Capital flows and their implications for central bank policies in Mongolia

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Chapter 5

CAPITAL FLOWS AND THEIR IMPLICATIONS FOR CENTRAL BANK POLICIES IN MONGOLIA

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1. General Framework and Major Capital Flows Management Policies

1.1 General Framework

At the beginning of its transition to a market economy, Mongolia had a relatively closed capital account. Economic liberalisation, such as reduction of price controls, floating exchange rates, the privatisation of state-owned enterprises, and trade and capital liberalisation processes, was implemented in the 1990s. Most of the changes had occurred between 1990 and 1993. The Government of Mongolia accepted the obligations of Article VIII, Sections 2, 3, and 4 of the IMF Articles of Agreement, with effect from February 1, 1996[2]. The implementation of current and capital account liberalisation has both negative and positive impact on the economy.

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

Like in other SEACEN countries, the liberalisation of the financial market and capital account has resulted in large capital inflows to Mongolia. On the other hand, the inflows were motivated by good macroeconomic performance

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1. Author is Economist attached to the Monetary Policy and Research Department of the Bank of Mongolia. The opinions expressed in this paper are those of the author and do not necessarily reflect the views of the Bank of Mongolia.

2. 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.

and by strong demand of foreign investors in the mining and financial sectors. The large capital inflows have financed a higher economic growth, although it created pressures that led to inflation, real appreciation of the exchange rate, and a reduction in the domestic interest rate in recent years. Furthermore, due to this negative impact, an analysis of the determinants of capital flows and their macroeconomic impact and their implications for the policy management of capital flows is required.

Capital inflows are expected to increase massively due to the fact that large mining projects (Oyu tolgoi and Tavan tolgoi) are in the pipeline to be implemented in the coming years and with financial investment in the commercial banking sector increasing. Thus, the importance of the topic, while not considered as significant previously, is engaging the close attention of policy makers today.

This paper examines the evidence on the 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. There is no preceding work done in this area in Mongolia. Thus, it is not possible to make a review of literature in the Mongolian case and compare some results with other papers' results.

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 the Mongolian case, current and capital account were almost fully liberalised in earlier 1990s. The present capital flow management framework is as follows:
- Non-residents can purchase local bond and other debt securities;
- Commercial credits to and from non-residents are allowed;
- Investment by private corporations in export promotion, use of advanced technology, and the exploration of natural resources are encouraged;
- Sales or issue of capital market securities, money market securities, derivatives and other instruments by non-residents are prohibited; and
- Gold mining companies are not required to register their exports at the Bank of Mongolia (BOM) or a commercial bank.

Nowadays the 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 the 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 have adverse effects on the trade balance.

The BOM shifted to a floating-exchange rate regime in May 1993 and then moved to a managed floating regime in 2001. For the BOM, its interventions are officially limited to smoothening severe volatility in the foreign exchange market, using the US dollar as the principal intervention currency. In reality, the BOM has been a net seller of foreign exchange in the interbank market.

The 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

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

Before 2007, without sterilisation, capital inflows led to reserve money and money supply injection into the economy, which could have contributed to inflation. Furthermore, in recent years the 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 the net international reserves (NIR) before 2007. IMF staff (January 2007) calculated the sterilisation coefficient as the ratio of the change in Central bank bills (CBBs)[3] to the change

in NIR. The short-term elasticity is estimated around 60-70% and even the long-run elasticity is less than 80%. Also they conclude that sterilisation through CBBs issuance was not sufficient and the effectiveness of monetary policy may be dampened.

Since July 2007, the excess liquidity in the inter-bank market, reserve money and growth of monetary aggregates have decreased and the sterilisation coefficient has risen due to the revision of the regulation on CBBs auction. In the economy, decreases in the growth of monetary aggregates reduce inflationary pressure with lags of 3-5 quarters. Section 4.3 considers the issue of sterilisation 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) and this policy may be effective in limiting the appreciation of the real exchange rate. In the 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, the fiscal expenditure increased from 27.5% of GDP in 2005 to 38.4% in 2007. The funds for public expenditure are derived from windfall tax income of gold and copper. This 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 up GDP growth. Annual real GDP growth has averaged to 8.4% since 2003 due to the 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 the last three years.

