

Is Inflow of Foreign Loans in Bangladesh Sensitive to Interest Rate Differentials?

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Abstract

Theoretically, an increase in interest rate differentials—the difference between domestic interest rate and foreign interest rate—boosts either inflow of foreign loans or investment or both in any country. In Bangladesh, before the financial sector reform programme (FSRP) in 1990s, the inflow of external resources in the form of foreign direct investment (FDI), portfolio investment and other foreign loans were insignificant. But the policy changes in the financial sector, as well as the external sector, facilitated the increased inflow of external resources. Against this backdrop, this paper attempts to analyse empirically the relationship between foreign loan inflows and interest rate differentials in Bangladesh. The empirical results show that interest rate differentials have a positive impact on the gross inflows of foreign loans. It indicates that gross inflows of foreign loans will rise by 0.06 percentage point if interest differentials increases by 1 percentage point. However, the paper also finds that for the periods from quarters of 2012 onwards a higher response of gross inflows of foreign loans is evident with the change in foreign exchange policy. The paper suggests that liberalisation of external economic policies can expedite inflows of foreign loans in Bangladesh.

Keywords: International capital movement, interest rate differentials, external sector openness.

JEL Classification: C22, F21, F34, G15, O53

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1. Introduction

Capital inflows in the form of foreign loans or foreign investment—foreign direct investment (FDI) and portfolio investment—are very crucial for countries facing external shocks or encouraging foreign investment for economic development. Both foreign loans and investment depends on the difference between domestic and foreign interest rates. While higher domestic interest rate increases inflows of external resources like FDI and portfolio investment, a lower foreign interest rate induces to increase in the inflow of foreign loans. Interest rate differential is considered as a major determinant of capital inflows into developing economies and at times, it is felt that changes in monetary policy measures could increase or decrease the volume of capital inflows into a country. Capital inflows can help to show the relative strength or weakness of the external sector of an economy through building up foreign exchange reserves.

Capital inflows grew worldwide in the second half of 2010 due to the sign of recovery of the global economy from the financial crisis and so there were a lot of investment opportunities in emerging markets. Now the question is what caused these inflows into emerging markets? The answer lies mostly in interest rate differentials—the gap between monetary policy interest rates in emerging market economies (EMEs) and advanced economies. Advanced economies have been still striving to recover from the financial crisis and have eased monetary policy. In contrast, the recovery of emerging markets has been much stronger and in order to keep this recovery sustainable, authorities have had to tighten monetary policy and control inflationary pressures. So, the interest rate differential widened and attracted capital inflows to emerging markets (Gregorio, 2011).

Interest rate differentials invite arbitrage operations, i.e. attempts by actors to profit from price differences across different markets. There is an incentive to borrow money in a low-interest currency and invest that money in another high-interest currency to earn the interest differential. Dornbusch (1976) and Frankel (1979) observed that a relative rise in domestic interest rates reflects a rise in the domestic real interest rate. A rise in domestic interest rates will attract foreign capital inflows and thereby bring on an appreciation of home currency which moves the exchange rate and the interest rate differential in the same direction. But large speculative flows in “search for yield” can potentially jeopardize financial stability as they are volatile by nature. Volatile inflows typically concentrated in short-term maturity instruments can trigger sharp asset price movements and destabilizing sudden stops or reversals of flows. The International

Monetary Fund (IMF) in its Global Financial Stability Report 2007 (IMF 2007b) suggested that more open economies and increased global liquidity are associated with lower capital volatility for emerging market economies.

In Bangladesh, before the financial sector reform programme (FSRP) in 1990s, the inflow of external resources in the form of FDI, portfolio investment, and other foreign loans were insignificant. But the policy changes in the financial sector as well as the external sector facilitated the increased inflow of external resources. However, the increasing gap between the international rate of interest and domestic rate of interest induced domestic investors to go for foreign loans which in turn raising gross capital inflows into Bangladesh. The foreign exchange market in Bangladesh is floating since 2003 which also insinuates that Bangladesh is moving towards market-based system for international transactions. So the issue of the inflows of foreign loans in Bangladesh is becoming more important and relevant for Bangladesh day by day. It is true that associated risks with the foreign loans are also necessary to be addressed but the benefit from foreign loans also needs to be considered as the country is suffering from sufficient private investment with low-interest rate. The existing relationship between interest rate differential and inflows of foreign loans can guide the policymakers to take the decision on further liberalisation of financial market and capital account addressing pertinent menaces.

The objective of the study is to identify the relationship between inflows of foreign loans and interest rate differentials; to find the interest rate (either domestic or foreign) dominating on the gross inflow of foreign loans in Bangladesh and to formulate external shock accommodating interest policy.

After reviewing the literature in the second section, we discuss the trends in capital inflows and interest rate differentials in Bangladesh in the third section. In the fourth section, we depict policy developments for capital inflow in Bangladesh. We explain methodology and model specification in the fifth section. The sixth section contains the analysis of empirical findings. The concluding observations and relevant policy recommendations are presented in the final section.

2. Literature Review on Capital Inflows

There is a large and growing body of literature dealing with various issues like trends, determinants and impacts on capital inflows, surprisingly a few are found on the relevant topics.

In the East Asian case, Bird and Rajan (2000) also found that an interest rate advantage persisted. Domestic interest rates actually increased due to financial liberalisation. In East Asian economies the persistent interest rate advantage was associated with rising domestic interest rates rather than falling world interest rates. This suggested that capital was “pulled” rather than “pushed”.

In line with Bird and Rajan, Taylor, Mody and Kim (2001) analysed capital flows forecasts for 32 developing countries based on underlying domestic (pull) fundamentals and international (push) factors using a dynamic vector error correction framework. They took level of domestic credit, consumer price index, level of industrial production, short term debt to forex reserves ratio, credit rating, domestic short term interest rate and reserve to import ratio as a country-specific factors. They included factors such as the strength of the US output growth, the Emerging Markets Bond Index (EMBI), the US short-term and long-term interest rates, the US swap rate and the US high-yield spread (as proxies for a measure of risk aversion) as global or ‘push’ factors. Their variance decomposition analysis suggested that for developing countries domestic or “pull” factors were relatively more dominant in the determination of capital flows. Shocks to global real factors such as zero growth in the US industrial production which dropped capital flows to emerging markets substantially and continued to decline without any signs of recovery. They also found that changes in both the US interest rates and the US high-yield spreads had significant effects on capital flows to most emerging markets.

