of money supply announcement for a period ranging from late 1960s to mid-1970s. Urich and Wachtel (1984) and Sirlock (1986) explored the impact of announcements relating to the PPI, CPI and unemployment rate in their analysis. Balduzzi, Elton, and Green (1997), Fleming and Remolona (1997) Fleming and Remolona (1999) use intra-day data of economic news released on the U.S. Treasury bond market, thus concentrating at high-frequency impact. They examine five minute price change for 5-year Treasury note from 1993 to 1994 and find that each of the trading surge and largest price change over this period was preceded by macroeconomic releases. Fleming and Remolona (1999) observe a hump-shaped effect of the impact of news releases on the yield curve between 1991 and 1995. However, news effect is stronger for higher maturities than shorter maturities bonds. These studies with intra-

day data in general conclude that interest rates are influenced by many releases, but most significantly by employment data. The surprise components of the announcements and the effect of market condition on market behaviour were checked to assess if the reactions are rational.

Ederington and Lee (1993) show that the various scheduled macroeconomic news releases significantly affected the volatility of Treasury bond, Eurodollar and Deutsche Mark future market using intraday day. Using daily return for 5, 10 and 30 year Treasury Bonds Jones, Lamount and Lumsdaine (1998) studied the impact of announcements about the Producer Price Index (PPI) and employment on the U.S. Treasury bond prices. Focusing on the degree of persistence of bond price volatility, they found volatility spike on the day of announcement to fade away. A high volatility in prices on the announcement day as compared to the non-announcement days implied spill over to the consecutive days.

Balduzzi, Elton and Green (2001) study of the U.S. Treasury market, used three-month bill, a two-year note, a 10-year note and a 30-year bond. They found that the 17 out of 26 news releases collected over 5 year period had a significant effect on at least one of the instrument but the extent of the effect was not uniform across different maturity.

Liebermann (2011) and Altavilla, Giannone and Modugno (2013)Ouadghiri, Mignon, and Boitout (2014) have all included the GFC phase in their sample it is perhaps astonishing that their results are consistent with that of other authors.

Liebermann's (2011) examines the daily response of T-bonds yields to macroeconomic news during January 1997 to September 2010. With daily data for 2, 5, 7, and 10 year yields of U.S. government Treasuries bonds and news from Bloomberg show that only unanticipated revisions or surprise news releases moves market. The expected values of the indicators were calculated by the median of forecasted value by

market participants up till the day of actual news release. Forecast error (the surprise) is defined as the difference between actual and survey based release. The value of R^2 gives the ability of market participants to forecast these values. The unbiasedness of expectations is checked through the application of the Wald test whereas the standard time-series is used to estimate the daily response of bond yield.

The change in yield of bond of each maturity is regressed on the unexpected component of indicators. Fed funds rate changes are controlled by including market-based monetary policy shocks. The standardized surprises are used as units of measurement differ across macroeconomic variables. A set of 12 news releases are observed to be significant across all maturities such as jobless claims, total non-farm payrolls and earnings, retails sales, capacity utilization, existing home sales and core CPI. As anticipated his detailed study provides evidence that different news releases affect different maturity bond yields differently.

A multi-country study by Ouadghiri, Mignon, and Boitout (2014) also show that economic activities and inflation indicators are main bond market movers; short maturity bonds are slightly less sensitive to macroeconomic news releases than longer maturity bonds; and bond markets are more sensitive to bad news than good news releases. 2-year and 10-year bonds are used for comparison over different horizons. 5 countries – United States, the United Kingdom, China, Germany and Japan were included to assess news announcements on bond yield. They utilize high frequency intra-day data with small windows of 15 minutes before to 15 minutes after the announcements (from 5 minutes before to 15 minutes after release for U.K. and China) on the normalized surprise component of the macroeconomic news releases, to find Chinese bond prices are largely unaffected by news surprises, as opposed to the significant response of US, German and Japanese bond yield to surprise news releases.

Altavilla, Giannone and Modugno (2013) covering1996 – 2012 includes the GFC. Data for macroeconomic releases is obtained from the Economic Calendars (ECO) by Bloomberg. A news index summarizing the fluctuations in bond returns is constructed for different holding period and different maturities using the surprise components of large set of macroeconomic data releases monitored by market participants. The maturity periods are 3, 60 and 120 months. The wide range of news impact the entire term structure, while the short-end of yield curve is affected by Building Permits, change in Nonfarm Payrolls, core PCE, Federal Open Market Committee (FOMC) Decision announcement of the Federal Reserve key interest rate, Initial Jobless Claims, GDP Deflator. The long-end of yield curve is affected by Employment, Advance Retail Sales, Change in Non-farm Payrolls, Initial Jobless Claims, Trade Balance, PPI Ex Food, GDP (advance release) etc.

They find that the bond markets reacts more to the macroeconomic news releases after the crisis. One of the explanations of this can be that non-macroeconomic driven effects are temporary in nature while macro driven effects persist over the years. It can also be that news releases have become more frequent or the sensitivity of market to this news has increased. The R^2 values for different holding period in the two samples- before and after crisis are investigated and they find that the macroeconomic data release has a robust and significant explanatory power for bond returns which monotonically increases with the holding period, ranging from 10 percent (with daily holding period) up to 40 percent (with 1-year holding period). In this paper we test whether similar results are obtained from the sample of countries, although we specifically focus in the post crisis period.

Andritzky, Bannister, and Tamirisa (2005) study on emerging bond markets reaction to macroeconomic announcements find that global bond spreads respond to rating actions and changes in global interest rates rather than domestic data and policy announcements. Data and

policy announcements reduce uncertainty and stabilize the trading environment, while rating actions cause greater volatility. Their sample covers 12 emerging market economies across diverse geographic location; Brazil, Chile, China, Colombia, Korea, Malaysia, Mexico, Poland, South Africa, Thailand, Turkey, and Venezuela.

To our knowledge there are no studies on the Indian bond market highlighting the bond prices response to surprise macroeconomics news. Most researches in this field are on U.S. Treasury bonds that found significant price movements of Treasury bonds before the adjustments in volume implying that the price volatility is mainly driven by the public information. In a nut shell the type of news, the type of the fixed income security the trading behaviour in the market as well as the data frequency contributes to the volatility of the bond market.
In the next section we discuss the empirical analysis.

EMPIRICAL ANALYSIS

Database and Methodology

We collected data for yield of bonds with different maturity – India, China and Japan and the macroeconomic news releases. The data for macroeconomic news announcement is collected from economic calendar of each country given by official site of the Financial Times (FT). The economic calendar gives the exact time and date of macroeconomic releases. The name, description and unit of the variable whose value being released and the prior, market and actual values of the indicator at the time of release. The market value represents the median forecasted value given by the consensus of market participants. It also gives values of indicator under head "4cast" which are forecasts made by analysts of the forecasting and analytics firm "4cast" and can be used as a proxy of market value. Different sets of economic indicators are used with monthly and quarterly frequencies- 10 indicators for Indian Bond Market, 12 for Chinese Bond Market and 18 for Japanese Bond Market. For every country, the domestically released macroeconomic indicators are used.

