CAPITAL FLOWS AND THEIR IMPLICATION FOR CENTRAL BANK POLICIES: THE CASE OF MONGOLIA[**]

by
Gan-Ochir Doojav[*]
doojav_ganochir@yahoo.com
December 2008

1. General Framework and Major Capital Flows Management Policies

1.1 General Framework

At the beginning of the transition to market economies, Mongolia had relatively closed capital accounts. In Mongolian case, economic liberalization, such as reduction of price controls, floating exchange rates, the privatization of state-owned enterprises and trade and capital liberalization processes, was implemented in 1990s. Most of the changes had occurred between 1990 and 1993. Also The Government of Mongolia has accepted the obligations of Article VIII, Sections 2, 3, and 4 of the IMF Articles of Agreement, with effect from February 1, 1996[1]. The implementations of the current and capital account liberalization have had both negative and positive impacts in the economy.

Mongolia was the first country in transition to join the World Trade Organization (WTO) in January 1997. The opening-up of Mongolian markets (foreign trade liberalization) as well as the integration into the multilateral trading system under the WTO has created not only new opportunities and prospects for economic development of Mongolia but also limitations and restrictions for its domestic policies.

Like other SEACEN countries, liberalization of financial market and capital account has resulted in large capital inflows in Mongolia. On the other hand, the inflows were motivated by good macroeconomic performance and strong demand of foreign investors in mining and financial sectors. The large capital inflows has financed a higher economic growth, although it has created pressures that lead to inflation, real appreciation of the exchange rate, and a reduction in the domestic interest rate in recent years. Furthermore, due to those negative impacts, analysis of determinants of capital flows and its macro economic impacts and the determination of possible authorities' policy management for capital flows are required.

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[*] *Economist at the Monetary Policy and Research Department of the Bank of Mongolia. Opinions expressed in this paper are of the author and do not necessarily correspond to the opinions of the institutions he works for.*
[**] *This paper was written for research studies series of the South East Asian Central Banks (SEACEN) Research and Training Centre.*

[1] IMF members accepting the obligations of Article VIII undertake to refrain from imposing restrictions on the making of payments and transfers for current international transactions or from engaging in discriminatory currency arrangements or multiple currency practices without IMF approval.

Capital inflows is expected to increase massively due to the fact that large Mining projects (Oyu tolgoi and Tavan tolgoi) planned to be implemented in coming years, financial investment in commercial banks is increasing. Thus, the importance of the topic was not considered as significant previously, but now many policy makers are paying attention to it.

This paper examines the evidence on recent developments in capital flows empirically, the determinants of capital flows, impact of capital flows on monetary and financial variables, and review of policy management of capital flows in Mongolia. This type of paper has not been written in Mongolia before. Thus to make review of literature in Mongolian case and to compare some results with other papers' results were impossible.

1.2 Policies Implemented to Manage Capital Flows

Capital inflows may lead to inflationary pressures, to real exchange rate appreciation, which can reduce international competitiveness, and to rapid growth of monetary aggregates and credit, and banking sector problems, if the inflows are not properly intermediated. So capital inflows worry policy makers. The impact depends on the volume of flows, the macroeconomic policy framework, the microstructure of the flows, and incentives in the financial sector. In Mongolian case, current and capital account were almost fully liberalized in earlier 1990s. Present capital flow management framework is as follows:

- Nonresidents can purchase local bond and other debt securities;
- Commercial credits to and from nonresidents are allowed;
- Investment by private corporations in export promotion, use of advanced technology, and the exploloration of natural resources are encouraged;
- Sales or issue of capital market securities, money market securities, derivatives and other instruments by nonresidents are prohibited;
- Gold mining companies are not required to register their exports at the Bank of Mongolia (BOM) or a commercial bank.

Nowadays Mongolian authorities do not use any direct controls to react to capital flows. However they implement policies to reduce the negative effects of capital flows.

1.2.1 Exchange rate policy

A country with high inflows is to let the nominal exchange rate appreciate in response to capital inflows. Calvo, Leiderman and Reinhart (1998) noted that a disadvantage of a pure float is that massive capital flows may induce rapid nominal and real appreciation which may damage strategic sectors of the economy, like non-traditional exports and it could rise to adverse effects on the trade balance.

The BOM shifted to floating exchange rate regime in May 1993 and then moved to managed floating regime in 2001. For the BOM, interventions are officially limited to

smoothing severe volatility in the foreign exchange market, using the US$ as the principal intervention currency. In reality, the BOM has been a net seller of foreign exchange in the interbank market.

IMF staffs' report (January 2007) documented that the impact of the BOM's intervention on the market rate is limited. The BOM's interventions are atypical of central banks' interventions, whereby the central banks buy or sell foreign exchange in order to affect the exchange rate level. Nevertheless, the impact could still be significant, given that these interventions are relatively large. Also the report concludes that the interventions may have reduced the magnitude of the appreciation/depreciation (in other words, the volatility), but have not fundamentally changed the trend of exchange rate movements.

1.2.2 Monetary policy

Sterilization is used in several countries as the popular policy. This policy aims to mitigate inflationary pressures, the real exchange rate appreciation and to avoid the loss of control over the domestic money stock.

Before 2007, without sterilization, capital inflows lead to reserve money and money supply injection into the economy, which can contribute inflation. Furthermore recent years' real exchange rate appreciation is effected through higher inflation in Mongolia. In fact, the increase in the reserve money in Mongolia has been largely driven by an increase in net international reserves (NIR) before 2007. IMF staff (January 2007) calculated the sterilization coefficient as the ratio of the change in Central bank bills (CBBs)[2] to the change in NIR. The short-term elasticity is estimated around 60-70% and even long-run elasticity is less than 80%. Also they conclude that sterilization through CBBs issuance was not sufficient and the effectiveness of monetary policy may be dampened.

Since July 2007, excess liquidity in the inter-bank market, reserve money and growth of monetary aggregates has decreased and the sterilization coefficient has risen due to revision of the regulation on CBBs auction. In the economy, decreases in growth of monetary aggregates reduce inflationary pressure with lags of 3-5 quarters. Section 4.3 considers the issue of sterilization policy from the BOM in more detail.

1.2.3 Fiscal Policy

The government of Mongolia has revised the profit tax and income tax rates to encourage the FDI by private corporations in January 2007. The government has not imposed any taxes and restrictions on capital flows. Calvo, Leiderman and Reinhart (1996) noted that a policy reaction to the surge in capital inflows is to tighten fiscal policy (cut in public expenditures)

[2] BOM issue CBBs to observe excess liquidity from the banking sector.

and this policy may be effective in limiting the appreciation of the real exchange rate. In case of Mongolia, fiscal policy expansion has continuously increased due to government transfer for social purpose, increased pensions and wages of state employees since 2005. For example, fiscal expenditure increased from 27.5% of GDP in 2005 to 38.4% in 2007. The funds for public expenditure has provided by windfall tax income of gold and copper. The expansion has led to high monetary growth, accelerating inflation and appreciation of REER.

2. Trends of Capital Flows in Mongolia

2.1 Key Macroeconomic Indicators

Economic growth in Mongolia has been strong in recent years. Capital inflows, of which foreign direct investment – especially in mining and construction activities and Mongolian workers' remittances have increased significantly in recent years pushing GDP growth. Annual real GDP growth has averaged to 8.4% since 2003 due to high world prices of gold and copper. As illustrated in Figure 1, there is a strong empirical positive correlation between GDP growth and net capital flows, especially during last 3 years.

Figure 1
**Capital Flows and GDP Growth Rates**
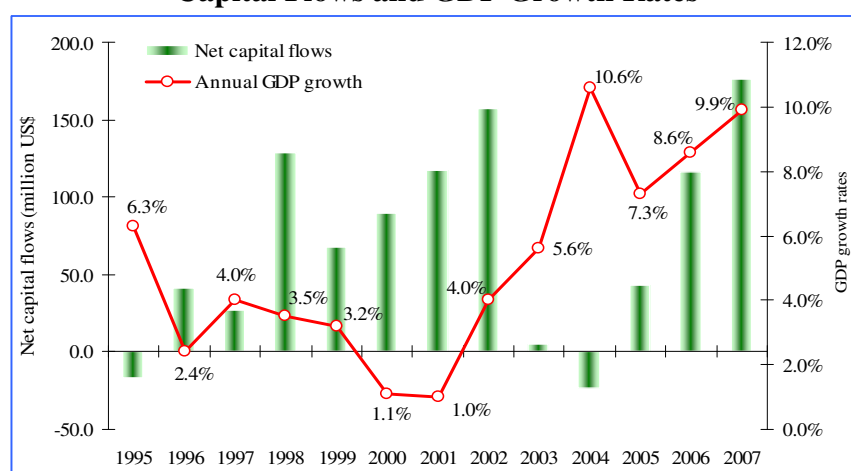
Source: The Bank of Mongolia and National Statistical Committee

Mongolian economy grew nearly 5% per year between 1995 and 2007, while receiving net capital flows of nearly 5.8% of GDP.

