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Rates and Credit Research

Indian Bond Pricing Watch

August 2016

2 August 2016

Pricing the Indian bond

- In this report, we use a fundamental multi-factor model to price the long dated Indian Govt. bonds (IGBs). We will update this report on a quarterly basis to decipher potential mispricing in IGBs.
- To develop the model, we utilize the following approach:

> IGBs = f (currency, interest)= f (global macro, local macro)

- We utilize the following variables to represent the various functions above

> global macro= f (U.S. 10 year yield)

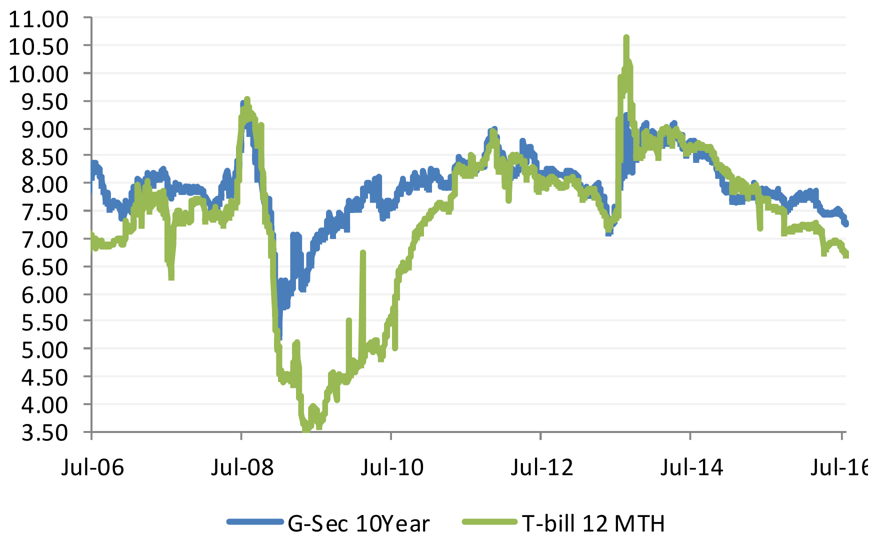
> local macro= f (inflation differential, India- U.S.)

> credit risk = f (JP Emerging market bond index)

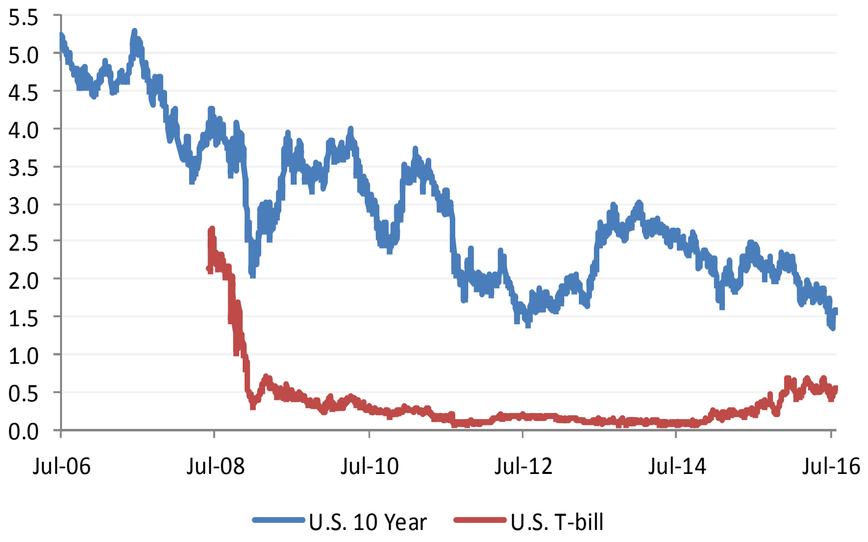
Global macro- U.S. Treasury yield

- Global macro conditions are represented by the U.S. 10 Year treasury yield. Historically, the relationship between IGBs and U.S. treasuries have been strongly correlated.
- For example, in August 2013, at time of the "Taper Tantrum", as U.S. rates, rose India rates also rose as flows moved out of Indian and other EM rates, attracted to the higher yielding U.S. assets.
- We have looked at this relationship over a 10 year period from January 2006 onwards.