The daily bond yield data for 1-year, 5-year and 10-year maturity is collected from Investing.com[1]. The period of study is from October 2011 to February 2014. The selection of the period of study was constrained by data availability. However, the objective was to observe a period beyond the subprime crisis and exclude the GFC. The list of the economic indicator of each news release is reported in Table 1.

Table 1: List of Economic Indicators

	INDIA	CHINA	JAPAN
1	PMI Manufacturing	PMI Manufacturing Index	Tankan
2	Exports	Exports	Real Household Spending
3	Imports	Imports	Unemployment
4	Trade Balance	Trade Balance	CPI Core (Tokyo)
5	GDP	CPI	Retail Sales y/y
6	WPI	PPI	CSPI
7	Industrial Production	Money Supply M2	All Industry activity index
8	CRR	New Yuan Loans	Customs Cleared Trade
9	Repo Rate	Industrial Production	Industrial Production (Prelim.) m/m
10	Reverse Repo Rate	Real GDP	CGPI
11	Retail Sales		M2 Money Supply
12	Urban Fixed Asset Investment		GDP (Prelim.) q/q ann
13			GDP (Final) q/q ann
14			Capital Spending
15			Leading indicator (Prelim.)
16			Bank Lending Data
17			Current Account
18			Key Machinery Orders m/m

Note: CSPI is Corporate Service Price Index for Japan.
CGPI is Corporate Goods Price Index which is Japan's version of PPI released by Bank of Japan.

1 Investing.com is a global financial portal where news, analysis, streaming quotes and charts, technical data and financial tools about the global financial markets.

Tankan is issued by the central Bank of Japan. It is an economic survey of Japanese business covering thousands of Japanese companies with a specified minimum amount of capital, although firms deemed sufficiently influential may also be included. This survey is also used to formulate monetary policy, wherein the companies are asked about current trends and conditions in the business place, their respective industries and their expected business activities for the next quarter and year.

This kind of study is dependent on how efficient a market is to absorb any new information release in the market, considering a small time interval before and after announcement of the news. Intraday price changes give a clearer measure of the reaction of market rates to news release as this should be the only news hitting markets in the time interval considered. Daily price changes are the sum of the intra-day prices changes. On any given day, many news items hit markets, some of which are noise or not relevant, possibly yielding an instantaneous market reaction but having no lasting effect. For example, if there is an economic report released on day *t* during a given time interval, one could expect markets to react to it. But, once markets have properly assessed its information content, they may move back to their initial level if the information is redundant or too noisy. From a macroeconomic and policymaker perspective one should not be concerned about these effects which disappear after a few minutes. However, if information contained in the releases of these reports is considered to be new and fundamental for assessing economic conditions and the future stance of monetary policy, then the impact should still be significant at the daily frequency.

The daily movement of the bond yield of the three different maturities across the three countries in our study are reported in Charts 1, 2 and 3 below. The graphs for each country reflect the degree of riskiness as we see that all the Indian bonds hover between 7percent and 10 percent and Chinese bonds oscillate between 2percent and 4 percent.

The Japanese bond yields are all below 1 percent. Being a highly developed economy their bonds yields are much below the others. Later it will be observed that it the Japanese bonds are more sensitive to the US yield rates clearly indicating its affinity to the American bond market as an OECD member.

Chart 1A: Yield Trend for 1 Year Bonds

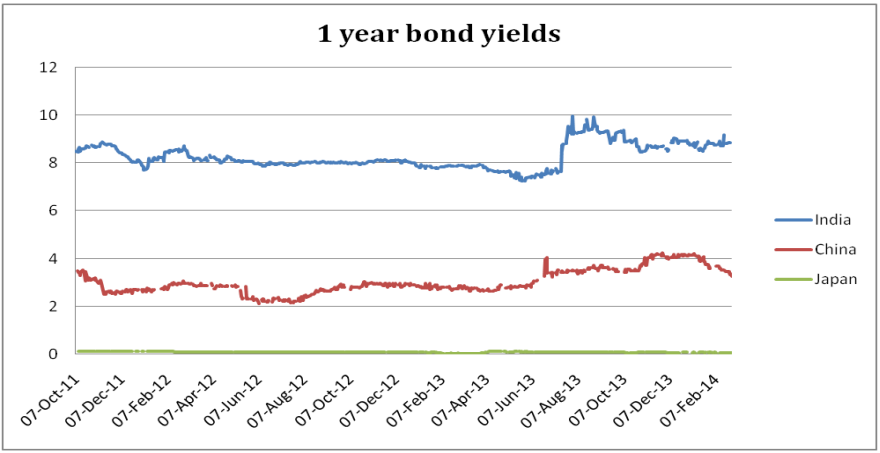


Chart 1B: Yield Trend for 5 Year Bonds

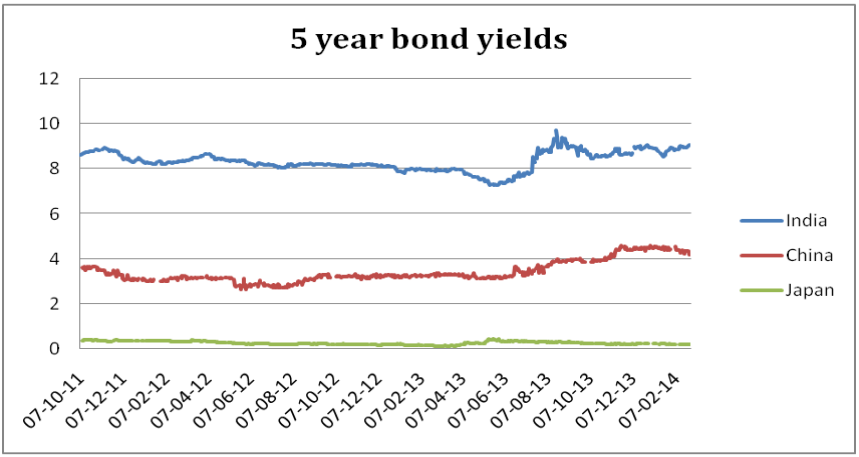
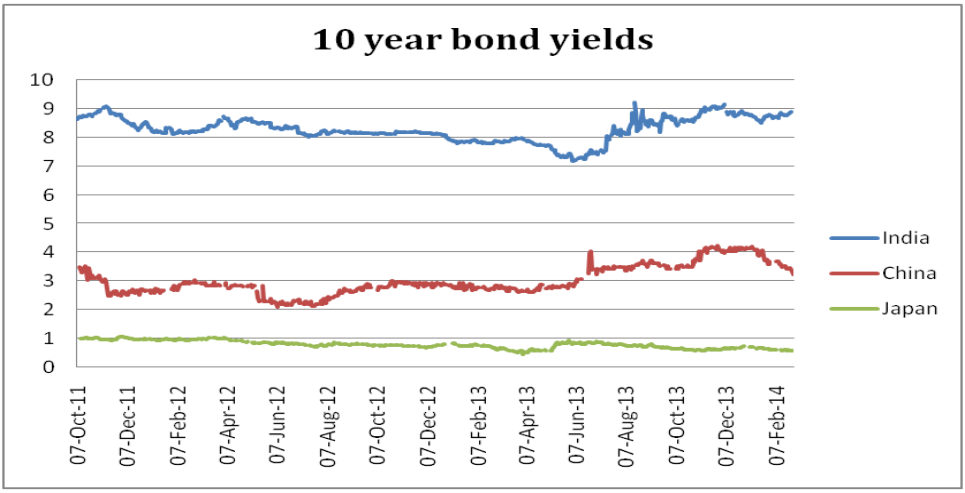


Chart 1C: Yield Trend for 10 Year Bonds



Testing Unbiasedness of Macroeconomic News Releases

The predictive power of the market-based expectations for the announced series is measured by estimating the regression equation (1)

$$Ait = \alpha + \beta Fit + \eta i \quad (1)$$

Where A_{it} is the actual released value of the macroeconomic indicator, i at time *t* and F_{it} is the forecasted value of the macroeconomic indicator, i at time *t*.

