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**WHAT DRIVES BILATERAL  
REMITTANCES TO PAKISTAN? A  
GRAVITY MODEL APPROACH**

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GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

# What drives bilateral remittances to Pakistan? A gravity model approach

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## Abstract

Formal remittance flows to Pakistan have shown noticeable growth over the past decade. Using bilateral remittance data for 23 major source countries, this study examines the external and internal factors driving these remittance flows during the period 2001-2011. We estimate a gravity model for bilateral remittance flows using a variety of panel data techniques suitable to control for unobserved heterogeneity as well as simultaneous bias existing between remittances and migrant's stock. The main novelty with respect to the existing literature is the use of transaction costs of remittances as a superior alternative to geographical distance to proxy for remittance costs. We find that several factors have a significant effect on remittances, such as improved economic conditions in the receiving country, Pakistani migrant's stock in the source country, and financial development and political stability in the recipient country. Geographical distance, economic conditions and the unemployment rate in the source countries, however, do not appear to play a substantial role. We also find that geographical distance seems to be a poor proxy for the cost of remitting. This can be better understood in terms of migrant networks and improvements in receiving and source country financial services. While the effect of transaction costs of remittances' on remittance flows is found to be negative, its significance is not robust to changes in the specification of the estimated models.

**Key words:** Remittances, gravity model, stock of migrant, geographical distance, and transaction cost, financial development, political stability, Pakistan.

**JEL-Codes:** F22, F30, J61, O11, O24

## 1- Introduction

One of the principal factors that encourage migration across national boundaries is the difference in expected real earnings adjusted for migration cost (Borjas, G. 1991; Stark and Taylor, 1991). The costs incurred during the migration process increases with distance from the migrant's sending to the migrant's receiving countries, and decreases as social networks in the migrant's receiving countries increases (Ozden and Schiff, 2006). In 2013, the United Nations reported that there are about 232 million migrants around the world (approximately 3.2 percent of the world population) compared with 175 million in 2000, and 154 million in 1990 (UN-DESA, 2013). The foremost impact of migration is the increase in income of recipient country residents, mainly through remittances (McKenzie and Sasin, 2007). Recorded remittances to developing countries are the largest source of foreign financing after foreign direct investment (FDI), exceeding both official development assistance (ODA) and portfolio investment (World Bank, 2013b). The inflows to developing countries have increased more than tenfold over the last decade. The amount reached 414 billion in 2012, growing by 6.3 percent over the previous year (World Bank, 2013b). The overwhelming growth in remittances may be attributed to the better recording of data as well as a shift from informal to formal channels induced by lower transaction costs of remitting money home. However, the prevalence of informal transactions is still likely to be substantial. Freud and Spatafora (2008) argue that informal remittances amount to about 35-75 percent of recorded remittances to developing countries.

For many developing countries facing a weak balance of payments situation like Pakistan, remittances emerged as a large source of foreign exchange earnings. Pakistan is one of the top destinations of official remittance-receiving countries together with India, China, the Philippines, Mexico, Nigeria, Egypt, and Bangladesh (World Bank, 2013b). The flow reached \$14 billion in 2012, compared with \$2 billion in 2002. This increase in remittances has outpaced that of net ODA and FDI, which accounted for only \$2.02 billion and \$0.85 billion in 2012 (WDI, 2013). Likewise, compared to FDI and foreign aid, remittances tend to be resilient and increase during periods of economic turmoil (Ahmed and Martinez, 2013).

It is important to understand the determinants of remittances so that suitable policies can be devised in order to enhance access to remittances. However, with the exception of a few studies that emphasized remittances from the Persian Gulf, existing empirical literature on the determinants of migrant's remittances to Pakistan has mainly focused either on the microeconomic determinants by employing household survey data, or aggregate remittance flows. At the microeconomic level, Pasha and Altaf (1987) find that the investment motive influences the migrant's decision to remit, while Nishat and Bilgrami (1993) find support for motives that are both altruistic and based on self-interest. Anwar and Mughal (2012) find that altruistic motives are likely the main drivers of remittance incidence at the household level. Illahi and Jaffery (1999) conclude that informal loan repayment is an important reason for remitting for Pakistani migrant's. The only study that identifies the macroeconomic response of remittance flows in Pakistan is Kock and Sun (2011), which find that the skill level of migrant's, agricultural output, and the relative yield on investments in recipient and source countries are important determinants of remittances to Pakistan. We distinguish our study from Kock and Sun's analysis by using bilateral remittance flows.

