Determinants of Workers' Remittances in Bangladesh: An Empirical Study

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Abstract

The purpose of this paper is to identify macroeconomic determinants of inflow of workers' remittances in the context of Bangladesh. We used a balanced panel dataset of bilateral remittance flows from 10 major host countries (of Bangladeshi migrants') to Bangladesh over the 1993 to 2005 period. We found that income differential between host and home country is positively correlated with the inflow of remittances. We explained the above findings as an indication of altruistic motive to remit. On the other hand there are some indications of investment motive to remit in the dataset. Inflation differential between home and host country is also found to be negatively correlated with the inflow of remittances, indicating that higher inflation in home country relative to host country may have exerted some negative effect on workers' remittances. Devaluation of domestic currency or (increase in exchange rate) appeared to be positively correlated with the flow of workers' remittances in Bangladesh.

Keywords: Workers' remittances

JEL Classification:

1. Introduction

Flow of workers' remittances in Bangladesh exhibited a continuously increasing trend over the last 30 years in both absolute and relative terms. While total remittance to Bangladesh was only USD 24 million in 1976, the amount stood at USD 6584 million in 2007. Bangladesh was the 10th largest recipient of remittances among the developing countries considering the average for the period 1990 to 2005 (IFS, October 2007). It ranked 14th among all of the remittance-recipient countries in terms of the amount of remittances received in 2005 (Global Economic Prospects, GEP 2006, WB). Flow of worker's remittances in Bangladesh reached new heights at the end of fiscal year, FY07 as the remittance-GDP ratio jumped to 9.4 percent from 7.7 percent in FY06. Average remittances relative to imports and exports increased to 38 and 49 percent respectively during FY02-FY07 period from 22 and 31 percent respectively in FY97-FY01 period.

Remittance generates remarkable benefits for the home country economy in terms of macro and microeconomic impacts. The remitters, most of whom were once unemployed in the home country, are now getting employed in the host country, and on the other hand, the inward remittance is causing employment generation domestically by reinforcing national savings, capital accumulation and investment. Over and above the employment aspect, many other key macroeconomic variables in Bangladesh such as growth, poverty reduction, social security, BOP situation have proven to be significantly positively related to remittances (Murshid et. al. 2001, Deb 1988), Mahmud et. al. 1980, Das 1981), Mahmud 1988, Bruyan et. al. 2005). It is strongly opined in the Global Economic Prospects (GEP 2006, WB) 2006 that remittances have given rise to a decline in the poverty headcount ratio by 6 percentage points in Bangladesh during 1990-2006.

The amount of remittances arriving through the formal channel historically depends upon several factors playing important role in the decision matrix of the remitters. Macroeconomic variables such as home and host country GDP, exchange rate, interest rate, inflation, investment facilities for remitters etc. are considered to be important factors. The main thrust of this paper is to find out macroeconomic determinants of inflow of workers' remittances through formal channels in the context of Bangladesh. In doing so, the paper will provide a snapshot of channels, trends and patterns of remittances in Bangladesh. Throughout the paper 'remittance' will mean 'inward workers' remittances' through formal channels' unless mentioned otherwise.

We used a balanced panel dataset of bilateral remittance flows from 10 major host countries (of Bangladeshi migrants') to Bangladesh over the 1993 to 2004 period. This

data set allows us to explicitly test both the altruistic motive and the investment motive for remittance using a single estimation technique. Besides, effect of inflation differential between host and home country are also tested in an alternative model for remittance flows. Here the preliminary model takes into account all the 10 source countries' income differential, real interest rate differential along with other explanatory variables. In alternative models we used reduced set of six host countries which covers almost 80 percent of our migration stock.

After controlling for time and country fixed effects, it was found that there are good and consistent evidence of altruism in the dataset and the finding is robust to changes in the combinations of several explanatory variables. In addition little evidence of investment motive for remittance was found in our preliminary estimate from panel data model. However, in alternative estimations, which reduces the host country coverage (to six), some evidence of investment motive were noticed. By using different combinations of explanatory variables (excluding real interest rate differential but including inflation differential), we found that inflation (measured by Consumer Price Index) may have exerted some negative effect on the inflow of workers' remittances.

2. Channels Used in Sending Remittances

In order to send remittances within the formal legal framework, remitters use such devices as demand draft issued by a bank or an exchange house, travelers' check, telegraphic transfer, postal order, account to account transfer, automatic teller machine facilities, electronic transfer and in kind. Along with the formal channels the informal channels also have a very vibrant existence in Bangladesh. Available devices in the informal channel are hundi, home bound friends and relatives, personally hand carried cash without declaration, and in the form of visa/work permit. Hundi is the most popular method of transfer among the unofficial channels. A study conducted by IMF revealed that during 1981-2000 total recorded and unrecorded private transfers to Bangladesh amounted to USD 34.5 billion and USD 49.6 billion respectively, meaning that the share of unrecorded remittances to Bangladesh was 59 percent of total (Bahar et. al. 2006). Another study by the World Bank estimated the share of informal channels to be 54 percent (GEP 2006, WB). It is evident from these two studies that about 54 to 59 percent of total remittances were transferred through informal channels. The dominance of unofficial channels in Bangladesh is due to the suitability of these channels (such as hundi) to meet remitters' needs. Compared to formal channels, the informal channels are not only less expensive but also more and easily accessible. The fact that informal agents can deliver money on short notice with almost no paper work and minimal commission requirement and can reach remote areas of the