For expectation to be unbiased, the actual released values of macroeconomic variables (A_{it}) are entirely explained by its forecasted value (F_{it}) so that the slope term, **a** must be 1 and the intercept term, β must be 0. The unbiasedness of expectations is tested by the joint hypothesis H_0: $\alpha=0, \beta = 1$ in the above regression equations using Wald test. The daily data of bond yields' with maturities 1-year, 5-year and 10-year is used for the analysis. The results of the regression and Wald test are reported in Table A1 for India, Table A2 for China and Table A3 for Japan.

In India, for most of the indicators the test is observed to be true, i.e., expectations are not biased at 5 percent level of significance. On the other hand, for China the expectations formed for 4 out of 12 indicators are observed to be biased and it is 4 out of 18 for Japan. According to the Least squares (LS) estimates of equation (1), the expectations are statistically significant at the 5 percent level for most of the indicators for all the three countries, India, China and Japan indicating that they do contain information about the announcements. However, there is a large spread in the ability of market participants to forecasts these variables, as seen by the R^2 values which range from 20.90 percent to as high as 91.29 percent for India and from 0.33 percent to 99.39 percent for China, the spread being wider for China. The spread is higher for China indicating that Indian market has better predictive power. For Japan the adjusted R^2 values range from 5.46 percent to 98.64 percent, thus Japan has better predictive power than China but not India.

Computing the Surprise Factor

The surprise component of the news release is defined as Ait – Fit, where Ai and Fi are the announced and forecasted values of the indicator as per Ouadghiri, Mignon, and Boitout (2014). This surprise component is normalized by dividing by the standard deviation, σ_i of the difference Ai-Fi; $\mathbf{S_{it} = (Ait - Fit)/ \sigma_i}$. σi is the standard deviation of the difference between announced and forecasted values for the indicator i over the entire sample period. Thus S_i is the measure of the unexpected component of the released information, i.e., the surprise.

Event Study Model 1

In model 1 the daily changes in yields at different maturities(h) is regressed on the surprise component of the news releases to measure the responsiveness of changes in yields to macroeconomic announcements using the regression equation as per Liebermann's (2011).

$$\Delta Yh,t = \alpha i,h + i = 1K\sum\beta i,hXi,t + \gamma \Delta Yh,t-i + \xi h,t \qquad (2)$$

The equation (2) indicates that it is not only the macroeconomic news releases that brings out the fluctuations in the bond yields but current changes in bond yields may also be dependent on the previous changes in the bond yields. As we are using a time series data there is likelihood of stationarity and hence we test for stationarity using Augmented Dickey Fuller test. We take the first difference for the data to overcome stationarity issue (see Appendix Chart A1 to A3).

- $\Delta Y_{h,t}$ is the day *t* change in the h-year yield,
- $X_{i,t}$ measures the unexpected component of indicator i at time *t*,
- $\beta_{i,h}$ is the response of the h-year yield to that news, and K is the number of variables belonging released at the same or different time.
- $\Delta Y_{h,t-i}$ is the optimal lags that should be included. The error term, $\xi_{h,t}$, accounts for all other factors affecting the yield on that day.

The vector for each $X_{i,t}$ is adjusted by inserting zeros whenever any $X_{i's,t}$ is not released on a release day of other indicators. The measure of the response, in basis points, of the h-year yield to a one unit standard deviation in news i is given by $\beta_{i,h}$. The coefficients along with their p-values are reported below in Table 2, Table 3 and Table 4 for India, China and Japan respectively.

Table 2: Reaction of Bond Yields to Macroeconomic News Releases: India

Indicators	1 year		5 year		10 year	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Lag (t_{-1})	-.2826***	0.000	.0573	0.519	.0928	0.264
Lag (t_{-2})	.0436	0.440	-.1127	0.117	-.0553	0.501
Lag (t_{-3})	-.0476	0.378	-.0969*	0.097	-.1819***	0.006
PMI Manufacturing	-.0404***	0.008	-.0136**	0.034	-.0318**	0.022
Trade Balance	-.0018	0.619	-.0165***	0.000	-.0161***	0.000
Imports	.0057	0.435	-.0006	0.945	.0045	0.638
Exports	-.0314***	0.000	.0102	0.378	.0051	0.607
GDP	.0342***	0.009	.0265*	0.053	.0409***	0.002
WPI	.0336***	0.005	.0295***	0.002	.0231**	0.021
Industrial Production	.0310	0.190	.0049	0.523	.0096	0.291
RBI - Cash Reserve Ratio	.0125***	0.004	-.0141***	0.007	-.0352***	0.000
RBI - Repo Rate	-.0289**	0.039	.0637**	0.041	.1008***	0.003
RBI - Reverse Repo Rate	.0767***	0.000	.0236***	0.000	-.0039	0.409
Constant	.0014	0.703	.0005	0.833	.0004	0.877

Note: The significance of coefficients at 1 percent and 5 percent are denoted by (*) and (**) respectively.

Table 3: Reaction of Bond Yields to Macroeconomic News Releases: China

Indicators	1 year		5 year		10 year	
	Coeffici-ent	p-value	Coeffici-ent	p-value	Coeffici-ent	p-value
Lag (t_{-1})	-.3521***	0.000	-.6921***	0.000	-.4239***	0.000
Lag (t_{-2})	-.0875	0.221	-.4620**	0.018	-.1848***	0.002
Lag (t_{-3})	-.0815	0.394	-.2233	0.157	-.1869***	0.000
PMI Manufacturing	.0160	0.165	.0271	0.161	.0184**	0.040
Exports	.0525	0.126	-.0189	0.672	.0023	0.928
Imports	-.0370	0.292	.0137	0.721	.0012	0.953
Trade Balance	-.0650	0.187	.0290	0.593	.0135	0.671
CPI	.0021	0.906	.0058	0.505	.0066	0.439
PPI	-.0135	0.246	.0151	0.148	-.0079	0.174
Money Supply, M2	.0123	0.628	.0099	0.732	.0019	0.900
New Yuan Loans	-.0093	0.719	-.0078	0.798	-.0129	0.457
Industrial Production	-.0061	0.602	.0154**	0.012	.0049	0.678
Real GDP	.0039	0.756	-.0145*	0.057	-.0181	0.145
Retail Sales	.0008	0.953	-.0307**	0.019	-.0052	0.665
Urban Fixed Asset Investment	.0049	0.645	-.0317***	0.001	-.0158	0.153
Constant	-.0006	0.861	.0028	0.680	.0015	0.478

Note: The significance of coefficients at 1 percent , 5 percent and 10 percent are denoted by (***) , (**) and (*) respectively.