In linkage of capital inflows with economic growth Ying and Kim (2001) examined the macroeconomic factors of capital inflows and economic fluctuations in Korea and Mexico using the structural VAR method during the period January 1960 to April 1996. They took foreign interest rate and foreign output as push factors and as pull factors, they took domestic money supply and domestic productivity as determinants of capital inflows. Their empirical result suggested that a foreign interest rate shock generated a moderately negative effect on domestic output in both countries. They also observed that foreign output shock accounted for more than 50 percent of the variation in capital flows for both countries.

Chakrabarty (2006) has found a long-run relationship between net capital inflows, interest rate differential, and the real exchange rate using quarterly data for the period 1993 to 2003 for India by using the co-integration method. He also observed an error correction mechanism for the post-liberalisation period which related dynamic adjustment to capital inflows to the movements in the real exchange rate and the interest rate differential. Since 1993, the changes in the real exchange rate in India have mainly been due to the intervention by the Reserve Bank of India in the foreign exchange market. These changes in the real exchange rate were, therefore, followed by the changes in net capital inflows, such that a long-run equilibrium relationship changes among capital inflows, real exchange rate, and interest rate differential. The policy of exchange market intervention was, therefore, instrumental in preventing the volatility of the real exchange rate, which could have resulted from the volatility of the net capital inflows into India.

There is a debate on whether capital flows to emerging market economies are driven by external (push) factors or domestic (pull) factors. In this regards Culha (2006) studied the determinants of capital flows into Turkey using the Structural Vector Auto Regression (SVAR) model, impulse response function, and variance decomposition functions for the period 1992:M01 to 2005:M12. He used push-pull factors approach. He took the Istanbul stock exchange index, current account balance, real interest rate, and budget balance on Turkish T-Bills as pull factors while US industrial production index and interest rate on 3-month US T-Bills are taken as push factors. He found a general dominance of pull factors over push factors in determining capital flows into Turkey. More specifically, he found a negative relationship of capital inflows with budget balance and current account balance while a positive relationship was found between stock exchange price index and capital inflows. He also observed that a shock in the real interest rate in Turkey resulted from an immediate capital outflow in Turkey during the periods January 1992 to December 2005. Moreover, in the sub-period January 2002 to December 2005, it was seen that a shock to real interest rate tended to initially enhance capital inflows while keeping it in the positive territory over the twelve-month horizon.

Singh (2007) estimated a cointegration and error correction model (ECM) for the determinants of the Indian external commercial borrowings using quarterly data during the period March, 1993 to December, 2007. He observed that interest rate differential, real activity (proxied by IIP), and liquidity (proxied by broad money supply) had a statistically significant long-run effect on the demand for external borrowings. Liquidity had an inverse relation with the external borrowings while the real activity and interest

rate differential had a positive association. The coefficient of the error correction equation suggested that there is a rapid and complete adjustment to deviation from the long-run path of external commercial borrowings in about three quarters. He also found that an interest rate differential (arbitrage) was the second most important variable to explaining changes in external borrowings.

Singh has done the same job in 2009 and found a high correlation between external commercial borrowing disbursements and interest rate differential (i.e. the commercial banks' prime lending rates minus the six-month LIBOR). He examined the factors of various components of private debt flows and equity flows to India using multivariate regression on monthly data for the period 1993-2009. During the normal periods, the overseas borrowings are influenced by the underlying domestic demand shocks, the external credit shocks which seem to be the most dominant factor during the periods of the financial crisis. He also observed strong co-movement of ECBs and domestic activity which is predominantly influenced by the pace of domestic real activity, followed by interest rate differentials and the credit conditions in domestic markets. For determinants of non-resident Indian deposits, he applied vector error correction model (VECM) and found that NRI deposits are significantly influenced by real economic activity in the host country (index of oil price was taken as a proxy), exchange rate movements and interest rate differential (between the interest rate on NRI deposits and six month LIBOR) which revealed that NRI deposits were found to be much unstable in nature. He tested the Granger causal relationship between portfolio flows and the stock prices and revealed that these two variables have a simultaneous interaction due to their bidirectional causal relationship. Johansen's approach to the co-integration analysis also suggested a long-run relationship between the two variables. With regard to portfolio equity flows, he found co-movement in volatility of daily net foreign institutional investments inflows and stock returns.

To find out the relationship between interest rate differentials and capital inflows Verma and Prakash (2011) have done a great job and provides empirical evidence on the sensitivity of capital inflows to interest rate differential in the India specific context. By using both Granger causality and cointegration analyses during the period from 2001-2010, they suggested that foreign direct investment and foreign institutional investment equity flows, which together on a net basis are not sensitive to interest rate differentials as it depends on long-term fundamentals of the economy. In turn, debt-creating flows, in particular, external commercial borrowings, foreign currency denominated deposits and

non-resident Indian (NRI) deposits exhibit statistically significant sensitivity to interest rate differentials, even though other determinants of these inflows dominate significantly the impact of interest rate differential. They have also found that, at the aggregate level, cumulative gross capital inflows appear to increase by 0.05 percentage points in response to a one percentage point increase in interest rate differential.

Byrne and Fiess (2011) studied national and global determinants of international capital flows to emerging and developing countries. They assess the permanence of shocks to commonalities and their determinants if the commonalities exist. They consider individual country coherence with global capital flows and also measure the extent of co-movements in the volatility of capital flows. Their results suggested that there are commonalities in capital inflows, although aggregate or disaggregate capital flows respond differently to shocks. They found that the US long-run real interest rate is an important determinant of global capital flows, and real commodity prices are relevant but to a lesser extent.

In studies discussed above shows a positive relationship between capital inflows and interest rate differentials. As a developing country like Bangladesh foreign loans or investment can play a vital role on our economy and interest rate differentials positively influence in the capital inflows in Bangladesh though we have not found any literature on this issue in Bangladesh context. So, we are the first to examine this issue in context of Bangladesh.