country very easily makes the unofficial channels attractive to migrant workers and their families. However, if the informally sent remittances are made possible to be channeled through formal arrangement, the financial system would be in a position to make more efficient use of funds which could accelerate the country's economic development to a speedy pace.
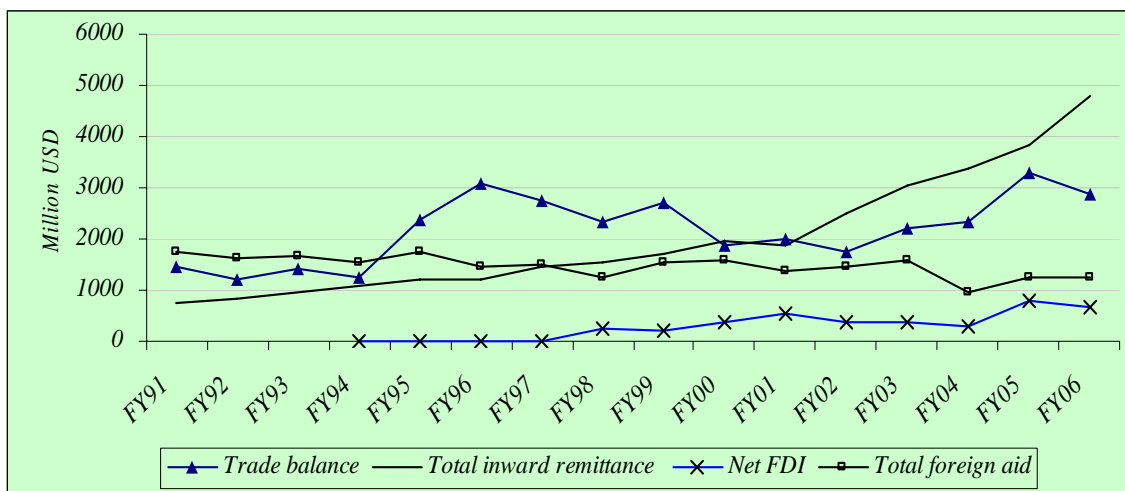
The issue of choosing between the two channels (formal vs. informal) is significant for the economy because the extent of positive impact of remittances largely depends upon whether the remittances are coming in through formal or informal ways. Remittances sent using formal channel and informal channel have quite different implications. While in the case of remittances being sent through formal channels, the remitted foreign currencies clearly add to the home countries foreign reserve, it is highly unlikely to be so in the case of remittances using informal channels. In the latter case misuse of the hard-earned remittances is a possible consequence because informal channels are often believed to facilitate the smuggling trade across borders and other illegal financial activities. Persons intending to unlawfully transfer foreign currency abroad, black marketers, importers under-invoicing to avoid import tariff and providers of terrorist finance are reportedly the key purchaser of such funds. One other important point is that as remittances sent through informal channels are not documented they are not taken into account in the policymaking process. As a result, the adopted policies do not reflect the impact of those unofficially transacted remittances, and hence the policies taken in related areas have no reasons to work properly. In view of the above analysis, it is quite clear that to maximize the positive impact of remittances, authorities should concentrate on channeling remittances through formal arrangements. Variables inducing choice among channels would include, among others, sending cost, speed of transaction, level of simplicity in formalities, differential between official and kerb market exchange rate, strength of related legal framework etc.

3. Trends and Patterns of Remittances in Bangladesh: *A brief migration history*

Bangladesh has a long history of migration and overseas remittances. It is reported that as far back as in 1942 Bangladeshi nationals had migrated to the port cities of London and Liverpool in the UK (Mahmood 1991). The British had a scheme of issuance of employment voucher to overseas workers seeking work abroad. The scheme, during the British regime, opened up a great opportunity for Bangladeshi workers to migrate to United Kingdom (UK). It is believed that thousands of Bangladeshis, especially from Sylhet, took the opportunity and created a flow of migration towards UK. For certain reasons, however, this flow had weakened by the 1960s and the direction of the migration flow changed in the 1970s. After the birth of Bangladesh, most Bangladeshi migrants

sought to look job to Middle East countries as well as selected EU destinations (mainly Germany). A tendency to find employment in developed countries like USA, Canada, Italy and in some Asian countries like Japan, Malaysia and Singapore was observed in the 1990s and onward. The process of migrating abroad from Bangladesh is continuing strongly till now. During the period 1976 to 2006, the migration of labour totaled 4.55 million with yearly migration being 6,087 in 1976 and 3,77,591 in 2006.[1] The huge increase in outward migration as indicated above makes Bangladesh as one of the major remittance recipient countries in the world.

Figure 1: Trend of Remittances vis-à-vis Foreign Aid, Net FDI and Trade Balance

Source: Constructed by the authors on the basis of data from various issues of Economic Trends, Bangladesh Bank Annual Report and Bangladesh Economic Review.

Historical trend

As Figure-1 shows, the absolute amount of remittances gradually swelled over the years with very few incidents of minor declines. It is also evident from the figure that overseas remittances have been outpacing foreign aid and trade deficit for quite a few years and net Foreign Direct Investment (FDI) for the whole period under study. This implies that remittance is in the leading position among all types of inflows and is large enough to compensate the typical negative gap between export and import in Bangladesh. In Bangladesh Bank's *Annual Report* 2003-04 it is opined that the recent boost in remittances has been attributed to the efforts to encourage remittances through official channel by adoption of measures such as opening of new exchange houses in source countries, expansion of drawing arrangements, setting an annual remittance threshold, close monitoring and supervision of banks, speeding up of delivery to the beneficiaries and more importantly, surveillance measures under the Money Laundering Prevention Act.

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[1] Website of Bureau of Manpower, Employment and Training and Economic Trends, Bangladesh Bank.

Resilience of remittance: As demonstrated in Figure-2, remittance has proved to be the most stable and resilient amongst the external sources of income. It is categorically seen from the figure that while export, net FDI and foreign aid display unstable movement, remittances have maintained a relatively stable uptrend in spite of frequent economic shocks.