As economy being open to external shocks, inflation has been relatively volatile; however in low level (1.6-11.0%) between 1998 and 2006. Strong supply shocks, such as increases of petroleum and food prices have mainly been responsible for inflation volatility. Inflation rate jumped from 6% in 2006 to 15.1% in 2007, due to supply side shocks (rapid increase of oil and food price in the world market), fiscal expansion, rapid monetary growth and structural bottleneck (Figure 2).
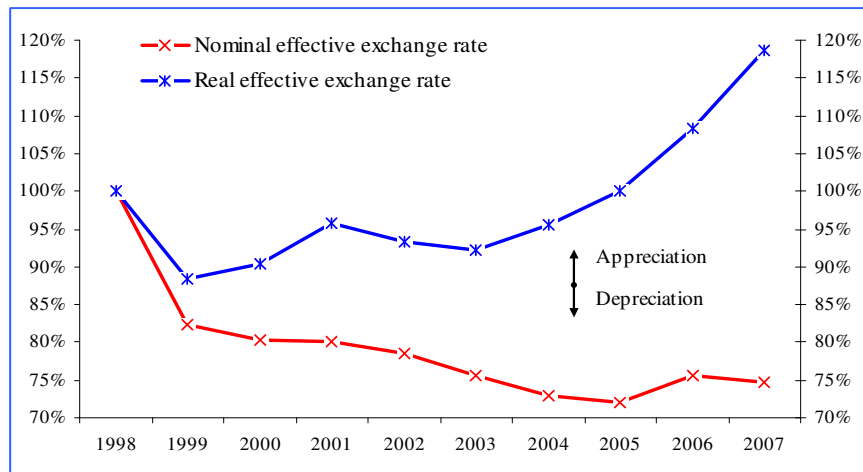
Figure 2
Inflation and Interest Rates[3]
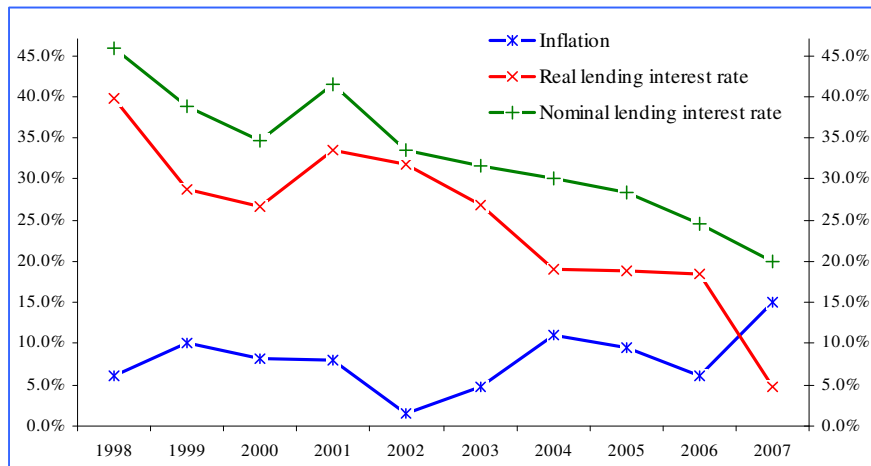
Figure 2 shows that high lending interest rates have also been decreasing in recent years. Especially during last 5 years, lending interest rate dropped twice to 20%. This decrease reflected to reduction in interest rate spread due to extension of banking operation, decrease of NPL ratio, and financial intermediation deepness of banking system, high economic growth and relatively low inflation. At the same time deposit rates has not decreased and it seems to be mainly the result of strong competition among banks.

Figure 3
Developments of NEER and REER

NEER has slightly appreciated in 2006 due to strong trade balance surplus, and the REER has been moderately appreciating since 2004 (Figure 3). Recent years' exchange rate movements have related to capital inflows, improvement in term of trade and rapid increases in domestic price level.

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[3] Real interest rate is calculated using Fisher's identity.

Figure 4
Growth of Money Supply and Credit


Annual growth of money supply
Annual growth of credit
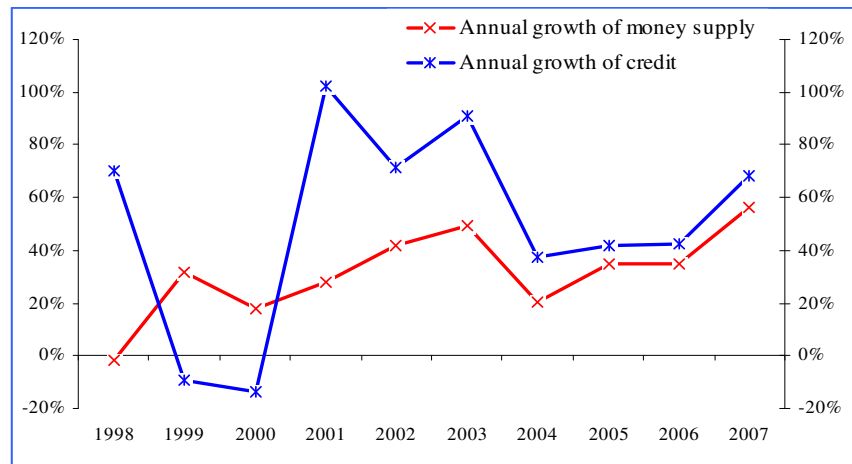
Money supply and credit growth have been high, that is between 20 and 90% per year in last 6 years (Figure 4). The growth in money supply reflected to strong foreign exchange inflows. Especially 2007's high growths of money supply and credit have mainly driven by increases of financial inflows and fiscal expansion. The improvement on fiscal position has driven by strong economic growth, increase in mining sector revenues (related with rapid growth of copper prices).

Average annual credit growth was over 40% in 2001-2007 and it is relatively high indicator comparing to other transition economies. The growth in credit has supported by decreases of lending interest rate, expansion of economic scale and rapid growth of banks' deposits.

2.2 Trends in Capital Flows

Figure 5 presents that capital inflows have a rising trend since 1996. During this period, the composition of capital inflows changed, public debt inflows have been replaced by foreign direct investment (FDI) and private debt inflows. In other word, the averaging 40 and 38% of capital inflows provided by FDI and private debt inflows in last 4 years, respectively. While public debt inflows declined from 77% of capital inflows in 1996 to about 10% in 2007. FDI inflows peaked at 327.8 million US$ in 2007.
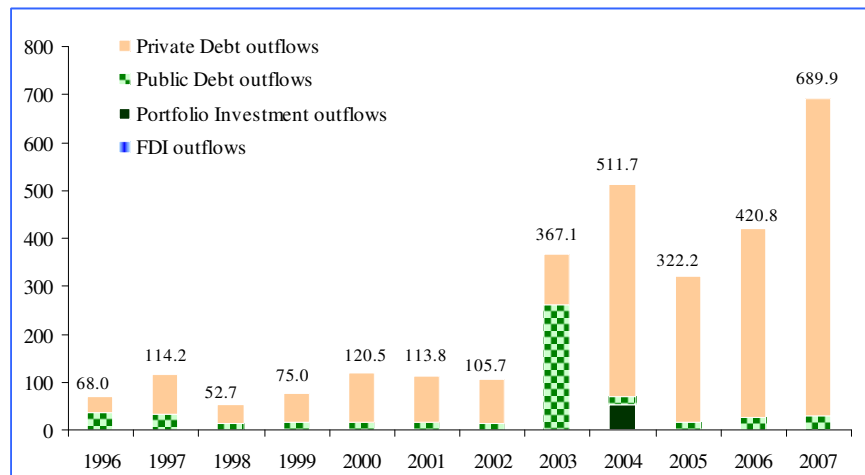
Figure 5
Composition of Capital Inflows (US$ million)
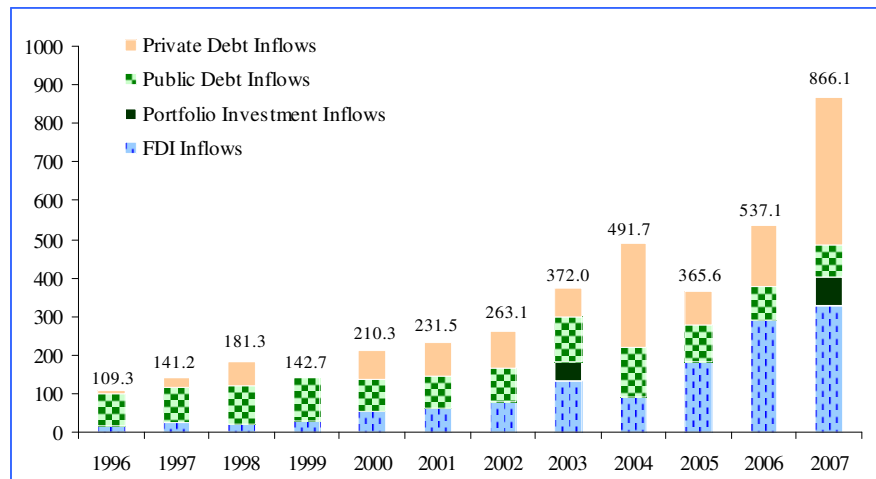
Source: The Bank of Mongolia, Balance of Payment Statistics

The increases of world copper and gold price, domestic real estate prices and high growth of private sector, high differential interest rate have motivated a large amount of FDI and private debt inflows in recent years.

