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Bank of Mongolia

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**MONETARY POLICY AND BOND MARKET DEVELOPMENT:  
A CASE OF MONGOLIA\***

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## I. INTRODUCTION

The foundation of the Mongolian stock exchange was laid down in 1990 with the privatization of state owned companies and their listing on the stock exchange. The period of 15 years since then saw no other stock exchange or commercial company emerged on the stock market. The weak development of stock exchange might be explained by numerous factors; however we would suggest the following two explanations. The history of the Mongolian stock exchange is still short enough and started simultaneously with the institutional and structural reforms initiated by the Government. Secondly, the price level of 1990s was subject to high inflation discouraging individuals and entities to accumulate financial resources.

However, stabilization of the economy accompanied by the Central Bank successful efforts to curb the inflation and low down the lending rate, increased public interest to make savings pave the way to recovery of the stock exchange. What was the effect, if any, of the monetary and macro policies on development of the securities market, what has been learnt and what recommendations can be given to policy makers? The answers to these questions are extremely important.

In this paper we have three principal objectives. First, we measure the bond market development in Mongolia. Second, we analyze in some detail the stock markets response to monetary policy actions using VAR (vector autoregression) analysis. Third, we study determinants (include monetary policy variables and other macro economic variables) of Mongolian bond market development using VAR analysis.

Relatively few papers to date have attempted to provide an explanation for the markets reaction to monetary policy. For example, Goto and Valkanov (2000) used a somewhat different VAR-based method to focus on the covariance between inflation and stock returns. Both relied on policy shocks derived from identified VARs, however, rather than the futures-based surprise used in our analysis. Boyd et al. (2001) also considered the linkage between policy and stock prices. Their analysis focused on the markets response to employment news, rather than to monetary policy directly, however<sup>2</sup>.

Using pooled data from fifteen industrial and development countries from 1980 to 1995, Garcia and Liu (1999) examines the macroeconomic determinants of stock market development. They show that real income and, saving rate, financial intermediary development, and stock market liquidity are important determinants of stock market capitalization.

Although, Atje and Jovanovic (1993) test the hypothesis that the stock markets have a positive impact on growth performance. They find significant correlations between economic growth and the value of stock market trading divided by GDP for 40 countries over the period 1980-88. Similarly, Levine and Zervos (1996, 1998) and Singh (1997) show that stock market development is positively and robustly associated with long-run

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<sup>2</sup> See Bernanke and Kuttner (2004).

economic growth. In addition, using cross-country data for 47 countries from 1976-93, Levine and Zervos (1998) find that stock market liquidity is positively and significantly correlated with current and future rates of economic growth, even after controlling for economic and political factors. They also find that measures of both stock market liquidity and banking development significantly predict future rates of growth. They, therefore, conclude that stock markets provide important but different financial services from banks.

Torre, Gozzi and Schukler (2006) studied capital market development: Whither Latin America? using pool the data from across countries (95 countries, including Mongolia) over time 1975-2004 period. They show that GDP per capita, financial openness (measured by stock market liberalization and equity flows over GDP), and shareholder rights are positively and significantly associated with market capitalization, while government deficits are negatively related to stock market development. The growth opportunities variable enters positively and significantly in the regressions.

In Mongolia, D.Boldbaatar (2003) analyses the implications of capital markets for monetary policy and concludes that the capital market is not developed yet to attract investor for a profit from capital gain. So, capital market is not ready to operate as monetary policy transmission mechanism today.

The study is structured as follows: Section II broadly explains the role of monetary policy in the developing bond market. In the section III, we measured the Mongolian bond market development and show comparison of Mongolian bond market development with other countries (Latin American, East Asian, developed countries and some countries of ESCAP Member States (Pakistan and Sri Lanka)), and the correlations and direction Granger causality between stock market development and macroeconomic performance. Section IV presents empirical evidence including impulse response analysis for determining impact of Monetary Policy on Bond returns and Macroeconomic Determinants of Bond Market Development. Finally, Section V provides policy implications and concludes the paper.

## **II. THE ROLE OF MONETARY POLICY IN THE DEVELOPING BOND MARKET**

The ultimate objectives of monetary policy are expressed in terms of macroeconomic variables such as nominal variables, which are output, employment, and inflation. However, the influence of monetary policy instruments on these variables is at best indirect. The most direct and immediate effects of monetary policy actions, such as changes in the central bank's bill rate, are on the financial markets; by affecting asset prices and returns, policymakers try to modify economic behavior in ways that will help to achieve their ultimate objectives. Understanding the links between monetary policy and asset prices (stock market) is thus crucially important for understanding the monetary policy transmission mechanism, which is channel of Tobin's  $q$ .<sup>3</sup> We will examine the channel in the next sections of the paper.

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<sup>3</sup> See Hayford and Malliaris (2002), "Monetary Policy and the Stock Market".

Monetary policy actions have their most direct and immediate effects on the broader financial markets, including the stock market, government and corporate bond markets, mortgage markets, markets for consumer credit, foreign exchange markets, and many others. If all goes as planned, the changes in financial asset prices and returns which induced by the actions of monetary policymakers lead to the changes in economic behavior that the policy was trying to achieve. Thus, understanding how monetary policy affects the broader economy necessarily entails understanding both how policy actions affect key financial markets, as well as how changes in asset prices and returns in these markets in turn affect the behavior of households, firms, and other decision makers.

The link between monetary policy and the stock market is of particular interest. Stock prices are among the most closely watched asset prices in the economy and are viewed as being highly sensitive to economic conditions. Stock prices have also been known to swing rather widely, leading to concerns about possible "bubbles" or other deviations of stock prices from fundamental values that may have adverse implications for the economy. It is of great interest, then, to understand more precisely how monetary policy and the stock market are related.

A share of stock is a claim on the current and future dividends (or other cash flows, such as stock buybacks) to be paid by a company. Suppose, for just a moment, that financial investors do not care about risk. Then only two types of news ought to affect current stock values: news that affects investor forecasts of current or future (after-tax) dividends or news that affects forecasts of current or future short-term interest rates. News that current or future dividends (measured in real, or inflation-adjusted, terms) are likely to be higher than previously expected—say, because the company is expecting to be more profitable—should raise the current stock price. News that current or future short-term interest rates (also measured in real, or inflation-adjusted, terms) are likely to be higher than previously expected should depress the stock price. There are two essentially equivalent ways of understanding why expectations of higher short-term real interest rates should lower stock prices. First, to value future dividends, an investor must discount them back to the present; as higher interest rates make a given future dividend less valuable in today's dollars; higher interest rates reduce the value of a share of stock. Second, higher real interest rates make investments other than stocks, such as bonds, more attractive, raising the required return on stocks and reducing what investors are willing to pay for them. Under either interpretation, expectations of higher real interest rates are bad news for stocks.

So, to reiterate, in a world in which investors do not care about risk, stock prices should change only with news about current or future dividends or about current or future real interest rates. However, investors do care about risk, of course. Because investors care about risk, and because stocks are viewed as relatively risky investments, investors generally demand a higher average return, relative to other assets perceived to be safer, to hold stocks.

This extra return, known as the risk premium on stocks, or the equity premium, presumably reflects, in part, the extra compensation that investors demand to be willing to hold relatively more risky stocks.

Like news about dividends and real interest rates, news that affects the risk premium on stocks also affects stock prices. For example, news of an impending recession could raise the risk premium on stocks in two ways. First, the macroeconomic environment is more volatile than usual during a recession, so stocks themselves may become riskier investments. Second, the incomes and wealth of financial investors tend to fall during a downturn, giving them a smaller cushion to support the lifestyles to which they are accustomed (that is, to make house payments etc). With less discretionary income and wealth to absorb potential losses, people may become less willing to bear the risks of more volatile financial investments<sup>4</sup>. For both reasons, the extra return that investors demand to hold stocks is likely to rise when bad times loom. With expected dividends and the real interest rate on alternative assets held constant, the expected yield on stocks can rise only through a decline in the current stock price.