Indian Govt. Bonds

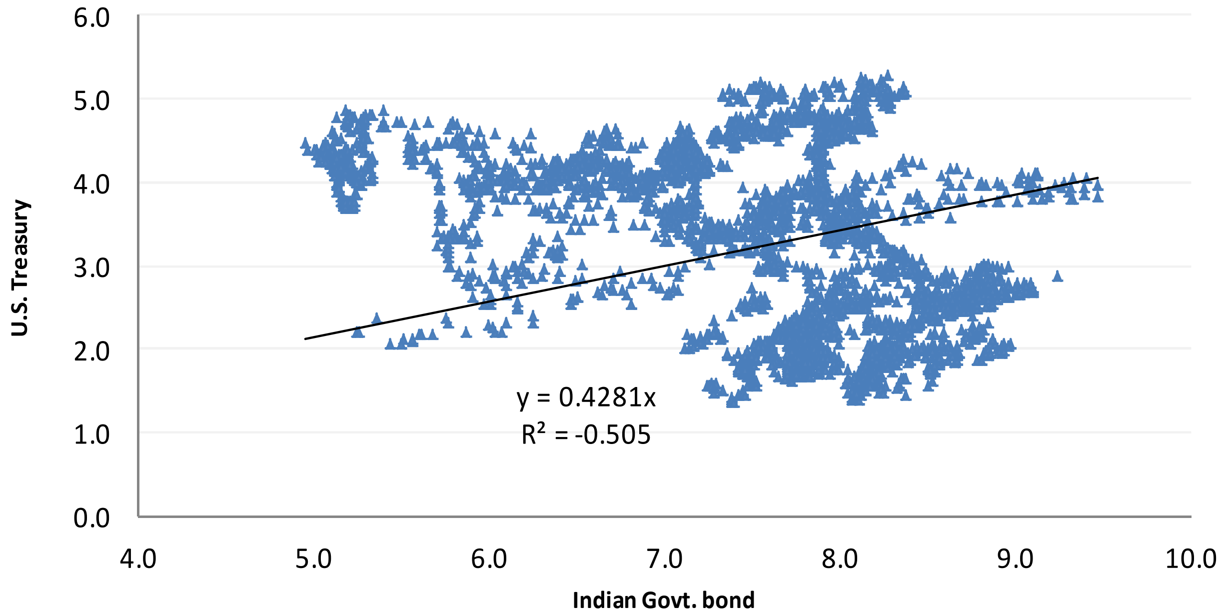


U.S. Treasury bonds



Global macro- U.S. Treasury yield

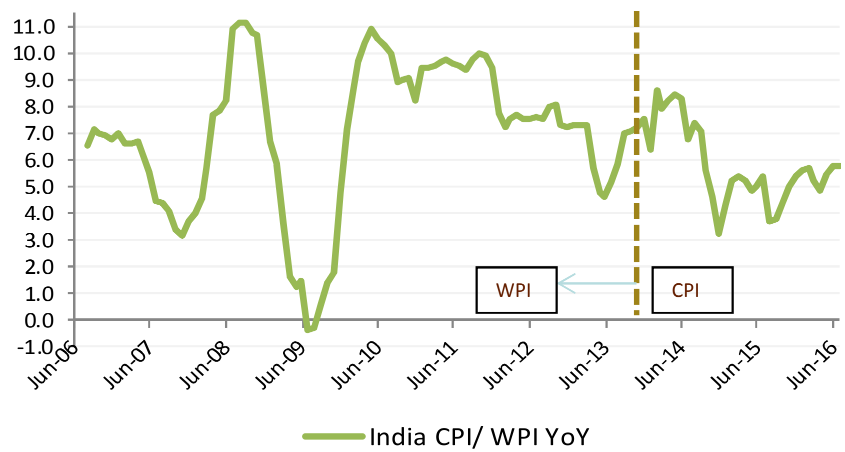
U.S. and Indian Bonds



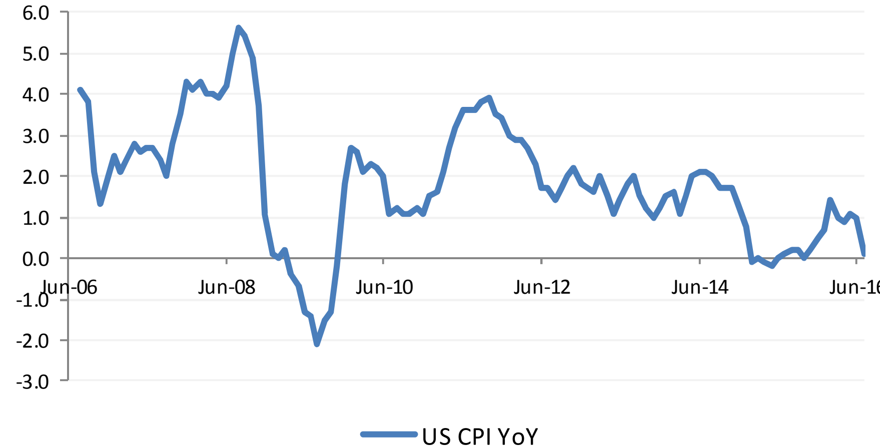
- The Indian 10 Year and the U.S. 10 Year, as expected are positively correlated.
- We will now add other variables, like inflation differentials and credit risk, to improve our pricing relationship of Indian Govt. bonds.

Inflation differential

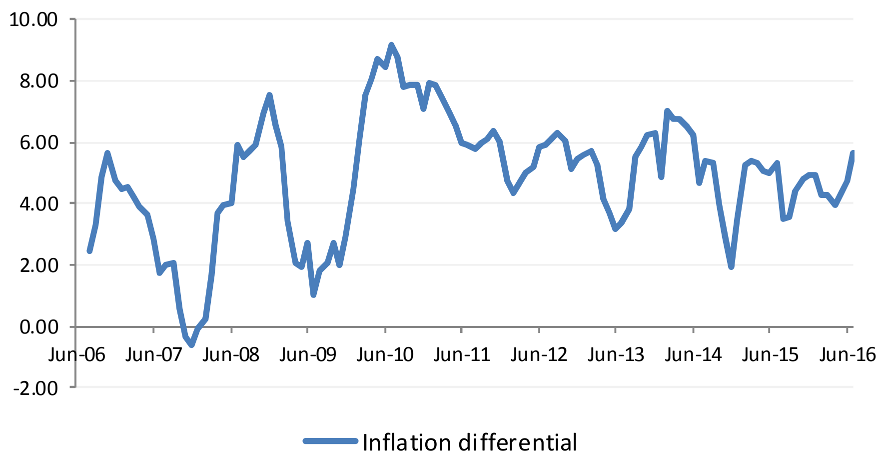
India CPI and WPI Inflation (YoY %)



