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Interdependencies among Asian bond markets

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Abstract

There is an ongoing intraregional attempt to develop bond markets in Asia. This is to some extent a result of the Asian financial crisis, which showed the need for well-functioning fixed income markets in the region. This paper analyzes the relationships among four Asian bond markets. Cointegration tests show that the markets exhibit strong long-term interdependencies. In addition, all markets show signs of short-run cross-dependencies in the mean. The correlations between the markets are time-varying and high, except for in short turbulent periods. The results indicate that a regional bond portfolio would allow for some level of risk diversification for investors and that policymakers need to pay attention to movements in different markets.

JEL classification: C22; F31; F36; G15

Keywords: Bond markets; Asia; Cointegration; Multivariate GARCH; Dynamic conditional correlation

1. Introduction

In the aftermath of the Asian financial crisis in 1997–1998, many argued that the immature national fixed income markets made the countries more vulnerable to sudden shifts in investor sentiment. Due to the low levels of bond issuance and illiquid fixed income markets, companies had relied mainly on the stock market and loans from the banking sector for their financing needs. This resulted in an excessive amount of short-term financing, which in turn enabled very fast capital outflows after the initial crisis symptoms in Thailand. The crisis thus highlighted the importance of well-functioning fixed income markets in the region. Another reason for developing local bond markets is that domestic investors need possibilities to diversify their portfolios. Some argue that there is a clear mismatch in investments due to Asian investors investing mainly in foreign assets with lower yield, while foreign investors place sizeable amounts of capital in Asian higher yielding assets (e.g. Charoenwongse & Piesse, 2006; Ma & Remolona, 2005). As a response to these issues, the governments in East Asia have since then initiated various development schemes for their respective bond markets on both the regional and domestic level.

There are several reasons to why it is important to study the relationship between price movements in different local bond markets. First, investors need to understand how different markets behave in relation to each other in order to

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compose optimal portfolios. Second, bond markets are vehicles for monetary policies; that is, they are important for both central banks and for the ability to perform good macroeconomic analysis. As we will discuss in more detail, more integrated markets may result in difficulties carrying out independent domestic monetary policies. Finally, the study of relative price movements in the Asian bond markets improves our understanding of the regional financial integration that is taking place in Asia.

To our knowledge, there are few studies on the relationships among different bond markets, and especially so when it comes to Asia. In an early paper, Ilmanen (1995) shows that global factors are more important than local factors when forecasting international bond movements. Clare and Lekkos (2001) look at the US, UK, and German bond markets by applying a vector autoregression (VAR) model, finding that the different interest rates tend to be more influenced by international factors during periods of financial crisis while local factors dominate during normal periods. Analyzing the same markets, Driessen, Melenberg, and Nijman (2003) apply principal component analysis to single out factors that affect bond returns. In two studies on European interest rates, Laopodis (2001, 2002) uses a VAR model and a multivariate GARCH model to show that the markets are getting more integrated and that the importance of the German interest rate has decreased since the unification of East and West Germany. Skintzi and Refenes (2006) use an EGARCH model to analyze volatility spillovers from the aggregate Euro area and the US to individual European markets. Similarly, Christiansen (2005) looks at volatility spillovers from US and European aggregate markets to individual bond markets in Europe. In a related study, Christiansen (2004) looks at spillover effects between equity and bond markets in Europe. Charoenwongse and Piesse (2006) study regional transmission among the bond markets in Hong Kong, Singapore, and South Korea and the influence of the US and Japanese markets on the three Asian markets, using a linear regression model to analyze how volatility in one country depends on volatility in other bond markets, the exchange rate and in equity markets. Chaorenwongse and Piesse also look at the correlations among the three Asian markets in order to see whether there are benefits to be gained from portfolio diversification. However, the study only applies a constant correlation estimation procedure and does not look into the possibility of time-varying correlations. Nieh and Yau (2004) use a VAR analysis to study the relationship between interest rates in China, Hong Kong, and Taiwan. They find that interest rates in Hong Kong and Taiwan tend to be influenced by movements in the Chinese interest rate. Dalla (2003) discusses the macroeconomic developments after the Asian Financial Crisis and gives an outline of the development of the Asian bond markets. Finally, Plummer and Click (2005) is an interesting survey on the ongoing development of the bond markets in the Association of Southeast Asian Nations (ASEAN). The countries in Asia have decided to cooperate in the development of the national bond markets in order to overcome problems such as scale inefficiencies. This cooperative nature in itself makes it interesting to study the level of integration in the area.

This study attempts to shed light on the ongoing regional integration and cross-country dependencies among the East Asian bond markets. We focus on four countries with interesting developments in their domestic markets: China, South Korea, Malaysia, and Thailand. In order to model the relationships among the markets, we explicitly model both mean and variance. Using cointegration analysis, we first look for possible long-term dependence among the four markets. We find no less than three cointegrating relationships and thus model the mean as a vector error correction model (VECM). In order to take conditional heteroscedasticity into account, we model the variance with multivariate GARCH (MVGARCH) models. We also allow for possible asymmetries in volatility, a common feature in international equity markets. By applying a dynamic conditional correlation (DCC) model, we are able to estimate the time-varying covariance and correlations between each set of bond index returns. The estimations show that there are significant relationships among all four markets, both in the short and long term. Furthermore, the correlation patterns between each of the pairs vary and seem to grow stronger over time for most of the pairs. The results have important implications for both policymakers and investors in the region, which we discuss in more detail in the final sections.

The remainder of this study is organized as follows: Section 2 provides a general overview of the development of the bond markets in Asia, with a focus on the four countries included in this paper. Section 3 describes the data, while Section 4 presents the results of the unit root and cointegration tests for the four markets. Section 5 describes the methodology for the multivariate GARCH model and presents the main empirical results. Finally, Section 6 concludes the study.

2. Regional bond market development

During the 1980s and 1990s, the economic development in the East Asian region came to be known as the Asian Miracle. The Asian countries showed impressive successive growth numbers during a long period of time. The