Figure 2: Remittances: the Most Stable Source of External Income

Source: Constructed by the authors on the basis of data from various issues of Economic Trends, Bangladesh Bank Annual Report and Bangladesh Economic Review
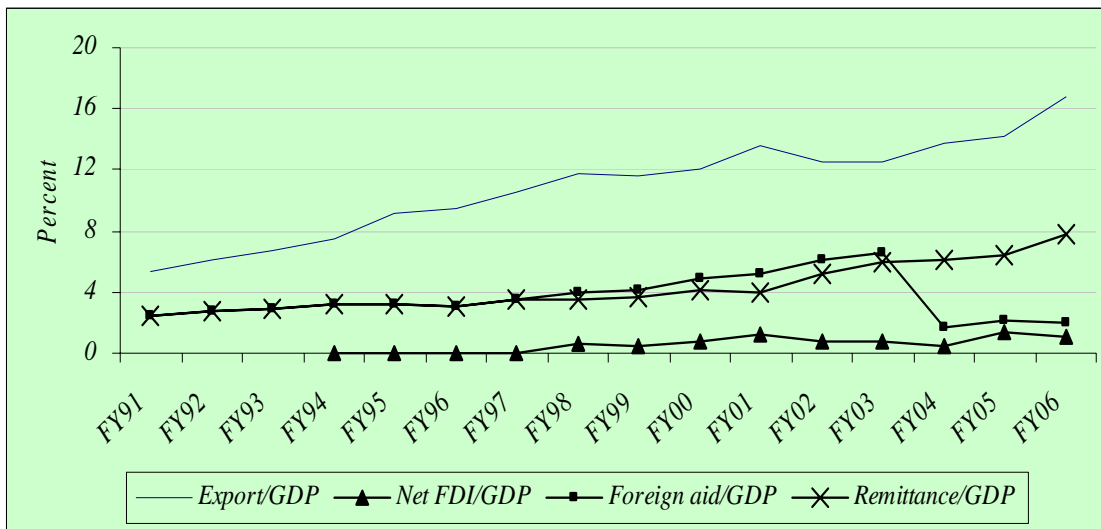
Importance of remittance vis-à-vis other macroeconomic variables: An interesting way of analyzing the dynamics of remittances is to examine the trend lines of remittances as a share of key macroeconomic variables such as export, import, GDP, Annual Development Program (ADP) etc. The figures as presented by Table-1 provide an idea about the relative importance of remittances relative to the key macroeconomic variables and the variation of this importance over time. According to the table, remittances in Bangladesh as a percentage of most key macroeconomic variables showed upward trend during the period from FY95 to FY06. Most importantly, the remittance-GDP ratio touched 7.75 percent mark in FY06 as compared to 3.5 percent in FY97. Over all, upward tendency of the share testify to the popular view that remittances are gradually providing more and more important contribution in our GDP over time.

Source pattern: Table-2, based on quinquennial data, gives an indication of the region-wise dynamics of remittances. As shown in the table, Middle-East region continues to maintain the lion's share (70 percent or above throughout except FY06) of remittances to Bangladesh with a slight downtrend since 1995-2000. The recent increase in health in ROW share and a fall in Middle-East share can be partly explained by a shift in migration

towards countries like USA, Canada, UK, Germany, Italy, Japan, Malaysia, Singapore etc. This change in the pattern of migration has been brought about mainly by two intentions of the migrants: higher education and higher income. Apart from the migration surge, greater scrutiny by immigration and finance authorities especially in the USA and Europe after the 9/11 tragedy seems to be responsible for increasing share of ROW in remittances. Besides, remittances from Iraq, a middle-eastern country, have been nil since 1991-92, which contributed somewhat to the decreasing/increasing share of middle-east/ROW region.

Table 1: Remittances as Percentage of Key Macroeconomic Variables										
Year	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06
Remittances/Tax revenue	45.0	46.0	52.0	57.0	52.0	66.0	71.0	70.0	74.0	87.0
Remittances/ ADP	57.0	63.0	66.0	63.0	63.0	102.0	115.0	118.0	126.0	186.0
Remittances/ Domestic savings	22.0	20.0	21.0	23.0	22.0	29.0	32.0	31.0	32.0	38.0
Remittances/ Domestic investment	17.0	16.0	17.0	18.0	17.0	23.0	25.0	25.0	26.0	31.0
Remittances/ Export	33.0	29.0	32.0	34.0	29.0	42.0	47.0	45.0	45.0	46.0
Remittances/ Import	21.0	20.0	21.0	26.0	22.0	32.0	35.0	34.0	32.0	36.0
Remittances/ Trade deficit	54.0	65.0	63.0	105.0	94.0	141.0	138.0	145.0	117.0	167.0
Remittances/ Reserve	87.0	89.0	112.0	122.0	144.0	158.0	124.0	125.0	131.0	138.0
Remittances/ GDP	3.49	3.46	3.73	4.14	4.01	5.26	5.90	6.17	6.37	7.75
Remittances/FDI	92.2	61.3	86.1	51.0	34.2	64.0	81.4	122.2	48.1	71.3
Remittances/ Foreign aid	100.0	116.0	116.0	124.0	137.0	200.0	193.0	353.0	306.0	388.0

Source: Constructed by the authors on the basis of data from various issues of Economic Trends, Bangladesh Bank Annual Report and Bangladesh Economic Review.

Table 2: Region-wise Remittances (%)						
Area	1880-85	1985-90	1990-95	1995-2000	2000-06	2006-07
Middle-East	72	70	75	74	73	66
ROW	28	30	25	26	27	34
Total	100	100	100	100	100	100

Source: Constructed by the author on the basis of data from various issues of Economic Trends.

Another important feature of source pattern of remittance is that the Kingdom of Saudi Arabia (K.S.A.) dominates the remittance flow among the Middle-East region. As figure-4 depicts, in FY06, K.S.A. took the lead with 53 percent contribution in our remittances coming from Middle-East followed by U.A.E and Kuwait with comparatively with lower contribution of 18 and 16 percent respectively. In the case of ROW, key contributions are made by U.S.A and U.K. It is seen from Chart-5 that U.S.A captured the highest, 46 percent, and U.K. remained just behind it with a significant 34 percent contribution in the year 2005-06.

Figure 3: Remittance from Middle East in FY06 **Figure 4: Remittance from ROW in FY06**

Source: Constructed by the authors on the basis of data from various issues of Economic Trends.