3. Trends in Capital Inflows and Interest Rate Differentials in Bangladesh

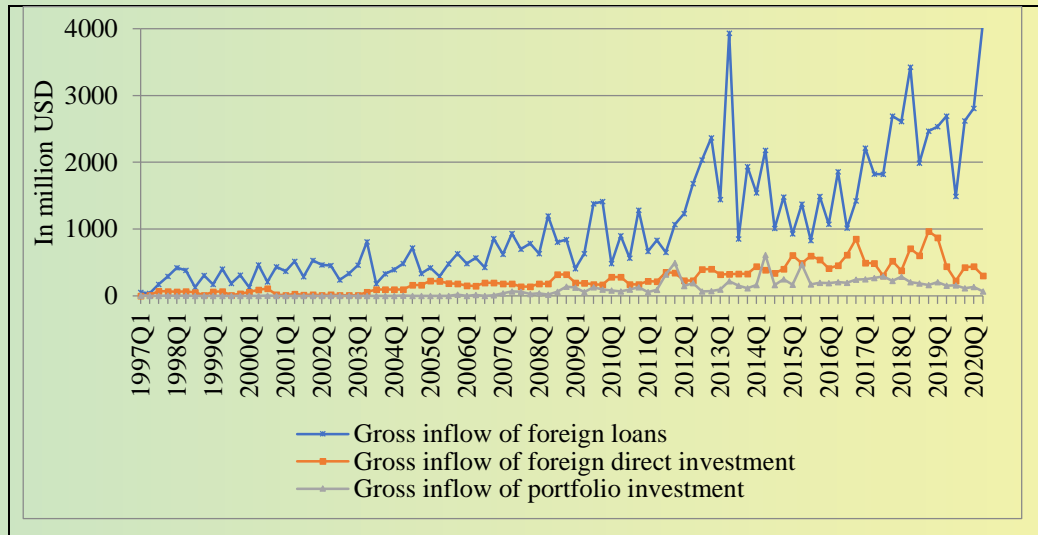
The statement of balance of payments (BOP) produced by Bangladesh Bank is the source of data on capital flows in Bangladesh. Capital inflows consist mainly of foreign loans (GFL), foreign direct investment (GFDI) and portfolio investment (GPI).

3.1 Trends in components of capital inflows in Bangladesh

Bangladesh recorded a capital and financial account surplus of USD 7.65 billion in FY20 from USD 691 million in FY97. The quarterly trends in the components of capital inflows (figure 1) show that GFL spearheaded the composition of the inflow over time. Data from 1997Q1 illustrates that GFDI and GPI are moving at a constant pace when GFL is moving with even fluctuations till 2012Q1. Then the fluctuations in GFL increased sharply with increasing trends in the flow. An important effect of post external sector liberalisation is the slight rise in GPI when GFDI shows even mean inflow with

increased fluctuations. But the scope of private sector borrowing raised the inflow of GFL significantly accompanying by high fluctuations following 2012Q1. The scope also affected other components of gross inflow but at a milder extent.

Figure 1: Trends in Components of Capital Inflows



Source: Bangladesh Bank

3.2 Trends in Domestic and Foreign Interest Rates

The interest rate differential is defined by two interest rates: the interbank call money rate of Bangladesh and the London interbank offer rate (LIBOR). The movement of the domestic call money rate and LIBOR is shown in figure 2.

Figure 2: Trends in Interbank call money rate of Bangladesh and LIBOR

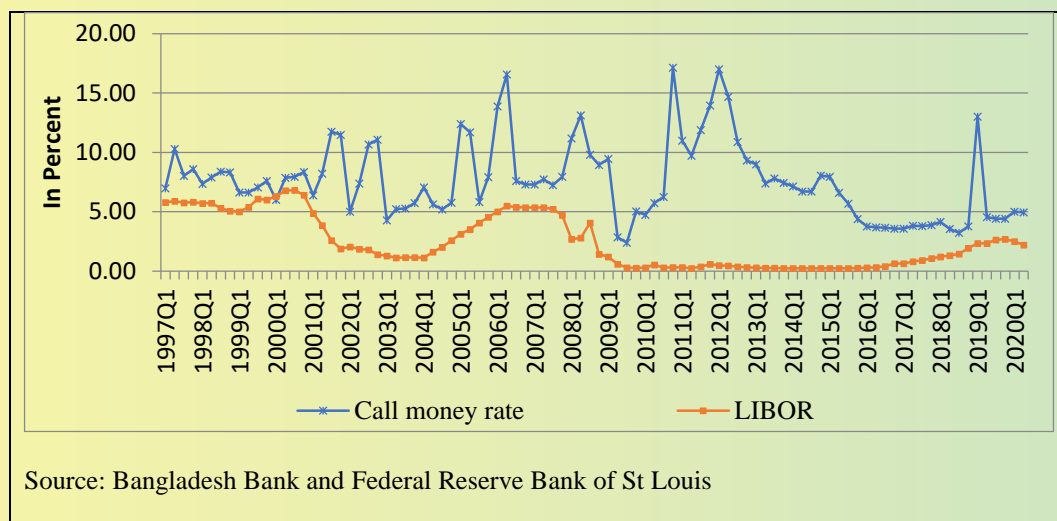
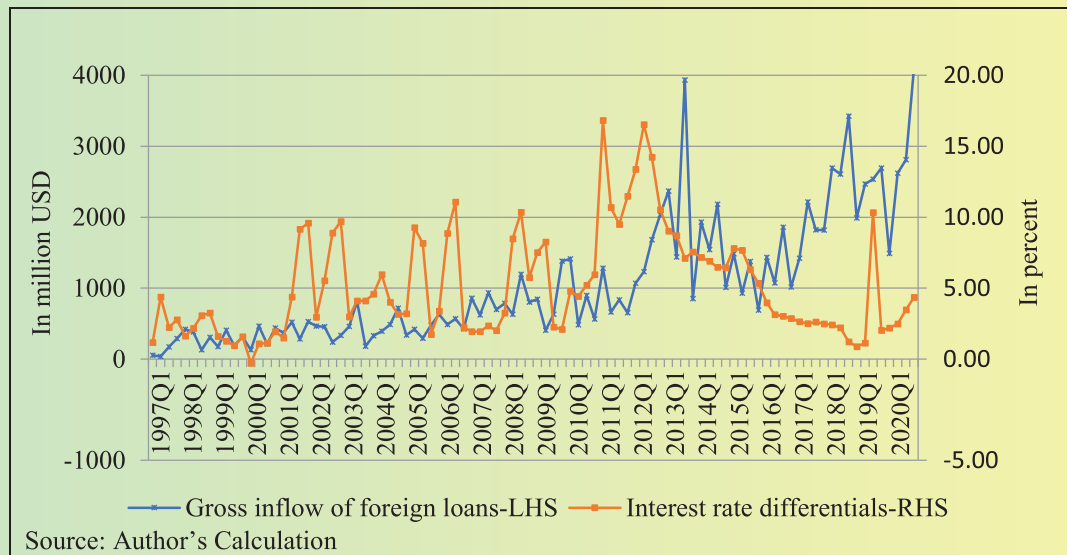