We now have a list of three key factors that should affect stock prices. First, news that current or future dividends will be higher should raise stock prices. Second, news that current or future real short-term interest rates will be higher should lower stock prices. And third, news that leads investors to demand a higher risk premium on stocks should lower stock prices.

How does all this relate to the effects of monetary policy on stock prices? According to our analysis, central bank's actions should affect stock prices only to the extent that they affect investor expectations about dividends, short-term real interest rates, or the riskiness of stocks. The trick is to determine quantitatively which of these sets of investor expectations is likely to be most affected when the central bank unexpectedly changes the monetary policy rate.

A long-held element of the conventional wisdom is that the stock market is an important part of the transmission mechanism for monetary policy. The logic goes as follows: Easier monetary policy, for example, raises stock prices. Higher stock prices increase the wealth of households, prompting consumers to spend more—a result known as the wealth effect of the transmission mechanism. Moreover, high stock prices effectively reduce the cost of capital for firms, stimulating increased capital investment. Increases in both types of spending—consumer spending and business spending—tend to stimulate the economy. We will analyze the transmission mechanism in section IV of the paper.

### **III. BOND MARKET DEVELOPMENT IN MONGOLIA**

#### **3.1 Measuring the Bond Market Development**

We use three measures of Mongolian bond market development: Size (market capitalization, as a percentage of GDP), Liquidity (value traded, as a percentage of GDP and turnover ratios), Volatility (we used the procedure defined by William G. Schwert (1989)).

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<sup>4</sup> See Campbell and Cochrane (1999), “A consumption-based explanation of aggregate stock market behavior”

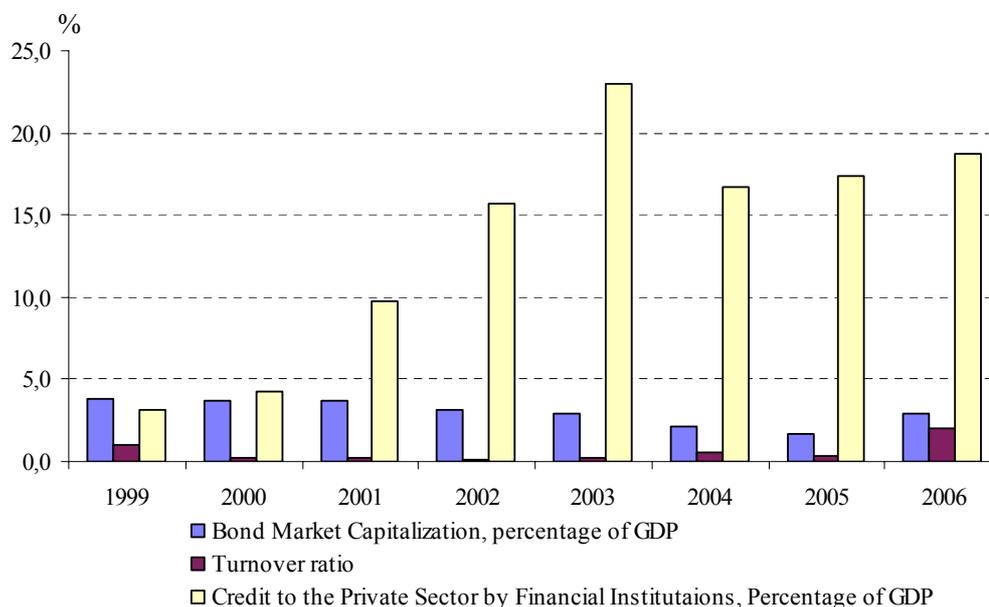
Theory also points out a rich array of channels through which the stock markets - market size, liquidity, integration with world capital markets, and volatility - may be linked to economic growth. For example, Pagano (1993) shows the increased risk-sharing benefits from larger stock market size through market externalities, while Levine (1991) and Bencivenga, Smith, and Starr (1996) show that stock markets may affect economic activity through the creation of liquidity. Similarly, Devereux and Smith (1994) and Obstfeld (1994) show that risk diversification through internationally integrated stock markets is another vehicle through which the stock markets can affect economic growth. Besides stock market size, liquidity, and integration with world capital markets, theorists have examined stock return volatility. For example, DeLong et.al. (1989) argue that excess volatility in the stock market can hinder investment, and therefore growth.

**Size:** To measure the size of the stock market, we use the ratio of market capitalization divided by Gross Domestic Product (GDP). Market capitalization equals the total value of all listed shares. The assumption underlying the use of this variable as an indicator of stock market development is that the size of the stock market is positively correlated with the ability to mobilize capital and diversify risk.

**Liquidity:** To measure the liquidity of the stock market, we use two measures. First, we compute the ratio of total value of trades on the major stock exchanges divided by GDP. This measures the value of equity transactions relative to the size of the economy. This liquidity measure complements the measure of stock market size since markets may be large but inactive. Our second measure of liquidity equals the ratio of the total value of trades on the major stock exchanges divided by market capitalization and is frequently called the turnover ratio. This measures the value of equity transactions relative to the size of the equity market. The turnover ratio also complements the measure of stock market size since markets may be large but inactive. Turnover also complements the first liquidity measure - the total value of equity transactions divided by GDP - since markets may be small (compared with the whole economy) but liquid. These indicators do not directly measure the ease with which agents can buy and sell securities at posted prices. The indicators do, however, measure the degree of trading, compared with the size of the economy and the size of the market. Since liquidity may importantly influence growth by easing investment in large, long-term projects and by promoting the acquisition of information about firms and managers, we include these two liquidity measures in our stock market development index.

Figure 1 shows indicators that represent bond market development in Mongolia.

**Figure 1. Domestic Financial Sector Development: Mongolia, 1999-2006<sup>5</sup>**



**Source: Author's Calculation**

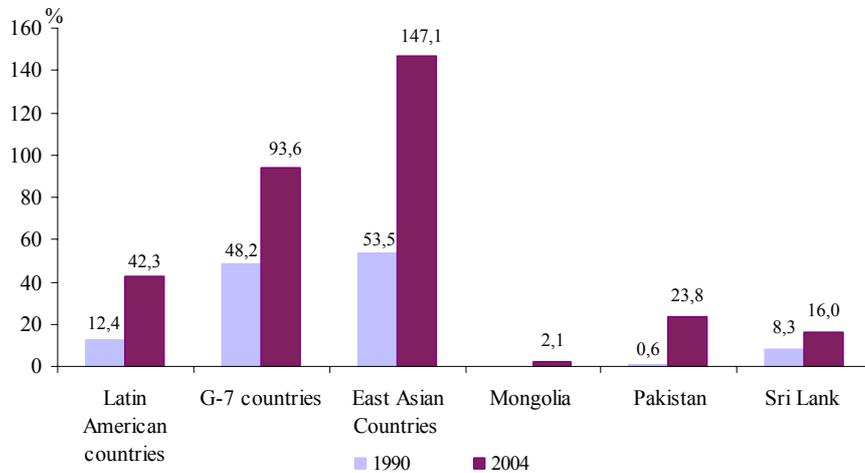
Figure 1 illustrates a situation that as far as banking sector develops, bond market development slows down. On the contrary, weak development of financial sector is meaning that firms borrow from banks instead of issuing bond in stock market. Likewise, smaller value of transaction (turnover ratio, as a percentage of GDP) in stock market shows that public prefers to place deposit in banks more than to issue bond in stock market. This condition also proved by case that broad money growth provided by quasi money growth.

In some theoretical works showed that financial intermediation develops aggressive in countries which have well developed financial market. But in Mongolia, weak stock market shifts choice of absorbing funds to banking sector and reversely banking sector development will slow down the stock market development. While stock market development variables which decreased from 2001 to 2005, increased in 2006 and reached 2003 year's level. Also Top-20 indexes which report bond price changes, rised all over year 2006 and exceed from previous years levels. That proves activation of stock market improvement. From all mentioned above, we can conclude that stock market able to develop with complex management and support of politics.