Table 4: Reaction of Bond Yields to Macroeconomic News Releases: Japan

Indicators	1 year		5 year		10 year	
	Coefficien	p-value	Coefficien	p-value	Coefficien	p-value
Lag (t_{-1})	-.0732	0.202	.0788	0.398	.0238	0.565
Lag (t_{-2})	.1078	0.295	-.0181	0.808	-.0438	0.530
Lag (t_{-3})	.1392	0.035	-.0741	0.336	-.0257	0.693
Tankan	-.0005	0.328	-.0048	0.194	-.0096	0.137
Real Household Spending	.0005	0.285	.0028	0.113	-.0077	0.221
Unemployment	.0008**	0.042	.0038	0.202	.0094	0.200
CPI Core (Tokyo)	-.0004	0.473	-.0031*	0.050	-.0179	0.231
Retail Sales y/y	.0002	0.506	.0003	0.847	-.0093	0.286
CSPI	-.0002	0.440	-.0018	0.146	-.0001	0.973
All Industry activity index	-.0004	0.403	.0005	0.829	-.0092***	0.001
Customs Cleared Trade	-.0001	0.900	.0006	0.705	-.0036	0.264
Industrial Production (Prelim.) m/m	-.0006*	0.088	-.0032**	0.012	-.0178	0.152
CGPI	-.0002	0.294	.0006	0.760	.0008	0.707
M2 Money Supply	.0005	0.246	.0026	0.404	-.0003	0.930
GDP (Prelim.) q/q ann	.0004***	0.000	-.0003	0.471	-.0009	0.307
GDP (Final) q/q ann	-.0002	0.775	-.0003	0.901	.0023	0.487
Capital Spending	-.0003	0.446	-.0033	0.197	.0004	0.864
Leading indicato (Prelim.)	.0005	0.812	-.0015***	0.002	-.0042	0.190
Bank Lending Data	-.0007	0.261	-.0003	0.841	-.0008	0.644
Current Account	.0001	0.821	.0019	0.185	.0040	0.113
Key Machinery Orders y/y	.0001	0.748	-.0033**	0.031	.0011	0.532
Constant	-.0001	0.673	-.0003	0.500	-.0014	0.180

Note: The significance of coefficients at 1 percent , 5 percent and 10 percent are denoted by(***), (**) and (*) respectively.

As hypothesized the bond yields do respond to macroeconomic news of GDP for all the three countries. Indian bond yields for short,

medium and long term respond to GDP while only the Japanese 1 year bond yields respond to it. Surprisingly even though China is an export driven economy none of the trade data of exports, imports and trade balance influence the bond yields. In a highly government controlled economy like China this result is not unexpected and corroborates with that of Ouadghiri, Mignon, and Boitout (2014).

Monetary policy data announcements influence Indian bond yield across all maturities but not at all for China or Japan. A plausible rationale for the insensitivity of Chinese Bond market yields to surprise news release is the high degree of government control in the country so that the flexibility of a market oriented bond market is not observed. A similar explanation is also perhaps valid for Japan despite being an OECD country and a member of the G7 group.

Model 2

In this model we estimate the effect of change in US yields on the bond markets of the respective countries. The daily changes in yields at different maturities(h) is regressed on the available surprise component of the news releases and the daily changes in the lagged US yields of the same maturity to measure the responsiveness of changes in yields to macroeconomic announcements in equation(3)

$$\Delta Y_{h,t} = \alpha_{ih} + \Sigma_{i=1}^{k} + \Sigma_{i=1}^{3}\beta_{i,h}X + \Sigma_{i=1}^{3}\lambda\Delta Y_{US\,h,t-i} + \gamma\Delta Y_{h,t-1} + \xi_{h,t} \quad (3)$$

- $\Delta Yus_{h,t-i}$ is the daily changes US yields with maturity h and at time t-i
- All other variables are defined as in model 1.

We do not include the daily change in US yield at time '*t*' because the time zone of all the three Asian countries under study is ahead of US such that the market on day '*t*' in US opens after the day 't' market in these countries have been closed. The equation indicates that it is not only the macroeconomic news releases that brings out the fluctuations in the bond yields but lagged changes in own country's bond yields and

lagged changes in US bond yields may also move the daily bond yields. The data is tested for presence of unit root using Augmented Dickey Fuller test and the first difference is taken to overcome stationarity issue.

Table 5: Response Bond of Yields to Macroeconomic News Releases and Same Maturity U.S. Bond Yields: India

Indicators	**1 year**		**5 year**		**10 year**	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Lag (t_{-1})	-.2854***	0.000	.0536	0.546	.0887	0.285
Lag (t_{-2})	.0421	0.454	-.1069	0.137	-.0437	0.593
Lag (t_{-3})	-.0405	0.458	-.0944	0.104	-.1867***	0.005
PMI Manufacturing	-.0386*	0.050	-.0092	0.255	-.0318**	0.034
Trade Balance	-.0038	0.359	-.0164***	0.000	-.0167***	0.000
Imports	.0062	0.468	-.0034	0.739	.0024	0.824
Exports	-.0317***	0.002	.0093	0.432	.0047	0.658
GDP	.0346**	0.011	.0270**	0.053	.0399***	0.001
WPI	.0350***	0.004	.0285***	0.002	.0221**	0.019
Industrial Production	.0301	0.203	.0052	0.490	.0126	0.238
RBI - Cash Reserve Ratio	.0107***	0.005	-.0136**	0.012	-.0352***	0.000
RBI - Repo Rate	-.0236	0.134	.0650**	0.045	.1058***	0.001
RBI - Reverse Repo Rate	.0735***	0.000	.0235***	0.001	-.0081	0.172
ΔU.S. bond yield (t_{-1})	.4389	0.688	.0545	0.285	.1269**	0.036
ΔU.S. bond yield (t_{-2})	.1048	0.871	.0540	0.274	-.0056	0.924
ΔU.S. bond yield (t_{-3})	-1.0398	0.244	-.0145	0.818	-.0330	0.593
Constant	.0013	0.728	.0005	0.848	.0004	0.879

Note: The significance of coefficients at 1 percent , 5 percent and 10 percent are denoted by(***), (**) and (*) respectively.

Table 6: Response Bond Yields to Macroeconomic News Releases and Same Maturity U.S. Bond Yields: China

Indicators	1 year		5 year		10 year	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Lag (t_{-1})	-.3453***	0.000	-.6969***	0.000	-.4575***	0.000
Lag (t_{-2})	-.0885	0.207	-.4670**	0.018	-.2000***	0.001
Lag (t_{-3})	-.0756	0.425	-.2293	0.156	-.1994***	0.000
PMI Manufacturing	.0142	0.234	.0240	0.179	.0197**	0.018
Exports	.0560*	0.078	-.0240	0.644	-.0191	0.421
Imports	-.0378	0.230	.0168	0.712	.0179	0.319
Trade Balance	-.0664	0.140	.0355	0.570	.0425	0.151
CPI	.0081	0.655	.0025	0.799	.0014	0.877
PPI	-.0084	0.503	.0119	0.243	-.0076	0.188
Money Supply, M2	-.0066	0.783	-.0004	0.989	-.0050	0.731
New Yuan Loans	-.0039	0.886	-.0018	0.957	-.0031	0.859
Industrial Production	-.0070	0.516	.0167***	0.002	.0046	0.695
Real GDP	-.0002	0.986	-.0083	0.242	-.0142	0.264
Retail Sales	.0010	0.942	-.0277**	0.010	-.0072	0.523
Urban Fixed Asset Investment	.0054	0.598	-.0336***	0.000	-.0194*	0.070
ΔU.S. bond yield (t_{-1})	-.2691	0.771	.1535	0.155	-.0127	0.793
ΔU.S. bond yield (t_{-2})	.9867	0.129	.2806**	0.010	.1463***	0.002
ΔU.S. bond yield (t_{-3})	-.5970	0.266	.1210	0.212	.0132	0.766
Constant	-.0004	0.902	.0026	0.708	.0014	0.522

Note: The significance of coefficients at 1 percent , 5 percent and 10 percent are denoted by(***), (**) and (*) respectively.