Considering all countries together it is found that again K.S.A. is the largest provider of remittances to Bangladesh. Figure-5 demonstrates the relative share of source countries in the remittance basket in FY06. According to this Chart, K.S.A had a sizeable 35 percent share as compared to the countries like U.S.A, U.A.E, Kuwait and U.K contributing 16, 12, 12 and 10 percent respectively.
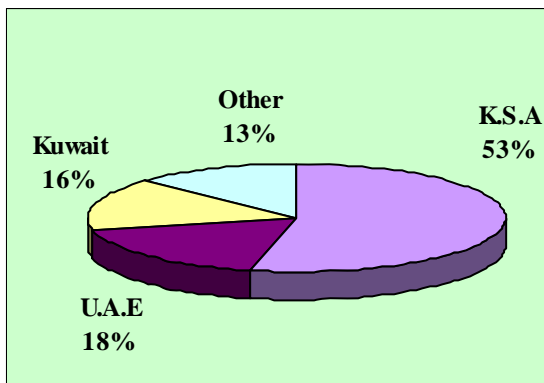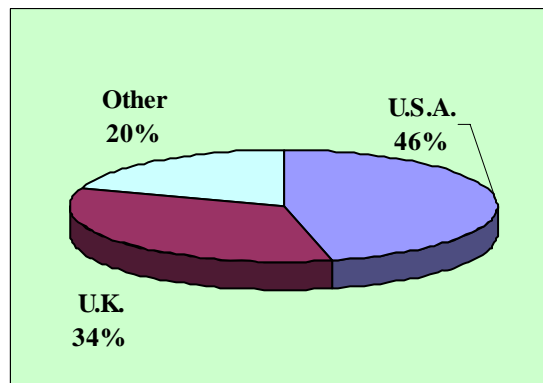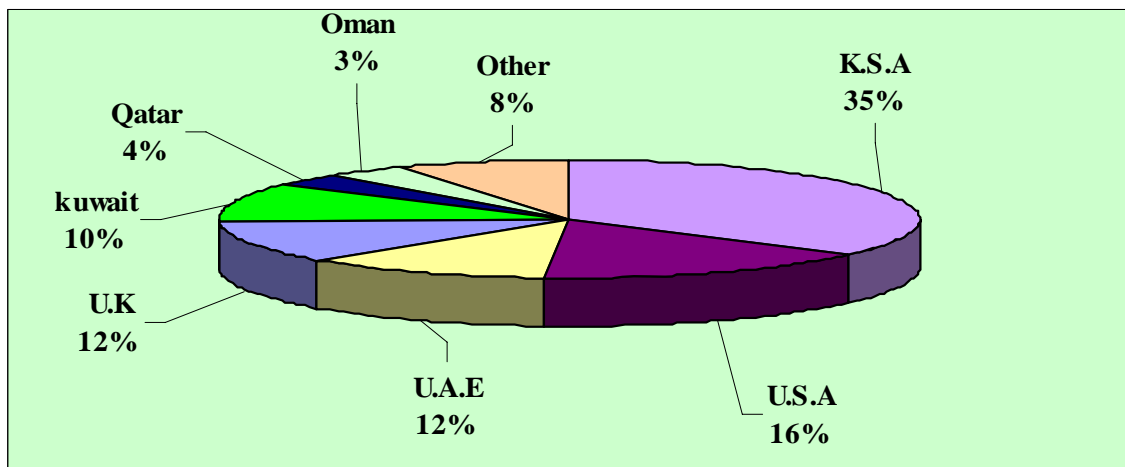
Figure 5: Remittance from All Countries in FY06

Source: Constructed by the authors on the of basis data from various issues of Economic Trends.

4. Literature Review

Literature on the determinants of remittance may be grouped into three main categories depending on the approaches they focus. One category uses 'altruism approach', which deals with the variables relating to the economics of the family including the length of stay in the host country, household's income, employment of other household members, migrant's marital status, migrant's education level, severity of family needs, etc. Some other papers focus on the 'portfolio approach' which views remittance as similar to capital flows. In this approach, variables typically of macroeconomic nature such as GDP of home and host countries, rate of inflation, interest rate differential, exchange rate etc. are hypothesized as determining factors of remittances. Literature of the third category, on the other hand, include a mix of two approaches in their analysis.

An IMF study (Chami, et al, 2005) based on panel data (annual) of 87 countries during the period 1980-2003 suggests that while host country GDP has statistically positive impact on remittances, home country GDP, presence of multiple exchange rates and black market premia, restrictions on holding foreign exchange deposits have significant negative impact on the same. Variables like financial development, political risk, law and order, relative investment opportunity were found to be of little significannce in influencing inward remittance flows. The study also estimated that removal of all exchange rate distortions led remittances to increase by 1-2 percentage points of GDP, implying that policies and regulations have important bearing on the inflow of remittances. This point is corroborated in Bruyn and Kuddus (2005). In his view, remittances through formal channels were bolstered by anti-terrorism policies adopted by international communities.

The World Bank's report (GEP 2006) identifies remittance cost, attitude of host countries towards migrants' financial matters, employment opportunities in the host countries, cost of living in the host and home countries, government policies in host and home countries as crucial factors affecting remittances. In the home countries, such policy variables include tax exemption for remittance income, easing recipients' access to financial services, incentives to attract investments by the diasporas, easing access to foreign exchange, lowering import duties and support for the projects of migrant.

Schiopu and Siegfried (2006), analyzed determinants of flow of workers' remittances from 21 Western European countries to 7 European neighbouring countries. In their data set they found that altruistic motive is important for sending remittances, while investment motive is not significant. Moreover, average remittance per migrant increases with increase in the migrants' skill level but decreases with rise of the share of informal economy host countries.

Bouhga-Hagbe (2006), investigated the role of altruism in workers' decision to remit in some selected countries (in the Middle East and Central Asia). Using Johansen cointegration technique for individual countries, the author found that remittances tend to be negatively correlated with agricultural GDP in the long run; reflecting the dominance of the role of altruism in workers' decision to remit. Chamon, Semblat and Morant (2005) find results partly similar to that of the IMF study (2005) in case of Samoa. Their results indicate that depreciation of domestic currency and growth in the host country have positive impact on remittance, while growth in the home country has negative impact. The negative association between home country growth and remittances implies the counter cyclicality of remittances. It also implies the presence of the consumption motive behind the decision to remit.

The counter cyclical nature of remittances also appeared to be evident in a study undertaken by Quartey and Blankson (2004). They showed that migrant remittances in Ghana increase in times of economic downturn and vice versa. Similar behavior of remittances is also confirmed by an IMF study by Chami, Fullenkamp and Jahjah (2005). Factors determining remittances listed by Puri and Ritzema (1999), Sophism and van Doorn (2003) include number of workers, wage rates, economic activity in the host and the home countries, exchange rates, relative interest rates in the host and home countries, political risk, facility for transferring funds, marital status, level of education of the migrants, number of dependents, length of stay in host country, household income level, personal situation and available savings.

Siddiqui and Abrar (2001) focused on the cost aspect of remittance. They argue that cost is not a significant factor, rather the efficiency of workers, existence of smuggling, exchange rate differentials and need for recruitment fees in the destination countries which seem to be highly influential in choosing between formal and informal channels. The World Bank (2006) mentions about a survey of Tongan migrants in New Zealand conducted by Gibson, McKenzie, and Rohorua (2005). The result of the survey runs sharply counter to the view of Siddiqui and Abrar (2001) regarding cost. The overall cost-elasticity of remittances with respect to the fee was estimated to be as significant as -0.22 in that survey. It is however, confirmed by the World Bank survey on Senegalese migrants in Belgium that the estimated elasticity applies only to high cost corridors.