Figure 6
Composition of Capital Outflows (US$ million)

Source: The Bank of Mongolia, Balance of Payment Statistics

Figure 6 shows that capital outflows have been rapidly increasing from 2003. Capital outflows have largely been almost provided by private debt outflows since 2003. Public debt outflows rose from 48.2% of total capital outflows in 1996 to 95.7% in 2007. Macroeconomic determinants of capital flows are being extensively examined in third section of the paper.
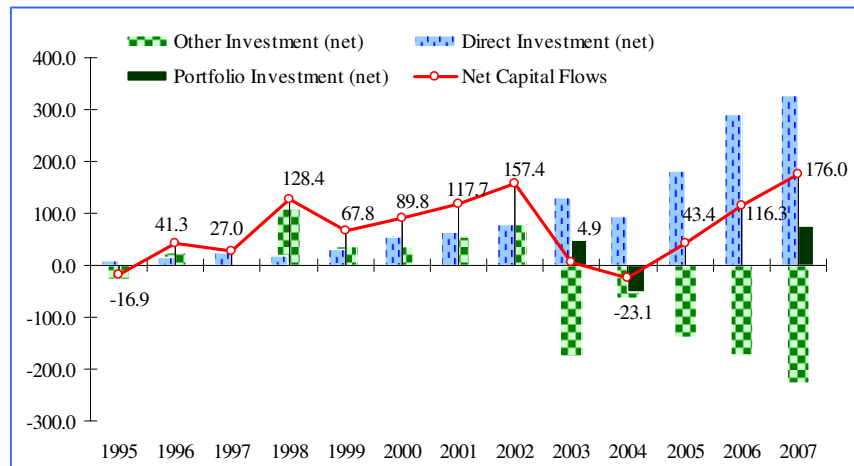
Figure 7
Composition of Net Capital Flows (US$ million)

Source: The Bank of Mongolia, Balance of Payment Statistics

Figure 7 plots trend of net capital flows (capital inflows minus capital outflows) and its composition in Mongolia. The plot shows that net capital flows were positive and continuously increasing between 2004 and 2007. The composition of net capital flows has not changed during this time. The recent years' net capital flows are mainly provided by net direct investment, because of strong demand from foreign investors for Mongolian mining and exploration sector. FDI into mining and exploration sector has been growing fast since 2001 with the biggest percent in the growth of total FDI. FDI inflows increased 38.1% compared to its previous year. In 2007, net capital flows increased by 51.3% and showed a surplus of 176.0 million US$.

Figure 8
Composition of Balance of Payment (% of GDP)
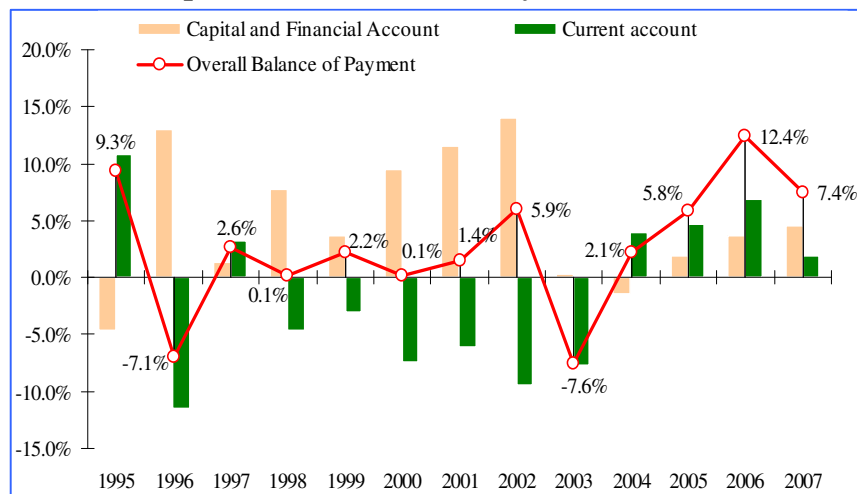
Source: The Bank of Mongolia, Balance of Payment Statistics

Since 2004, current account of the balance of payments is in surplus, since gold and copper price in the world market has continuously increased and kept in relatively high level. In other word, improved terms of trade have shifted the current account into surplus. Capital and

financial account (net capital flows) had a surplus since 2003, given the net capital flows of about 4.1% of GDP in last two years. The peak level for Mongolia was 12.4% of GDP in 2006. Surplus of current and capital accounts led to overall balance of payments surplus and a ratio of overall balance of payments to GDP has increased from 2.1% to 7.4% in last four years (Figure 8).

3. Determinants of Capital Flows

3.1 Methodology

Lipschitz, Lane, and Mourmouras (2002) noted that there are two ways to think about the motivation for capital flows to transition economies. One way is in portfolio terms, about interest rate differentials and arbitrage condition. The other way is in terms of fundamentally, different supply conditions-mainly, capital-labor ratios and rates of return on capital.

Some researchers divided the factors by its influence on capital flows into external and internal factors. Calvo, Leideman and Reinhart (1993), Fernandez-Arias (1996), Frankel and Okongwu (1996) noted that for small open economies, external factors (world interest rates and world growth) are major drivers of capital flows. Other external factors include terms of trade, the international business cycle and its impact on profit opportunities, and some regulatory changes that affect the international diversification of investment portfolios at the main financial centers. Whereas Chuchan, Claessens and Mamingi (1995), Henandez and Rudolph (1995), Kang et al (2002) noted that internal factors are also as important as external factors. The internal factors are related to domestic monetary, exchange rate and fiscal policies[4] and market-oriented reforms, such as trade and capital market liberalization. In the most empirical studies, internal and external factors are chosen as follows:

Internal (Pull) factors:
- Real GDP growth rate
- Real interest rate
- Current account balance
- Stock price index
- Exchange rate volatility
- Credit rating
- Financial/Trade openess
- Investment Enviroment
- Expectation of exchange rate

External (push) factors:
- World or industrial countries's real GDP growth rate
- World real interest rate

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[4] Capital can also flow to a country as a result of lack of credibility in current policies, or renewed confidence about a country's economic prospects. For example, inflation stabilization programs can reduce macroeconomic risk.

Like other studies, the determinants of capital flows in Mongolia are examined using simple regression model. Based on above theoretical and empirical concepts, the empirical model for determinants of capital flows is chosen as follows:

[1] $$CF = \alpha + \beta X + \gamma Z + \lambda D + e$$

Where CF is real capital inflows or real capital outflows (in logarithms), X is a group internal variables (pull factors) including real GDP growth rate, domestic real interest rate (proxied by real 12-month time deposit rate), current account to GDP ratio, Z is a group of external variables (push factors) including world real GDP growth rate (proxied by US GDP growth rate), world real interest rate (proxied by US real interest rate), D is dummy for structural break and e is residual of the regression.

3.2 Data Description, Unit Root Tests and Cointegration Tests

The data are quarterly for the sample 1998Q1-2008Q2 (42 observations) to exclude impact of structural changes of the economy and banking crise. Also the official quarterly data of real GDP and capital flows are available from first quarter of 1998 in Mongolian case. Table 1 summarizes the variables used in the estimation and its sources.

Table 1
Variables in the estimation[5]

Name of variables	Notation	Information	Source
Dependent variables			
Capital inflows	CIN_R_L	Real capital inflows, (in log)[6]	Balance of Payment Statistics, BOM
Capital outflows	COUT_R_L	Real capital outflows, in real terms (in log)	Balance of Payment Statistics, BOM
Independent variables			
Internal factors			
Real GDP growth	GDP_G	Real GDP growth	Bulletin of Statistic, National Statistical Committee (NSC)
Domestic real Interest Rate	R	12-month time deposit real rate	Bulletin of Statistic, BOM
Current account to GDP ratio	CA_GDP	Current account to GDP ratio	Bulletin of Statistic, NSC and Bulletin of Statistic, BOM
External factors			
World real GDP growth	W_GDP_G	US real GDP growth	www.economagic.com
World real interest rate	R_W	US real interest rate (1 year constant maturity treasury yield-inflation)	www.economagic.com

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[5] All variables are in percent except capital inflows and capital outflows. The series of capital inflows, capital outflows, GDP and current account are seasonally adjusted by using X-12-ARIMA method.
[6] Real capital flows= nominal capital flows (in US$)/CPI of USA.