Despite the ever-increasing size of these flows, to date, very little attention has been paid to the macroeconomic foundation of remittance flows from Pakistan's main remittance source countries and regions. Given Pakistan's current economic challenges in the face of the ongoing terrorism campaign, migrant's remittances are serving as the country's economic

lifeline (Mughal, 2013), and their development potential is therefore of great importance. This study examines key aspects influencing remittances, employing a gravity model approach. In particular, the economic, geographical, institutional, and financial determinants of bilateral remittance flows are considered. The main novelty with respect to the existing literature that examines bilateral remittances is the use of transaction costs of remittances as a superior alternative to geographical distance to proxy for remittance costs.

More specifically, we aim to answer the following questions:

- Is distance a good proxy for the transaction cost of remittances?
- What is the relationship between the migrant's stock and remittances?
- Are there altruistic or self-interest motives that drive remittance flows?
- How do institutional quality and financial development affect the size of remittances to the country?

This study attempts to answer these questions using a dataset for the period 2001-2011 comprising 23 major remittances' source countries. To answer the first question, we estimate the cost of sending remittances and use this variable in the model instead of distance. In order to answer the second question, we construct a time series of Pakistani migration stock. The third and fourth questions are answered by using several explanatory variables related to income, institutional quality, and financial development.

The rest of the paper proceeds as follows. Section 2 briefly presents Pakistan's migration and remittance history. Section 3 reviews the literature, particularly focusing on bilateral remittance determinants. Section 4 employs a gravity model framework in order to examine the main determinants of remittance flows using bilateral data. Results are presented in section 5. Section 6 concludes and outlines a number of policy implications.

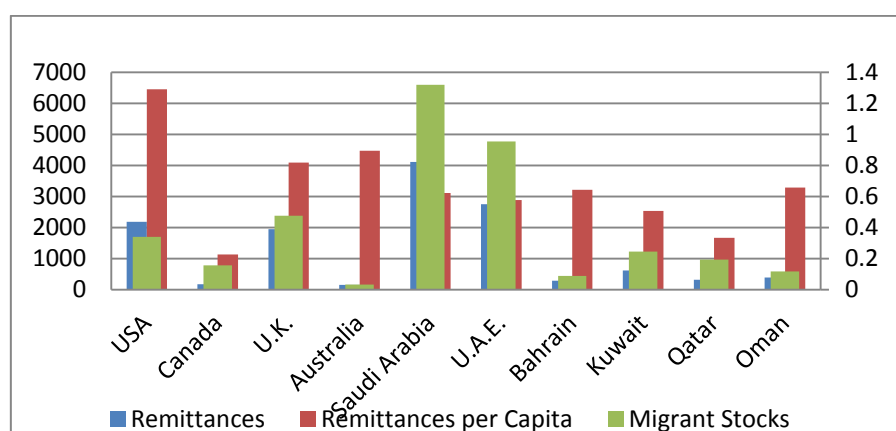
## **2- Overview of Bilateral Migration and Remittances to Pakistan: A Closer Look**

The first major wave of migration from Pakistan began in the 1970s when thousands of Pakistani workers left for the states of the Persian Gulf. In 2013, about 5.7 million Pakistani immigrant's resided abroad, compared with 3.7 million in 2000, and 3.6 million in 1990<sup>1</sup> (UN-DESA, 2013). This shows that 54 percent of this growth in migrant's stock took place during the period 2000-2013. Some of the factors pushing this move overseas included unfavorable socio-economic conditions, political turmoil, growing population, and substantial wage differentials (PILDAT, 2008). Figure 1 shows that the Middle East is the most popular regional destination with 2 million Pakistani migrant's, followed by half a million each in North America, Europe, and Asia Pacific. The Middle East, Saudi Arabia, and the United Arab Emirates (UAE) host the largest Pakistani migrant's communities, possibly due to geographical proximity and cultural closeness. Moreover, the Gulf region also has attracted a large proportion of immigrant's due to the availability of medium- and low-skilled jobs (Arif, 2009).