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3. BOM issue CBBs to **observe** (absorb?) excess liquidity from the banking sector.
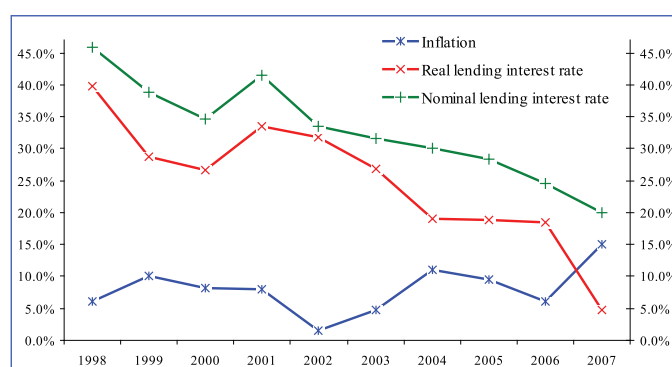
Figure 1
Capital Flows and GDP Growth Rates
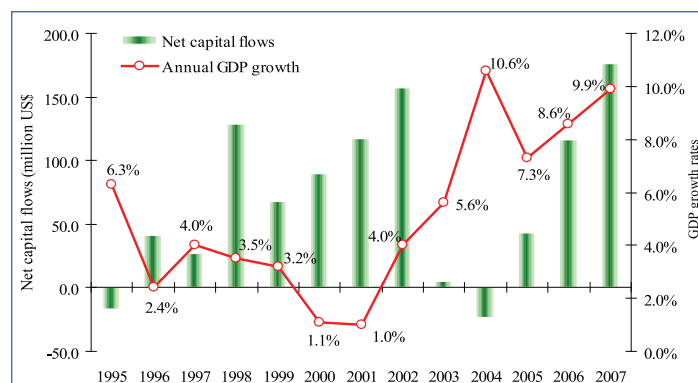
The Mongolian economy grew nearly 5% per year between 1995 and 2007, while receiving net capital flows of nearly 5.8% of GDP.

As the economy began to be exposed to external shocks, inflation acquired significance, though it was at a low level (1.6-11.0%) between 1998 and 2006. Strong supply shocks, such as increases in petroleum and food prices have mainly been responsible for inflation volatility. The 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).
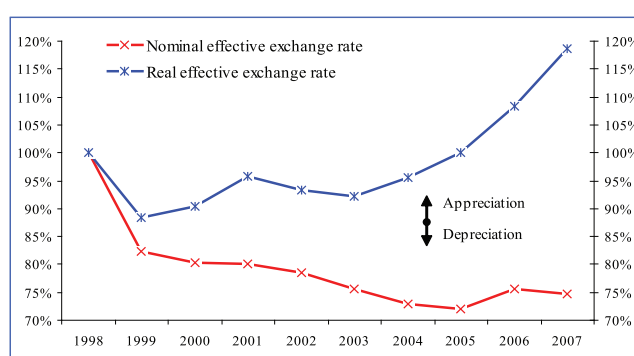
Figure 2
Inflation and Interest Rates[4]

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4. Real interest rate is calculated using Fisher's identity.

Figure 2 shows that high lending interest rates have also been decreasing in recent years. Especially during the last five years, the lending interest rate dropped twice to 20%. This decrease reflected in the reduction in the 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 have not decreased and it seems to be mainly the result of strong competition among banks.

Figure 3
Developments of NEER and REER

Source: The Bank of Mongolia

The 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.

Figure 4
Growth of Money Supply and Credit

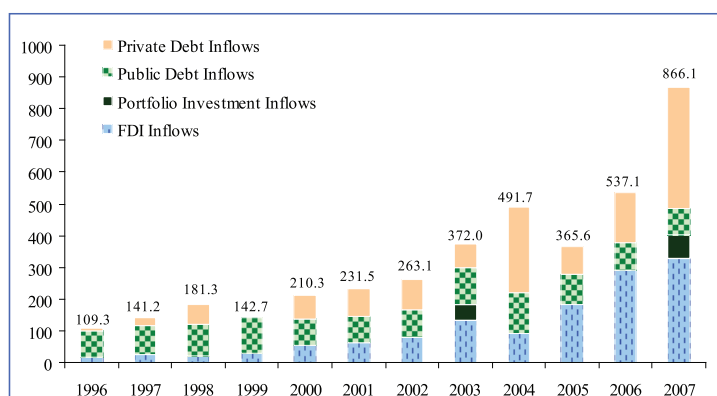

Source: The Bank of Mongolia

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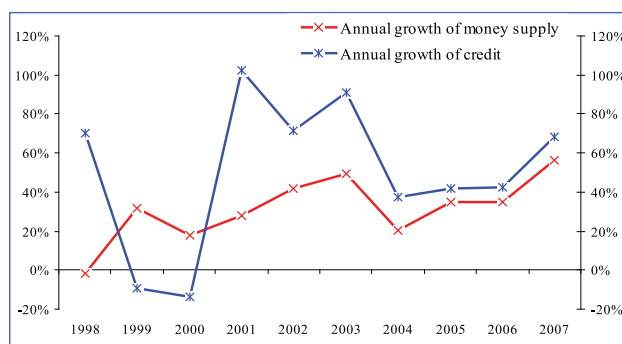
The money supply and credit growth have been high, that is between 20% and 90% per year in the last six years (Figure 4). The growth in money supply was reflected in the strong foreign exchange inflows. Especially in 2007, the high growth of money supply and credit has mainly been driven by increases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

The average annual credit growth was over 40% in 2001-2007, and it is a relatively high indicator comparing to other transition economies. The growth in credit has been 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 reveals that capital inflows are trending upwards since 1996. During this period, the composition of capital inflows changed, with public debt inflows replaced by foreign direct investment (FDI) and private debt inflows. FDI and private debt inflows in last four years took up on average 40% and 38% of capital inflows, respectively. While public debt inflows declined from 77% of capital inflows in 1996 to about 10% in 2007. FDI inflows peaked at US$327.8 million in 2007.