The order of integration of the series is tested by employing the ADF and Perron (1997) (IO2 model)[7] test. The result of AFD test is reported in Appendix 1.

ADF test represent that the variables *CA_GDP, W_GDP_G, R* and *R_W* appear to be integrated to order I(1) and their underlying processes are with no deterministic trend. Variables CIN_R_L, *COUNT_R_L* and *GDP_G*, on the other hand, appear to be stationary, i.e. integrated to order I(0)[8]. As these variables appear to be mixed (stationary and non-stationary), suitable estimation method (ARDL approach) for mixed time series is applied.

But a problem with AFD test is it does not allow for testing the possibility of a structural break. Perron (1997) proposed unit root test with existence of structural break. In the paper, IO2 model of Perron (1997) is also used for testing unit roots of the series. The time of break (T_b) of the series is chosen based on the historical experience and the principle, which is to minimize the t-statistic of $\alpha = 1$. The timing of any T_b for each series is shown in table 2. Also the optimal lag (k^*) is selected such that the last coefficient in an autoregression of order greater than k^* is insignificant, up to a maximum order k. Table 2 provides unit root tests using IO2 model. The results obtained indicate that all variables are non-stationary under structural change at 5% significance level.

Table 2
Unit Root Tests: Innovational model (IO2)

Variable	Break point (T_b)	Lag ($\hat{k}$)	Test Stat (t_α)
CIN_R_L	2002Q3	0	-4.47
COUT_R_L	2003Q4	0	-4.17
GDP_G	2002Q1	3	-4.35
R	2006Q2[9]	3	-2.75
CA_GDP	2006Q3[10]	3	0.81
W_GDP_G	2001Q4	0	-2.27
R_W	2006Q3[11]	0	-0.97

Note: Critical values for the IO2 models at 1%, 5% and 10% are -6.32, -5.59 and -5.29 (Source: Perron (1997), page # 36, table 2.A), respectively.

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[7] The IO2 model allows for gradual changes in with the intercept and the slope of the trend function such that:

$$x_t = \mu + \theta DU_t + \beta t + \gamma DT_t + \delta D(T_b)_t + \alpha x_{t-1} + \sum_{i=1}^{K} c_i \Delta x_{t-i} + e_t$$

Where T_b denotes the time break ($1 < T_b < T$) which is unknown, $DU_t = 1$ if $t > T_b$ and zero otherwise, $DT_t = T_t$ if $t > T_b$ and zero elsewhere, $D(T_b) = 1$ if $t = T_b + 1$ and zero otherwise, x_t is any general ARMA process and e_t is the residual term assumed white noise. The null hypothesis of a unit root is rejected if the absolute value of the t statistic for testing $\alpha = 1$ is greater than the corresponding critical value tabulated by Perron (1997).

[8] In the paper, order of integration was chosen at the 5% level.

[9] Real interest rate has decreased from first quarter of 2006, due to rapidly decreased nominal interest rate between first quarters of 2006 and second quarter of 2007. Then this trend has continued, because inflation rate quickly increased since July of 2007.

[10] Due to increase gold and copper prices in the World market, current account had a surplus between third and fourth quarters of 2006.

[11] Nominal interest rate of USA started to decrease from third quarter of 2006. Then Federal Reserve Bank has decreased FED target rate since September of 2007, due to sub-prime crises.

As all variables appear to be non-stationary under structural change (IO2 model, Perron 1997), suitable estimation methods for non-stationary time series are applied. The co-integration analysis is carried out using main two methods so as to ensure that the acquired estimates have some robustness. These methods are: the auto-regressive distributed lag (ARDL) approach due to Pesaran and Shin (1995, 1999), and the full-information maximum likelihood (FIML) method due to Johansen (1995).

Due to the small sample available, a maximum of three lags in the lag-length selection process is considered. It appears that both the LR test statistic and AIC (Akaike information criterion) suggest that this maximum of three lags is employed. Both criteria are weakly consistent in the case where the lag-length determination is carried out for non-stationary variables. Thus VAR(3) for the Johansen procedure[12] and a maximum of three lags for the ARDL method are used. The Trace and Maximum-Eigen statistics for the VAR(3) system of the variables considered are reported in table 3.

The Maximum-Eigenvalue statistics indicates presence of two co-integration vectors at the 5% significance level within the system of part 2 and the presence of only one co-integration vectors within the system of part 1. Also, the Trace statistic indicates the presence of only one co-integrating vector within the system of part 1 and the presence of two co-integrating vector within the system of part 2. It continues with more conservative choice of one co-integrating vector, which is easily identified in our case by normalizing on the real capital inflows or real capital outflows (in log).

Table 3
Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	Max-Eigen Statistic	5% Critical Value
Part 1. Vectors: CIN_R_L, GDP_G, R, CA_GDP, W_GDP_G, R_W					
r=0	0.91	178.1*	117.7	91.9*	44.5
r≤1	0.56	86.2	88.8	31.8	38.3
r≤2	0.42	54.4	63.9	21.4	32.1
r≤3	0.39	32.9	42.9	19.4	25.8
r≤4	0.18	13.6	25.9	7.6	19.4
r≤5	0.14	5.9	12.5	5.9	12.52
Part 2. Vectors: COUT_R_L, GDP_G, R, CA_GDP, W_GDP_G, R_W					
r=0	0.76	165.9*	117.7	56.4*	44.5
r≤1	0.72	109.4*	88.8	49.3*	38.3
r≤2	0.53	60.1	63.9	28.9	32.1
r≤3	0.39	31.2	42.9	19.4	25.8
r≤4	0.156	11.8	25.9	6.6	19.4
r≤5	0.125	5.2	12.5	5.2	12.5

Note: * denotes rejection of the hypothesis at the 5% level.

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[12] The Johansen co-integration technique is used to determine the number of co-integrating vectors in a vector autoregression (VAR) framework.

An advantage of the ARDL model is that while other cointegration techniques require all of the regressors to be integrated of the same order; ARDL model can be applied irrespective of their order of integration. It thus avoids the pre-testing problems associated with standard cointegration tests (Pesaran et all., 2000).

In the ARDL approach, the null hypothesis (H_0: *all long-run coefficients of the underlying ARDL are equal to zero,* implying no cointegration) is tested by computing general F-statistic to determine that a long-run relationship does exist between the dependent and independent variables. At this stage F-statistic is compared with the critical value tabulated by Pesaran et al. (2001). We choose 3 as the maximum lag length in the ARDL model and the calculated F-statistics of real capital inflows and real capital outflows equation is equal to 14.7 and 21.4, respectively. These estimated F-statistics is greater than upper bound critical value[13], respectively. Thus the null hypothesis of no cointegration are rejected, implying long-run relationship exists between the real capital inflows/capital outflows and its independent variables. However, based on the theory, real capital inflows/capital outflows are used as the dependent variable in the paper.

3.3 Estimation results: What are determinants of capital flows?

The estimates of long-run coefficients of the model in equation [1] using two (ARDL and Johansen methods) estimations are reported in table 4. The general to specific approach is applied to arrive at the parsimonious versions of the estimates provided in table 4.

Table 4
Estimated long-run coefficients of the real capital inflows/capital outflows model

Variable/Method	CIN_R_L (Real Capital Inflows)		COUT_R_L (Real Capital Outflows)	
	ADRL[14] (1,2,2,3,0,1)	Johansen VECM (2)	ADRL[7] (1,2,2,2,2)	Johansen VECM (2)
Internal factors				
GDP_G	0.03 (1.86)*	0.05 (3.55)***	0.12 (5.4)***	0.16 (8.34)***
R	0.015 (1.83)*	0.013 (1.89)*	-0.04 (2.96)***	-0.03 (2.23)**
CA_GDP	0.05 (7.78)***	0.04 (7.55)***	0.016 (1.86)*	0.015 (2.21)**
External factors				
W_GDP_G	0.17 (4.67)***	0.09 (2.68)**	0.18 (2.93)***	0.10 (1.90)*

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[13] Source: Pesaran et al (2001), Critical Value Bounds for the F-Statistic, Table C1.iii: Case III with unrestricted intercept and no trend for k=4, k=5. For k=4, Lower bound I(0)=3.74 and Upper bound I(1)=5.06 at the 1% significance level. For k=5, Lower bound I(0)=3.41 and Upper bound I(1)=4.68 at the 1% significance level.
[14] The order of the optimal ARDL model (distributed lag function) is selected based on the AIC.

|				
R_W	-0.35 (8.43)***	-0.29 (6.85)***	----	----
Intercept and Dummy for Structural Break				
Intercept	5.05 (24.9)***	4.88[15]	3.38 (10.2)***	3.32
DUM_2002Q3	0.82 (3.37)***	0.91 (2.21)**	----	----
DUM_2003Q4	----	----	2.62 (5.02)***	2.64 (5.25)***
Error Correction Mechanism (ECM)				
ECT_{t-1}	-0.90 (6.74)***	-0.95 (4.71)***	-0.69 (8.85)***	-0.86 (4.85)***
Summary Statistics and Diagnostic Tests				
$R^2, \bar{R}^2$	0.77, 0.66	0.74, 0.58	0.75, 0.67	0.83, 0.73
Prob (F-stat)	0.00	0.00	0.00	0.00
SER	0.25	0.28	0.40	0.34
Serial Correlation (AR(4))	[0.39]	[0.60]	[0.23]	[0.33]
Normality (Jarque-Bera)	[0.49]	[0.17]	[0.84]	[0.15]
Heteroscedasticity	[0.26]	[0.21]	[0.62]	[0.61]

Note: *, **, *** denotes 10%, 5% and 1% significance level, respectively. t-statistics are in parentheses. The probability level of the diagnostic tests is in square brackets. The long-run coefficient standard errors of ARDL model are obtained using familiar delta method.