We shows comparision of Mongolian bond market development with other countries in Figure 2.

<sup>5</sup> Since the market capitalization value is measured at the end of the year, and GDP is measured over the year, there is a stock-flow problem in this measure. To solve this problem, we use the average of two consecutive end-of-year market capitalizations to estimate the mid-year value.

**Figure 2. Domestic Bond Market Development Across Countries: Market capitalization/GDP**



**Source: World Bank, Torre and others (2006) and Authors' calculation (in Mongolia)**

Figure 2 shows different indicators of financial development for selected Latin American, East Asian, developed countries and some countries of ESCAP Member States (Mongolia, Pakistan and Sri Lank). In ESCAP Member States countries, especially in Mongolia stock market development is too low compared with developing countries. We can describe it as stock market development history is too short in Mongolia. But it's not enough. There is another explanation that we used stock market just as a tool of privatization and left it. It can be proved by facts that in last 15 years stock market couldn't developed well, public has no complex information about it, public confidence in stock market still low in Mongolia, few firms are in stock market now and couldn't connected with foreign markets etc. From A and B of Appendix 1, the average number of firms listed in Mongolia bond markets is greater than the number of Latin American countries. However, Mongolian bond market's value of traded is very lower than level of Latin American Countries.

**Volatility:** We measure the volatility of bond returns, Volatility, as a twelvemonth rolling standard deviation estimate that is based on market returns. We cleanse the return series of monthly means and twelve months of autocorrelations using the procedure defined by William G. Schwert (1989)<sup>6</sup>.

<sup>6</sup> Specifically, we estimate a 12th-order autoregression of monthly returns,  $R_t$  including dummy variables,  $D_{jt}$ , to allow for different monthly mean returns:

$$R_t = \sum_{j=1}^{12} \alpha_j D_{jt} + \sum_{k=1}^{12} \beta_k R_{t-k} + v_t$$

We collect the absolute value of the residuals from equation (3), and then estimate a 12th-order autoregression of the absolute value of the residuals including dummy variables for each month to allow for different monthly standard deviations of returns:

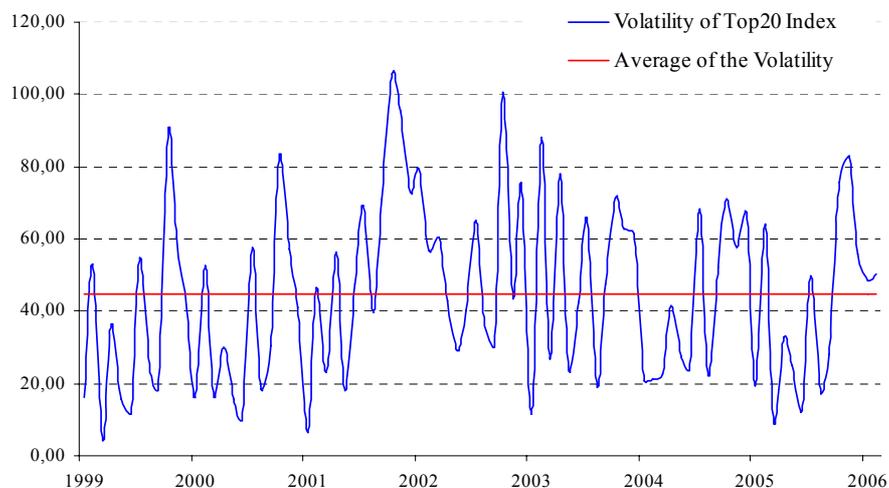
$$|\hat{v}_t| = \sum_{j=1}^{12} c_j D_{jt} + \sum_{k=1}^{12} d_k |\hat{v}_{t-k}| + \mu_t$$

The fitted values from this last equation give estimates of the conditional standard deviation of returns. We include this measure because of the intense interest in market volatility by academics, practitioners, and policy makers.

Stock markets in countries with volatile macroeconomic conditions would also have volatile price indexes. Theoretically both bond market volatility and macroeconomic volatility are hypothesized to have negative effects on bond market development. Using data on 44 developed and emerging markets from 1986 to 1993, Demirguc-Kunt and Levine (1996a) find that large bond markets are more liquid, less volatile, and more internationally integrated than smaller markets.

The Figure 3 represents the estimation results after the above mentioned method has been applied.

**Figure 3. The Volatility of Bond Returns (Top 20 Index): Mongolia, 1999-2006**



**Source: Author's calculation**

As it can be seen from the Figure 3, the volatility of bond returns is relatively high and subject to seasonal fluctuations (See Appendix 1. C). Researchers in general agree that high volatility of bond returns is negatively related to market capitalization and hinders the development bond market. This may well be the case for Mongolia. In other words, high price volatility is perceived as a high risk for investors and difficulties associated with risk assessment discourages market players.

However, effective risk management would allow investors to manipulate from price fluctuations and thus attracts their participation on the market. This is not the case in Mongolia, where price spread is narrow, operational cost is relatively high, and where there is shortage in staff capable to assess risk and price consequences, and supply shocks are quite common.

Based on main indicators, such as size (market capitalization, as a percentage of GDP), liquidity (value traded, as a percentage of GDP and turnover ratios), volatility (we used the procedure defined by William G. Schwert, 1989), stock exchange performance in Mongolia can be considered as extremely poor compared to other countries. This issue requires careful and comprehensive addressing from the Government.

## **3.2 Correlations and the Direction of Granger Causality between the Bond Market Development and Macroeconomic performance**

### **3.2.1 Correlations**

There is common consensus that economies with well developed financial intermediation usually performs better than those where the financial intermediation is underdeveloped. High economic growth may also accelerate the development of financial market which is explained in economic theory by endogenous growth theory models. Empiric testing of data for 10 developing countries (Luintel, Khan, 1999) shows strong correlation between financial and economic developments.

Using different data set, Demirguc-Kunt and Levine (1996), and Levine and Zervos (1998) have shown that measures of stock market development are positively correlated with measures of financial intermediary development (measured by credit to private sector divided by GDP).

We examine if this complementary relationship exist in our study. Data permitting, we observed the monthly data over the January, 1998- March, 2007 period. In Mongolia, banking sector development (measured by share of Domestic Credit to Private Sector in GDP) and bond market development (measured by bond market capitalization divided by GDP) are positively correlated, but the correlation is not significant. Banking sector variables that represent financial intermediation are relatively affecting to each other. Also, turns over ratio and total value are negatively linked to each other and value of stock market transaction and credit to private sector are negatively correlated. It shows that firms finance themselves by taking credit from financial institutions instead of issuing bond in bond market. Because of negative correlation between domestic credit to private sector and interest rate, central bank bond rate and inflation, decreasing of these variables indicate that loan supply will rise (see Appendix 4).

Although, the ratio of market capitalization in GDP is positively correlated with banking sector development indicators, however, only ratio of M1 and GDP is significant. There is a negative correlation between turnover ratio, total value of traded and banking sector deepen indicators. It can be described as that Central Bank Bill (CBB) rate give an impulse to interest rate and decrease of interest rate leads to increase loan supply. This means amount of issued stock of firms fall off or value of transaction go down because of firms' view that to take an loan is easier than to issue stock in financial market. Likewise, hence there is a significant negative relation between exchange rate and total value transaction, depreciation of exchange rate may lead people to convert their tugrug to foreign currency and interest to participate in stock market may affect to value of transaction.

From analysis which we made above, we can see that correlation between stock market development indicators, banking sector's financial deepening indicators, economic growth and macro economic environmental variables is wheter positive or negative and how was power of that correlation. Since this analysis can't give us result of direction and lag of

variables, we will show direction and lag of these variables by using granger Gausality test in following section.

### **3.2.2 Direction of Granger Causality**

Granger causality tests have been widely used in studies of financial markets as well as several studies of the determinants of economic growth including savings (Carroll and Weil, 1994); exports (Rahman and Mustafa, 1997, Jin and Yu, 1995); government expenditures (Conte and Darrat, 1988); money supply (Hess and Porter, 1993); and price stability (Darrat and Lopez, 1989).