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<sup>1</sup> This corresponds to around 2.2 percent of the country population in 2013 reside abroad compared to 2.9 percent in 2000 and 5.9 percent in 1990.

**Figure 1:** Relationship between Pakistani migrant's stock, remittances, and remittances per capita in major destination countries in 2013.



Source: Author's calculations using data from the UN-DESA (2013) and the State Bank of Pakistan (2013).

Similarly, the United States (US), Canada, the United Kingdom (UK), Italy, and Spain are countries with sizeable Pakistani overseas communities. At present, rapidly growing Southeast Asian economies such as Malaysia and Singapore, and Australia are attracting an increasing number of Pakistani workers (UN-DESA, 2013). Overall, migrant tend to choose destinations with the same religion and official language as in their origin country and that are geographically close.

Migration to the Persian Gulf is mostly temporary in nature and workers are usually young and low-skilled males (Gazder, 2003; Arif, 2009) coming from a rural, low-income family background (Azam, 1991; Addleton, 1992). These migrant's lack not only the financial resources required for distant migration, but also the education and skills required in the labor markets in high-income countries. In contrast, migrant's to Western countries are often highly educated and come from well-off households (Gazder, 2003). These migrants have the possibility to bring their families with them, ultimately leading to permanent settlement in those countries. For this type of migration, the emigrant's predominantly migrate to the US and the UK (Figure 1). The presence of such a significant number of immigrant's has not only accelerated the integration of Pakistan into the world economy, but has also translated into a large flow of remittances back home. This flow plays an increasingly important role in easing difficulties facing the country's economy in terms of foreign exchange, balance of payments, and economic growth (State Bank of Pakistan, 2012). The amount of remittances increased from a modest US\$ 1 billion in 2000 to US\$5 billion in 2006 crossing to \$14 billion in 2012 (WDI, 2013). This spectacular growth means that the country is now ranked as the sixth highest receiver of remittances in the world (World Bank, 2012b). Remittances to the country comprised about 6.2 percent of GDP in 2012, and equaled 45 and 29 percent of the country's exports and imports of goods and services in 2012 respectively.