Two model estimates satisfy the summary statistics and common diagnostic tests, given results reported in the last three rows of table 4. Even though two estimation methods employed produce plausible results that satisfy the common diagnostic tests. The residual tests show that there is no significant serial correlation and heteroscedasticity in the residuals. Also from the accompanying summary statistics of the R^2, $\bar{R}^2$ and the F-statistics, the selected models have a good fit. These are especially appropriate in a case like ours, where the sample size is very small. Recursive estimation of the ARDL models also suggests that the regression coefficients are generally stable over the sample period. The cumulative sum (CUSUM test) and cumulative sum of squares (CUSUM of Squares test) plots based on the recursive residuals are given in Figure 9 and do not show evidence of statistically significant breaks. This implies that the estimated models are stable.
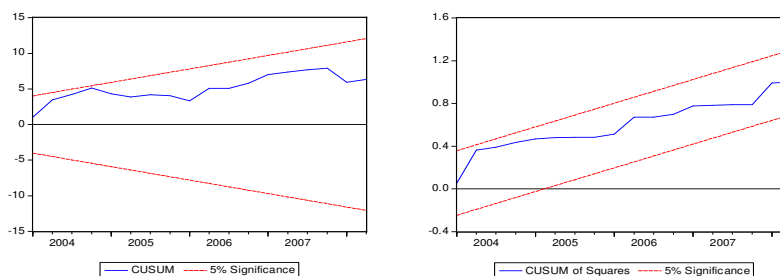
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[15] Standard error of the coefficient is not defined from the Eviews 6.0 software.

Figure 9. CUSUM Test and CUSUM of Squares Test

A) ADRL (1,2,2,3,0,1) Model of Real Capital Inflows
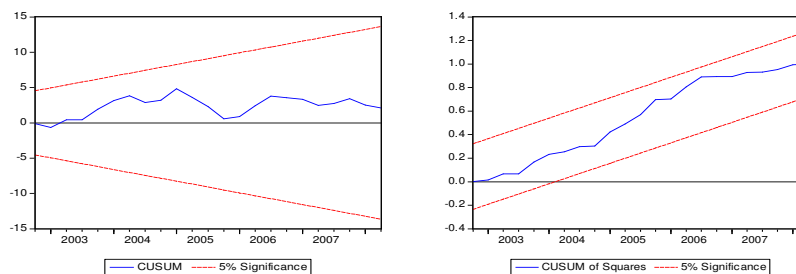
B) ADRL (1,2,2,2,2) Model of Real Capital Outflows

According to the estimates from two methods employed an increase in domestic real GDP growth results in a rise of the real capital inflows and real capital outflows. Namely, the ARDL and Johansen estimates suggest that the 1 percentage point increase of domestic GDP growth causes the real capital inflows to increase by 3-5%. This result confirms that real capital inflows are waved by high domestic real GDP growth in recent years.

An increase in domestic real interest rate causes a growth of real capital inflows, in accordance with underlying theory. Namely, the estimates indicate that the 1 percentage point increase of domestic real interest rate makes the real capital inflows to increase by 1.3-1.5%. Although as predicted, the effect of domestic real interest rate on real capital outflows is significantly negative. In the other word, 1 percentage point increase in domestic real interest rate leads to 3-4% decrease in real capital outflows.

The effect of the current account balance as a proportion of GDP on real capital inflows and real capital outflows has positive relation. That is 1 percentage point increase in the ratio waves the real capital inflows to raise 4-5%. The effects of World real GDP on the real capital inflows and capital outflows are significant and consistent across two methods, with slight variability in the estimates' magnitude. Similarly, increasing World real GDP growth appears to induce a rise of real capital inflows and capital outflows. As predicted earlier parts of this paper, the effect of the World real interest rate on the real capital inflows is negative and significant. In the other word, decreasing World real interest rate results in a rise of the real capital inflows. But the World real interest rate does not help to explain real capital outflows.

Results of the estimations indicate that recent year's high real capital inflows determined by push and pull factors including high domestic economic growth, high domestic real interest rate, positive current account performance, strong World real GDP growth and low world real interest rate. Whereas real capital outflows has determined by internal factors including domestic economic growth, domestic real interest rate and current account to GDP ratio. Furthermore, the high real capital inflows associated with FDI promotion policies after 2001, increasing interest of foreign investors for investment in mining sector, decline in corporate income tax rate since January 2007, growing international confidence in the economy, macroeconomic stability and rapid growth of banking sector credit increasing by bank borrowing from abroad. These do mean that capital flows are affected by the domestic policy environment and external shocks will necessarily require important macroeconomic policy.

The coefficients of error correction term (ECT_{t-1}) have the right sign (negative) and are statistically significant at 1% level. Estimated values of ECT_{t-1} of real capital inflows and real capital outflows are indicating that 90-95% and 69-86% of the disequilibria of the previous quarter's shock adjust back to the long-run equilibrium in the current quarter, respectively.

4. Capital Flows and Monetary Policy

4.1 Short-term Capital Flows

Figure 9 shows that short-term net capital had deficit from 2003, due to capital outflows have been rapidly increased from 2003. In Mongolian case, short-term capital flows are dominated by short-term private debt. Before 2003, amount of short term capital flows was small and the deficit of short-term net capital flows increased by 7.5 times between 2003 and 2007. Also the short-term capital flows have been highly volatile: short-term capital outflows decreased by 3.9 times between 2005 and 2006, and the short-term capital inflows increased 4.4 times between 2006 and 2007.

Figure 9
Short-term capital flows (US$ million)
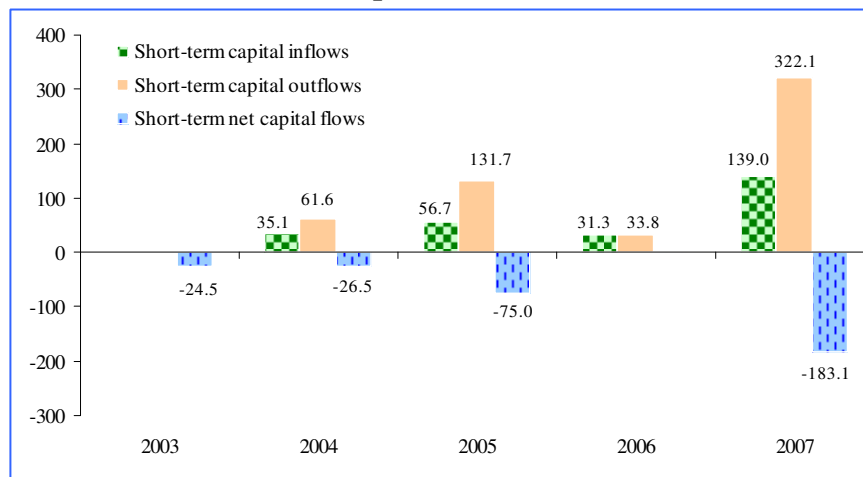
Source: Bank of Mongolia, Balance of Payment Statistics

For capital controls in short-term capital flows, Mongolia has a very liberal capital account regime with free flows into and out of the economy. But short term capital inflows in the economy are expected to increase massively. Thus policy makers need to deeply study the effect of short-term capital flows on the economy and the other countries' experiences of managing short-term capital flows.

4.2 Impact of Capital Flows on Monetary and Financial Variables

This section will examine the effects of capital flows in important macroeconomic variables, which are GDP growth rate, real effective exchange rate, foreign exchange reserves and monetary expansion. Capital flows have different effects on an economy depending on its economic structure, exchange rate regime etc and this section describes upon other studies (Kohli (2001), Edward (1999) and others) in analyzing Mongolia's experience. Large capital inflows can create a higher rate of economic growth, rapid monetary and credit expansions and can lead to pressures of inflation, real exchange rate appreciation, lower domestic saving, and a reduction in the domestic interest rate or the cost of capital, generally.