Figure 2 shows that the domestic call money rate and LIBOR are moving closely from 1997Q1 till 2009Q2. In this period domestic call money rate was more fluctuating comparing with LIBOR. With high fluctuations, domestic call money rate kept rising till the second quarter of 2006. After 2006Q2, the domestic call money rate fell and maintained a declining trend with fluctuations till the third quarter of 2009 accompanying the commencement of external sector liberalisation in Bangladesh. LIBOR started to fall from the third quarter of 2007 and reached to the lowest level in the third quarter of 2009. Following 2009Q3, the domestic call money rate picked upward when LIBOR remained at the low level consistently. So, the gap between domestic call money rate and LIBOR reached to a maximum level which caused the opening of external sector borrowing liberalisation in 2012Q1. With the effect of the policy, the domestic call money rate started to fall from 2012Q1.

3.3 Trends in gross inflows of foreign loans and interest rate differentials

The interplay between gross foreign loans inflow and interest rate differential is depicted in figure 3. The quarterly data shows that the gross inflow of capital is following the interest rate differential. Both the variables moved very closely when the gross foreign loans inflow continued at the same pace but there were fluctuations in the interest rate differentials.

Figure 3: Trends in gross inflow of foreign loans and interest rate differentials



Increased call money rate and decreased LIBOR contributed to the fluctuations in the interest rate differential. In spite of fluctuations in the interest rate differentials, the gross foreign loans inflow followed the direction of interest rate differential changes. Since 2006Q4, the interest rate differential remained almost the same when the gross foreign loans inflow also remained steady till 2008Q1. After this period, interest rate differential started to fluctuate again and gross foreign loans inflow followed the fluctuations. Both the gross foreign loans inflow and interest rate differential moved closely with fluctuations. Fluctuations in the interest rate differential increased significantly and gross foreign loans inflow started to show an increasing trend. From the second quarter of 2009, LIBOR plummeted below one percent which contributed to the significant fluctuations in the interest rate differential. Access to foreign credit source for

domestic investors with low-interest rate depicted through the high-interest rate differential which can be taken as one of the prime causes behind the increasing trend in the gross foreign loans inflow from 2012Q1. Gross foreign loans inflow reached the peak in 2013Q2, but it fell in 2013Q3 indicating a cycle in the inflow of capital. From the end of 2012, domestic call money rate in the domestic market fell, but still it was too high compared to the LIBOR. As a result, amid the fall of interest rate differential, gross foreign loans inflow has been increasing since 2012 indicating the considerable impact of interest rate differential on the gross capital inflow into the country.

4. Policy Developments for Financial and External Sectors in Bangladesh

Bangladesh, like many other developing countries, undertook a Financial Sector Reform Programme (FSRP) in the early 1990s. One of the key elements of the FSRP was to promote a market-based interest rate policy. The main objectives of market-based/liberalised interest policy were to introduce flexibility in the deposit and lending rates, permitting individual banks to establish their own rates, within limits set by the Bangladesh Bank, which would encourage competition among the banks and price their products based on market forces of demand and supply.

Likewise, the external sector liberalisation process has been enhanced with the support from IMF under various programmes—Structural Adjustment Facility (SAF) from 1988 to 1990, Enhanced Structural Adjustment Facility (ESAF) from 1990 to 1993, Poverty Reduction and Growth Facility (PRGF)/Poverty Reduction Strategy Papers (PRSPs) from 1993 and Extended Credit Facility (ECF) from 2012 to onward.

4.1 Developments in Foreign Exchange Market

To activate an effective and efficient inter-bank foreign exchange market, Bangladesh Bank had taken a lot of policy measures since the mid-1990s for development in the foreign exchange market. Some of such measures are depicted in box-1.

Box 1: Developments in Foreign Exchange Market

- Adoption of market-based floating exchange rate system;
- Rationalisation of Bangladesh Bank's intervention in the foreign exchange market;
- Approval of transactions in USD only by Bangladesh Bank with other banks;
- Fixation of the minimum amount of transactions with Bangladesh Bank (BB);
- Permission given to banks to freely quote to both bank and non-bank customers;

- Establishment of foreign currency clearing arrangement with BB;
- Enhancement gradually of the open position limits of banks;

Since the adoption of the floating exchange rate system in May 2003, the exchange rate is now being determined based on market demand and supply of the respective currencies. All scheduled banks are now free to set their own rates for inter-bank and customer transactions. Besides, BB has remained vigilant in the foreign exchange market in line with its monetary policy goal of ensuring stability in the foreign exchange market. BB also intervenes sometimes to maintain orderly condition in the foreign exchange market. At present in Bangladesh, strong growth of remittance from wage-earners abroad and flow of foreign aid with the rationalisation of import payments and moderate export growth has helped to keep Bangladesh taka (BDT) competitive during the last couple of years.

4.2 Current account liberalisation

The most significant measure adopted is the acceptance of current account convertibility in 1994, symbolising a turning point in the country's exchange rate management and exchange rate systems. Thereafter, restrictions have been being gradually removed for current account transactions and extensive powers have been given to the authorised dealers (ADs). ADs do not require prior approval from BB to conduct current account transactions within the indicative limit as set by BB. Major reform measures undertaken on current account convertibility are shown in box-2.