A limited number of previous studies have used Granger causality to examine the link between financial markets and growth. Thornton (1995) analyzes 22 developing economies with mixed results although for some countries there was evidence that financial deepening promoted growth.

Luintel and Khan (1999) study 10 developing economies and find bi-directional causality between financial development and economic growth in all the sample countries. Spears (1991) reports that financial intermediation induced economic growth in Sub-Saharan Africa in the early stages of development, while Ahmed and Ansari (1998) report similar results for three major South-Asian economies. Demetriades and Hussain (1996) report “very little evidence that finance is a leading sector in the process of economic growth” in a sample of 10 countries, while Neusser and Kugler (1998) report that financial sector GDP Granger-caused manufacturing sector GDP in a sample of thirteen OECD countries.

In Mongolia, financial deeping (measured by money, M1 divided by GDP) and exchange rate are Granger cause of stock market total value of transaction with 6 months lag and interest rate only affects with 3 months lag. Whereas economic growth and other variables are not Granger cause of the total value of transaction. Economic growth and financial deeping are Granger cause of stock market development indicator (measured by market capitalization divided by GDP), with 3-8 months lag. From that we can say that these variables are directed to stock market development indicators and affect after relatively long period. For others, they don't Granger cause of stock market development indicators.

Furthermore, Interest rate and Exchange rate are Granger cause of stock market activation variables turnover ratio and lagged with 4-7 months. Also, there is evidence that the turnover ratio may be cause of changes of interest rate lagged wit 4 months. For financial deeping variable, it becomes Granger cause of the turnover ratio with 7 months lag. That means, As far as longer lag leads to that banking sector financial deeping is tended to stock market.

## IV. EMPIRICAL ANALYSIS OF RELATIONSHIP BETWEEN MONETARY POLICY AND STOCK MARKET IN MONGOLIA

### 4.1 Impact of Monetary Policy on Bond returns

The theoretical issues of the relationship between monetary policy and capital market in Mongolia have been analyzed by D.Boldbaatar (2003). Although, in our paper, the structural VAR model analyses the effect of monetary policy instruments such as inflation, lending rate, Central Bank Bills rate, exchange rate, money supply on bond market return (Top-20 index). At the same time, the paper determines empirically if the development of bond market causes any changes in monetary policy.

Monetary policy affects the decision making process of economical agents. In this sense the monetary policy has direct effect on such important macro economic indicators as real GDP, consumption, investment. Through monetary policy instruments, the Central bank may affect the interest rate and money supply; moreover, the policy may cause changes in economical behavior. Therefore, it is extremely important to determine if the monetary policy affects capital market returns.

We used a simple model of stock returns presented by Crowder (2004). The most widely used model to describe the valuation of assets is the present value model. The present value model models the stock price ( $P_{t+1}$ ) as the present discounted value of the future expected cash flows ( $D_{t+j}$ ). This is expressed as,

$$P_{t+1} = E_t \left[ \sum_{j=1}^K \left( \frac{1}{1+R_t} \right)^j D_{t+j} \right] + E_t \left[ \left( \frac{1}{1+R_t} \right)^K P_{t+K} \right]$$

where  $E_t$  is the conditional expectations operator based on information available to market participants at time  $t$ ,  $R_t$  is the rate of return used by market participants to discount future values and  $K$  is the investor's time horizon or holding period. Imposing the standard transversality condition that as  $K$  gets large the last term on the right vanishes<sup>7</sup> and dividing both sides by  $P_t$  yields an expression for stock returns.

From the equation it can be seen that monetary policy can affect stock returns in two distinct ways. First, policy can alter expected future cash flows of the firm and thereby alter the return on the firm's stock. This channel generally relies on the effects of monetary policy on the aggregate economy. A monetary easing, a decrease in the federal funds rate, will increase the overall level of economic activity. This will in turn raise the earnings of firms in the economy and cause stock prices to rise. The effects of a monetary tightening will reduce overall expected firm profitability and stock returns. The second, and probably more direct, way that policy affects stock returns is by altering the discount

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<sup>7</sup> Price bubbles are the result of violations of this transversality condition.

rate used by market participants. It is believed that discount factors used by equity market participants are tied in a general way to market rates of interest. Therefore, the Fed's ability to alter discount rates is linked to its ability to alter other market rates of interest.

Fuhrer (1995) finds that the federal funds rate is the source of changes in many longer term interest rates. A tighter monetary policy raises the federal funds rate, which increases the discount rate, in turn causing stock prices to decline. Both of these channels are generally reinforcing since a tighter monetary policy usually implies both higher discount rates and lower future cash flows. In the present study,<sup>8</sup> therefore, we make no attempt to distinguish between the two channels of transmission.

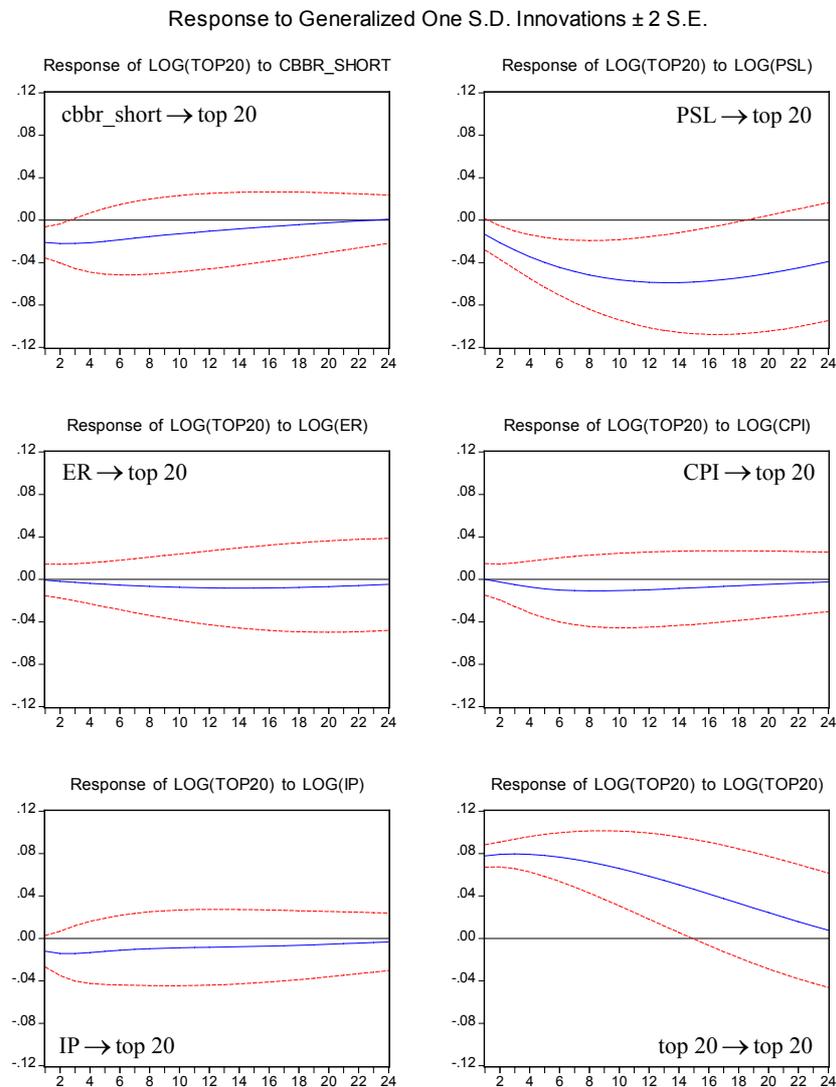
In this section, we examine the multivariate relationship between stock returns and monetary policy by using the VAR methodology. From the VAR we are able to conduct dynamic response analysis to determine the temporal relationship between bond returns and macroeconomic variables (include variable of monetary policy). In the analysis, data permitting, we observed the monthly data from the January, 1998 to March, 2007. The data used are in log levels and are not seasonally adjusted, except for interest rates, which are just in levels. For the monetary policy rate we use the short-run central bank's bill rate (weighted average of the bill rates of 7,14,28 days). Facing the relatively short data sample and based on VAR lag order selection criteria (we prefer the Schwarz test for lag order selection), we decided to use the lag of order one.