**Table 1:** Remittance flow to Pakistan as a share of total remittances, GDP and export

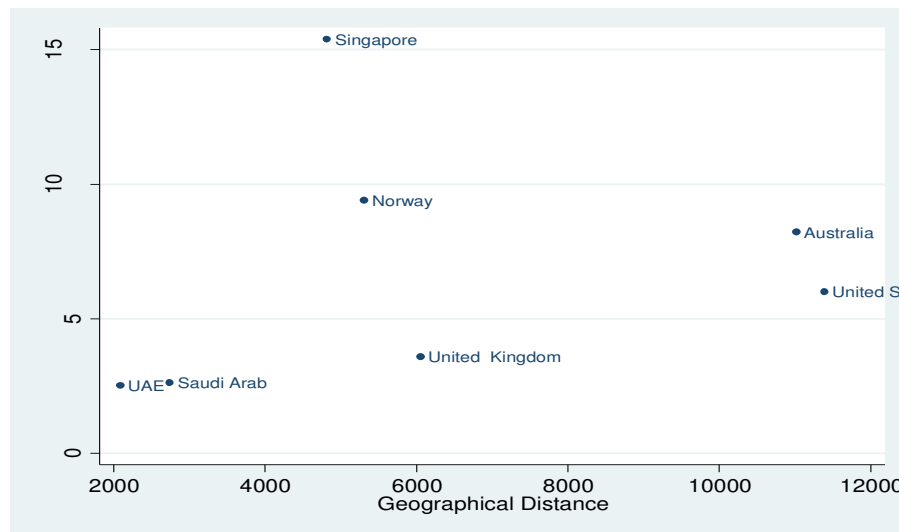
|                      | Remittances by source countries |         | Share in total remittances |       | Share in GDP |      | Share in Export |       |
|----------------------|---------------------------------|---------|----------------------------|-------|--------------|------|-----------------|-------|
|                      | 2001                            | 2012    | 2001                       | 2012  | 2001         | 2012 | 2001            | 2012  |
| <b>GCC</b>           | 693.22                          | 8030.86 | 63.80                      | 60.90 | 0.96         | 3.47 | 7.76            | 32.46 |
| <b>Bahrain</b>       | 23.87                           | 210.95  | 2.20                       | 1.60  | 0.03         | 0.09 | 0.27            | 0.85  |
| <b>Kuwait</b>        | 123.39                          | 582.57  | 11.36                      | 4.46  | 0.17         | 0.25 | 1.38            | 2.37  |
| <b>Qatar</b>         | 13.38                           | 318.82  | 1.23                       | 2.42  | 0.02         | 0.14 | 0.15            | 1.29  |
| <b>Saudi Arabia</b>  | 304.43                          | 3687    | 28.02                      | 27.96 | 0.42         | 1.59 | 3.41            | 14.90 |
| <b>UAE</b>           | 190.04                          | 2848.86 | 17.49                      | 21.60 | 0.26         | 1.23 | 2.13            | 11.51 |
| <b>Oman</b>          | 38.11                           | 382.66  | 3.51                       | 2.90  | 0.05         | 0.17 | 0.43            | 1.55  |
| <b>North America</b> | 230.52                          | 1676.17 | 21.22                      | 12.71 | 0.32         | 0.73 | 2.58            | 6.77  |
| <b>Canada</b>        | 4.9                             | 177.71  | 0.45                       | 1.35  | 0.01         | 0.08 | 0.05            | 0.72  |
| <b>US</b>            | 225.62                          | 1498.46 | 20.76                      | 11.36 | 0.31         | 0.65 | 2.53            | 6.06  |
| <b>Euro Area</b>     | 112.87                          | 1957.92 | 10.39                      | 14.85 | 0.16         | 0.85 | 1.26            | 7.91  |
| <b>Belgium</b>       | 1.1                             | 3.14    | 0.10                       | 0.02  | 0.00         | 0.00 | 0.01            | 0.01  |
| <b>Denmark</b>       | 3.83                            | 26.46   | 0.35                       | 0.20  | 0.01         | 0.01 | 0.04            | 0.11  |
| <b>France</b>        | 2.22                            | 45.11   | 0.20                       | 0.34  | 0.00         | 0.02 | 0.02            | 0.18  |
| <b>Germany</b>       | 9.2                             | 88.74   | 0.85                       | 0.67  | 0.01         | 0.04 | 0.10            | 0.36  |
| <b>Greece</b>        | 0                               | 9.92    | 0.00                       | 0.08  | 0.00         | 0.00 | 0.00            | 0.04  |
| <b>Ireland</b>       | 0.2                             | 79.55   | 0.02                       | 0.60  | 0.00         | 0.03 | 0.00            | 0.32  |
| <b>Italy</b>         | 0.55                            | 41.09   | 0.05                       | 0.31  | 0.00         | 0.02 | 0.01            | 0.17  |
| <b>Netherlands</b>   | 3.6                             | 6.63    | 0.33                       | 0.05  | 0.00         | 0.00 | 0.04            | 0.03  |
| <b>Norway</b>        | 5.74                            | 38.49   | 0.53                       | 0.29  | 0.01         | 0.02 | 0.06            | 0.16  |
| <b>Spain</b>         | 0.06                            | 52.77   | 0.01                       | 0.40  | 0.00         | 0.02 | 0.00            | 0.21  |
| <b>Switzerland</b>   | 4.24                            | 33.54   | 0.39                       | 0.25  | 0.01         | 0.01 | 0.05            | 0.14  |
| <b>Sweden</b>        | 0.74                            | 11.38   | 0.07                       | 0.09  | 0.00         | 0.00 | 0.01            | 0.05  |
| <b>UK</b>            | 81.39                           | 1521.1  | 7.49                       | 11.54 | 0.11         | 0.66 | 0.91            | 6.15  |
| <b>Asia Pacific</b>  | 8.08                            | 123.48  | 0.74                       | 0.94  | 0.01         | 0.05 | 0.09            | 0.50  |
| <b>Japan</b>         | 3.93                            | 9.03    | 0.36                       | 0.07  | 0.01         | 0.00 | 0.04            | 0.04  |
| <b>Australia</b>     | 4.15                            | 114.45  | 0.38                       | 0.87  | 0.01         | 0.05 | 0.05            | 0.46  |