Figure 5
**Composition of Capital Inflows (US$ million)**

Source: The Bank of Mongolia, Balance of Payment Statistics

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

Figure 6
Composition of Capital Outflows (US$ million)
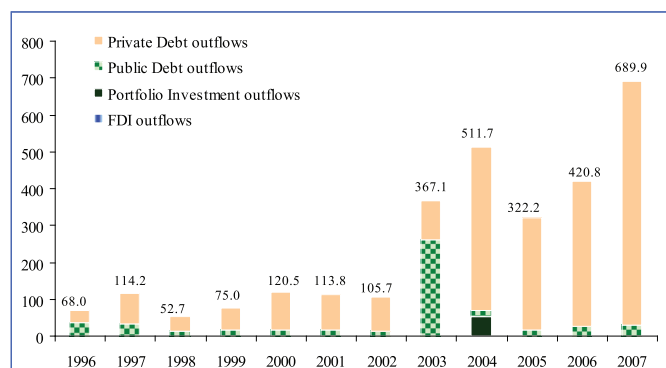
Figure 6 shows that capital outflows have been rapidly increasing from 2003. Capital outflows have largely been accounted by private debt outflows since 2003. Private debt outflows rose from 48.2% of total capital outflows in 1996 to 95.7% in 2007. The macroeconomic determinants of capital flows are closely examined in Section 3 of this paper.

Figure 7
Composition of Net Capital Flows (US$ million)

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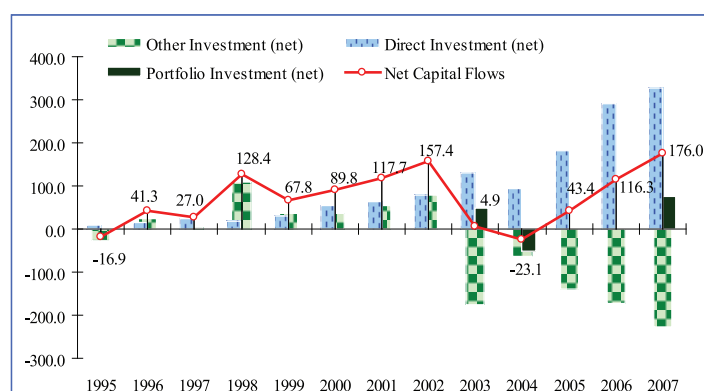
Figure 7 plots the trend of net capital flows (capital inflows minus capital outflows) and its composition in Mongolia. The plot shows that net capital flows were positive and continuously increasing between 2004 and 2007. The composition of net capital flows has not changed during this time. The net capital flows in the recent years are mainly accounted by net direct investment, because of strong demand from foreign investors for Mongolian mining and exploration sector. FDI into the mining and exploration sector has been growing rapidly since 2001 and is the fastest growing component of total FDI. The FDI inflows increased 38.1% as compared to the previous year. In 2007, net capital flows increased by 51.3% and showed a surplus of US$176.0 million.
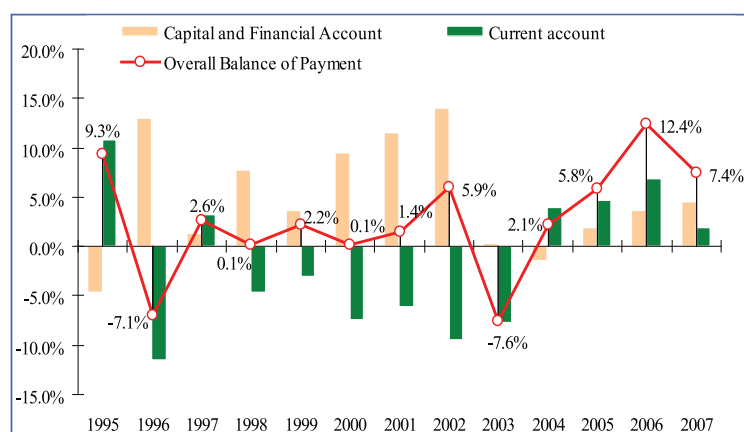
Figure 8
Composition of Balance of Payment (% of GDP)

Source: The Bank of Mongolia, Balance of Payment Statistics

Since 2004, the current account of the balance of payments is in surplus, since gold and copper prices in the world market have continuously increased and stayed at relatively high levels. In other words, the improved terms of trade have shifted the current account into surplus. The capital and financial account (net capital flows) recorded a surplus since 2003, given the net capital flows of about 4.1% of GDP in the last two years. The surplus of current and capital accounts led to an overall balance of payments surplus – with the ratio of overall balance of payments surplus to GDP increasing from 2.1% to 7.4% in last four years, reaching its peak at 12.4% of GDP in 2006 (Figure 8).