Table 7: Response of Bond Yields to Macroeconomic News Releases and Same Maturity U.S. Bond Yields: Japan

Indicators	1 year		5 year		10 year	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Lag (t_{-1})	-.0793	0.180	.0452	0.650	-.0505	0.539
Lag (t_{-2})	.1225	0.219	-.0219	0.781	-.0528	0.424
Lag (t_{-3})	.1156	0.110	-.0799	0.327	-.0688	0.349
Tankan	-.0012	0.162	-.0038	0.332	-.0078	0.181
Real Household Spending	.0005	0.285	.0028*	0.078	-.0010	0.790
Unemployment	.0009**	0.042	.0038	0.162	.0074	0.122
CPI Core (Tokyo)	-.0002	0.678	-.0035**	0.041	-.0021	0.712
Retail Sales y/y	.0002	0.499	.0003	0.810	.0014	0.593
CSPI	-.0003	0.305	-.0027**	0.033	-.0002	0.919
All Industry activity index	-.0005	0.315	.0005	0.826	-.0099***	0.003
Customs Cleared Trade	-.0001	0.779	.0014	0.212	-.0007	0.651
Industrial Production (Prelim.) m/m	-.0006	0.105	-.0026**	0.041	-.0098**	0.033
CGPI	-.0003	0.261	.0009	0.656	-.0011	0.618
M2 Money Supply	.0006	0.238	.0022	0.492	.0013	0.714
GDP (Prelim.) q/q ann	.0004***	0.000	-.0003	0.543	-.0010*	0.059
GDP (Final) q/q ann	-.0004	0.473	-.0001	0.977	.0017	0.593
Capital Spending	-.0003	0.559	-.0031	0.293	.0003	0.943
Leading indicator (Prelim.)	.0001	0.929	-.0013***	0.007	-.0051**	0.044
Bank Lending Data	-.0006	0.326	-.0004	0.754	-.0018	0.299
Current Account	.0001	0.867	.0013	0.342	.0025	0.335
Key Machinery Orders y/y	.0002	0.731	-.0029*	0.088	.0018	0.358
ΔU.S. bond yield (t_{-1})	.0054	0.758	.0646***	0.000	.1238***	0.000
ΔU.S. bond yield (t_{-2})	-.0169	0.271	.0260**	0.034	.0465***	0.004
ΔU.S. bond yield (t_{-3})	-.0212	0.183	.0073	0.540	.0103	0.545
Constant	-.0001	0.665	-.0003	0.445	-.0009	0.221

Note: The significance of coefficients at 1 percent, 5 percent and 10 percent are denoted by(***), (**) and (*) respectively.

Of all the three Asian bond markets studied the yields in Indian bond market is most sensitive to the macroeconomic surprises on new release and also to the fluctuations in U.S. yields. This is an exploratory study as we have not factored the role of rating in the price of bonds which is another strand of research gaining popularity. We next explore the prospects of market efficiency of the bond markets of India China and Japan

Testing for weak form of market efficiency

The Efficient Market Hypothesis (EMH) requires that agents have rational expectations; that on an average the investors as a whole are correct whenever new relevant information appears, the agents update their expectations appropriately. EMH proposes that some investors may overreact and some may underreact when they receive new information. All that is required by the EMH is that investors' reactions to be random and follow a normal distribution so that the net effect on market prices cannot be reliably exploited to make an abnormal profit, especially when considering transaction costs. Fama (1970) fine-tuned the EMH proposing three common forms of the efficient-market hypothesis namely—*weak-form efficiency, semi-strong-form efficiency and strong-form efficiency*, each of which has different implications for how markets work[2].In this section we observe whether the bond markets of the three Asian countries are efficient in the weak form.

A financial asset market is considered to be efficient in the weak form if the asset prices fully reflect all available information, so none of the market participants can earn abnormal profits. The weak form of efficiency defines a market as being efficient if current prices fully reflect all information contained in past prices, which implies that past prices

2 The semi-strong form of EMH states that knowledge of current prices of assets and not only historical prices but all publicly available information will not yield consistently superior returns. The strong–form of EMH declares that not only publicly held information but all information including insider information will not permit an investor to earn superior returns.

cannot be used as a predictive tool for future asset prices movements. So a trader cannot earn abnormal returns by using only the historical prices. One of the tests for weak for of EMH is serial correlation. The random walk theory can hold if successive price changes are independent, this can be captured by computing the correlation between price in t+1 and t or between t+1 and t+2 and so on. If in fact the price changes are correlated then the weak form of EMH is violated. But this method has a potential problem; correlation coefficients are dominated by extreme values, this disadvantage is overcome by the runs test.

The runs test is a non-parametric test that is designed to examine whether or not an observed sequence is random. Runs test ignores the absolute values of the numbers in the series and observe only their sign. The test is based on the assumption that if a series of data is random, the observed number of runs in the series should be close to the expected number of the runs. A run can be defined as a sequence of consecutive price changes with the same sign in the same direction. For example, the sequence ---+0+ have four runs. Next the actual numbers of runs observed are compared with the numbers that are expected from a series of randomly generated price changes. If no significant differences exist it supports the random walk and hence the weak form of EMH.

Table 8: Runs Test: India

Ho: No serial autocorrelation among the residuals obtained by regressing bond yields on the surprise factor of news releases.			
Maturity	**1 year**	**5 year**	**10 year**
No. of observations	680	681	681
No. of Runs	275	326	313
z-value	-4.99*	-0.35	-1.35
Prob> |z|	0	0.73	0.18
Null	Rejected	Not Rejected	Not Rejected

Table 9: Runs Test: China

Ho: No serial autocorrelation among the residuals obtained by regressing bond yields on the surprise factor of news releases.			
Maturity	**1 year**	**5 year**	**10 year**
No. of observations	625	628	627
No. of Runs	301	286	310
z-value	-0.72	-2.32**	-0.35
Prob> |z|	0.47	0.02	0.72
Null	Not Rejected	Rejected	Not Rejected

Table 10: Runs Test: Japan

Ho: No serial autocorrelation among the residuals obtained by regressing bond yields on the surprise factor of news releases.			
Maturity	**1 year**	**5 year**	**10 year**
No. of observations	715	714	630
No. of Runs	396	370	310
z-value	4.19*	0.9	-0.46
Prob> |z|	0	0.37	0.64
Null	Rejected	Not Rejected	Not Rejected

Does Weak Form of Market Efficiency Hold?