Source: The State Bank of Pakistan and author's own calculations. All figures are percentages.

Table 1 presents detailed information on the remittance shares of selected source countries in 2001 and 2012. Saudi Arabia, the US, the UAE, and the UK represent Pakistan's main remittance sending countries. Over the past ten years, Saudi Arabia and the UAE have accounted for the largest share of remittances to Pakistan. The share of the US has somewhat decreased during the period, from 21 percent of the total to 11 percent. In contrast, the share of Canada has tripled during the same period. The share of the UK has also risen. The overall rise in remittances reflects both the increase in migrant's stock and the reduction in transaction cost. Remittances per capita, however, portray a somewhat different picture, with more flows coming from developed nations such as the US, Australia, and the UK (Figure 2).

## Geographical Distance and Transaction Costs

**Figure 2:** Comparison of geographical distance and transaction cost of remittances to Pakistan from selected source countries, 2013.



Note: Information on transaction cost was collected in May 2013. The cost includes the fee and the exchange rate margin of transferring \$200. Source: CEPII and World Bank Remittances Prices Worldwide. All figures are percentages.

Pakistani migrant's use various channels for sending remittances back home including banks, money transfer operators such as Western Union and Money Gram, family members, and friends as well as through Hundi<sup>2</sup>. Family, friends, and Hundi are considered informal channels and are not recorded in the official statistics.

The World Bank has constructed a database on the cost of sending remittances to family back in the home country. As shown in Figure 2, countries in the Middle East, such as the UAE and Saudi Arabia constitute the least expensive corridor, where it costs about 2.5 and 2.6 percent to send \$200 to Pakistan. On the more expensive end, it can cost over 15 percent of the transfer amount to send remittances from Singapore to Pakistan. Hence, there is large variation in transfer costs across remittance corridors. This high transaction cost is the main obstacle that deters the use of remittances in the development process (Orozco, 2003, World Bank, 2013b). Similarly, some studies have shown that these flows are very sensitive to cost and are more likely to rise with drop in cost (Gibson et.al, 2006). Therefore, high transaction costs and lack of access to convenient remittance services encourage migrant's to use informal channels. In comparing transaction costs with geographical distance, the cost to transfer \$200 to Pakistan from the UK was 3.6 percent despite a capital-to-capital distance of 6049.92 kms; while the same amount costs 9.41 percent from Norway, with a distance of 5308.44 kms; and an even higher 15.37 percent from Singapore despite a smaller distance of 4819.49 kms. This shows that transaction costs are not exclusively determined by the distance from the destination country to the recipient country.

<sup>2</sup> This is an informal method and comparatively cheaper than the formal transaction. The sender contacts a broker who acts as an intermediary in arranging the transfer. The sender sends a certain amount in Riyal and the broker contacts a counterpart in Pakistan, who makes the payment in Pakistan rupees to his home. In the whole procedure, no money crosses the border, and no official records exist for this transaction.