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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 their 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 and others (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[5] and market-oriented reforms, such as trade and capital market liberalisation. In most of the empirical studies, the 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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5. 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 stabilisation programmes can reduce macroeconomic risk.

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

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

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   is residual of the regression.

3.2 Data Description, Unit Root Tests and Cointegration Tests

The empirical results are based on quarterly data for the period 1998Q1-2008Q2 (42 observations) to exclude impact of structural changes of the economy and banking crisis. Also the official quarterly data of real GDP and capital flows are available from the first quarter of 1998 for Mongolia. Table 1 summarises the variables used in the estimation and their sources.

Table 1
Variables in the Estimation[6]

Name of variables	Notation	Information	Source
Dependent variables			
Capital inflows	CIN_R_L	Real capital inflows, (in log)[7]	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

The order of integration of the series is tested by employing the ADF and Perron (1997) (IO2 model)[8] test. The result of AFD test is reported in Appendix 1.

The ADF test represents 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 without deterministic trend. The 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)[9]. As

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6. All the 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 the X-12-ARIMA method.

7. Real capital flows= nominal capital flows (in US$)/CPI of USA.

8. The IO2 model allows for gradual changes in 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) which is unknown, if and zero otherwise, if and zero elsewhere, if t= and zero otherwise, is any general ARMA process and white noise. The null hypothesis of a unit root is rejected if the absolute value of the t statistic for testing a=1 is greater than the corresponding critical value tabulated by Perron (1997).

9. In the paper, order of integration was chosen at the 5% level.

these variables appear to be mixed (stationary and non-stationary), the appropriate estimation method (ARDL approach) for mixed time series is applied.

But a problem with the 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 this paper, the 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 minimise 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 is insignificant, up to a maximum order k. Figure 10 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[10]	3	-2.75
CA_GDP	2006Q3[11]	3	0.81
W_GDP_G	2001Q4	0	-2.27
R_W	2006Q3[12]	0	-0.97

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

As all variables appear to be non-stationary under structural change (IO2 model, Perron 1997), the appropriate estimation methods for non-stationary time series are applied. The co-integration analysis is carried out using the 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).

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10. Real interest rate has decreased from the first quarter of 2006, due to rapidly decreasing nominal interest rate between the first quarter of 2006 and second quarter of 2007. This trend has continued because of the rapid increase in the inflation rate since July of 2007.

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

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

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[13] 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 statistic indicates the 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 normalising the real capital inflows or real capital outflows (in log).

Table 3
Cointegration Rank Test

Hypothesised 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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13. 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, the ARDL model can be applied irrespective of their order of integration. It thus avoids the pre-testing problems associated with the standard cointegration tests (Pesaran et al., 2000).

In the ARDL approach, the null hypothesis (*all long-run coefficients of the underlying ARDL are equal to zero,* implying no cointegration) is tested by computing the general F-statistic to determine that a long-run relationship does exist between the dependent and independent variables. At this stage the 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[14], respectively. Thus, the null hypothesis of no cointegration is 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 variables in the paper.

3.3 Estimation Results: 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 Figure 12. The general to specific approach is applied to arrive at the parsimonious versions of the estimates provided in Table 4.

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14. 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.

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[15] (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)*
R_W	-0.35 (8.43)***	-0.29 (6.85)***	----	----
Intercept and Dummy for Structural Break				
Intercept	5.05 (24.9)***	4.88[16]	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.

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15. The order of the optimal ARDL model (distributed lag function) is selected based on the AIC.

16. Standard error of the coefficient is not defined from the Eviews 6.0 software.

The two model estimates satisfy the summary statistics and common diagnostic tests, based on the results reported in the last three rows of Figure 12. 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.