Figure 4 displays the impulse response functions (IRFs) for the macroeconomic variables (including variable of monetary policy) and Bond return (top 20 index) obtained using Generalized Impulses as described by Pesaran and Shin (1998).

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<sup>8</sup> Which of these channels is operative is of course an interesting question in and for itself, but is not addressed directly here. A recent study of these issues can be found in Bernanke and Kuttner (2003).

**Figure 4. Impulse Response Function of Top-20 Index to change in Macroeconomic variables**



Where: TOP-20- TOP-20 Index of Bond Market, CBBR\_SHORT- Short-run Central Bank's Bill Rate, PSL- Credit to Private Sector, ER- Togrog Exchange Rate against to USD, CPI- Consumer Price Index, IP- Industrial Product.

**Source: Author's calculation**

Top-20 index begins to be affected by short term CBBs policy changes after 1-3 months. That is slashing down CBB rates makes TOP-20 index decrease for 1-3 months. However, the variance decomposition analysis assumes the effect of this channel to be somewhat relatively weak (see Appendix 2).

Changes in domestic credit to the private sector may affect TOP-20 index in 1-18 months period. That is, any increase of loans granted by commercial banks to the private sector this month may result in decrease of the index after 1.5 years and according the variance decomposition analysis such an effect increases over time. This kind of relationship

reflects banking system and bond market inter-substitution or to be more precise, the dominance of the former over the latter.

Changes in CPI, exchange rate against USD, or industrial product seem to have no effect on TOP-20 index. This is because the interest rates in banking and bond markets include much of the inflation and expectations. Growth in Mongolian industry seems does not cause any increase in either bond amount, or its price.

In summary, two interesting results are obtained from the above regression. First, Central Bank's Bill rate and domestic credit to private sector are important predictors of bond returns. Second, the CPI, exchange rate against USD, or industrial product do not play an important role in bond returns determination in Mongolia.

#### **4.2 Macroeconomic Determinants of Bond Market Development**

We used an econometric model of bond market development preferred by Garcia (1999). Garcia (1999) explained there are two approaches to assess stock market capitalization. These are:

1. Institutional approach. It looks at institutional factors such as property rights, clearance and settlement issues, transparency and the inside information problems, taxation issues, and accounting standards.
2. Macroeconomic approach. It looks at factors such as income growth, savings and investment, financial development, and inflation.

As we know, both institutional and macroeconomic factors are important in stock market development. Pagano (1993) shows that regulatory and institutional factors may influence the functioning of stock markets. For example, mandatory disclosure of reliable information about firms may enhance investor participation, and regulations that instill investor's confidence in brokers should encourage investment and trading in the stock markets.

However, we take the macroeconomic approach in this study. There are three reasons for doing so (Garcia and Lin Liu (1999)).

**First**, accurate information on institutional variables is limited for many of our sample countries.

**Second**, to our best knowledge, macroeconomic determinants of stock market development have not been studied before, while institutional determinants have. For example, using data from forty-nine countries, La Porta, Lopez-de-Silanes, Shleifer and Vishny (1996) find that institutional variables such as rule of law, antidirector rights and one-share=one-vote are important predictors of stock market development. Furthermore, some authors take the institutional approach for an individual country. For example, Miller (1991) finds that in Sweden the (securities) transaction tax was, by far, the highest

in the world. Similarly, Ness and Martinez (1997) examine the effects of the institutional factors on Argentine and Brazilian stock markets.

**Third**, institutional factors are directly reflected in macroeconomic factors. It has been shown that some institutional measures such as legal rule are highly correlated with stock market liquidity, while stock market liquidity is one of the macroeconomic determinants we examine in this paper. For example, Demirguc-Kunt and Levine (1996b) find that countries with well-developed regulatory and institutional systems tend to have large, liquid stock markets.

This analysis focuses on the determinants of bond market capitalization - defined as the total market value of all listed shares - as a proxy for bond market development. We conduct time series analysis (VAR) on data from January, 1998 to March, 2007. We chose explain variables are following:

1. Consider *real income and income growth rate*. Real income has been found to be highly correlated with the stock market size. Higher volume of intermediation through stock markets causes higher real income growth. High income growth in turn promotes development in the stock market. As income increases, its cyclical component should impact the size of the stock market and its price index. In addition, because higher income usually goes hand in hand with better defined property rights, better education, and a better general environment for business, we expect it to have a positive effect on the stock market size<sup>9</sup>. We use **real industrial product** to measure the income level and calculate the real income growth rate.
2. Consider *financial intermediary development*. Since both the banking sector and stock markets intermediate savings towards investment projects, they can be either complements or substitutes<sup>10</sup>. From the “demand for funds” point of view, the Modigliani-Miller theorem (1958) states that in a perfect market with symmetric information, the market value of all the securities issued by a firm is independent of the firm’s source of finance and consequently firms could go either to the banking sector or to the stock markets to finance their capital. From the “supply of funds” point of view, in the short run the relationship might be negative because of arbitrage between interest rates and stock market returns, but in the medium and longer term investors would probably want to diversify their financial assets and spread their

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<sup>9</sup> The institutional approach of La Porta and others (1996) sheds some light on the rationale for positive income effect on stock market size. Their regressions find that per-capita income is a crucial variable in explaining the enforcement of legal rights and the quality of accounting standards, which are important predictors for stock market development.

<sup>10</sup> Demirguc-Kunt and Levine (1996a) and Garcia and Liu (1999) find that across countries the level of stock market development is positively correlated with development of financial intermediaries. Thus, they conclude that stock markets and financial institutions are generally complements and they growth simultaneously. In contrast, Garcia (1986) finds that many developing countries have had many episodes of intermittent monetary policies with immediate consequences on banking credit. By changing credit in an exogenous way the central bank may create a negative correlation between banking credit and other sources of finance.

savings between the banking sector and stock markets. The substitutes or complements issue could be country specific due to special incentives to obtain debt or equity financing.

To evaluate whether stock market development is significantly correlated with financial intermediary development, we include the measures of financial intermediary development in the regressions. Two empirical indicators are used to measure the financial intermediary development. One is **domestic credit to the private sector**, and the other is **total loan in the banking sector**.

3. Consider *stock market liquidity*. Liquidity is usually defined as the ease and speed at which agents can buy and sell securities. It is one of the most important functions the stock markets provide (Miller, 1991). Many high-return projects require a long-run commitment of capital, which bears higher default and liquidity risks. Investors are generally reluctant to take these risks. Thus, without liquid stock markets less investment may occur to the high-return projects. In contrast, liquid stock markets allow investors to alter their portfolios quickly and cheaply, it makes investment less risky and facilitates longer-term, more profitable investments (Levine (1991) and Bencivenga, Smith and Starr (1996)). Consequently, the more liquid the stock market, the larger amount of savings are channeled through stock markets. Therefore, we expect a more liquid market to lead to higher market capitalization. We use **total value traded** to measure the bond market liquidity.
4. Consider *macroeconomic and bond market stability*. General macroeconomic stability may well be an important factor for the development of the stock market. We expect that the higher the volatility of the underlying economic situation the less incentive firms and savers would have to participate in the market. Furthermore, the profitability of corporations can experience sharp movements due to unexpected changes in economic policies such as monetary policy, fiscal policy, exchange rate policy and trade policy. Hence, we expect that stock markets in countries with volatile macroeconomic conditions would also have volatile price indexes and market capitalization. Theoretically both bond market volatility and macroeconomic volatility are hypothesized to have negative effects on stock market capitalization. So that, to evaluate the effects of bond market stability on market capitalization, we use one proxy for bond market stability: **a twelvemonth rolling standard deviation of bond market price index (Top 20 index)**. We cleanse the return series of monthly means and twelve months of autocorrelations using the procedure defined by William G. Schwert (1989).