Box 2: Current Account Liberalisation

- **Repatriation requirement on earnings abroad:** Resident entities other than ADs are not entitled to retain funds outside Bangladesh and must repatriate to Bangladesh export receipts, factor income and any other earning abroad.
- **Provisions in respect of funds of foreign nationals and non-residents:** Foreign nationals and non-resident Bangladeshi (NRB) can maintain foreign currency (FC) accounts with ADs in Bangladesh and have been permitted to convert foreign currencies so that they can send them abroad and vice versa.
- **Short-term external borrowing for trade:** Importers can avail short-term suppliers' credits/buyers' credit from abroad for tenure up to one year. Recently BB has allowed foreign-owned/controlled industrial enterprises in Bangladesh to access interest-free loans for working capital other than input procurements from parent companies/shareholders abroad for up to one year without any prior approval. Besides, exporters are allowed to access short-term foreign currency for import of inputs from the

Export Development Fund (EDF) on sight basis through ADs for up to 180 days. Export bills relating to direct and deemed exports of Bangladeshi products on usage basis can be discounted in foreign exchange by the concerned AD of the exporter.

- **Short-term borrowing by ADs:** ADs may obtain short-term loans and overdrafts for a period not exceeding 7 days at a time from overseas branches and correspondents.
- **Establishment of Off-shore Banking Units (OBUs):** BB has permitted the establishment and operations of OBUs in Bangladesh, allowing free foreign exchange transactions by 100% foreign-owned companies of Export Processing Zones and with persons who are nonresidents in Bangladesh.

However, exchange regulations require residents to repatriate export proceeds and other foreign earnings, as also to file proof of the arrival of goods against import payments within specified periods. Exchange regulations necessitate some extent of documentation requirement and bona fide checks on current transactions as well. For instance, travel-related foreign exchange needs, and royalty/technical fee payments abroad at higher than specified usual rates attract prior bona fide checks before authorisation.

4.3 Capital account liberalisation

In order to increase capital flows in the form of equity or loans, Bangladesh Bank has taken a lot of measures towards capital account liberalisation. Box-3 shows mentionable policy measures in capital account liberalisation.

Box 3: Capital Account Liberalisation.

- **FDI and FPI Inflows:** Both foreign direct investment and foreign portfolio investment in Bangladesh are allowed except in a few reserved sectors. Investments in few sectors require permission. Foreign investors are free to buy and sell debt/equity securities from/to stock markets in Bangladesh. They are also allowed to buy shares of companies not listed in the stock exchange. Besides, NRBs are allowed to invest and sell Bangladesh Government Treasury Bonds (BGTBs) at any time. Recently the government has withdrawn mandatory lock for a period for foreign investors.
- **The ceiling for Investment:** For foreign private investment, there is no ceiling in Bangladesh. Foreign investors are allowed to establish enterprises in full ownership and also permitted to repatriate their dividend/profit and proceeds of liquidation of the investment.
- **Borrowing from local banks:** Short-term or long-term borrowings including working capital from the local banks are allowed for foreign-owned/foreign-controlled companies based on banker-customer relationships.

- **External borrowing:** External term and medium borrowing are also allowed, subject to approval from the Board of Investment where the same deeds are applicable for locally-owned and foreign-owned companies.
- **Short-term capital flows:** To avoid speculative/volatile inflow and outflows of capital as short-term funds, access of non-residents to Bangladesh Taka (BDT) money market securities is still restricted.

In addition, Bangladesh Bank is allowing buyers' credit for banks since 2012. Also, banks are permitted to obtain a short-term credit line from abroad for discounting export bills. Both initiatives have attracted enterprises.

5. Methodology and Model Specification

5.1 Theoretical Background

Standard Neoclassical theory describes that return differentials among countries drive the capital flows. In the absence of any restrictions, capital will flow where returns are comparatively higher and capital is relatively scarcer, i.e., to developing countries. This theory postulates that there is a positive relationship between capital inflow and interest rate differentials shown as follows:

$$CF = f(i-i^*) \tag{1}$$

$$\frac{dCF}{d(i-i^*)} > 0$$

where CF is capital inflows, $(i-i^*)$ is interest rate differentials which is defined as domestic interest rate (i) minus foreign interest rate (i^*).

For the positive relationship between CF and $(i-i^*)$, liberalised policies for external inflows or outflows are required and domestic interest rates must be determined by market forces. Liyanage (2016) examined the relationship between capital inflow and interest rate differentials for Sri Lanka where the capital inflows were expected to increase in response to the rise in the interest rate differentials. In addition to interest rate differentials, Liyanage (2016) used world GDP, domestic GDP, budget deficit, current account balance, year-on-year growth of credit granted by licensed banks, and a dummy variable for civil war to explain the inflow of capital. The paper defined interest rate differentials as the difference between annualised Sri Lankan monthly Treasury bill rate and 3-month LIBOR rate. However, we used only the interest rate differential variable as a determinant of capital inflow into Bangladesh as our central interest is in the role of

interest rate differentials in capital inflow and most of the other variables used by Liyanage (2016) are difficult to find for Bangladesh in the data frequency we used for our analysis. It is also noteworthy that Mundell (1963) showed in the case of extreme degree of mobility of capital that no country can generate interest rate differentials, but the extreme degree of capital mobility is not common for developing countries like Bangladesh.

5.2 Econometric Model

In Bangladesh, for foreign loans or investment-any kind of foreign capital—inflows are easier than outflows because any kind of capital outflows takes time for completing formalities e.g. lock-in, permission, restrictions, etc. Outflows of foreign loans or investment in Bangladesh need more time than inflows. Therefore, it is very difficult to make the relationship with interest rate differentials and net inflows of foreign loans or investment. So, to establish a relationship between interest rate differentials and capital inflows as stated in equation (1), we use gross inflows of foreign loans—the dominant component of gross capital inflows in Bangladesh. Accordingly, for empirical analysis, we will use the Ordinary Least Squares (OLS) method and specify our model modifying equation (1) as follows,

$$\log G_{FLt} = a + b I_{Dt} + u_t \quad (2)$$

where $\log G_{FL}$ is the logarithm form of gross inflow of foreign loans, I_D is interest rate differentials defined as interbank call money rate of Bangladesh and LIBOR, and u is the error term.