Vargas-Silva and Huang (2005) wanted to see the relative effectiveness of host and home countries' economic conditions considering data of several countries. They observe that remittances are more responsive to host country's economic conditions than to economic conditions of home country. Results of another study by Silva (2005) reveal that

remittances have positive association with home country currency depreciation and negative association with exchange rate volatility. The fact that demographic factors affect the level of remittances is also confirmed by this study. Besides, the study provides mixed evidence regarding the relationship between GDP per capita of the home country and remittances. Gupta (2005) in studying the case of India finds that increase in migration and total earnings of migrants can explain the growth of remittances. According to this study, economic conditions of home and host country have negative and positive impacts on remittances respectively. Study by Hyder (2002) on remittance inflow to Pakistan shows that higher premium in the kerb market causes a detrimental effect on remittance. The study also identifies level of efficiency and speed of transaction as important variables in explaining remittance behavior.

Aydas, Neyapti and Metin-Ozcan (undated) argue on the basis of their empirical study for the 1965-93 period that in Turkey black market premium, inflation and military regime influence remittances negatively. Besides, both consumption smoothing and investment motives remain effective with the latter being more prevalent after the 1980s. Rahman (2003), seeking to ascertain the determinants of outward remittances from Kingdom of Saudi Arabia (KSA), found remittances to be insensitive to interest rate but pro-cyclical with the host country economy.

The above discussion on the recent empirical literature on workers' remittances suggests that altruism tended to play an important role in workers decision to remit. However, impact of other macroeconomic variables (e.g., interest rate differential, inflation differential) on such decision is not clear-cut. The present study develops a simple empirical model of macroeconomic determinants of workers' remittances to shed further light on the issue in the context of Bangladesh.

5. Methodology, Variables and Data

As previously mentioned, remittances are frequently analyzed using two broad approaches to remit, namely, *altruism* and *portfolio*. Altruistic motive to remit is described as the migrants concern for their families' welfare at home. The *portfolio* approach (investment motive to remit) describes remitters' intention to diversify portfolios between assets of remittance sending and receiving countries e. g., such as buying real estates in the home country. In this study we combine the altruistic and investment motive to remit by formulating a remittance-determination model. Variables are selected according to the objective of the study and in line with the existing literature in this field. The remittance-determination model used in this study can be represented by following functional form:

Log (R) = F (Y_h, $Y_p^* - Y_p$, ER, MS, $RIRDIF_{h-s}$, Dum_{2001})   (1)

Definition of the variables in the model

Workers' remittances: Workers' Remittances are generally defined as the amount of money sent to the home country by its citizens working abroad. Data on inflow of workers' remittances to Bangladesh are obtained from two sources namely Bangladesh Bank and BMET, where the first one reports inflow of worker's remittances in each fiscal year and the second one in the calendar year format.

Migration stock: It is commonly believed that increase in the number of migrant workers abroad is directly correlated with level of remittances. However, compositional features of migrants are also important in determining the amount of remittance sent home (GEP 2006, p-92, WB). One such feature is the mix of temporary and permanent migrants, where the first category is deemed to send higher proportion of their income. Another aspect of migration composition is the skill mix; the effect of which is not clear-cut in the literature reviewed earlier. It is argued that low skill workers tend to send a higher proportion of their lower income (GEP 2006, WB); on the other hand, a negative relationship between unskilled workers and remittances may appear, resulting from the positive relationship between income and human capital (Schiopu and Siegfried, 2006). The latter found that a higher share of unskilled labour reduces the average remittance size, which they interpreted as a reflection of small earning of unskilled workers from which to remit.[2] As we do not have disaggregated (by temporary or permanent workers or level of skill) bilateral data of migration flows we could not consider the impact of such factors in the model discussed below.

Host country economic condition: Prospective economic scenario in the labor importing countries may raise existing migrant workers' wages and generate positive impetus on demand for low-cost foreign workers. Consequently, present and future flow of remittances can increase in the migrants' home country. The future flow can be even greater with the higher number of migrants sent abroad, depending on the home country's ability to negotiate with the host countries. However, the match between prospective workers' skill level and the demand of host countries would also be crucial for future remittance potential. Many studies found significant relationship between host countries' output (world output) with the flow of remittances.

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[2] Detail description is presented in the appendix on construction of migration stock variable.

Home country economic condition: Economic condition in the migrants' home country is considered as one of the important determinants of workers' remittances. As altruistic motive is believed to play a prominent role in sending remittances, adverse economic situation in the migrants' home country, which resulted in a fall in family income at home may lead to a surge in inflow of remittances. Since we are considering the flow of remittances from multiple source countries to one home country we do not use home country economic activities directly in our model, rather, we use income deferential between host and home country to reflect the altruism motive to remit (Schiopu and Siegfried, 2006).

Income differential: As a measure of income differential between host and home country, the ratio of host (i) and home country GDP at purchasing power parity (PPP) is used. The advantages of using this measure of income differential over other measures (such as GDP at nominal or real term) are that it accounts for non-tradeables. Proper valuation of non-tradeables does mater in the decision matrix of remitters because they send remittance presumably for purchasing goods and services at home (Schiopu and Siegfried, 2006). If the estimated coefficient of this variable is positive, then one can argue that the flow of remittances has a tendency to increase during the economic downturn in home. Chami et al (2005) used the difference between home and host country (US) per capita output to reflect the altruistic motive in their empirical model. Schiopu and Siegfried (2006) used the ratio of GDP per capita in USD at PPP as a proxy for the income differential.

Dummy variables: Many surveys (GEP 2006, WB) documented that the recent worldwide surge in the flow of workers' remittances has been brought about mainly by regulatory tightening following the terrorist attack on USA on September 11, 2001. Two different factors are supposed to have contributed in this regard; one is the increase in monitoring by financial regulators on remittance service providers, which caused a shift of remittances from informal to formal sources. Another may have resulted from the uncertainty of deportation among undocumented migrants, inducing them to send a larger proportion of their income. Gupta (2005) included a dummy variable (D2001) to reflect post September 11, 2001 effect, however, found no unusual pattern in remittances. Therefore, D2001 takes the value of 1 for 2001-2004 period for inflow of workers' remittances from USA and UK in the empirical analysis to follow.