U.S. CPI Inflation (YoY %)



India – U.S Inflation differential

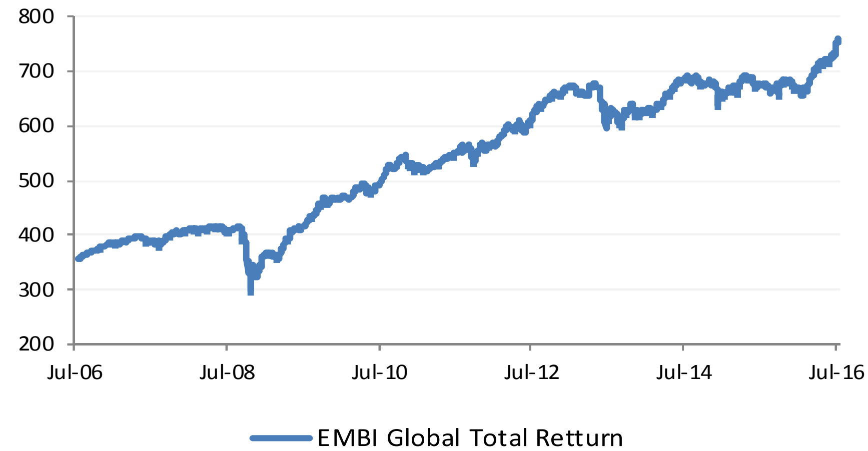


- We use Inflation differential as variable to represent local Indian macro given its wide spread use in monetary policy framework.
- We have used CPI as primary indicator since Jan 2014. Historically, India's inflation has been high compared to the U.S. – a reason for higher Indian rates.
- Since June 2010, the inflation differential between India and U.S. has fallen but has picked up again the last few months as Indian inflation has ticked up.