While choosing OLS method, it is often very useful to examine the nature of data i.e whether there is a unit root. There are two most popular tests—Phillip Parron (PP) and augmented Dickey-Fuller (ADF)—for checking unit root. The ADF test adjusts Dickey-Fuller test to take care of possible serial correlation in the error terms by adding the lagged difference terms of the regressand while PP test uses nonparametric statistical methods to take care of serial correlation in the error terms without adding the lagged difference terms (Gujrati, 2003). We perform both unit root tests for all variables. If unit root tests show that all variables have no unit roots at the levels i.e. $I(0)$, then the variables are considered as stationary and suitable for applying the ordinary least squares method.

As our capital account is not fully convertible, the impact of any kind of inflows of foreign capital takes time in response to changes in interest rates at home and abroad. Therefore, we consider time lag in equation (2). In this case, we determine lag length

through an unrestricted Vector Auto Regression. There are several criteria for selecting a lag length. Among these, the widely used techniques, we use Schwartz information criterion (SC). We select lag length on the basis of SC. According to Schwartz information criteria (Table 4 in the appendix), the minimum lag requirement for our model is two.

We suppose that the relationship between the gross inflow of foreign loans and interest rate differentials might be affected by changes of policies in both domestic and global economies. It is clear from chart-1 that the inflows of foreign loans got momentum from the first quarter of 2012 onwards. The first quarter of 2012 signifies the liberalisation of external private sector borrowing through approval of buyers' credit for banks. Hence, we will apply the Chow test to see structural change or break (supposing at the first quarter of 2012) in the relationship between inflow of foreign loans and interest rate differentials. If the Chow test endorses us to a structural break at that period, we use a dummy variable for policy implication in the relationship shown in equation (2). From the result Chow test (Table 3 in the appendix) we found that there is a structural break that happened from the first quarter of 2012. Considering lag effects and policy implication, we can specify our second and final estimating equation as follows:

$$\log G_{FLt} = a + b I_{Dt} + c I_{Dt-1} + d I_{Dt-2} + eD + f DI_{Dt} + g DI_{Dt-1} + h DI_{Dt-2} + u_t \quad (3)$$

where D is dummy variables taking values 1 (i.e. $D = 1$) for the periods from the 1st quarter of 2012 and onwards, and 0 (i.e. $D = 0$) before that periods. DI_{Dt} , DI_{Dt-1} and DI_{Dt-2} are cross-terms of the dummy, D and independent variable, I_{Dt} .

The cross terms of dummy are used in the model to find the behaviour of explanatory variable, I_{Dt} and its two lagged terms (I_{Dt-1} and I_{Dt-2}) with regard to any change in policy. In fact, the cross terms of dummy affect the magnitude of coefficients of the explanatory variable and its two lagged terms.

The data collected for all variables from quarter first of 1997 to quarter two of 2020. The data on gross foreign loans is measured as liabilities side of other investment in the financial account of the BB's annual publication named *Balance of Payments*. On other hand, data on inter-bank call money rate of Bangladesh is collected from BB's monthly publication named *Economic Trends*. Finally, quarterly data on LIBOR is collected from the website of the Federal Reserve Bank of St Louis.

6. Empirical Results

We have found a positive significant correlation between the gross inflow of foreign loans and interest rate differentials (Table 1). From the results of unit root tests with data on the gross inflow of foreign loans and interest differentials (Table 2 in the appendix), we have observed that both variables are stationary at levels. Therefore, we applied the OLS method for estimating our first econometric model stated in equation (2) and regression results are summarised in Table 5 in the appendix. However, the estimated equation of 1st model is shown as follows:

$$\log G_{FLt} = 6.37^{***} + 0.04 * I_{Dt} \quad (4)$$

where *** and * denote levels of significance at 1% and 10% respectively.

The low value of Adj R^2 of the estimated equation shows that there might be lag effects of the explanatory variable as well as structural break. The results (shown in Table 5 in the appendix) of our second econometric model as expressed in equation (3) are as follows:

$$\begin{aligned} \log G_{FLt} = & 5.68^{***} + 0.06^{***} I_{Dt} - 0.04 * I_{Dt-1} + 0.08^{***} I_{Dt-2} + 2.01^{***} D \\ & - 0.07 * DI_{Dt} + 0.07 DI_{Dt-1} - 0.13^{***} DI_{Dt-2} \end{aligned} \quad (5)$$

From equation (5) we see that the coefficients of interest rate differentials, one and two quarters lag of interest rate differentials, dummy and cross term of the dummy with two quarter lag of interest differentials are statistically significant and therefore, we made diagnostic tests for this estimated equation. The robustness of this estimated equation has been passed by the four most important diagnostics which are shown in Table 6 in the appendix—Jarque-Bera normality test, Breusch-Godfrey Serial Correlation (LM) Test, White test for heteroscedasticity and stability tests. All these tests revealed that the model provides consistent results except serial correlation. So, we corrected it by applying heteroskedasticity and autocorrelation consistent (HAC) covariance estimation. The result (shown in table 6 in the appendix) of HAC covariance estimation is stated as below.

$$\begin{aligned} \log G_{FLt} = & 5.68^{***} + 0.06^{***} I_{Dt} - 0.04^{**} I_{Dt-1} + 0.08^{***} I_{Dt-2} + 2.01^{***} D \\ & - 0.07^{**} DI_{Dt} + 0.07^{**} DI_{Dt-1} - 0.13^{***} DI_{Dt-2} \end{aligned} \quad (6)$$

where ** denotes level of significance at 5%.

The results of HAC covariance estimation corrected only standard errors and thus t-values. We find that all coefficients of equation (6) are statistically significant. We see

that interest rate differentials, I_{Dt} , has a positive impact on gross inflow of foreign loans. Moreover, the estimated coefficient of I_{Dt} denotes that a one percentage point increase of interest differentials may induce an increase of gross inflows of foreign loans by 0.06 percentage point. The combined impact of coefficients of two lagged variables of the explanatory variable is also positive and significant. This indicates that the responsiveness of gross inflow of foreign loans sometimes takes at least two quarters. But the magnitude of the coefficient of interest rate differentials as well as its combined lagged coefficients is not very high which indicates a weak response of gross inflow of foreign loans if any changes in interest rate differentials take place. The coefficient of the dummy variable is positive and significant which implies that the responsiveness of gross inflows of foreign loans to any change in interest rate differentials is somewhat higher for any quarter from 2012 onwards. However, coefficients of two cross-terms of the dummy with one and two-quarter lag of interest differentials are statistically significant, but their combined effect is not positive. While comparing adjusted R^2 between two estimated equations (4) and (6), we find it is much higher in the second model which is 0.71 showing modest goodness of fit. Moreover, the value of the Schwarz criterion is lower for the second model. Therefore, we chose the second model for economic interpretation.