Even though the effects of macroeconomic volatility on market capitalization might be ambiguous, we expect high volatility to have a negative effect on market capitalization<sup>11</sup>. To evaluate the effects of macroeconomic stability on market capitalization, we use two proxies for macroeconomic stability: **inflation rate, and inflation change**. First, we use the inflation rate to measure macroeconomic stability. Second, we use the difference of inflation rates to measure macroeconomic stability.

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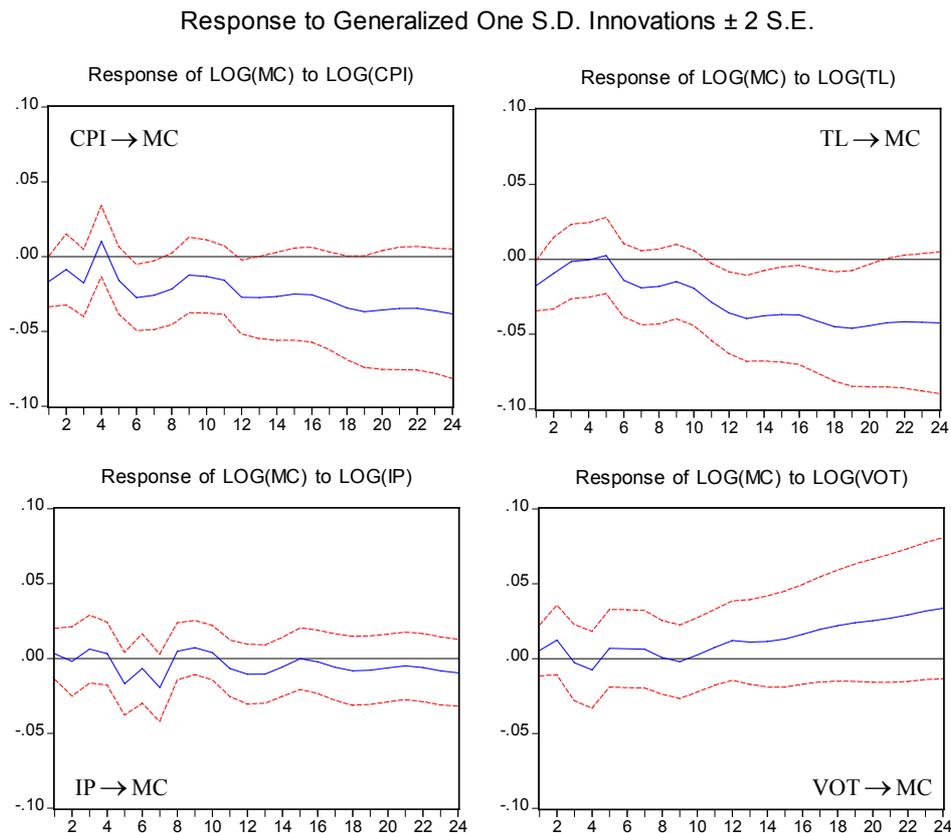
<sup>11</sup> Demirguc-Kunt and Levine (1996b) claim that “greater volatility (in the stock market) is not necessarily a sign of more or less stock market development. Indeed, high volatility could be an indicator of development.”

We calculate the change of this year's inflation rate from last year. Inflation change is used because we believe that high, stable inflation may not represent much instability, but inflation rates that bounce around a lot probably do represent macroeconomic instability.

In the following section, we examine the macroeconomic determinants of bond market development (in Mongolian case) by using the VAR methodology. From the VAR we are able to conduct dynamic response analysis to determine the temporal relationship between bond market development (proxy by bond market capitalization) and macroeconomic variables. In Data permitting, we observed the monthly data from the January, 1998 to March, 2007. The data used are in log levels and are not seasonally adjusted. We decided to use the lag of order five based on VAR lag order selection criteria (lag of order 5 selected by LR test statistic, Final prediction error (FPE) and AIC).

Figure 5 displays the impulse response functions (IRFs) for the macroeconomic variables and bond market development (market capitalization) obtained using Generalized Impulses as described by Pesaran and Shin (1998).

**Figure 5. Impulse Response Function of Top-20 Index to change in Macroeconomic variables**



Where: MC- Capitalization of Bond Market, CPI- Consumer Price Index, TL- Total Loan, VOT- Value Traded of Bond market, IP- Industrial Product.

**Source: Author's calculation**

From the figure, it can be seen that after 5 months consumer price index cause an decrease in market capitalization with the peak effects occurring after 6-7 months. Effect of this channel is statistically significant and weak. And its variance decomposition analysis assumes the effect of this channel to be somewhat weak (see Appendix 3). This shows that the Bank of Mongolia's eventual objective of keeping price level at stable and low level has favorable effect on bond market development.

However shock to the total loan tends to decrease market capitalization after 11 to 20 months. Effect of this channel is strong and statistically significant (see Appendix 3). This again proves that there are uneven developments between banking system and capital market, and that the former is far ahead than the latter.

Shock to (an increase) industrial product and value of transaction initially tends to decrease the market capitalization in 2 to 4 months and in 1 to 3 months are statistically not significant, respectively (see Appendix 3). This shows that the expansion of industrial sector does not find favorable reflection on capital market as an important channel of attracting funds. Instead, necessary funds are obtained in the form of banking loans or foreign direct investments.

In summary, two results are obtained from the above this analysis. First, the macro economic stability (measured by the CPI) and financial intermediary development (measured by total loan divided by GDP) are important predictors of bond market capitalization. Second, the real income level (measured by Industrial Product) and bond market liquidity (measured by turnover ratio) does not play an important role in bond market capitalization determination in Mongolia.

## **V. POLICY IMPLICATIONS AND CONCLUSIONS**

In this paper, we measured the bond market development in Mongolia, analyzed in some detail the stock markets response to monetary policy actions, and studied determinants (include monetary policy variables) of Mongolian bond market development. We find that bond market in Mongolia remain underdeveloped compared to markets in Latin America, East Asia, developed countries and some countries of ESCAP Member States (Pakistan and Sri Lank).

We used time series data for Mongolia from January, 1998 to March, 2007. Simple correlation analysis shows that the relationship between economic growth and financial intermediation is negative; however it is not strong and statistically not significant. Analogously correlation between GDP growth and money supply, bond market development indicators, which are turnover ratio, ratio of total value of transaction to GDP and volatility of top 20 index variables are positively, but these relationship are not significantly.

Granger causality test shows that with the lag period of 3-6 months financial deepening and economic growth highly interrelated (level of significance 1%). The longer the lag period the more the probability that economic growth causes financial deepening. The indicators of capital market do not cause changes in economic growth, financial

deepening or macro environment. However, economic growth, loan interest rate, exchange rate and financial deepening do affect capital market development with the lag of 3-8 months.

The correlation and Granger causality analysis show that the Tobin's q-channel of monetary policy transmission is ineffective; that is the channel through which money supply increases investments and economy via affecting capital price is not valid in the case of Mongolia. The Granger test results, however, indicate that other channels might be effective, so further research works are required in this field.

Also, this study analyzes the dynamic relationship that exists between bond returns (top-20 index) and monetary policy by employing VAR analysis. This analysis shows Top-20 index begins to be affected by short term Central Banks Bill (CBB) policy changes after 1-3 months. However, the variance decomposition analysis assumes the effect of this channel to be somewhat weak. And changes in loans granted to the private sector may affect TOP-20 index in 1-18 months period. This kind of relationship reflects banking system and bond market inter-substitution or to be more precise, the dominance of the former over the latter. Changes in CPI, exchange rate against USD, or industrial output seem to have no effect on TOP-20 index.

It might be concluded that the effect of monetary policy and macro economic indicators on bond market development is consistent with theory; however the effect is lagged and relatively weak. The lack of strong relationship between monetary policy and capital market development indicates that the former is still far from the level where it can contribute capital market, and that the phase of their relationship could be regarded as immature.