The results of Run Test, the weak form of market efficiency does not hold for short term bond market but holds for longer term bond markets in India and in Japan. In case of China, the weak form of market efficiency does not hold for medium term bond market but holds for short and long term bond market. The results are reported in Tables 8, 9, 10.

Findings from Empirical Analysis

Results

Table 11A: Interpretation of Results of the Two Models Domestic And Domestic Plus US Yields

Model 1 (not including U.S. yield)	Model 2 (including U.S. yield)
11.1 India	
•7 out of 10 economic indicators have a significant impact on 1-year bond yield and 5-year bond yield, 6 indicators affect 10-year bond yield. •The monetary policy instrument announcements such as Repo Rate and Cash Reserve Ratio, and macroeconomic news WPI, PMI Manufacturing and GDP have a consistent impact over the bond yields' of different maturities. •Exports affect only 1-year bond yield. Trade Balance does not affect short-term of the bond structure but has a significant effect in longer run. •The 1-year bond yield is also determined by its immediate lag. 5-year and 10-year bond yields are affected by their 3rd lag.	•6 out of 10 economic indicators have a significant impact on 1-year bond yield, 5-year bond yield and 10-year bond yield. • The monetary policy instrument announcements such as Repo Rate and Cash Reserve Ratio, and macroeconomic news WPI and GDP have a consistent impact over the bond yields' of different maturities. •PMI Manufacturing now affects only 1-year and 10-year bond yields and not 5-year bond yield. Reserve Repo Rate now does not affect short term, i.e., 1 year bond yield. •The 5-year bond yield is now not affected by any lag. One day lagged daily changes in U.S. yield moves the 10-year bond yield.
11.2 China	
•The three different maturity bond yields are significantly dependent on their immediate lag values. 5-year bond yields are also determined by its 2nd lag while 2nd and 3rd lag both adds to the explanation of 10-year bond yields. •None of the economic indicators have any impact on 1-year bond	•There is no change in dependence of different maturity bond yields on their lag values. The longer term bond yields, i.e., 5-year and 10-year bond yield are also affected by daily changes in two days lagged U.S. yields of respective maturity bonds. •Exports now have a impact on 1-

yield. Only PMI manufacturing significantly affect the 10-year bond yield. •4 out of 12 economic indicators have impact on 5-year bond yield – Industrial Production, Real GDP, Real Sales and Urban Fixed Asset Investment. Thus the medium term yield is more sensitive to the surprise in the news.	year bond yield. And besides PMI manufacturing, Urban Fixed Asset Investment also significantly affect the 10-year bond yield. •3 out of 12 economic indicators impact on 5-year bond yield – Industrial Production, Retail Sales and Urban Fixed Asset Investment. Real GDP becomes insignificant. The medium term yields are still more sensitive to the surprise in the news.
11.3 Japan	
•3 out of 18 economic indicators have a significant impact on 1-year bond yield, 4 out of 18 on 5-year bond yield and 1 out of 18 on 10-year bond yield. Only 1-year bond yield is determined by its 3rd lag. •Unemployment, annualized GDP Prelim. and Industrial Production (Prelim.) have significant effect on 1-year bond yield. •Indicators affecting 5-year bond yields are: CPI Core (Tokyo), monthly Industrial Production (Prelim.), annualized GDP (Prelim.), Key Machinery Order and Leading Indicator (prelim.). All Industry Activity Index affect only 10-year bond yield.	•2 out of 18 economic indicators have a significant impact on 1-year bond yield, 6 out of 18 on 5-year bond yield and 4 out of 18 on 10-year bond yield. The longer term bond yields, i.e., 5-year and 10-year bond yield are also affected by daily changes in one day and two days lagged U.S. yields of respective maturity bonds. No lag effect of its own yield. • Unemployment and annualized GDP Prelim. have significant effect on 1-year bond yield. All Industry Activity Index, monthly Industrial Production (Prelim.), annualized GDP (Prelim.) and leading indicator (prelim.) affect the 10-year bond yield. •Indicators affecting 5-year bond yields are: Real Household Spending, CPI Core (Tokyo), CSPI, monthly Industrial Production (Prelim.), Leading Indicator (Prelim.), Key Machinery Order.

Observations show that the bond market in India is more active than the bond markets in Japan and China. The released information is immediately absorbed by the bond prices thus affecting the yield significantly for India. That is not observed in the case for the other two big Asian economies of Japan and China.	It is observed that the lagged value of daily changes in US yields with same maturity have significant impact on the longer term bond yields of the three Asian countries. While in case of India only 10-year bond yields are affected by lagged US yield, in case of China and Japan both 5-year and 10-year bond yield are affected. One day lagged daily changes in US yield and two day lagged daily changes in US yield have significant effect on India's yield and China's yield respectively. Both, one day lagged and two day lagged daily changes in US yield have significant effect on Japan's yield.

As for unbiasedness the Wald test shows that the expectations for the released values of macroeconomic variables in case of India were unbiased so the results were also unbiased. But in case of China, the expectations for released values of PMI Manufacturing, Exports, PPI, Money Supply, M2 and New Yuan Loans were biased. Similarly, for Japan the expectations were biased for unemployment, custom cleared trade, leading Indicator (prelim.) and band lending data.

Not including U.S. yield	*Including U.S. yield*
Therefore, released value of PMI Manufacturing affecting 10-year bond in China might be a biased result. And the observation that released value of leading Indicator (prelim.) affects 5-year bond yield of Japan might also be biased.	The released value of PMI Manufacturing affecting 10-year bond in China might be a biased result and the observation that released value of unemployment affecting 1-year and leading Indicator (prelim.) affecting 5-year and 10-year bond yield of Japan might also be biased.

Comparison

Table 11B: Comparative Study of the Bond Market Features Observed for India China and Japan

Bond Market	India	China	Japan
Market predictive power of changes in economic variables	Highest	Least	Higher than China but less than India
Dependence on lags	1-year bond yield	All maturity bond yields	1-year bond yield
Market activity and function	More than the other two countries	Not much	Not much
Which maturity bond yield is most affected by news releases?	Entire term structure.	Medium term (5 year bond yield)	Medium term
Market Efficiency	Longer term bond market is weakly efficient.	Medium term bond market is weakly efficient.	Longer term bond market is weakly efficient.
Variables that moves the bond market	Macroeconomic and Monetary variables	Macroeconomic variables and Money Supply	Macroeconomic variables and Money Supply
Affected by daily U.S. yield	In longer term	In long term	In long term

A convergence in the behavior of the bond yields are seen for China and Japan. The yields are affected only by the changes in the macroeconomic variables in both China and Japan. The banking variables and the monetary variables does not show any influence. Also, in both cases, most of the variables affect the yields for only the medium term bonds but none of the variables affect the entire term structure. The long term bond yields, i.e., 5-year as well as 10-year bond yields are affected by the U.S, yield in both the countries.

The empirical result for India shows a divergence from those observed for China and Japan. Changes in both macroeconomic variables and monetary variables significantly affect the Indian bond yield. Among those affecting the bond yields significantly, most of the variables have effect over the entire term structure while trade balance and exports are observed to affect only the long-end and the short-end of the yield curve respectively. The U.S. yield affects only the 10-year bond yields.

