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Linkages in the term structure of interest rates across sovereign bond markets

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A B S T R A C T

This paper investigates the linkages in the sovereign bond yields across different maturity spectrums among both developed and Asian countries. Term structure of interest rate is estimated using the Dynamic Nelson Siegel model and Kalman filter. The degrees of integration and transmission of shocks from one country to another are measured using forecast error variance decomposition in the generalized vector autoregression (VAR) model. The level factor showed higher spillover index across the countries. Regional influence is found to be higher in slope and curvature factors among the Asian countries. The linkages are high during periods of crisis.

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1. Introduction

The term structure of interest rates in general is driven either by the policy channel or by the risk compensation channel. In the policy channel, monetary authorities revise the short-term interest rates to influence the medium- and long-term interest rates. In the risk compensation channel, the investors assign the market

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price, which gets adjusted to the long-term interest rates as term premia (Jotikasthira et al., 2015). Many studies have tested the link between short-term interest rates and long-term interest rates using the expectation hypothesis[1] (Campbell and Shiller, 1991; Sarno et al., 2007). Kumar and Okimoto (2011) provided evidence of gradual decoupling of long-term rates from short-term rates among the major industrialized countries. Their findings raise the need to investigate other factors that influence the term structure of interest rates.

Bond yields across countries are correlated (Engsted and Tanggaard, 2007). Sutton (2000) found evidence of co-movements in the long-term yields in developed markets. Bernanke (2007) provided evidence that in the integrated financial market, global factors play a role in determining the long-term interest rates. Similarly, Diebold et al. (2008) and Bae et al. (2011) found significant influence of global factors on the country's term structure. These findings motivate the present study to explore the co-variation and the degree of integration in bond yields across the maturity spectrum in the term structure of interest rates.

The growing evidence of financial integration coupled with domestic economic growth has increased capital flows to Asian economies. These capital flows have notable influence on the convergence of bond yields (Pradhan et al., 2011). This integrated market environment necessitates the study of the linkages in sovereign bond yields across the maturity spectrum for both developed and Asian countries. The study analyzes the degree of integration and transmission of shocks from one country to another at various maturity horizons of the term structures of interest rates.

The term structures of interest rates are estimated using the Dynamic Nelson Siegel (DNS) model as in Diebold and Li (2006). The Dynamic Nelson Siegel model decomposes term structure of interest rates into three factors: level, representing long-term interest rates, slope, representing short-term interest rates and curvature, representing medium-term interest rates for each country in the sample. These three latent factors in term structure of interest rates are extracted using the Kalman filter. Further, the study investigates the linkages between these factors across the developed countries such as the US, UK, Germany and Australia, and the Asian countries of China, Japan, Hong Kong, Malaysia, India, Singapore and Korea (from January 2003 to December 2013 at monthly frequency). The cross-country co-variation in these factors is captured using the spillover measure proposed by Diebold and Yilmaz (2012). The model uses forecast error variance decomposition in the generalized VAR (vector autoregression) framework, which is invariant to the country ordering. This model is a convenient measure that captures the direction and magnitude of spillovers to and from the individual country. In addition, the rolling window of the spillover index was plotted to trace the changes over time.

The results of the study indicated that spillover is high in the level factor (approximately 62.30%), followed by the slope (approximately 34.20%) and the curvature factor (approximately 18.70%). There is more regional influence in the slope and curvature factors among Asian economies. The result is consistent with the premise that long-term interest rates are driven by international investor preferences and savings whereas short-term interest rates are driven by domestic monetary policies and economic fundamentals. The US, UK and Australia highly influence others in the level factor. Japan, Hong Kong and Korea contribute to the slope of other countries' term structure. It was also found that linkages are high during the crisis period and the times of heightened market volatility. The results are robust with the changes in the model and the variation in the forecast horizons of forecast error variance decomposition.

The contribution of this study is fourfold. It is the first study to explore co-variation in the term structure of interest rates at different maturity horizons. It extends the work of Diebold et al. (2008) and Bae et al. (2011). Diebold et al. (2008) constructed a global yield curve and found the influence of global factors on countries' term structure of interest rates. Bae et al. (2011) examined the influence of global and regional factors on East Asian economies' term structure of interest rates. They did not capture the direction and transmission of shocks from the individual countries to the domestic term structure of interest rates. This paper focuses on the direction and magnitude of spillover shocks to and from the other countries in the term structure of interest rates. It also analyzes the degree of integration at the various maturity horizons. This will help in understanding the direction of shocks and influence of the other countries on the domestic term structure.

Second, this paper is the first to explore cross-country spillovers in term structure of interest rates using the spillover measure proposed by Diebold and Yilmaz (2012). The spillover measure using the generalized VAR framework is extensively used in equity markets (Diebold and Yilmaz, 2009; Awartani and

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[1] The expectation hypothesis of term structure of interest rates provides the relationship between long-term and short-term interest rates. Long-term interest rates are the average of current and expected future short rates.