Figure 9
CUSUM Test and CUSUM of Squares Test

A) ADRL (1,2,2,3,0,1) Model of Real Capital Inflows
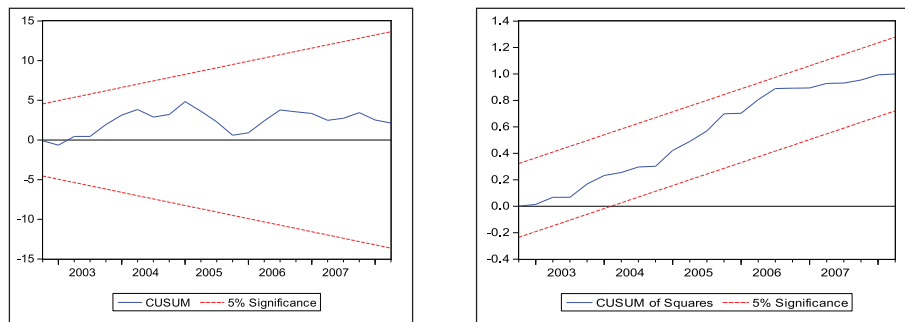
B) ADRL (1,2,2,2,2) Model of Real Capital Outflows
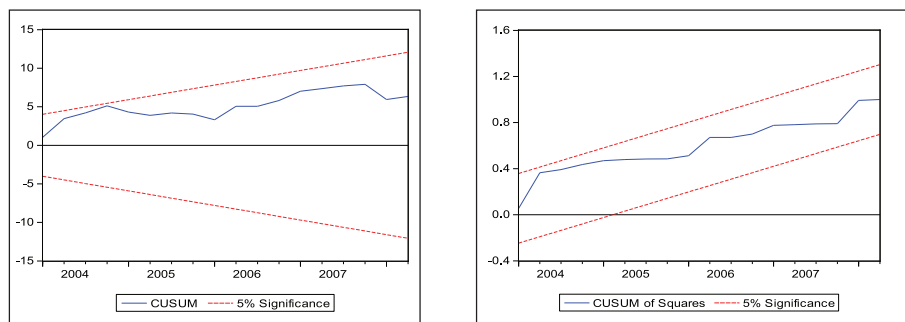
According to the estimates from the two methods employed an increase in domestic real GDP growth results in a rise of the real capital inflows and real capital outflows. Namely, the ARDL and Johansen estimates suggest that the 1 percentage point increase of domestic GDP growth causes the real capital inflows to increase by 3-5%. This result confirms that real capital inflows are partly explained 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 the underlying theory. Namely, the estimates indicate that a 1 percentage point increase of domestic real interest rate causes the real capital inflows to increase by 1.3-1.5%. However, the effect of domestic real interest rate on real capital outflows is significantly negative, as predicted. In the other words, a 1 percentage point increase in domestic real interest rate leads to 3-4% decrease in real capital outflows.

There is a positive relationship between the current account as a proportion of GDP and real capital inflows and real capital outflows. That is, a 1 percentage point increase in the ratio causes 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 in the 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 words, 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.

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

The coefficients of the error correction term (ECT_{t-1}) have the right sign (negative) and are statistically significant at 1% level. The estimated values of ECT_{t-1} of real capital inflows and real capital outflows indicate 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 10 shows that short-term net capital recorded a deficit from 2003, due to a rapid increase in capital outflows from 2003. In the Mongolian case, the short-term capital flows are dominated by short-term private debt. Before 2003, the volume 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 10
Short-term Capital Flows (US$ million)
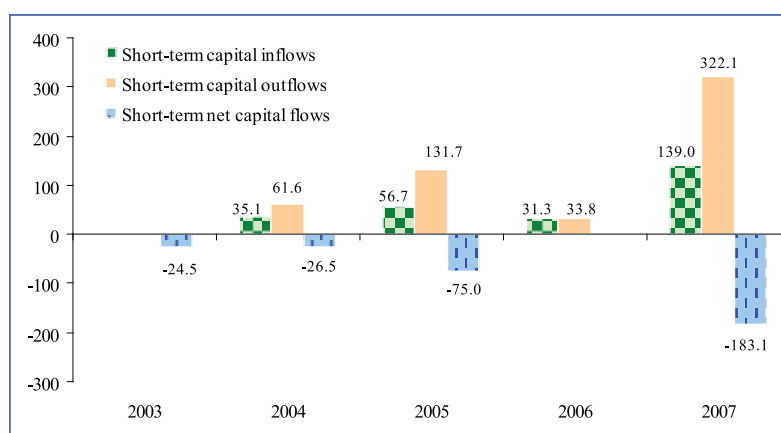
Source: Bank of Mongolia, Balance of Payment Statistics

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With regard to capital controls on short-term capital flows, Mongolia has a very liberal capital account regime with free flows into and out of the economy. Short-term capital inflows to the economy are expected to increase massively. Thus, the policy makers need to study carefully the effect of short-term capital flows on the economy in light of the experience of other countries in 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 on the important macroeconomic variables, namely, the 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 draws on the works of Kohli (2001), Edward (1999) and others in analysing Mongolia's experience. Large capital inflows can create a higher rate of economic growth, rapid monetary and credit expansions, and can generally 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.

4.2.1 Impact of Capital Flows on Economic Growth

Theoretically, FDI has a direct positive impact on economic growth through an economy's productive capacity. It also has an indirect impact on development via competition, improvement in 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 investors will be increasingly interested in investing when the host country is experiencing economic growth, as they are confident that industry promises high stable return and financial market.