We measure bond market liquidity by the total value of transaction, real income by real industrial product and financial intermediary development by total loan in banking sector. We use the consumer price index (CPI) to measure the macro economic stability. We find the macroeconomic stability and financial intermediary development is important predictors of bond market capitalization, while the real income level and bond market liquidity does not prove significant. We also determined that financial intermediation and bond market are substitutes rather than of complements.

These findings have important policy implications for Mongolian Bond Market development. First, macroeconomic stability (measured by CPI) plays an important role in bond market development. So that, the ultimate objective of the Bank of Mongolia aimed at keeping price stability and low level decreases the risk perception related to instability and thus has favorable effect on bond market development. Second, bond market liquidity and real income do not effect on the market development. It is related to underdevelopment of the bond market.

Third, in the other developing and developed countries, financial intermediaries can promote stock market development (many East Asian countries are successful examples). However, the bond market is a substitute rather than complement for the banking sector or developing financial intermediaries discourage stock market development in

Mongolia. One of the reasons that with the 90% of the market share, the commercial banks play crucial role in the financial market, therefore the stock market is traditionally not seen as a main provider for funding. The development of stock market lags far behind the banking sector. We may not say that the stock market is hold back by the banking sector; however, the very sluggishness of the stock market makes the banking sector be perceived as reliable and fast developing. So that policy measures aimed at increasing the public awareness of stock market and promoting greater participation from market players should be taken in order to boost up the stock market. For example, the Government of Mongolia could consider the possibility of issuing bonds not only for financing budget deficits but also for funding long term investment projects. Likewise, the Bank of Mongolia could re-consider the current situation when CBBs are only auctioned to commercial banks through inter-bank market. The CBBs could also be sold to the general public through the stock market.

Fourth, unreasonably high interest rates in the banking sector, and as a result high interest rates paid for bonds hinder the stock market development. Strong and inefficient competition for funds between banks, banks and savings & credit cooperatives leads to unreasonable high deposit rates. Investors (individuals, entities) in this case would prefer to keep their funds in the form of deposits rather than bonds. High deposit rates, in turn, lead to high lending rates. As an alternative, companies seek possibilities to issue bonds to attract cheaper funds. However, stock market data are not readily available for potential bond buyers; the companies' short financial history and their unfamiliarity to general public, sluggishness of the capital market discourage active trade of securities. Moreover, for companies bond-issuing seems to be more costly and time consuming process rather than referring to commercial banks. On the other hand, deposit rates paid on togrog-denominated deposits differ significantly from those paid on dollar-denominated ones. All the transactions on the stock exchange are made and measured in national currency unit; therefore interests paid to bond remain high.

Fifth, BoM to start making preparations for a shift from monetary policy based on reserve money targets to adopting a new framework of monetary policy of inflation targeting in the next few years. This is motivated by difficulties in conducting monetary aggregate targeting due to the ongoing re-monetization process in the Mongolian economy and the volatility of the money multiplier. Within this the Bank of Mongolia looks at updating Central Bank Bills regulations so that CBB rate is perceived as monetary policy rate and setting inter-bank short term rate as monetary policy target. By achieving this, the Bank of Mongolia would be able to have strong interest rate channels, and effectively influence bond market return and macroeconomic performance.

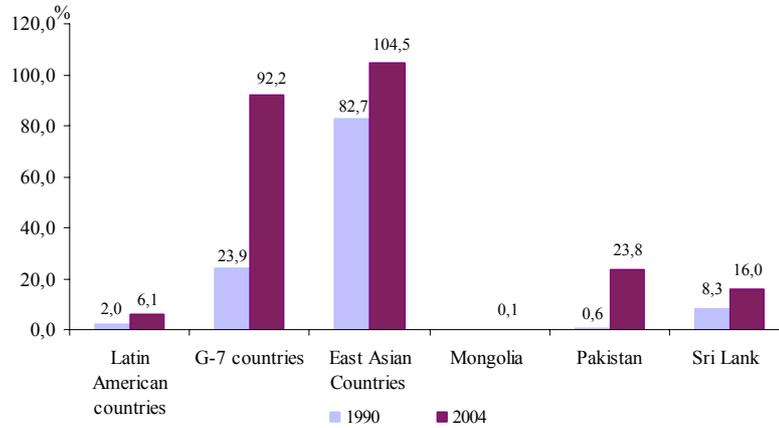
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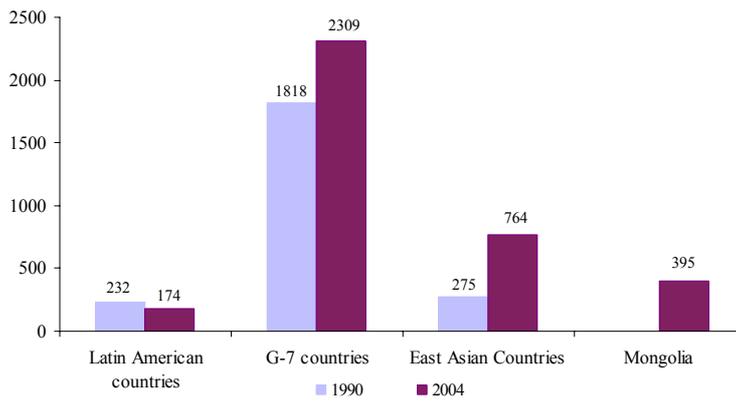
## APPENDIX 1. Domestic Stock Market Development

### A) Domestic Stock Market Development across Countries: Value Traded domestically/ GDP



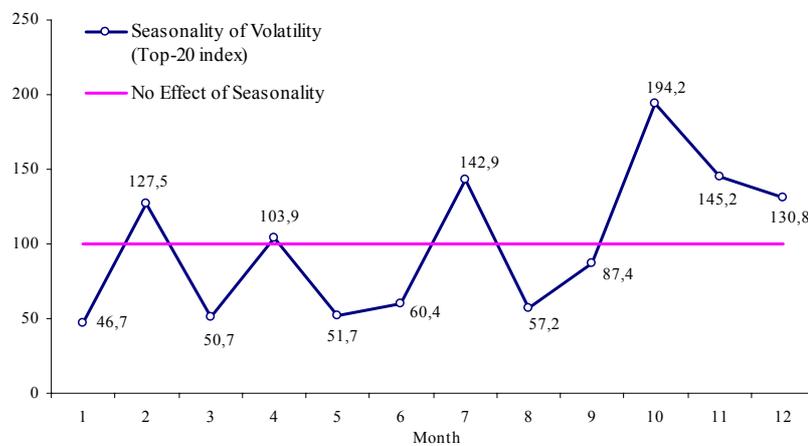
Source: World Bank, Torre and Others (2006) and Authors' calculation

### B) Domestic Stock Market Development Across Countries: Number of Listed Domestic Firms



Source: Torre and Others (2006) and Authors' calculation

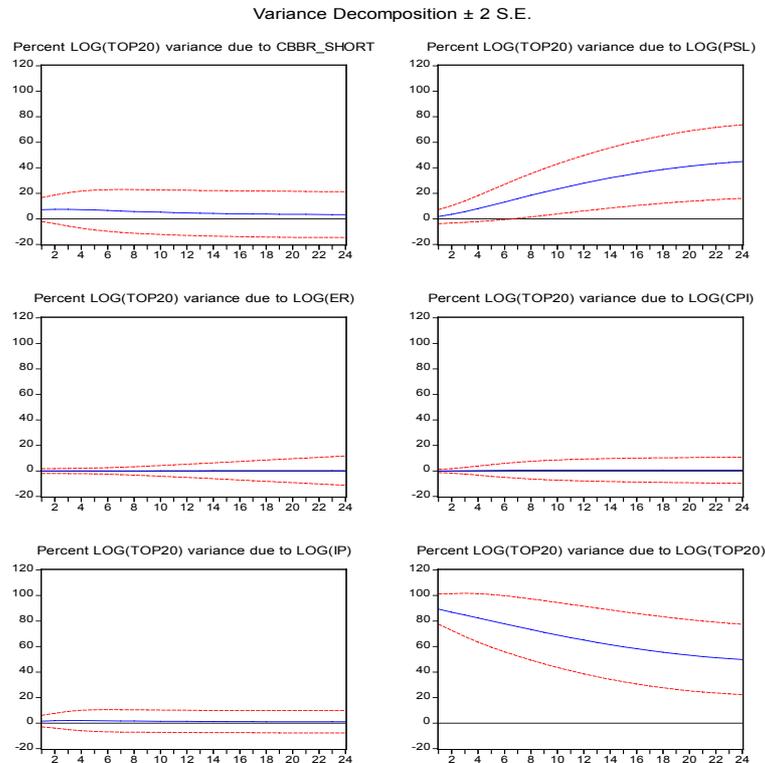
### C) Seasonality of Volatility (Top-20 index), calculated by Census X-12-ARIMA method