Inflation Differential: Higher inflation in the home country relative to host country can increase or decrease the flow of remittances. Higher inflation at home, which reduces the purchasing power of migrants' family, can induce migrants to send more remittances. On the other hand, it also represents more risk and uncertainty in the home country relative to

host country, thereby discouraging them to send more remittances. Inflation differential is constructed by using the difference between annual percentage change in the consumer price index of home and the host country.

Return on financial assets: If remittances are influenced by investment motive then the level of remittances should be correlated with the return on financial assets. Therefore, the amount of remittances in home country can be negatively correlated with the host country real interest rate or positively correlated with the home country real interest rate. Increase in real interest rate differential between home and host country should have effect on the level of remittances, assuming equal market risk in both countries. We used return on short-term financial assets (3-month deposit interest rate) minus inflation (consumer prices) as a proxy to estimate the real interest rate of host and home country. Interest rate differential is the home country real interest rate minus host country real interest rate.

Exchange rate: Bilateral exchange rate between host and home country plays an important role in workers' motive to remit. Two opposing effects may arise as a result of exchange rate depreciation; namely, *wealth effect* and *substitution effect (Bouhga-Hagbe, 2004).* Depreciation or devaluation of home currency reduces the prices of goods and services in the foreign currency, which allows a remitter to buy more foreign goods rather than domestic ones. On the other hand, the remitter is better-off as her income increases in the domestic currency, thereby encouraging her to buy more goods (including real estates) and services in home country. *Bouhga-Hagbe (2004)* points out that even though depreciation may temporarily increase the flow of workers' remittances in the home country, in the long run, it might undermine remitters' confidence in the economy.[3] It may be noted that significant depreciation of domestic currency in the floating regime also played a key role in the recent surge in workers' remittance in the country.[4] Bilateral exchange rates are calculated using the ratio of BDT/USD exchange rate and host country's rate with USD, obtained from the IFS online database. There is a possibility that the exchange rate may become endogenous to remittances (higher amount of remittances may lead to stronger currency). But the sample used in this study, mainly comprises of the fixed exchange rate regimes. Secondly, domestic currency experienced continuous devaluation against most of the major currencies of the world in the face of increasing pressures in the balance of

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[3] Here it can also be argued that remitters' degree of attachment to the home country plays a role in shifting the level of remittances with the depreciation of domestic currency. With high level of attachment to the family in the home country, they may send more money to buy real estate and other tangible goods or for saving at home in domestic currency.

[4] Depreciation of dollar against major currencies (specially against Euro) increased the dollar value of non-dollar remittances over time (GE, 2006, WB).

payments. Under the above circumstances it is unlikely that the increasing flow of remittances lead to a stronger currency in our sample and in the period examined.

5. Empirical Results

Remittance-determination model is estimated using a balanced sample of bilateral remittance flows from 10 major host countries (of Bangladeshi migrants') to Bangladesh over the 1993 to 2005 period. Our estimation of balanced panel takes into account unobservable variations across cross-section and periods by including host country specific and period specific dummy variables. The model is estimated by using feasible GLS method (with cross-section specific weights) to account for heteroskedasticity across cross sections.

Our main variable of interest, namely income differential between host and home country is found to be positively correlated with the inflow of remittances to Bangladesh in all the regression results. Therefore we can explain the above findings as an indication of altruistic motive to remit. The lower the income of remittance receiving country relative to sending country, the higher is the flow of workers remittances. In other words, flow of remittances tends to increase when home country income is relatively low. In our preliminary model we find that income differential between host and home country is positive and significant in most of our regressions, except for regression estimate using 1993-2004 period. (see Table-1). We find almost similar results for income differential using a different combination of explanatory variables (excluding real interest rate but including inflation differential), reported in Table-2. Therefore, our findings are robust to change in variable combination. The coefficient of the variable also showed similar results for a data set of six host countries (reported in Table-4 to 7).

The estimations yielded mixed result for investment motive and statistical significance level of estimated coefficient of the variable depends on the choice of host countries. We did not find any evidence of investment motive to remit in our preliminary model (which covers bilateral remittance flows from 10 host countries). However, in alternative estimations, by reducing the number of host country to six (based on the cumulative percent of migration stock), we found some evidence of investment motive to remit. In Table-4, it can be seen that the coefficient (of RIRDIF) is significant, at least, at 5% level for all regressions, with country and time specific dummy variables. Considering the low sample size, we further estimated the model replacing the time dummy variable with a time trend, as reported in Table-5. Here, the coefficient became insignificant for 1993-04 and 1997-04 and significant at 10% level (at least) in the other periods. Thus we can say that

there are some evidences of investment motive for the major host countries of Bangladeshi migrants.

We find that inflation differential (difference of home-host country inflation using consumer price index) is negatively correlated with the remittances where we exclude real interest rate but include inflation differential (reported in Table-2, 6, 7,). However, it is significant at only 10% level considering all the 10 countries for the latter two estimation period (1996-04 and 1997-04). We find a stronger evidence of negative relationship between inflation and remittances in the alternative model considering the major six host countries. The model with country and time specific dummy variables (Table-6) shows the coefficient is negative and significant at 5% level for all the periods. However, replacing the time dummy variable with a time trend (Table-7) we find that the coefficient is negative and significant at 5% level for regression estiamtes using sample periods 1994-05, 1995-05, 1995-05 and at 10% level for 1993-05 period, and became insignificant for regression estiamte using 1997-05 period. The findings reflect the fact that higher inflation in the home country relative to host country may have exerted some negative effect on the flow of remittances. Higher inflation in the home country which represents risk and uncertainty can discourage the migrant workers' to send more remittances.

Stock of migrants abroad is positively correlated with the level of remittance implying that growing stock of migrants abroad contribute to higher level of remittances. The above findings explain the reason why the workers' remittances is one of the most stable source of foreign currency around the world. The coefficient of dummy variable ($D_{2001}USUK$) is found to be positive in all the regressions, indicating that there was an upward shift in the flow of remittances from USA and UK, in the aftermath of September 11, 2001.