The simple correlation coefficient between FDI and GDP level is 0.76 and the long-run elasticity of GDP in relation to FDI is 0.27 between 2000 Q1 and 2008 Q1 in the Mongolian economy. Production elasticity of the agricultural sector in relation to the FDI to the sector is 0.25. For the sectors of mining and manufacturing, the calculated elasticity is 0.29; and, for hotels, restaurants and wholesale & retail trade, the value is also 0.29. These results imply that any expansion in foreign investment in those sectors cause their production level to rise. The response of GDP to FDI is obtained from vector error correction

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(VEC) with 4 quarters lags estimation between the two series[17]. The response function shows that a 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., three 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[18]. The simple correlation coefficient between net capital flows and the real effective exchange rate is 0.54. This result indicates that the relationship between these variables is positive and capital inflows may lead to appreciations of REER.

The Granger causality test[19] with one lag shows that the hypothesis that net capital flows do not cause an appreciation in the 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 on the exchange rate regime, capital inflows can be either international reserves' accumulation or a current account deficit[20]. 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. In addition, the increase in gold prices in the world market strongly affected the foreign exchange reserves. The stock of net international reserves was US$1.04 billion in March 2007, represents an increase 154% over January 2006. But the trade balance deficit has started increasing since April 2007, reaching a deficit

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17. Both GDP and FDI to be I(1) process and both series are also co-integrated at significance level of 5%.

18. Lipschitz. L, Lane. T, Mourmouras. A (2002).

19. The test is used in the Kohli, R. (2001), "Capital Flows and Their Macroeconomic Effects in India", IMF.

20. 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.

of US$706.1 million in July 2008. Due to the increase of this deficit, foreign exchange reserves have declined.

Net capital flows affect domestic money supply through accumulation of net foreign currency assets (NFA)[21]. The correlation coefficient (0.45) shows that a positive relationship between money supply and net capital flows exists in the economy.

The 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. The high growth of money supply in the last three years is fueled by the growth of net foreign currency assets. During this time, the average annual growth of NFA increased by 69.7% and it pushed the average annual growth of money supply to 41.9%. These results confirm that money and credit growth are rapidly growing, owing to the substantial capital inflows in the recent years. In other words, increases in capital inflows intermediated through the banking system have been supporting a strong growth of banking sector credit, leading to economic overheating, jeopardising stability and creating inflationary pressures.

4.2.4 Response of Monetary and Financial Variables to Capital Inflows

Figure 11 presents the impulse response functions (IRFs) for monetary and financial variables to one standard deviation innovation in the capital inflows. These IRFs are calculated from the SVAR model[22] 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 three quarters. The response of GDP to capital inflows is significantly different from zero at the significance level of 5% for first five quarters. With respect to inflation, it takes a major positive effect for first three quarters and reaches its peak level after two quarters.

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21. 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.

22. The SVAR model was identified by orthogonalising the variance-covariance matrix of the residuals of the equations using the Cholesky decomposition. In performing the decomposition, the causal ordering , , , , , , was used. Where is a logarithm of terms of trade, is nominal international interest rate (LINOR3M rate), is nominal domestic interest rate (monetary policy rate), is logarithm of real effective exchange rate, is logarithm of real GDP, is annual inflation rate, is logarithm of capital inflows.

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

Figure 11
Impact of Shocks to Capital Inflows on Monetary and Financial Variables[23]
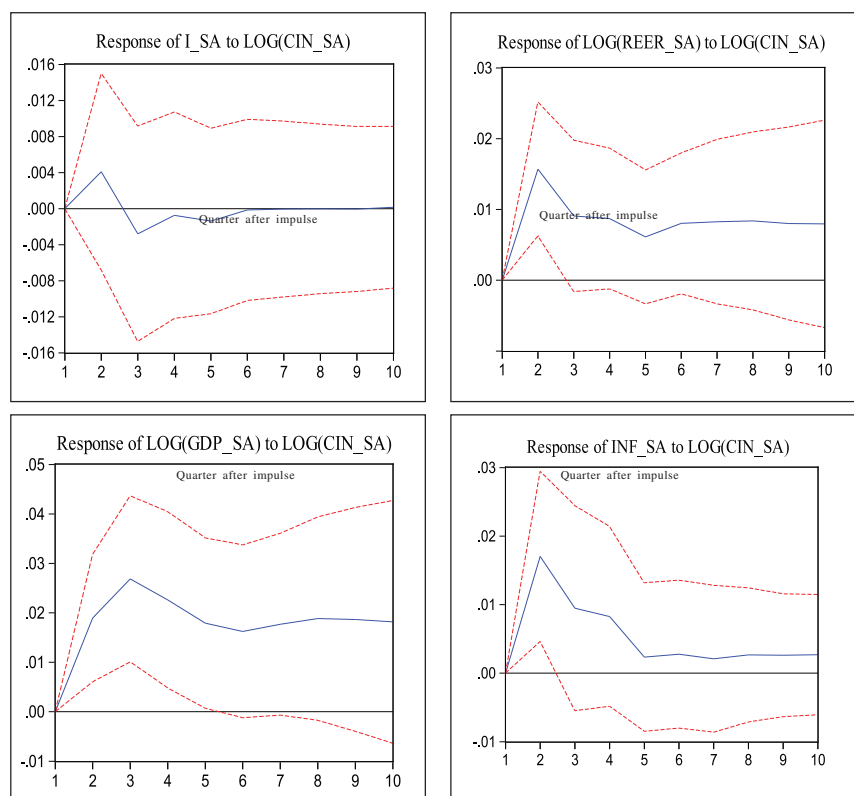
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23. The point estimates of responses are shown as solid lines; dashed lines display a two standard deviation confidence interval.