GDP (though the time and unit of measurement may be different) is the only common variable that moves the bond yield in all three Asian countries (in domestic model, i.e., model 1). While in China it moves only medium term bond yields; in Japan GDP affects short term bond yield. It has significant effect over the entire term structure in case of India. Since the nature of bond market is similar in China and Japan the coefficient of GDP may be negative in long term for both of them. GDP variable which is significant for India is nominal GDP, for China it is Real GDP and for Japan, it is GDP Prelim.

CONCLUSION

The motivation of this study was to observe how bond yields are affected by macroeconomic news releases within that country. We conclude through our findings that there is a significant effect of news releases on bond yield and this effect varies for different maturity bonds and for different countries. This is in line with existing literature which although primarily is focused on US bond markets and other developed economies. The results show that the bond market in India is much more active than that of Japan and China. We also tried to include the lags of daily changes in U.S. yield lags to check if the model is under-fitted which had significant effect on the countries bond yields. The number of macroeconomic releases to which bond yields reacted significantly also changed.

India responded significantly to its macroeconomic news releases and also to the U.S yield fluctuations. The bond market in India is evolving and has considerable scope for development. Many reforms have been introduced since 1990s by the Reserve Bank of India in line with the Narasimhan Committee Reports 1 and 2 in 1992 and 1998 in an effort to move toward a more transparent and market-driven structure. The process of auctioning new issues was introduced in 1992, replacing the previous system whereby government issues were allocated to investors—largely banks and state-owned investment institutions.

China's bond yield was not much affected by its surprise factors. It could potentially reflect a weak confidence in figures published by the Chinese public institutions. Since bond prices reflect expectations regarding monetary policy, our result may be due to the weak reaction of China's monetary policy to Chinese news. It may also stem from the absence of portfolio reallocation after the news releases.

The passive reactions of Japan's yield to its news releases are surprising as Japanese bond market is one of the oldest and developed as indicated by non- dependence on own lagged yields and strong dependence on U.S. lagged yields. One explanation can be that around 70 percent of Japanese government bonds are purchased by the Bank of Japan, and much of the remainder is purchased by Japanese banks and trust funds, which largely insulates the prices and yields of such bonds from the effects of the global bond market and reduces their sensitivity to credit rating changes.

Scope for Future Research

There has not been much research in this field for countries other than U.S. mostly due to data unavailability. Further study can be done for different countries taking into account the spillover effect, i.e., reaction in bond yield or prices of a country due to macroeconomic new releases in other countries are analyzed. The same model can be used for this study

but the period of observation needs to be large which is again subject to data availability. The study can also be extended to check to what type of surprise factor (positive or negative) does market reacts more.

REFERENCES

Altavilla, D. Carlo Giannone and Modugno (2013), "Bond Market and Macroeconomic News" http://www.csef.it/9th_c6/modugno.pdf

Altavilla, D.Carlo Giannone and M. Modugno (2014), "The Low Frequency Effects of Macroeconomic News on Government Bond Yields", *Federal Reserve Working Paper*, 2014-52.

Balduzzi, Pierluigi, J. Edwin Elton, and T. Clifton Green (1996), "Economic News and the Yield Curve: Evidence from the U.S. Treasury Market", *New York University Stern School of Business Finance Department, Working Paper Series,* FIN-96-13.

Balduzzi, Pierluigi, J. Edwin Elton, and T. Clifton Green (2001), "Economic News and Bond Prices: Evidence from the U.S. Treasury Market", *Journal of Financial and Quantitative Analysis*.

Berkman, N. (1978), "On the Significance of Weekly Changes in Ml", *New England Economic Review,* 78 (1978): 5-22.

Jones, C. M., O. Lamont and R. L. Lumsdaine (1998), "Macroeconomic News and Bond Market Volatility", *Journal of Financial Economics*, *47*(3), 315-337.

El Ouadghiri, I., V.Mignon and N. Boitout (2014), "On the Impact of Macroeconomic News Surprises on Treasury-bond Yields", (No. 2014-20), University of Paris West-Nanterre la Défense, EconomiX.

Fama, Eugene (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work", *Journal of Finance,* 25 (2): 383–417.

Fleming, M. J. and E. M. Remolona (1997), "What Moves the Bond Market?", *Economic Policy Review*, *3*(4).

Fleming, Michael J. and M. Eli Remolona (1999), "The Term Structure of Announcement Effects", *Federal Reserve Bank of New York,* Staff Reports No. 76, May.

Harvey, C. R., and R. D. Huang (2002), The Impact of the Federal Reserve Bank's Open Market Operations, *Journal of Financial Markets*, *5*(2), 223-257.

Andritzky Jochen R., J. Geoffrey Bannister and T. Natalia Tamirisa (2005), "The Impact of Macroeconomic Announcements on Emerging Market Bonds", *IMF Working Papers* , 05/83, International Monetary Fund.

Liebermann, J. (2011), "The Impact of Macroeconomic News on Bond Yields :(in) Stabilities Over Time and Relative Importance", *Research Technical Paper, Central Bank of Ireland.*

Smirlock, M. (1986), Inflation Announcements and Financial Market Reaction: Evidence from the Long-term Bond Market, *The Review of Economics and Statistics*, 329-333.

Urich, Thomas, and Paul Wachtel (1984), "The Effects of Inflation and Money Supply Announcements on Interest Rates", *Journal of Finance* , 39, No. 4: 1177-88.

APPENDIX

I. Non-Stationarity Test for Bond Yields

1-year, 5-year and 10-year bond yields for India, China and Japan are checked for non-stationarity. The autocorrelation function (ac) graphs shows that the bond yields are auto-correlated as the spikes are significant and gradually declining in nature. The null hypothesis for augmented DK Fuller test is not rejected implying that the bond yields contain unit root and must be differenced once to get unbiased results.

Chart A1

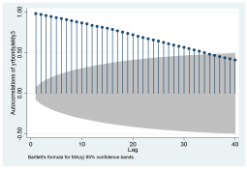
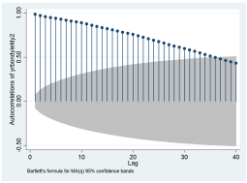
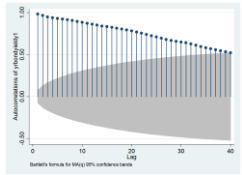
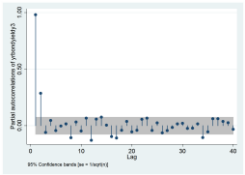
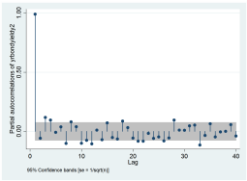
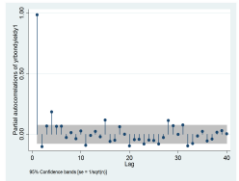
INDIA	1 year	5 year	10 year
AC			
PAC			
Augmented D-K Fuller test			
H_0: Unit root exists.			
	1 year	5 year	10 year
P-value	0.41	0.59	0.43