The coefficient of exchange rate has been found to be positive and significant in most of our regression analysis, implying that remittances tend to increase with the increase in the amount of domestic currency exchanged for a given amount of host country currency. The policy implication of this finding is that the remittance may also be negatively affected by the appreciation of domestic currency or stagnated with the stable currency. As in a floating exchange rate regime depreciation or appreciation of domestic currency mainly results from the demand and supply of foreign currency; increase in supply relative to its demand may lead to an appreciation of domestic currency, thereby causing the level of remittances to stagnate. Exchange rate depreciation, which generally reduces the difference between unofficial and official rate, may also positively affect the flow of remittances in recent times.

Conclusion

Over the last decade workers' remittances played a crucial role in the economic development of the country and is expected to remain so over the coming years. However, we could hardly trace any paper exploring the impact of macroeconomic variables on the workers' remittances in the context of Bangladesh. In this paper we have taken a moderate initiative to explore the issue using a balanced panel data set of bilateral remittance flows from 10 major host countries (of Bangladeshi migrants') to Bangladesh over the 1993 to 2004 period.

Using econometric techniques we find that income differential between host and home country significantly and positively correlate with the inflow of remittances to Bangladesh in all the regression results. We explained the above findings as an indication of altruistic motive to remit. On the other hand, real interest rate differential appears with a positive sign in our first sample (including 10 major host countries), but remains insignificant. The variable is found to be positively significant in our reduced sample (6 major host countries), providing some indication of investment motive to remit in the data set.

Inflation differential between home and host country is also found to be negatively correlated with the inflow of remittances, indicating that higher inflation in the home country relative to the host country may have exerted some negative effect on workers' remittances. Devaluation of domestic currency or (increase in exchange rate) appears to be positively correlated with the flow of workers' remittances in Bangladesh.

Besides, increase in stock of migrant workers abroad came out positively related with inward remittances in all the regression results. Probably growing stock of migrants' abroad contributed to the stability in the flow of workers' remittances source of foreign exchange earnings in Bangladesh.

Table 1: Regression Results for All Countries- With Income and Real Interest Rate Differential

Dependent Variable: LREM?					
Method: Pooled EGLS (Cross-section weights)					
Date: 05/15/07 Time: 15:07					
Sample Observations Period	**93-05**	**94-05**	**95-05**	**96-05**	**97-05**
Included observations: 12 for full sample size	12	11	10	9	8
Cross-sections included: 10	10	10	10	10	10
Total pool (balanced) observations: 120	120	110	100	90	80
Variable					
C	**8.05**	**5.97**	_4.78_	_5.91_	_7.31_
Log of Migration stock (LMSTOCK)	**0.65**	**0.66**	**0.66**	**0.61**	**0.48**
GDP (PPP) Host and Home Ratio (GDPPPPR)	0.04	_0.07_	**0.11**	**0.14**	**0.15**
Log of Nominal Exchange Rate (LNER)	0.64	**1.15**	**1.40**	**1.20**	_1.23_
Real Interest Rate Differential Home-Host (RIRDIF)	0.00	0.00	0.01	0.01	0.00
D$_{2001}$USUK	**0.65**	**0.73**	**0.79**	**0.78**	**0.73**

Notes: 1. Linear estimation after one-step weighting matrix
2. Cross Section and Period Fixed Estimation
3. Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Table 2: Regression Results for All Countries- With Income and Inflation Differential

Dependent Variable: LREM					
Method: Pooled EGLS (Cross-section weights)					
Date: 05/15/07 Time: 15:12					
Sample Observations Period	**93-05**	**94-05**	**95-05**	**96-05**	**97-05**
Included observations: 12 for full sample size	12	11	10	9	8
Cross-sections included: 10	10	10	10	10	10
Total pool (balanced) observations: 120	120	100	100	90	80
Variable					
C	**7.65**	5.55	4.62	_6.09_	7.54
Log of Migration stock (LMSTOCK)	**0.68**	**0.69**	**0.68**	**0.60**	**0.46**
GDP (PPP) Host and Home Ratio (GDPPPPR)	0.04	_0.07_	**0.11**	**0.14**	**0.16**
Log Nominal Exchange Rate (LNER)	0.68	**1.19**	**1.42**	**1.22**	_1.28_
Inflation (CPI) Differential Home-Host (INFDIFCP)	-0.01	-0.02	-0.02	_-0.03_	_-0.04_
D$_{2001}$USUK	**0.66**	**0.73**	**0.78**	**0.79**	**0.78**

Notes: 1. Linear estimation after one-step weighting matrix
2. Cross Section and Period Fixed Estimation
3. Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Table 3: Regression Results for All Countries- With Host Country Income and Real Interest Rate

Dependent Variable: LREM?					
Method: Pooled EGLS (Cross-section weights)					
Date: 05/15/07 Time: 16:58					
Sample Observations Period	**93-05**	**94-05**	**95-05**	**96-05**	**97-05**
Included Observations: 12 for full sample size	12	11	10	9	8
Cross-sections included: 10	10	10	10	10	10
Total pool (balanced) observations: 120	120	110	100	90	80
Variable					
C	2.06	4.98	7.39	1.64	-1.60
Log of Migration stock (LMSTOCK)	**0.64**	**0.62**	**0.61**	**0.55**	*0.34*
Log of Host Real GDP (LGDPH)	0.23	0.07	-0.04	0.24	0.43
Log Nominal Exchange Rate (LNER)	0.79	**1.17**	**1.33**	*1.13*	1.39
RIRH	-0.01	0.00	0.00	0.00	0.00
D_{2001}USUK	**0.56**	**0.53**	**0.50**	**0.46**	**0.41**

Notes: 1. Linear estimation after one-step weighting matrix 2. Cross Section and Period fixed Estimation
        3. Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Table 4: Regression Results for Selected Countries
With Income Differential and Real Interest Rate Differential