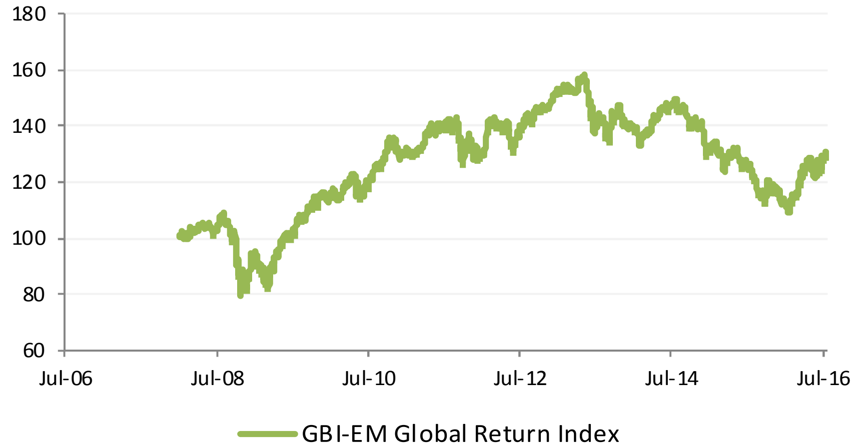
Source: Bloomberg, Trust Research

Credit Risk

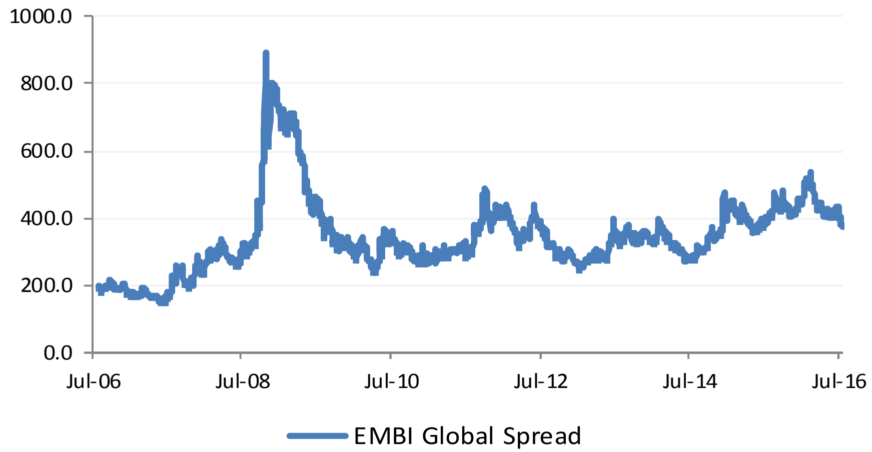
EMBI Global Total Return Index



GBI- EM Global Total Return Index



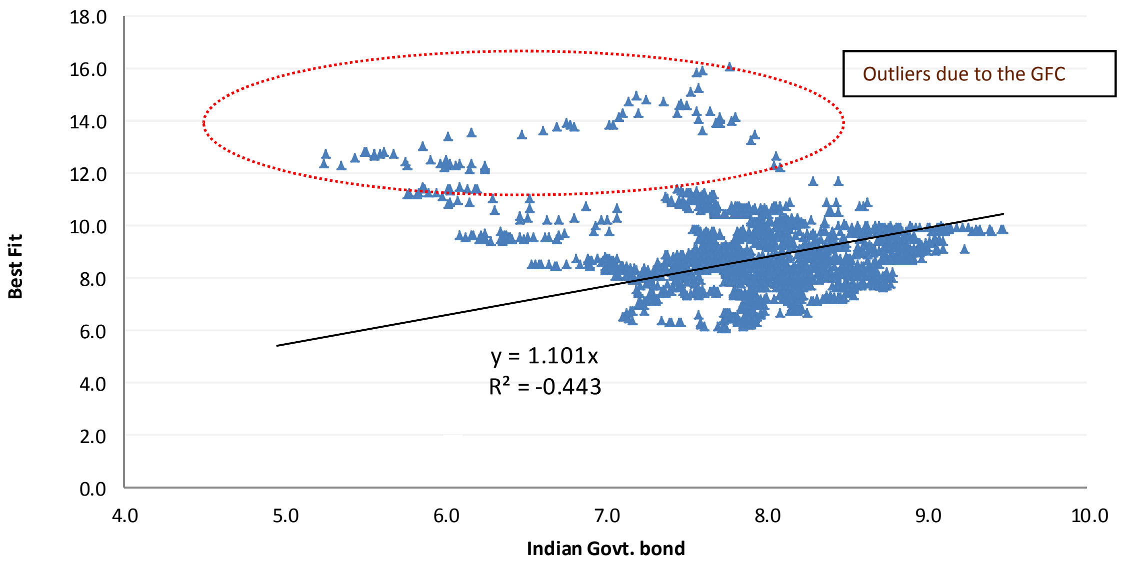
EMBI Global Spread (bps)