Chart A2

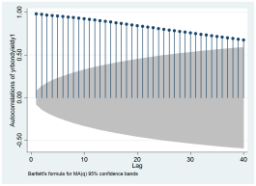
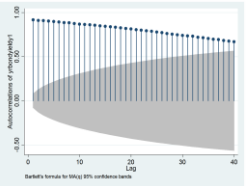
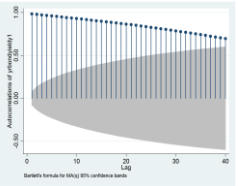
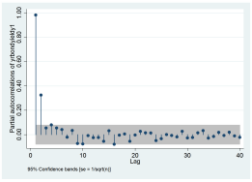
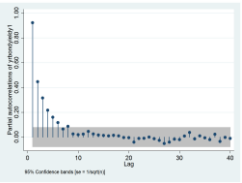
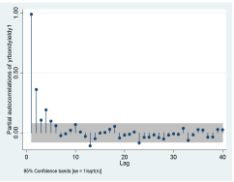
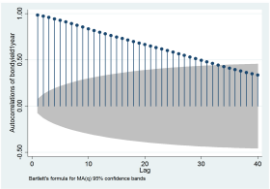
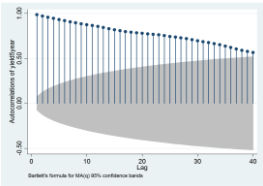
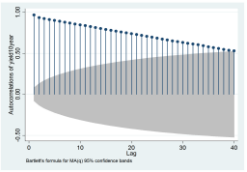
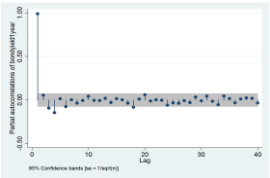
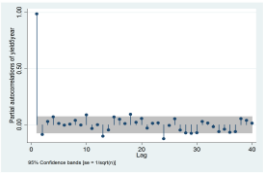
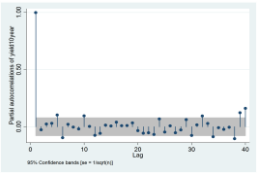
CHINA	1 year	5 year	10 year
AC			
PAC			
Augmented D-K Fuller test			
H_0: Unit root exists.			
	1 year	5 year	10 year
P-value	0.58	0.60	0.96

Chart A3

Japan	1 year	5 year	10 year
AC			
PAC			
Augmented D-K Fuller test			
H0: Unit root exists.			
	1 year	5 year	10 year
P-Value	0.45	0.23	0.94

II. Test for Unbiasedness of News Release

Table A1: Test for Unbiasedness of Macroeconomic News Releases: India

				H_0: α = 0, β = 1		
	Regression Result			Wald Test		
Indicators	**α**	**B**	R^2	F-statistic	Df	P-value
Industrial Production	-0.398	0.861*	38.94 percent	1.4086	(2,27)	0.26
WPI	0.172	0.973*	90.50 percent	0.1095	(2,27)	0.89
PMI Manufacturing	11.744	0.783*	45.57 percent	0.9503	(2,19)	0.40
Exports	0.733	0.920*	85.75 percent	0.5598	(2,23)	0.57
Imports	-1.670	0.949	87.67 percent	1.7422	(2,23)	0.19
Trade Balance	-10.304*	0.261**	**20.90 percent**	24.2533*	(2,23)	0.00
GDP	0.280	0.925*	83.88 percent	0.7726	(2,8)	0.49
RBI - Cash Reserve Ratio	0.857**	0.794*	82.80 percent	3.5816	(2,17)	0.05
RBI - Repo Rate	0.781	0.903*	**91.29 percent**	1.1392	(2,17)	0.34
RBI - Reverse Repo Rate	0.781	0.903*	**91.29 percent**	1.1392	(2,17)	0.34

Note: The significance of coefficients at 1 percent and 5 percent are denoted by (*) and (**) respectively.

Table A2: Test for Unbiasedness of Macroeconomic News Releases: China

				H0: α = 0, β = 1		
				Wald Test		
Indicators	A	β	R2	F-statistic	df	P-value
PMI Manufacturing	17.2192**	0.6588*	39.27 percent	2.526**	(2,27)	0.09
Exports	3.8615**	0.6569*	37.84 percent	2.627***	(2,27)	0.09
Imports	-2.2039	1.1947*	77.73 percent	1.349	(2,27)	0.27
Trade Balance	5.6169	0.7896*	39.31 percent	1.0183	(2,27)	0.37
CPI	-0.0487	1.0117*	96.45 percent	0.114	(2,27)	0.89
PPI	-0.2078*	0.9535	99.39 percent	17.174*	(2,27)	0.00
Money Supply, M2	14.2003*	-0.0129	00.33 percent	296.188*	(2,26)	0.00
New Yuan Loans	382.9322*	0.5191*	45.87 percent	12.541*	(2,26)	0.00
Industrial Production	1.1397	0.8768*	74.54 percent	1.224	(2,24)	0.31
Real GDP	0.5865	0.9206*	91.91 percent	0.746	(2,8)	0.50
Retail Sales	1.7065	0.8718*	70.98 percent	0.942	(2,24)	0.40
Urban Fixed Asset Investment	0.6501	0.9684*	96.23 percent	0.357	(2,24)	0.70

Note: The significance of coefficients at 1 percent and 5 percent are denoted by (*) and (**) respectively.

Table A3: Test For Unbiasedness of Macroeconomic News Releases: Japan

				H0: α = 0, β = 1		
				Wald Test		
Indicators	α	β	R2 (percent)	F-statistic	Df	P-value
Tankan	0.3150	1.1507*	93.53	1.074	(2,8)	0.38
Real Household Spending	0.0815	0.8601*	43.54	0.285	(2,28)	0.75
Unemployment	0.9348**	0.7743*	67.43	2.662***	(2,28)	0.08
CPI Core (Tokyo)	0.0050	1.0319*	93.25	0.185	(2,28)	0.83
Retail Sales y/y	-0.0486	1.0355*	82.70	0.078	(2,28)	0.92
CSPI	0.0375	0.9017*	80.91	1.009	(2,28)	0.37
All Industry activity index	0.0335	0.9745*	91.77	0.483	(2,28)	0.62
Customs Cleared Trade	-406.2363*	0.5896*	42.31	6.948*	(2,28)	0.00
Industrial Production (Prelim.) m/m	-0.4554	0.9211*	57.63	1.986	(2,28)	0.15
CGPI	-0.0655	1.0079*	97.99	1.181	(2,28)	0.32
M2 Money Supply	0.0277	1.0079*	92.36	1.006	(2,27)	0.37
GDP (Prelim.) q/q annual	-0.4729	1.0455*	91.94	1.084	(2,8)	0.38
GDP (Final) q/q annual	0.0111	1.0279*	98.64	0.306	(2,8)	0.74
Capital Spending	-0.3952	0.5804	21.97	0.589	(2,8)	0.57
Leading indicator (Prelim.)	86.2267*	0.1386*	25.51	201.527*	(2,28)	0.00
Bank Lending Data	1.0726*	0.3428	05.46	25.258*	(2,28)	0.00
Current Account	-30.3395	1.0313*	90.39	0.260	(2,28)	0.77
Key Machinery Orders m/m	0.3481	1.3420*	49.75	0.947	(2,28)	0.39

Note: The significance of coefficients at 1 percent, 5 percent and 10 percent are denoted by (***), (**) and (*) respectively.

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