Dependent Variable: LREM?					
Method: Pooled EGLS (Cross-section weights)					
Date: 05/15/07 Time: 17:24					
Sample Observations Period	**93-05**	**94-05**	**95-05**	**96-05**	**97-05**
Included Observations: 12 for full sample size	12	11	10	9	8
Cross-sections included: 6	6	6	6	6	6
Total observations: 72 for full sample (**93-95**)	72	66	60	54	48
Variable					
C	*7.41*	**5.60**	4.07	*5.41*	**9.23**
Log of Migration stock (LMSTOCK)	**0.86**	**0.74**	**0.70**	**0.78**	**0.94**
GDP (PPP) Host and Home Ratio (GDPPPPR)	0.05	*0.09*	**0.15**	**0.17**	**0.21**
Log Nominal Exchange Rate (LNER)	0.12	0.93	*1.35*	0.64	-1.06
Real Interest Rate Differential Home-Host (RIRDIF)	**0.03**	**0.04**	**0.06**	**0.05**	**0.06**
D_{2001}USUK	**0.72**	**0.82**	**0.93**	**0.93**	**0.87**

Notes: 1. Linear estimation after one-step weighting matrix 2. Cross Section and Period fixed Estimation
3. Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Table 5: Regression Results for Selected Countries
With Income Differential and Real Interest Rate Differential (With a time trend)

Dependent Variable: LREM?					
Method: Pooled EGLS (Cross-section weights)					
Date: 05/15/07 Time: 17:27					
Sample Observations Period	**93-05**	**94-05**	**95-05**	**96-05**	**97-05**
Included Observations: 12 for full sample size	12	11	10	9	8
Cross-sections included: 6	6	6	6	6	6
Total pool (balanced) observations: 72 for full sample	72	66	60	54	48
Variable					
C	**6.54**	**_4.68_**	4.02	**_4.53_**	**_8.09_**
Log of Migration stock (LMSTOCK)	**_0.68_**	**_0.67_**	**_0.72_**	**_0.79_**	**_0.90_**
GDP (PPP) Host and Home Ratio (GDPPPPR)	0.06	**0.09**	**_0.13_**	**_0.15_**	**_0.18_**
Log Nominal Exchange Rate (LNER)	_0.92_	**_1.45_**	**_1.38_**	_0.82_	-0.84
Real Interest Rate Differential Home-Host (RIRDIF)	0.01	_0.01_	_0.01_	**0.01**	0.01
D$_{2001}$USUK	**_0.80_**	**_0.87_**	**_0.92_**	**_0.88_**	**_0.79_**
TREND	0.02	-0.01	0.00	0.03	**_0.12_**

Linear estimation after one-step weighting matrix
Notes: 1. Linear estimation after one-step weighting matrix 2. Cross Section Fixed Estimation and a time trend 3. Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Table 6: Regression Results for Selected Countries
With Income Differential and Inflation Differential

Dependent Variable: LREM?					
Method: Pooled EGLS (Cross-section weights)					
Date: 05/15/07 Time: 17:35					
Sample Observations Period	**93-05**	**94-05**	**95-05**	**96-05**	**97-05**
Included Observations: 12 for full sample size	12	11	10	9	8
Cross-sections included: 6	6	6	6	6	6
Total observations: 72 for full sample (**93-95**)	72	66	60	54	48
Variable					
C	_7.20_	**5.37**	4.39	6.16	**_11.01_**
Log of Migration stock (LMSTOCK)	**_0.89_**	**_0.77_**	**_0.70_**	**_0.72_**	**_0.92_**
GDP (PPP) Host and Home Ratio (GDPPPPR)	0.05	**0.09**	**_0.13_**	**_0.16_**	**_0.19_**
Log Nominal Exchange Rate (LNER)	0.12	0.96	**1.39**	0.76	_-1.35_
Inflation (CPI) Differential Home-Host (INFDIFCP)	**-0.05**	**_-0.07_**	**_-0.07_**	**_-0.09_**	**_-0.09_**
D$_{2001}$USUK	**_0.68_**	**_0.74_**	**_0.82_**	0.84	**_0.78_**

Notes: 1. Linear estimation after one-step weighting matrix 2. Cross Section and Period Fixed Estimation
3. Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Table 7 : Regression Results for Selected Countries

With Income Differential and Inflation Differential (With a time trend)

Dependent Variable: LREM?					
Method: Pooled EGLS (Cross-section weights)					
Date: 05/15/07 Time: 17:38					
Sample Observations Period	**93-95**	**94-05**	**95-05**	**96-05**	**97-05**
Included Observations: 12 for full sample size	12	11	10	9	8
Cross-sections included: 6	6	6	6	6	6
Total observations: 72 for full sample (**93-95**)	72	66	60	54	48
Variable					
C	**6.46**	**<u>4.59</u>**	4.03	**<u>4.64</u>**	**<u>8.05</u>**
Log of Migration stock (LMSTOCK)	**<u>0.68</u>**	**<u>0.68</u>**	**<u>0.72</u>**	**<u>0.79</u>**	**<u>0.89</u>**
GDP (PPP) Host and Home Ratio (GDPPPPR)	0.06	**0.09**	**<u>0.13</u>**	**<u>0.15</u>**	**<u>0.17</u>**
Log Nominal Exchange Rate (LNER)	*<u>0.96</u>*	**<u>1.46</u>**	**<u>1.35</u>**	*<u>0.81</u>*	-0.79
Inflation (CPI) Differential Home-Host					
(INFDIFCP)	*<u>-0.01</u>*	**-0.01**	**-0.01**	**-0.01**	-0.01
$D_{2001}USUK$	**<u>0.80</u>**	**<u>0.86</u>**	**<u>0.91</u>**	**<u>0.88</u>**	**<u>0.77</u>**
TREND	0.02	-0.002	0.01	0.04	**<u>0.12</u>**

Notes: 1. Linear estimation after one-step weighting matrix 2. Cross Section Fixed Estimation and a time trend 3. Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

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Appendix

Migration stock

Time series data on bilateral migration stock are not available for most of the countries; however, outflow of workers' data are available from BMET except for USA and UK. But data on return migration from those countries are not available. Therefore, to solve the problem we assumed that almost sixty five percent of workers returns home after six years of their stay abroad. The estimated time series of migration stock is closer to the survey data on outstanding migrants available for last two years. For other two countries USA and UK, we used various sources to estimate migration stock. In estimating stock of Bangladeshi migrants in UK, we combined stock of foreign born population (available for only 2001) data from MPI data hub and time series data on inflow and outflow of migrants in UK (reported in aggregated form for India, Bangladesh and Sri Lanka) from National Statistics of UK. In constructing migration stock in USA we used the US Census Bureau data set, which is available for 1991-98 period and estimated the stock up to 2004 assuming constant growth rate.