

# How do policy and information shocks impact co-movements of China's T-bond and stock markets?

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## Abstract

We investigate the impacts of policy and information shocks on the correlation of China's T-bond and stock returns, using originally the asymmetric dynamic conditional correlation (DCC) model that allows for the coexistence of opposite-signed asymmetries. The co-movements of China's capital markets react to large macroeconomic policy shocks as evidenced by structural breaks in the correlation following the drastic 2004 macroeconomic austerity. We show that the T-bond market and the bond–stock correlations bear more of the brunt of the macroeconomic contractions. We also find that the bond–stock correlations respond more strongly to joint negative than joint positive shocks, implying that investors tend to move both the T-bond and stock prices in the same direction when the two asset classes have been hit concurrently by bad news, but tend to shift funds from one asset class to the other when hit concurrently by good news. However, the stock–stock correlation is found to increase for joint positive shocks, indicating that investors tend to herd more for joint bullish than joint bearish stock markets in Shanghai and Shenzhen.

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## 1. Introduction

During 2003 and early 2004, China experienced an excessive investment boom. To cool this economic overheating, in April–May 2004 the government put into practice a series of tight policy measures. Included in these policy measures were the following. The central bank raised the reserve requirements and tightened credit lines. The China Banking Regulatory Commission required commercial banks to nix investment projects deemed to be ill-planned, low quality, and unconformable to the government's industrial policies. The State Development and Reform Commission ordered local authorities to control the debut of price-hiking projects within their jurisdictions.

According to the news media, following the austerity programs, the Chinese stock and bond markets simultaneously underwent drastic drops, which subsequently had contagious effects on financial markets in Hong Kong, the US, Japan, London, Australia and so on (for example, Japan's stock price indexes reportedly fell by 400–500 points). A metaphor went: “As the Chinese economy is having an injection for allaying fever, the world's financial markets suffer a shivering fit” ([http://news.xinhuanet.com/fortune/2004-05/14/content\\_1468420.htm](http://news.xinhuanet.com/fortune/2004-05/14/content_1468420.htm)).

These observations and anecdotes seem to suggest that, in China, drastic policy changes have begun to impact domestic financial markets (as well as international financial markets), which then motivated the present paper to attempt a serious investigation on some related issues into which anecdotes do not and cannot provide insights. However, we are not interested in how individual market returns, but rather how *correlations* between them, respond

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to policy shocks. We have chosen to focus on the correlation between T-bond and stock returns for three main reasons as follows.

First, to reduce portfolio risk via diversification, a key input required by risk managers to hold efficient portfolios is the correlation between assets included in the portfolio.<sup>1</sup> Portfolios that contain stocks and government bonds have become popular among investors, as the two asset classes are believed to have different risk-return characteristics and their correlations to be low or even negative. Because the correlation between T-bonds and stocks plays a vital role in portfolio risk management and dynamic asset allocation for investors, it has been extensively studied in the literature. For example, an earlier study by Barsky (1989) looks at price co-movements between stocks and bonds, and finds that “when investors are scared, they look for safety. They adjust their portfolios to include more safe assets and fewer risky assets. This kind of movement is usually referred to as a ‘flight to quality’”. A recent study by Ilmanen (2003) on the US stock–bond correlation reports that the correlation between stock market and government bond returns was positive through most of the 1900s, but negative in the early 1930s, the late 1950s, and recently. A negative correlation implies that investors have benefited from the bond market upswing, offsetting some of their losses in stock markets. However, this combination may have severe implications for pension funding ratios, as both equities and discount rates decline, sending assets and liabilities in opposite directions.

Second, correlations between the stock and bond markets are important to policymakers. Since China entered the WTO in 2000, the Chinese government has endeavored to reform its financial system including capital markets, in order to transform the conduct of macroeconomic policies from being administrative to being market oriented in nature (as required by becoming a WTO member). In the latter context, the central bank cannot set specific price targets for stocks and bonds, and so has to utilize the information contained in the co-movements between the freely adjusted prices of these assets to gauge, for example, market participants’ expectations about growth and inflation. In other words, the stock–bond return correlation estimates may provide policymakers with useful complementary information to determine whether market participants are changing their views on inflation or economic activity prospects. Quantifying contemporaneous relations between the stock and bond markets also helps policymakers to estimate and control the unintended consequences that policies directed primarily at one market could have for the other. To our best knowledge, the existing literature lacks such a study as ours for China, despite the important policy implications of the issues examined in the present paper.

<sup>1</sup> An example that the correlation between three assets in a portfolio affects their optimal weights which maximize its Sharpe ratio is available from the authors upon request.

Third, correlations between asset returns have been viewed as an integral aspect of inter-financial market integration, in the literature. Kim et al. (2006) and Berben and Jansen (2005) examine the dynamic or time-varying correlation between stock and T-bond returns of several European countries to infer the state and progress of their financial integration, taking into account the influence of the European Monetary Union as a possible cause of structural change. Kim et al. (2005) also conducted a similar study for stock market integration in Europe. In these studies, the authors use return correlations to gauge the degree of integration between financial markets: a high/low correlation implies a high/low level of integration. High, not just low, stock–bond correlations have also been established. For example, Kim et al. (2006) document that the inter-bond–stock correlations for each of their sample Euro zone countries and the weighted average of these for Euro countries and also non-Euro zone countries once reached very high levels, although they have been falling since the mid 1990s. The authors take these results to imply a falling financial integration since the mid 1990s. Apart from correlation analysis, the cointegration framework is also a useful tool in studying the degree of market integration, and a recent application of cointegration analysis to the long-run equilibrium relationship among China’s money, stock and T-bond markets has appeared in Yin (2005). However, a long-run relationship detected by cointegration tests is credible only if the “true” relationship is constant or experiences few breaks over time. The fact that China has been reforming its financial systems with frequent debuts of new reform programs allows one to argue that the number of “breaks” is too large to permit a meaningful cointegration analysis. Such an unstable, time-varying relationship among financial markets ought to be modeled more appropriately within a time-varying correlation framework. By doing so, our investigation into the correlation between China’s T-bond and stock returns will shed new light on inter-stock–bond market integration that may vary across different points in time. However, we use the previously reported estimates of the European stock–bond return correlations as a reference point with which to compare the estimates of the Chinese stock–bond return correlations, in order to infer the *relative* degree of stock–bond market integration in China.

Our work contributes to the existing literature in at least two aspects. One is the link of stock–bond correlations to information shocks or macroeconomic factors. Recent studies on these issues include Chordia et al. (2005) and Li (2002). In the former article that uses the US data, the authors find that innovations to stock and bond market liquidity and volatility are significantly correlated, and attribute this observation to the possibility that common factors such as monetary shocks and money flows drive liquidity and volatility in these markets. The latter paper shows that the major trends in stock–bond correlation in G7 countries can be explained by their common exposure to macroeconomic factors, such as expected inflation,

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