- To represent credit risk of Indian rates, we have used the JPM EMBI spread to indicate higher credit risk associated with holding EM bonds vs. U.S. treasuries.
- Two relevant JPM indices exist:
  - JPM EMBI- for $ EM bonds
  - JPM GBI- EM Global- local EM bonds
- We have used the EMBI Spread in our case - removing the effects of local currency volatility.

Source: Bloomberg, Trust Research

Best fit regression model

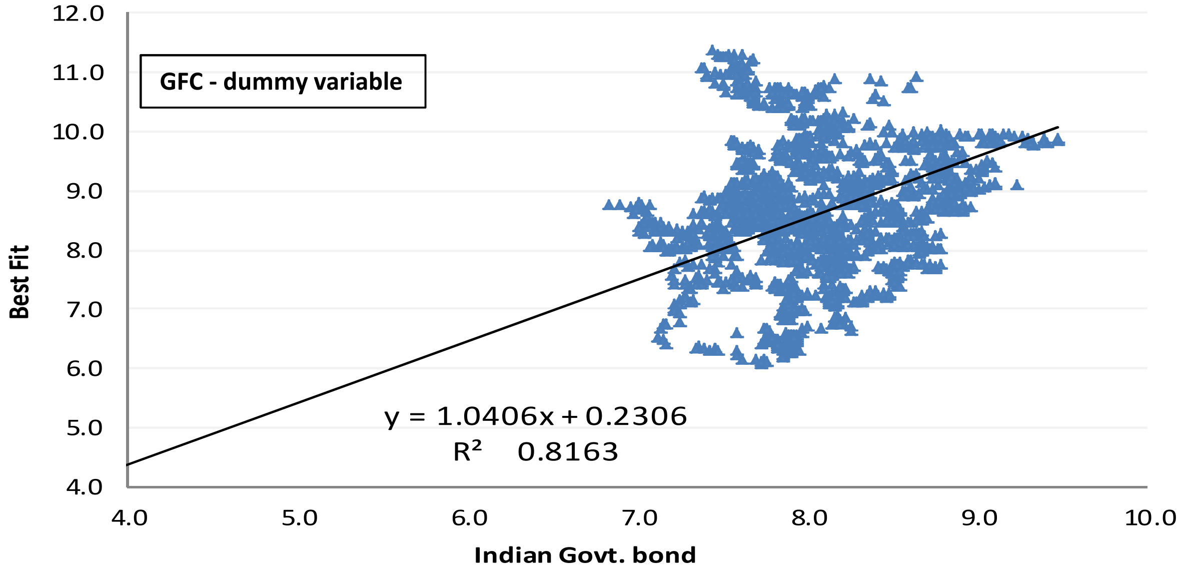


India 10 Year= U.S. 10 Year+ 0.5 Inflation differential+ EMBI Spread

- Comparing the actual Indian 10 Year yield with the best fit regression model over a 10 year period, we find that the relationship is highly correlated.
- If we were to account for the outliers using dummy variables, the correlation would even be stronger and R^2 higher.
- Outliers exist due to the global financial crisis, where Indian rates declined but EMBI Global spread increased. This anomaly exists due to low foreign holdings in IGBs compared to its EM peers.