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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[24].

In the Mongolian economy, it is clear from Figure 4, the monetary aggregates have been growing since 1999. Indeed, over the last eight 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 the 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 a 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 the consumer price inflation stayed at a relatively high level.

In recent years, the sharp increases in monetary aggregates associated with the current account surplus, fiscal expansion and rise in capital inflows. The BOM is concerned to see the credits and monetary aggregates rising rapidly. The issue of concern is that the rise in money supply will fuel inflation[25]. This fear led the BOM to engage in sterilisation policies through the open market sale of central bank bill and increases in monetary policy rate. Increases in the reserve requirements were also used to reduce liquidity during the monetary aggregates surge[26]. This sterilisation effort was particularly intensive since 2007.

In 2007, the BOM updated its regulations on CBB auction and statutory reserve requirement and announced one-week CBB rate as 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

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24. Calvo, G.A, Leiderman. L, Reinhart. M.C., (1996).

25. Fear of inflation often leads central banks to try to *sterilise* the increase in money supply through open market operations.

26. Theoretical model of sterilisation of capital inflows through the banking sectors (increase in reserve requirement) is postulated in Mark M. Spiegel (1995).

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preannounced allotment volume. By making all those changes, the BOM is able to realise all the advantages in announcing the real and true interest rate to market and use its monetary policy instruments efficiently.

Due to the high growth of credits and monetary aggregates and the tendency of inflation 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, the 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 the monetary policy rate and the increases in reserve requirement, the excess reserve of the interbank market has decreased and reached its lowest level of 9.3 billion tugrug in August 2008. Also owing to these policy changes, the weighted average of central bank bill rate and interbank market rate has continuously increased to 14.41% in August 2008[27]. As a result, the domestic currency loan rate increased to 21.8% and the foreign currency loan rate to 15.2% in August 2008.

As a result of the sterilisation policy, the 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 drive down inflation in the mid-term. But there were no signs of fiscal tightening as a reaction to the high credit growth (related with large capital inflows) and high inflation in past two years. Thus, the BOM aims to improve the conduct of monetary and fiscal policy (credible and consistent macroeconomic policy mix).

5.   Capital Flows and Financial Stability

5.1 Capital Flows in Banking Sector

Capital flows in the economy and banking sector are shown in the Table 5. The total capital inflows, excluding currency and deposits in the banking sector, rose 6.65 times from US$30 million in 2006 to US$199.6 million in 2007. The increase was provided by the joint growth of short-term (less than one year) and long-term capital inflows. Namely, the short-term capital inflows in banking sector was increased three fold, as the Trade Development Bank (a large commercial bank in Mongolia) issued US$ 75 million senior unsecured bond in

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27. In most cases, the domestic short-term interest rates rose when sterilisation began, suggesting that this policy had an impact, at least in the short run.

the international capital market. Furthermore, the long-term capital inflows in the banking sector rose by US$109.3 million, owing to the high differential interest rate and high demand for long-term foreign funds of commercial bank. Figure 16 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 accounted by the short-term capital outflows. In other words, the 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[28].

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28. In the Mongolian case, items of currency and deposit in balance of payment statistics are not classified.

Figure 16 also indicates that the capital flows of the economy are concentrated in the monetary authority and general government rather than the banking sector and non-bank private sector. But capital inflows to the banking sector constituted 23% of the total capital inflows in 2007.

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

5.2 Impact of Capital Flows on Financial Stability

Although large increases in financial flows can be handled by the financial system, flows of significant magnitude may risk the safety of the banking system. In addition, the real exchange rate appreciation 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 that the economy is overheating and the country's dependence on a relatively narrow range of commodity exports and the rapid credit growth are sources of risk. The y-o-y credit growth has been high, annual average growth is 58.6% in the last six years (Figure 4). The rapid credit growth fueled by the capital inflows[29] has also given rise to potential risks to financial sector stability. Some deterioration in the lending standards has been observed as banks compete for market shares[30]. The Granger causality test indicates that the faster credit growth leads to higher non-performing loans[31] after six to nine months. Furthermore, the 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.