4.2.1 Impact of Capital Flows on Economic Growth

Theoretically, FDI has a positive direct impact on economic growth through an economy's productive capacity and has an indirect effect on development via competition or improving technology and machinery, better education and knowledge, higher employment (higher household income), improved infrastructure and environment, and enhanced tax collection etc. On the other hand, foreign investor will be increasingly interested in investing when the host country is experiencing economic growth, it's certain that industry promises stable high return and financial market.

Simple correlation coefficient between FDI and GDP level is 0.76 and long-run elasticity of GDP in relation to FDI is 0.27 between 2000 Q1 and 2008 Q1 in Mongolian economy. Production elasticity of agricultural sector in relation to the FDI into the sector is 0.25. For the sectors of mining and manufacturing the calculated elasticity is 0.29, for hotels, restaurants and wholesale & retail trade is also 0.29. These results imply that any expansion in foreign investments into those sectors cause their production level to rise. The response of GDP to FDI is obtained from vector error correction (VEC) with 4 quarters lags estimation between the two series[16]. The response function shows that 10% increase shock to FDI in the first period causes the GDP to rise by 0.4% in the second quarter. This is then accompanied by a cumulative growth of 1.0% after 12 quarters, i.e. 3 years.

4.2.2 Impact of Capital Flows on Exchange Rate

Capital inflows are linked with the real appreciations of exchange rate. On the one side, capital inflows may be motivated by the anticipation of real appreciations and on the other side, inflows support the real appreciation[17]. Simple correlation coefficient between net capital flows and the real effective exchange rate is 0.54. This result indicates that relationship between these variables is positive and capital inflows may lead to appreciations of REER.

Granger causality test[18] with one lag shows that the hypothesis that net capital flows do not cause to REER can be rejected at the significance level of 10%. The test result indicates a permanent effect of capital account shock upon the REER.

4.2.3 Impact of Capital Flows on Foreign Exchange Reserves and Money Supply

Depending upon the exchange rate regime, capital inflows can be either international reserves' accumulation or a current account deficit[19]. The current account balance had surplus from third quarter of 2004 to second quarter of 2007. The sharp increase in foreign exchange reserves is parallel with the current account surplus, suggesting absorption of foreign currency inflows by the BOM. Else the increase in gold prices in the world market strongly affected the foreign exchange reserves. The stock of net international reserves was 1.04 billion US$ in March 2007, represents an increase 154% over January 2006. But the trade balance deficit has started increasing since April 2007, reaching to -706.1 million US$ in July 2008. Due to the increase of this deficit, foreign exchange reserves have declined.

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[16] Both GDP and FDI to be I(1) process and both series are also co-integrated at significance level of 5 %.
[17] Lipschitz. L, Lane. T, Mourmouras. A (2002).
[18] The test is used in the Kohli, R (2001), "Capital Flows and Their Macroeconomic Effects in India", IMF.
[19] If the exchange rate regime is fixed and the central bank intervenes to counter appreciation pressures, then capital inflows would be visible in increase in foreign exchange reserves. If there is no intervention by central bank, then the net increase in capital assets via capital inflows would be associated with a similar increase in imports and therefore a widening current account deficit.

Net capital flows affect domestic money supply through accumulation of net foreign currency assets (NFA)[20]. Correlation coefficient (0.45) shows that positive relationship between money supply and net capital flows exists in the economy.

Granger causality test with three lags shows that the hypothesis that net capital flows do not cause money supply can be rejected at the significance level of 10%. This result may be consistent with reality, last 3 years' high growth of money supply is provided by growth of net foreign currency assets. During this time, average annual growth of NFA increased by 69.7% and it pushed average annual growth of money supply to 41.9%. These results confirm that money and credit growth are rapidly growing, owing to substantial capital inflows in recent years. In other word, increases in capital inflows intermediated through the banking system have been supporting a strong growth of banking sector credit. Latter the rapid growth has contributed to economic overheating, with stability risk and inflation pressures.

4.2.4 Response of Monetary and Financial Variables to Capital Inflows

Figure 10 presents impulse response functions (IRFs) for monetary and financial variables to one standard deviation innovation in the capital inflows. These IRFs are calculated from SVAR model[21] used in analysis of determinants of capital inflows.

The positive reaction of GDP to one standard deviation impulse of capital inflows start from same period, reaches its peak after 3 quarters. The response of GDP to capital inflows is significantly different from zero at the significance level of 5% for first 5 quarters. With respect to inflation, it takes a major positive effect for first 3 quarters and reaches its peak level after 2 quarters.

The positive reaction of GDP to one standard deviation impulse of capital inflows start from same period, reaches its peak after 3 quarters. The response of GDP to capital inflows is significantly different from zero at the significance level of 5% for first 5 quarters. With respect to inflation, it takes a major positive effect for first 3 quarters and reaches its peak level after 2 quarters. The shock to capital inflows becomes appreciation of REER. This effect start after one quarter, reaches its peak after 2 quarters. The response is different from zero at the significance level of 5% for first 3 quarters. These impulse responses confirm that key macroeconomic indicators have strongly affected by large capital inflows in recent years.

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[20] If the central bank intervenes to maintain a fixed exchange rate, then an accumulation of international reserves represent an increase in the net foreign exchange assets of the central bank and directly affects the monetary base.

[21] The SVAR model was identified by orthogonalizing the variance-covariance matrix of the residuals of the equations using the Cholesky decomposition. In performing the decomposition, the causal ordering tot, i^*, i, $reer$, gdp, inf, cin was used. Where tot is a logarithm of terms of trade, i^* is nominal international interest rate (LINOR3M rate), i is nominal domestic interest rate (monetary policy rate), $reer$ is logarithm of real effective exchange rate, gdp is logarithm of real GDP, inf is annual inflation rate, cin is logarithm of capital inflows.

Figure 10
Impact of Shocks to Capital Inflows on Monetary and Financial Variables[22]

Response to Structural One S.D. Innovations ± 2 S.E.
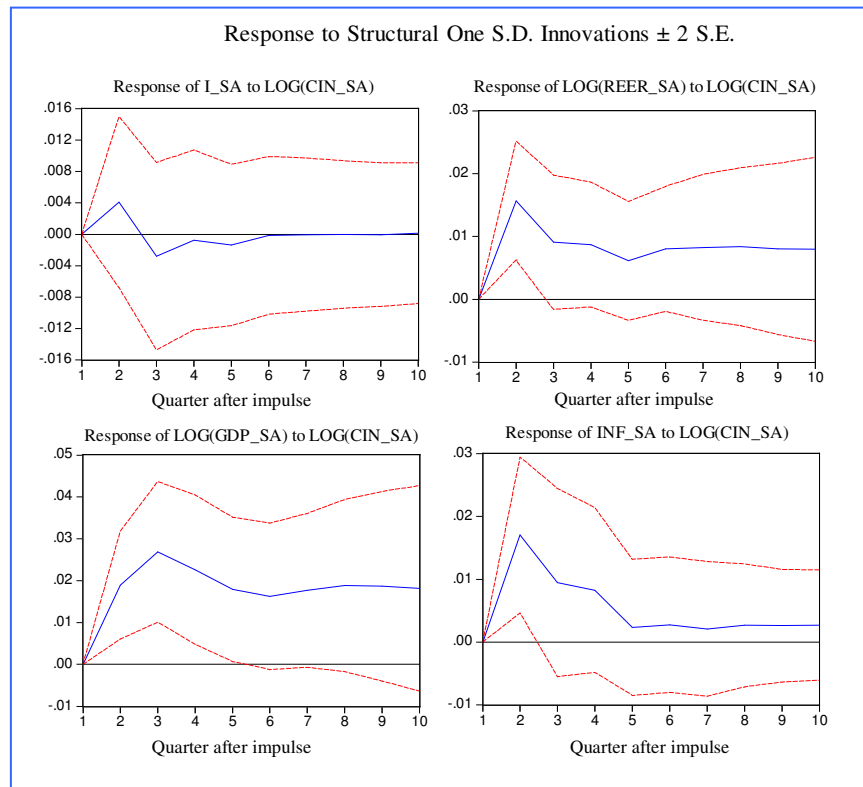
4.3 Monetary Policy Reactions to Deal with Capital Flows

It has been observed that large capital inflows often give rise to increases in money supply and domestic liquidity, appreciation of both nominal and real exchange rates, and acceleration in asset prices. Hence, a country experiencing excessive capital inflows usually has to face the challenges of inflationary pressures, loss of a competitive exchange rate and misallocation of capital into unproductive projects[23].