Source: Authors' calculation

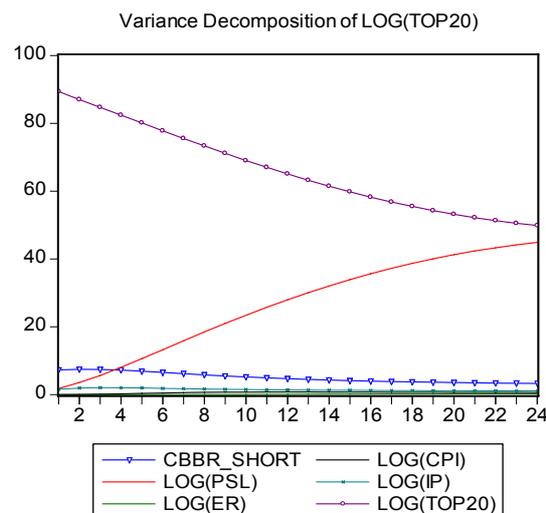
## APPENDIX 2. Variance Decomposition of the Returns (top-20 index)

### A) The decomposition by Multiple Graphs



Where: TOP-20- TOP-20 Index of Bond Market, CBBR\_SHORT- Short-run Central Bank's Bill Rate, PSL- Credit to Private Sector, ER- Togrog Exchange Rate against to USD, CPI- Consumer Price Index, IP- Industrial Product.  
**Source: Authors' calculation**

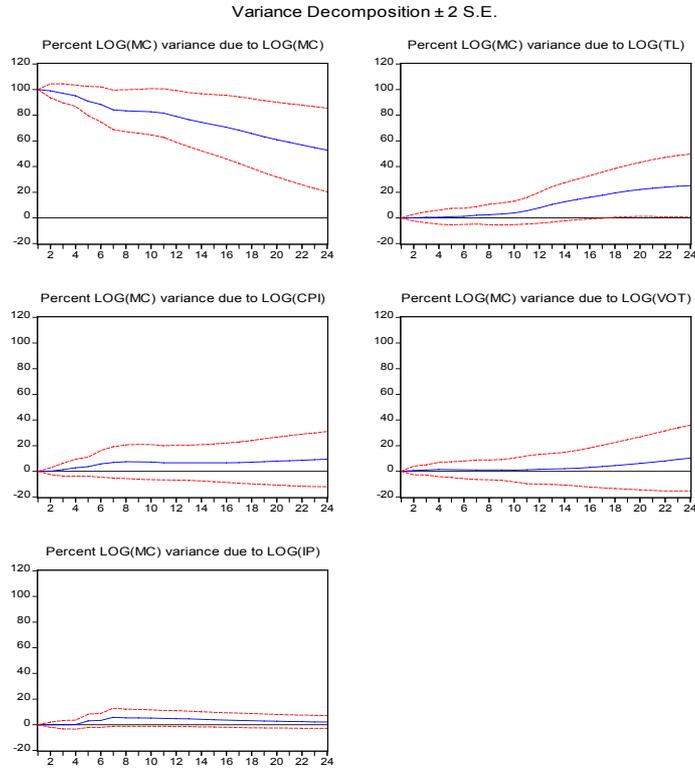
### B) The decomposition by Combined Graphs



Where: TOP-20- TOP-20 Index of Bond Market, CBBR\_SHORT- Short-run Central Bank's Bill Rate, PSL- Credit to Private Sector, ER- Togrog Exchange Rate against to USD, CPI- Consumer Price Index, IP- Industrial Product.  
**Source: Author's calculation**

### APPENDIX 3. Variance Decomposition of Bond Market Capitalization

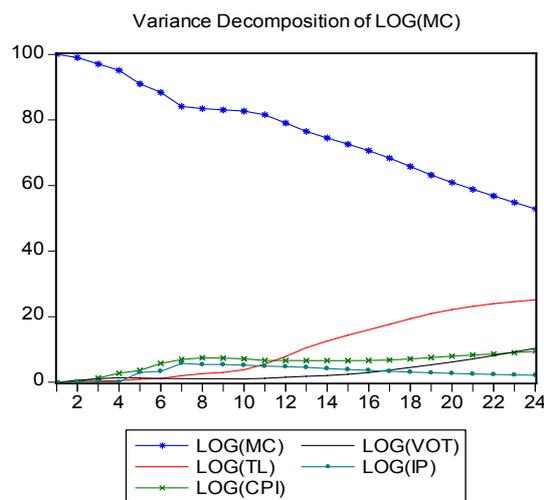
#### A) The decomposition by Multiple Graphs



Where: MC- Bond Market Capitalization, TL- Total loan of Banking system, CPI- Consumer Price Index, IP- Industrial Product, VOT- Value of Transaction, IP- Industrial Product.

Source: Authors' calculation

#### B) The decomposition by Combined Graphs



Where: MC- Bond Market Capitalization, TL- Total loan of Banking system, CPI- Consumer Price Index, IP- Industrial Product, VOT- Value of Transaction, IP- Industrial Product.

Source: Author's calculation

**APPENDIX 4. Correlations between indicators of Bond Market, banking sector and Economic Growth, Macroeconomic variables**

	<b>GROWTH</b>	<b>DCPY</b>	<b>M1Y</b>	<b>QMY</b>	<b>MCY</b>	<b>TOR</b>	<b>TVT</b>	<b>VOL</b>	<b>LNS</b>	<b>LOANRATE</b>	<b>P12</b>	<b>CBBR</b>
<b>GROWTH</b>	1	-0.047	-0.173	-0.159	-0.309	0.145	0.047	0.114	0.017	-0.058	-0.023	0.173
<b>DCPY</b>		1	0.535	0.928	0.157	-0.415	-0.421	0.165	0.495	-0.587	-0.539	-0.436
<b>M1Y</b>			1	0.764	0.596	-0.368	-0.379	-0.188	0.595	-0.589	-0.054	-0.628
<b>QMY</b>				1	0.395	-0.463	-0.447	0.052	0.598	-0.631	-0.365	-0.582
<b>MCY</b>					1	-0.115	0.050	-0.110	0.066	0.032	-0.169	-0.211
<b>TOR</b>						1	0.946	0.005	-0.659	0.547	0.219	0.655
<b>TVT</b>							1	0.041	-0.776	0.662	0.139	0.729
<b>VOL</b>								1	-0.080	0.158	-0.139	0.063
<b>LNS</b>									1	-0.813	-0.006	-0.866
<b>LOANRATE</b>										1	0.078	0.716
<b>P12</b>											1	0.048
<b>CBBR</b>												1

Notes: DCPY= Domestic Credit to Private Sector divided by GDP, in percent; LOANRATE- Loan rate, in percent; M1Y- Money, M1 divided by GDP, in percent; MCY- Market capitalization divided by GDP, in percent; P12- annual inflation, in percent; QMY- Quasi money divided by GDP, in percent; GROWTH- Economic Growth, calculated by monthly, in percent; TOR- Turnover ratio, in percent; TVT- Total value of transaction divided by GDP, in percent; VOL- Volatility of top 20 index; CBBR- Central Bank's Bill rate;

**Source: Author's calculation**