7. Conclusion and Recommendation

The objective of the study was to identify the relationship between the gross inflow of foreign loans and interest rate differentials. We found that interest rate differentials have a positive impact on the gross inflow of foreign loans. But the responsiveness of gross inflows of foreign loans on changing differentials is weak. However, the response of gross inflows of foreign loans to interest rate differentials is somewhat higher since the first quarter of 2012 onwards which implies that liberalisation of external policy can expedite capital flows in Bangladesh. Major capital inflows in recent years in Bangladesh are in the form of foreign loans which got momentum due to the lower foreign interest rate i.e. LIBOR than the domestic interest rate. This indicates that the foreign investment in the form of FDI or portfolio investment in the country is not driven much by the higher domestic interest rate. Instead, the economy of Bangladesh is getting the benefit of interest rate differentials by borrowing money in foreign currency at a cheaper rate from abroad and giving downward pressure on its domestic interest rate.

Appendix

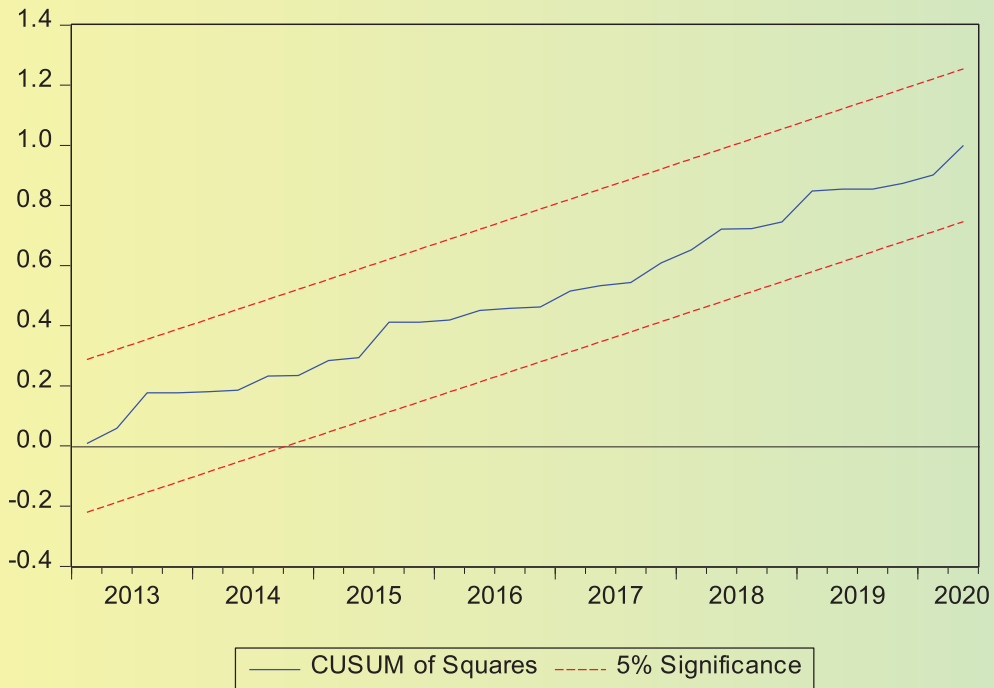
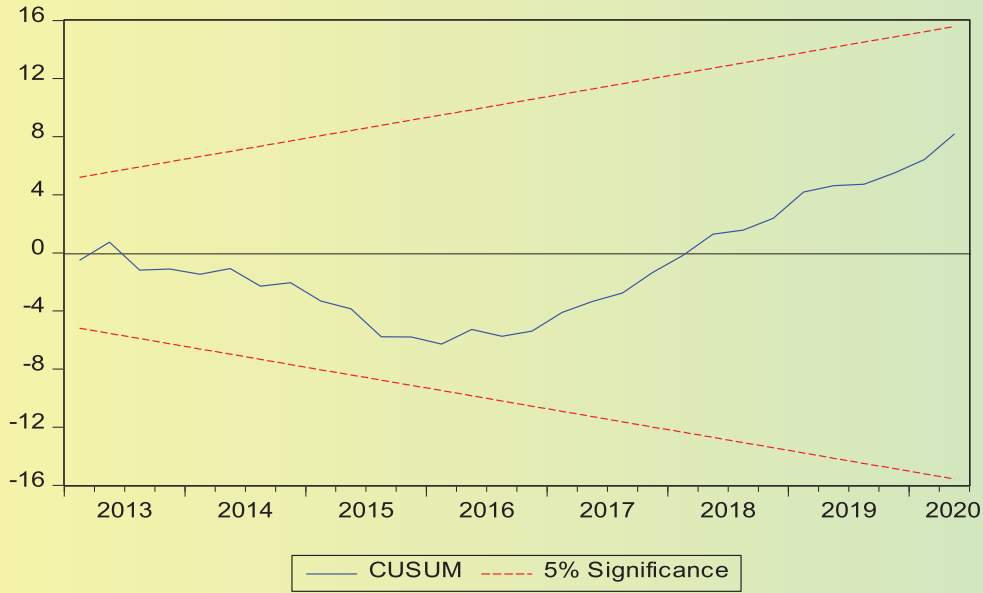


Table 1 : Correlation Analysis

Pair variables	Coefficient	Test Statistic	Probabilities	Conclusion
log <i>GFL</i> and <i>ID</i>	0.17	1.68	0.09	Positive significant relationship

Table 2 : Unit Root Tests

Variables (in level)	Phillips-Peron Test		Augmented Dickey-Fuller Test		Decision
	With intercept	With intercept and trend	With intercept	With intercept and trend	
<i>Log GFL</i>	-4.19 (0.00)	-9.01 (0.00)	-1.34 (0.61)	-4.40(0.00)	I(0)
<i>ID</i>	-4.24 (0.00)	-4.10 (0.01)	-4.32 (0.00)	-4.32 (0.00)	I(0)

Note: Figures in the parenthesis are p-values used to decide on unit roots at the 5% significance level.