In Mongolian economy, it is clear from Figure 4 that monetary aggregates have been growing since 1999. Indeed, over the last 8 years, the year-on-year (y-o-y) monetary growth rates have exceeded the y-o-y nominal GDP growth, which has averaged 21.5% only over the same period. Turning to exchange rates, we see that the Mongolian REER exhibited an upward trend since 2003 (Figure 3). However, depreciation in the NEER is discernible in the recent period, reflecting a return of the Mongolian Tögrög (domestic currency) to depreciation path against its major trading partners. By comparison, the REER continued its appreciation path, reflecting relatively high inflation until the most recent period. Correspondingly, Figure 2 shows that while the consumer price inflation stayed relatively high level.

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[22] The point estimates of responses are shown as solid lines; dashed lines display a two standard deviation confidence interval.
[23] Calvo, G.A, Leiderman. L, Reinhart. M.C (1996).

In recent years, the sharp increases in monetary aggregates associated with current account surplus, fiscal expansion and rise in capital inflows. At this period, BOM worried to see credits and monetary aggregates rapidly rising. The concern is that the rise in money supply will fuel inflation[24]. This fear led the BOM to engage in sterilization policies through the open market sale of central bank bill, increases in monetary policy rate. Increases in reserve requirements were also used to reduce liquidity during the monetary aggregates surge[25]. This sterilization effort was particularly intensive since 2007.

From 2007, the BOM has updated its regulations on CBB auction and statutory reserve requirement and announced one week CBB rate as a its policy rate. The policy rate shall apply to one-week CBB rate. The BOM has been conducting the one-week CBB auctions as fixed rate tender with preannounced full allotments and for longer maturity CBB auctions as variable rate tender with preannounced allotment volume. By making all those changes, BOM is able to do all the advantages to announce real and true interest rate to market and use its monetary policy instruments efficiently.

Due to high growth of credits and monetary aggregates and inflation tendency to increase continuously, the BOM increased its monetary policy rate to 10.25% in September 2008, bringing the cumulative increase since July 2007 to 3.85 percentage points. Furthermore, The BOM raised its reserve requirements by 0.5 percentage points to 5.5% from January 2008. As a result, by August of 2008, amounts of reserve requirements of commercial banks increased by 7.8–8.6 billion Tögrög. Excess reserve of interbank market stood at 81.1 billion Tögrög in June 2006. As a result of raising monetary policy rate and the increases in reserve requirement, excess reserve of interbank market has decreased and reached to the lowest level of 9.3 billion tugrug in August 2008. Also owing to these policy changes, weighted average of central bank bill rate and interbank market rate has continuously increased to 14.41% in August 2008[26]. As a result, domestic currency loan rate increased to 21.8% and foreign currency loan rate to 15.2% in August 2008.

As results of the sterilization policy, growth of credits and money aggregates has started to decelarate since first quarter of 2008. The BOM expects this deceleration of credits and monetary aggregates to be able to drive down inflation in the mid-term. But there were no signs of fiscal tightening as a reaction to high credit growth (related with large capital inflows) and high inflation in past two years. Thus the BOM aims to improve conduct of monetary and fiscal policy (credible and consistent macroeconomic policy mix).

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[24] Fear of inflation often leads central banks to try to *sterilize* the increase in money supply through open market operations.
[25] Theoretical model of Sterilization of Capital Inflows through the Banking sectors (increase in reserve requirement) is argued in Mark M. Spiegel (1995).
[26] In most cases, domestic short-term interest rates rose when sterilization began, suggesting that policy had an impact, at least in the short run.

5. Capital Flows and Financial Stability

5.1 Capital Flows in Banking Sector

Capital flows in the economy and banking sector is shown in the Table 5. Total capital inflows excluding currency and deposits in the banking sector rose 6.65 times from 30 million US$ in 2006 to 199.6 million US$ in 2007. The increase was provided by joint growth of short-term (less than one year) and long-term capital inflows. Namely, the short-term capital inflows in banking sector was increased by 3 times, as Trade Development Bank (a large commercial bank in Mongolia) issued 75 million US$ senior unsecured bond in the international capital market. Furthermore the long-term capital inflows in the banking sector rose by 109.3 million US$, owing to high differential interest rate and high demand for long-term foreign funds of commercial bank. Table 5 also provides some information about the changing maturity of capital flows. The maturity profile of capital inflows in the banking sector has changed where 45.2% of the capital inflows are now short-term.

The rise of the capital outflows is similar with the increase in capital inflows in the banking sector. But the increase in the capital outflows in the banking sector has been fully supplied by the short-term capital outflows. In other word, short-term capital outflows in the banking sector generally exceeded the long-term capital outflows where over 96% of the total capital outflows in December 2007 were in one year.

Table 5
Capital Flows in the Economy and Banking Sector by Maturity
(US$ million)

	Capital inflows					
	Short-term		Long-term		Total	
	Total	To banks*	Total	To banks*	Total	To banks*
2004	35.1	1.0	456.6	16.9	491.7	17.9
2005	56.7	12.0	308.9	1.0	365.6	13.0
2006	31.3	30.0	505.8	0.0	537.1	30.0
2007	139.0	90.3	727.1	109.3	866.1	199.6
	Capital outflows					
	Short-term		Long-term		Total	
	Total	To banks*	Total	To banks*	Total	To banks*
2004	61.6	0.9	450.1	5.8	511.7	6.7
2005	131.7	9.1	190.5	0.0	322.2	9.1
2006	33.8	14.6	387.0	0.0	420.8	14.6
2007	322.1	77.4	367.8	2.9	689.9	80.3

Source: The Bank of Mongolia Balance of Payment. * denotes capital flows excluding currency and deposits in the banking sector[27].

Table 5 also indicates that capital flows of the economy are concentrated in the monetary authority and general government rather than the banking sector and non-bank private sector.

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[27] In Mongolian case, items of currency and deposit in balance of payment statistics are not classified.

But 23% of total capital inflows were constituted by capital inflows in the banking sector in 2007.

Capital inflows in the banking sector are expected to rise in the immediate future, since commercial banks are starting to issue own bond in the international capital market and financial investment is increasing enormously in commercial banks.

5.2 Impact of Capital Flows on Financial Stability

Large increases in financial flows can be handled efficiently by the financial system, suggesting that flows of sufficient magnitude may risk the safety of the banking system. In addition, the real exchange rate appreciations that often accompany these capital inflows can lead to undesirable resource reallocation, particularly if the reallocation of resources motivated by the capital inflow surge is likely to be temporary. Financial development is important for financial intermediation and the efficient allocation of capital. It is clearly a crucial element to the overall economic development of emerging capital markets.

The Mongolian financial system is developing and performing well, in line with the economy as a whole, but faces a number of challenges. There are signs the economy is overheating and the country's dependence on a relatively narrow range of commodity exports and the rapid credit growth are also sources of risk. The y-o-y credit growth has been high, annual average growth is 58.6% in last 6 years (Figure 4). The rapid credit growth fueled by the capital inflows[28] has also given rise to potential risks to financial sector stability. Some deterioration in lending standards has also been observed as banks competed for market shares[29]. Granger causality test indicates that the faster credit growth leads to higher non-performing loans[30] after 6-9 months. Furthermore, negative real interest rates due to relatively high inflation, which in turn contribute to the real estate boom and rapid growth, have caused the risks to financial stability.

The securities' price has risen rapidly since first quarter of 2007 in tandem with the increase in market capitalization of the local securities market. Namely, the securities' prices and the market capitalization increased by 3.7 times and 4.4 times respectively between first quarters of 2007 and second quarter of 2008. A similar surge in housing prices saw an increase of by 2.8 times between fourth quarters of 2005 and second quarter of 2008, due to growth of mortgage loan and prices of raw material of construction. In other words, the increases in securities and housing prices had been fueled by capital inflows and rapid credit creation.

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[28] Also the rapid credit growth thus seems to reflect to a large extent financial sector deepening.

[29] Large inflows can lead to unsound credit allocation.

[30] An increase in loan growth is likely to lead to higher loan losses only if the source of the faster credit growth is a shift in the supply of bank credit.

The stress tests undertaken by the FSAP team of the IMF and the World Bank (September 2008) indicate that surge in capital inflows[31] would decrease in the aggregate capital adequacy ratio (CAR) by 2.7 percentage points from baseline CAR (15.2%). Also the hypothesized substantial increase in the NPL ratio by 10 percentage points would take the aggregate capital adequacy ratio to 9.8%. This indicator is lower than baseline CAR by 5.4 percentage points.

Table 6
Selected Financial Soundness Indicators
(in percent)

	2003	2004	2005	2006	2007
Capital Adequacy Ratio (CAR)	20.4	20.0	18.2	18.1	14.0
Return on Assets	3.1	2.5	2.2	2.7	2.5
Non-Performing Loan Ratio	4.8	6.4	5.8	4.9	3.3

Source: The Bank of Mongolia

As shown in Table 6, Mongolian banking sector remained resilient in the recent years, with positive developments recorded in all key financial soundness indicators. Due to increased investments and activity in banking sector and instruments, non-performing loans are continuing to trend downwards and profitability improving.