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

30. Large inflows can lead to unsound credit allocation.

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

The stress tests undertaken by the FSAP team of the IMF and the World Bank (September 2008) indicate that the surge in capital inflows[32] would decrease the aggregate capital adequacy ratio (CAR) by 2.7 percentage points from the baseline CAR (15.2%). Also, the hypothesised 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 the 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, the 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 the banking sector and instruments, the non-performing loans are continuing to trend downwards and profitability is improving.

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32. Under this scenario, it was assumed that substantial trade and capital inflows result in an appreciation of the Tögrög by 20%, 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.

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

The financial sector in Mongolia consists mainly of banks, which hold about 95% of assets in the financial sector. The BOM supervises banks to ensure the stability of the financial sector, which is one of its main goals stated in the Central Banking Law, within the framework of the related laws and regulations[33]. As the role of the banking sector in the economy increases, it is vital to make the supervisory 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 subscribes to such strategic aims 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 the "Short-term Strategy of Reform and Development of the Banking Sector". As a result of this policy implemented by the BOM to enhance stability and support the growth of financial sector, the confidence of customers and depositors in the banking sector has improved. The result of which led to an expansion of the scope of banks' operations and improvement in the profitability of banks.

The BOM has been refining its supervision policy and methods, such as conducting assessments 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 organisations, and the BOM has made adjustments in the sophistication of the system. As the activities of the banking and financial organisations 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 shifted to a risk-based analysis. Thus, the supervision operations are focused on evaluating and measuring risk, and encouraging customers' oversight of banks. As of now, the BOM has been harmonising its rules and regulations with international standards, especially those

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33. Improvements in prudential supervision and regulation have helped enhance the capacity to absorb the inflows.

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 the Mongolian Mortgage Corporation to support the development of a secondary mortgage market.

At the request of the BOM, the IMF and the World Bank performed a "Financial Sector Assessment Programme" in Mongolia. This programme 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 Programme," 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 the soundness and stability of the financial system, informing the public of a potential financial crisis and, in pertinent cases, work with the management of the financial institutions, provide financial aid and oversee effective cooperation between them. In addition, the "Financial Stability Report" had been constantly published since the third quarter of 2008.

6.   Conclusion

Capital inflows and outflows have increased significantly over the past 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 the recent years. A common feature of changes in the composition of the capital inflows has been an increased share of FDI and private debt, and a decrease in the public debt.

The results of empirical analysis indicate 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 the recent years. Whereas the high capital outflows in the recent years have mostly been determined by internal factors, which are

high domestic economic growth, domestic real interest rate and current account to GDP ratio.

The large capital inflows in the recent years have contributed in promoting economic growth and improving productivity and export performance, but the inflows are starting 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 shown by the some technical analysis. The rapid inflows also posed risks to financial stability in terms of 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 continue, they may create potential risk of economic overheating and financial instability. In the near future, capital inflows are expected to increase massively due in light of the large mining projects and the government's intention to issue sovereign bond in the international financial market. Thus, the policy makers are concerned how to sterilise the expected impact of the surge in capital inflows. Unfortunately, the management of capital flows is not an easy exercise and the 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 are recommended to avoid the adverse impact of surge in capital inflows:

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

- The BOM should continue tightening monetary policy (sterilisation policy) because tightened monetary policy reduces 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 sterilisation policies through the open market sale of CBB, monetary policy rate, reserve requirement and capital requirement, and foreign exchange intervention. But the policy makers should consider that while sterilisation may provide some relief, it may also be quite costly to the central bank.

- 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 a tighter fiscal policy. Tightening the fiscal stance helps to reduce the risk of economic overheating and inflation pressure. Fiscal policy and elimination of excessive fiscal incentives may be the options 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[34] 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 continue 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 the financial markets, closer monitoring of capital flows, and adoption of various debt management measures and some indirect intervention schemes. Thus, the authorities should aim to improve the conduct of macroeconomic policies and policy tools.

- Promoting the development of the stock market, improving the financial structure to cater for safe accommodation of capital flows and managing risk related to them. A well developed and deeper stock market could promote financial stability and help reduce the economy's susceptibility to volatile capital flows.

- The 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, it needs to be considered that the introduction of restrictions to capital mobility may have undesirable long-run effects.

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34. Beware of rapid credit growth during the inflow phase of the cycle. When capital flows out, these loans may have to be repaid at short notice, leading to bankruptcies in the private non-financial sector and, possibly, bank failures.

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Unit Root Tests: ADF test

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

Note: c or t
the test. *, **, *** denote rejection of null hypothesis at the 10%, 5%, and 1 % level, respectively.