Table 3: Chow breakpoint test: 2012Q1

Null Hypothesis	Period	Test Statistic	Probabilities	Conclusion
No structural break point	2012Q1	64.69	0.00	Structural breakpoint exists

Table 4: Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-337.2164	NA	9.143125	7.888754	7.945832	7.911725
1	-276.6860	116.8378	2.455661	6.574093	6.745327	6.643007
2	-252.1550	46.20949	1.523694	6.096629	6.382018*	6.211485
3	-248.1429	7.371143	1.523963	6.096347	6.495892	6.257145
4	-236.9836	19.98286*	1.291283*	5.929852*	6.443553	6.136593*
5	-234.1682	4.910614	1.329050	5.957401	6.585257	6.210084
6	-232.4117	2.981984	1.402828	6.009575	6.751587	6.308200
7	-231.4038	1.664157	1.507740	6.079159	6.935327	6.423727
8	-229.1472	3.621205	1.575377	6.119701	7.090025	6.510211

* indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Table 5: Results of Regression of Log of Gross Inflow of Foreign Loans

Regressors/other estimators	Model 1 (OLS)	Model 2 (OLS)	Model 3 (HAC covariance)
Constant	6.37*** (39.73)	5.68*** (46.36)	5.68*** (30.63)
ID	0.04*(1.69)	0.06*** (2.89)	0.06*** (3.48)
D		2.01***(10.39)	2.01***(8.29)
ID(t-1)		-0.04*(-1.68)	-0.04**(-2.22)
ID(t-2)		0.08*** (3.86)	0.08*** (3.73)
D*ID		-0.07*(-1.73)	-0.07**(-2.40)
D*ID(t-1)		0.07 (1.39)	0.07** (2.73)
D*ID(t-2)		-0.13***(-3.08)	-0.13***(-3.52)
AdjR2	0.02	0.69	0.69
F-stat	2.85*	29.35***	29.35***
<p>Note: Figures in the parenthesis are t-values. Figures in the parentheses show t-values. *, ** and *** show that coefficients are significant at 10%, 5% and 1% level respectively.</p>			

Table 6: Diagnostic Tests for Equation 2

Test for	Test Statistic	Probabilities	Conclusion
1. Normality (JB test)	0.22	0.90	Residuals are normally Distributed.
2. Breusch-Godfrey Serial Correlation (LM Test)	14.30	0.00	Autocorrelation exists.
3. Heteroscedasticity White (cross terms)	0.56	0.92	No heteroskedasticity exists.
White (No cross terms)	0.73	0.65	
4. Stability Test CUSUM CUSUM Squares			Within the bands

References

- Bangladesh Bank, *Balance of Payment*, various issues, 1997-2016.
- Bangladesh Bank, *Economic Trends*, various issues, 1997-2016.
- Bird, G., & Rajan, R. S. (2000). Resolving the interest rate premium puzzle: Capital inflows and Bank Intermediation in emerging economies. *CIES Working Paper No. 12*.
- Byrne, J. P., & Fiess, N. (2011). International Capital Flows to Emerging and Developing Countries-National and Global Determinants. *University of Glasgow, Series/Report no. SIRE discussion paper, SIRE-DP-2011-03*
- Chakrabarty, I. (2006). Capital Inflows during the Post-Liberalisation Period. *Economic and Political Weekly, January 14*.
- Chuhan, P., Claessens, S. & Mamingi, N. (1993). Equity and Bond Flows to Asia and Latin America, *Working Paper 1160. Policy Research Department, World Bank, Washington, D.C.*
- Çulha, A. (2006). A Structural VAR Analysis of the Determinants of Capital Flows Into Turkey, *Research and Monetary Policy Department, Working Paper No: 06/05. The Central Bank of the Republic of Turkey.*
- Dornbusch, R. (1976). Expectations and Exchange Rate Dynamics, *Journal of Political Economy, 84(6), 1161-1176*.
- Frankel, J. (1979). On the Mark: A Theory of Floating Exchange Rates Based on Real Interest Differentials, *American Economic Review, 69, 610-622*.
- Ghosh, J. (2008). The Financial Crisis and Developing World, *Third World Network, South-North Development Monitor (SUNS) a journal of Finance and Development, No. 6578*.
- Gregorio, J. D. (2011). Macroprudential Regulation, Financial Stability, And Capital Flow, World Scientific Book Chapters, in: Stijn Claessens & Douglas D Evanoff & George G Kaufman & Laura E Kodres (ed.), *Macroprudential Regulatory Policies The New Road to Financial Stability?.* 24, 387-401, World Scientific Publishing Co. Pte. Ltd.
- Gujarati, D. N. (2003). *Basic economics*. Boston: McGraw-Hill.
- Liyanaage, E. (2016). Determinants of Capital Inflows: Evidence from Sri Lanka, *Staff Studies: the central bank of Sri Lanka. 44(1-2), 1-31*.

- Mundell, R. A. (1963). Capital mobility and stabilisation policy under fixed and flexible exchange rates, *Canadian Journal of Economic and Political Science* 29 (4), 475–485.
- Singh, B. (2007). Corporate Choice for Overseas Borrowings, The Indian Evidence, *RBI Occasional Papers*, 28(3), Winter.
- Singh, B. (2009). Changing Contours of Capital Flows to India, *Economic and Political Weekly*, 44(43).
- Stein, L. J. (1965). International Short-Term Capital Movements. *The American Economic Review*, 55(1/2) (March 1, 1965). 40-66.
- Taylor, M. P., Mody, A., & Kim, J. Y. (2001). Modeling Fundamentals for Forecasting capital flows to emerging markets, *International Journal of Finance & Economics*. 6(3), 201-216.
- Verma, R. & Prakash, A. (2011) Sensitivity of Capital Flows to Interest Rate Differentials: An Empirical Assessment for India, *RBI Working Paper Series*.
- Ying, Y. H. & Kim, Y. (2001). An Empirical Analysis on Capital Flows: The Case of Korea and Mexico, *Southern Economic Journal*. 67(4), 954-968.