Source: Bloomberg, Trust Research

Best fit regression model



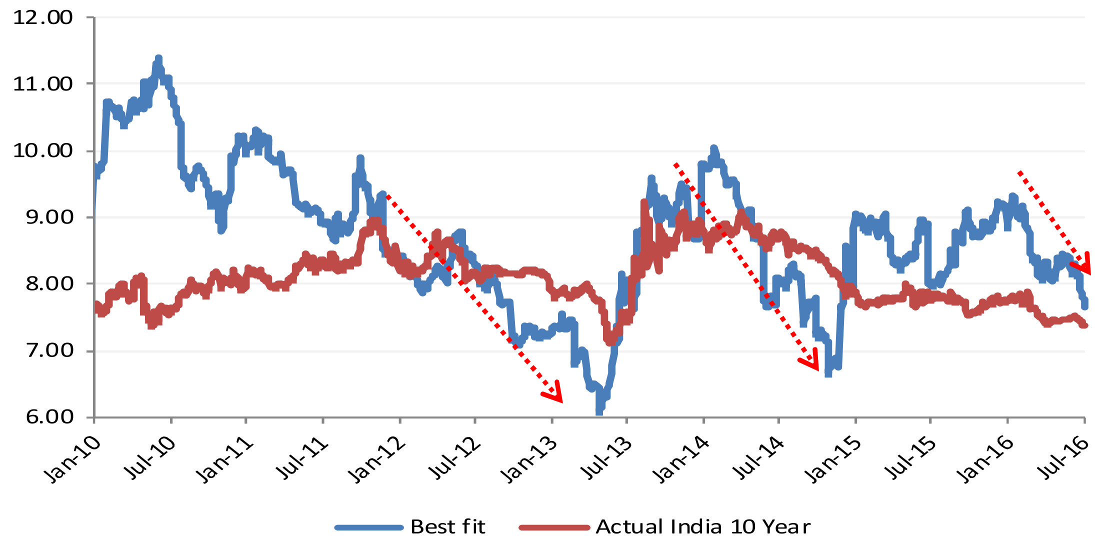
India 10 Year= U.S. 10 Year+ 0.5 Inflation differential+ EMBI Spread

- Here, we compare the Indian 10 year yield with the best fit regression model and use a dummy variable (0,1) to represent the time series during the Global Financial Crisis (GFC)
- The model increases in statistical significance after introducing the dummy variable. R^2 increases to 0.816.
- The best fit model captures 81.6% variability of the actual movements in 10 Year IGBs.

Source: Bloomberg, Trust Research

Best fit regression model

Best fit model versus Actual Indian 10 Year bond



- Given the high statistical significance, R^2= 0.816, we use the following best fit model to price the Indian 10 Year:
  - **India 10 Year = U.S. 10 Year + 0.5 Inflation differential + EMBI Global Spread**
- The best fit model was able to pre-empt the direction of the 3 major rallies in Indian rates – one in December 2012 and Sep-2014 and now since May 2016.
- The recent spike in the best fit model is due to spike in EMBI Spreads since Dec-14, due to pressure on the bonds of emerging markets. This is similar to what happened to the model during GFC
- If we were to adjust for that spike in EMBI spread (similar to using dummy variables during the GFC), we expect Indian 10 Year should trade in the **7.20- 7.30%** range according to the model. A fall in the EBMI spread or Indian CPI could drive yields lower while a rise in U.S rates could drive yields higher.

Source: Bloomberg, Trust Research

Thank You

Rates and Credit Research

Shashwat Nanda
+91 22 42245038
shashwat.nanda@trustgroup.co.in

Binyam Taddese
+91 22 42245037
binyam.taddese@trustgroup.co.in

Head of Equity

Naren Shah
+91 22 42245074
naren.shah@trustgroup.co.in

Institutional Sales

Pranav Inamdar
+91 22 40845031
pranav.inamdar@trustgroup.co.in

FII Sales

Sandeep Bagla
+91 22 42245143
trust-debtsales@trustgroup.co.in

Equity Sales

Sriram Rangarajan
+91 22 42245216
sriram.rangarajan@trustgroup.co.in

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Trust Group

109/110, 1st Floor, Balarama, Bandra Kurla Complex, Bandra (E), Mumbai -400 051, Maharashtra.

Ph: +91 22 4084 5000 • Fax: +91 22 4084 5052 • www.trustgroup.co.in