5.3 Central Bank Policy Reactions Related to Capital Flows and Financial Stability

The financial sector in Mongolia mainly consists of banks, which comprise about 95% of assets in the financial sector. The BOM supervises banks to ensure the stability of financial sector, which is one of its main goals stated in the Central Banking Law, within the framework of related laws and regulations[32]. As the role of banking sector in the economy increases, it is vital to make the supervision framework more prudent and banks need to manage their risks efficiently to improve corporate governance, and to adequately define their strategic aims.

In recent years, the BOM notes to strategic aims such as improving the quality and scope of financial intermediation, ensuring the stability of the financial sector, preventing financial crises, enhancing the confidence of investors and depositors in the banking sector, creating a favorable environment for banks, protecting the interests of depositors and restraining illegal activities through banks or other financial institutions. All these aims are stated in "Short-term strategy of reform and development of banking sector". As a result of the policy that the BOM has implemented in order to enhance stability and support the growth of financial sector, the confidence of customers and depositors in the credibility of the banking sector increased, as a result of which the scope of banks' operations is expanding and the profitability of banks has

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[31] Under this scenario, it was assumed that substantial trade and capital inflows result in an appreciation of the Tögrög by 20 percent, and intensified inflationary pressures, leading to a moderate slowdown in the performance of all tradable and non-tradable sectors. Interest rates were assumed to remain at the current levels.

[32] Improvements in prudential supervision and regulation have helped enhance the capacity to absorb the inflows.

improved.

The BOM has been refining its supervision policy and methods, such as making assessment of the financial sector, improving corporate governance, and enhancing prudential regulation, as well as defining future direction, and preventing financial crises.

The current system of supervision of banks is carried out in accordance with the common and accepted structure of international banking and financial organizations, and the BOM has made adjustments in the sophistication of the system. As the activities of the banking and financial organizations widen to embrace the latest methods and technologies, as has happened in recent years, banks face more risks. Therefore, to conduct supervision efficiently, the direction of supervision based on regulations and rules was changed into a risk based analysis. Thus, supervision operations were focused on evaluating and measuring risk, and encouraging customers' oversight of banks. As of now, the BOM has been harmonizing its rules and regulations with international standards, especially those of the Basel Committee. Amendments to the "Prudential ratios regulation of banks" was approved on October 2007, because of the Basel Committee's new capital framework and mortgage market, which has been adopted in Mongolia. Changes to the regulation include making market risk requirements more compliant with international standards; making calculation of capital adequacy more adequate, and lowering risk weights of mortgage-backed securities issued by Mongolian Mortgage Corporation to support the development of a secondary mortgage market.

By request of the BOM, the IMF and the World Bank performed a "Financial Sector Assessment Program" in Mongolia. This program evaluates the current situation of the financial sector and the regulation framework, and delivers recommendations for future work based on the "Core principles for effective banking supervision" issued by the Basel Committee. According to the report of the "Financial Sector Assessment Program", the performance of the Mongolian financial sector is relatively good compared to those countries which have the closest rate of social and economic development to Mongolia.

A "Financial Stability Council" was established, consisting of the Governor of the BOM, the Minister of Finance, and the Chairman of the Financial Regulatory Commission. The council shall monitor soundness and stability of the financial system, informing the public of a potential financial crisis and in pertinent cases, work with the management of financial institutions, provide financial aid and oversee effective cooperation between them. In addition "Financial stability report" had been constantly published since third quarter of 2008.

6. Conclusion

Capital inflows and outflows have increased significantly over five years, starting from 2003. Much of the capital inflows have taken the form of FDI – especially in mining and

construction activities, which has created GDP growth in recent years. A common feature of changes in the composition of the capital inflows have been an increase share of FDI and private debt, and a decrease in the public debt.

Results of empirical analysis indicates that push and pull factors including improved macroeconomic performance with high economic growth, high interest rate differentials, current account surplus, World real GDP growth have led to increases of capital inflows in recent years. Whereas recent year's high capital outflows have mostly determined by internal factors, which are high domestic economic growth, domestic real interest rate and current account to GDP ratio.

Recent years' large capital inflows has helped to promote economic growth and improve productivity and export performance, but the inflows has been started to create some adverse consequences including rapid monetary expansion, accelerating inflation, appreciation of REER and a loss of competitiveness and faster growth in securities and housing prices. The results are showed by the some technical analysis. The rapid inflows also posed risks to financial stability to extent their intermediation, resulted in a rapid growth of credit (credit risk), negative real interest rates related with high inflation (market and liquidity risks), and appreciation of domestic currency (currency risk). The results show that if the large capital inflows keep continuing, it may create potential risk of economic overheating and financial instability. In the near future, the capital inflows are expected to increase massively due to the fact that large projects of mining, the government is planning to issue soverign bond in the international financial market. Thus policy makers worry that how to sterilize the expected impact of the surge in capital inflows. Unfortunately, the management of capital flows is not easy and policy maker's efforts should focus on reducing the risks and adverse consequences associated with the inflows, as opposed to affecting the flows and their composition.

The following policies could be recommended for implementing to avoid the adverse impact of surge in capital inflows.

- Fiscal austerity, tighten monetary policy, enhanced bank supervision and institutional improvements are the best responses to a capital inflows episode.

- The BOM should continue tighten monetary policy (sterilization policy). Because tighten monetary policy response to economic overheating, excess money and inflationary pressure. Also to avoid excess money and inflationary pressure related to large capital inflows, the BOM need to engage in sterilization policies through the open market sale of CBB, monetary policy rate, reserve requirement and capital requirement, and foreign exchange intervention. But policy makers should consider that while sterilization may provide some relief, it may also be quite costly to central banks.

- The BOM may need to determine and formulate its foreign exchange rate intervention strategies. Although increases in capital inflows will require a careful mix of interest rate and intervention policies to avoid disorderly exchange rate adjustments, while preserving the credible monetary policy. Furthermore, the exchange rates of Tögrög need to be protected from a speculative attack depleting foreign exchange reserves.

- The Ministry of Finance should implement tighten fiscal policy. Tighten the fiscal stance helps to reduce the risk of economic overheating and inflation pressure. Although tightening fiscal policy and eliminating excessive fiscal incentives may be the available option for aggregate demand management.

- Deepening the financial markets and strengthening the financial system supervision and regulation, where needed, would be the most effective ways to deal with the risks associated with capital inflows. The rapid credit growth[33] and the rollover of loans could make it difficult for the BOM to spot emerging problems in the banking sector. Thus, the authorities should continue to upgrade the supervisory framework by improving the supervision of liquidity and operational risks of banks, and continuing to implement structural policies for a sound financial sector, including prudential regulation and supervision and improved risk management.

- Institutional improvements have helped strengthen the policy responses to capital inflows. Other countries' experiences show that instead of capital controls, countries have been able to combine macroeconomic policy tools, with efforts to develop financial markets, better monitor capital flows, and adopt various debt management measures and some indirect intervention schemes. Thus authorities should aim to improve conduct of macroeconomic policies and policy tools.

- Promoting the development of the stock market, improving financial structure to endorse safe accommodation of capital flow and managing risk related to it. Well developed and deeper stock market could promote financial stability and help to reduce the economy's susceptibility from volatile capital flows.

- Policy makers should consider capital controls on short-term capital inflows, if the capital inflows are mostly of the "hot money" type. While capital controls may work, at least in the very short run, but it needs to be considered that the introduction of restrictions to capital mobility may have undesirable long-run effects.

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[33] Beware of rapid credit growth during the inflow phase of the cycle; when capital flows out, these loans may have to be repaid in short notice, leading to bankruptcies in the private nonfinancial sector and, possibly, bank failures.

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Appendix 1
Unit Root Tests: ADF test

Variable	Order of variable	Optimal lag length	ADF test
CIN_R_L	*Levels*	0	-4.98 [c,t]***
	1st diff	0	-6.95 ***
COUT_R_L	*Levels*	0	-4.64[c,t]***
	1st diff	0	-8.85***
GDP_G	*Levels*	1	-5.89[c,t]***
	1st diff	3	-7.42***
R	*Levels*	3	-1.74*
	1st diff	2	-1.99**
CA_GDP	*Levels*	4	-2.22
	1st diff	3	-1.97**
W_GDP_G	*Levels*	0	-1.41
	1st diff	0	-5.74***
R_W	*Levels*	0	-1.85*
	1st diff	0	-5.76***

Note: c or t in square brackets represent the inclusion of a constant or a time trend in the regression underlying the test. *, **, *** denote rejection of null hypothesis at the 10%, 5%, and 1 % level, respectively.