### 3- Why Do Migrant's Remit? A Review of the Literature

There is considerable literature on the determinants of remittances using micro- and aggregate-level data. However, very little work has been done on understanding the principal determinants of these flows in a bilateral setting. Before discussing the bilateral remittance studies that affect the behavior of migrant's, we first provide an overview of the micro-economic and macro-economic motives at the aggregate level that determine remittance flows. In microeconomic studies, various motives of remittances have been discussed. The main motives behind sending remittances as proposed in the related theoretical literature include altruism, risk insurance, loan repayment, exchange and inheritance (Hagen and Siegel, 2007). These motives range from pure altruism to pure self-interest (Rapoport and Docquier, 2006). Those in between the two extremes can be termed "impure altruism" (Andreoni, 1989), "tempered altruism" or "enlightened self-interest" (Lucas and Stark, 1985)<sup>3</sup>. In pure altruism, migrant's send money home to financially support their dependents in the country of origin (Johnson and Whitelaw, 1974; Lucas and Stark, 1985; Rapoport and Docquier, 2006). When remittances are motivated by altruism, the share of remittances tend to increase with the migrant's income, and decrease with the recipient's non-remittance income (Funkhouser, 1995). According to the tempered altruism paradigm, remittances are considered to be the result of an implicit contract between the members of a household and migrant's (Hagen and Siegel, 2007).

First, migration can be used as a means of reducing risk by diversifying households' income sources in sending family members abroad (Stark, 1991). The resulting remittances being considered as an insurance premium (Amuedo-Dorantes and Pozo, 2006). This serves to compensate the family for the risk from sending a migrant's abroad, in the absence of an efficient insurance market in the recipient country (Stark, 1991; Lambert, 1994; Gubert, 2002). Second, the family invests in the migrant education and cost of the migration process (Rapoport and Docquier, 2006). In this scenario, the migrant sends remittances to the family to repay this implicit and informal loan (Lucas and Stark, 1985; Ilahi and Jafarey, 1999). Remittances can therefore be higher more with higher education and distance from the migration destination (Rapoport and Docquier, 2006). Third, remittances can be seen as an exchange framework. In this case, the family back home receives remittances as payment for the services it provides in caring for the migrant childrens, physical assets, and other financial and social interests (Cox, 1987; Cox, Eser and Jimenez, 1998). Another self-interested motive can be the desire to inherit. A migrant aspiring for a share in inheritance sends remittances in order to maintain a good relationship with the family (Hoddinott, 1994).

Another strand of the literature approaches remittances from a macroeconomic perspective. Straubhaar (1986) evaluates the macroeconomic determinants of remittances from Germany to Turkey and finds that the economic situation in the source country is the main determinant of remittances, but finds no correlation between exchange rates and interest rates with remittances. Similarly, Vargas-Silva and Huang (2006) in their study of a number of Latin American economies conclude that remittances are more responsive to the source country's economic conditions than to the economic conditions in the recipient country. Similarly, Al-Mashat and Billmeier (2012) find that remittances to Egypt react positively to economic conditions in the source country. Singh et.al, (2011) also finds that source country output and migrant's stock are important determinants of remittances to 36 Sub-Saharan African

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<sup>3</sup> The emigrant's and the family have contractual agreement to support each other in bad times (Vargas-Silva and Huang, 2006).

countries for the time period 1990-2005. However, both studies find that remittances are negatively associated with the recipient's per capita GDP, consistent with the hypothesis that remittances play a role as negative shock absorbers. Katseli and Glytsos (1986) argued instead that remittances are negatively associated with the source country's income, source country's real interest rate, and the receiving country's inflation rate. El-Sakka and McNabb (1999) focus on the macro-level determinants of remittances in Egypt for the period 1967-1991 and find that exchange rate and interest rate differentials are important factors in attracting remittances. Elbadawi and Rocha (1992) argue that the stock of migrant's in remittance-source countries have a significant impact on real remittances. Wahba (1991) points out that the black market premium, relative interest rate between the source and recipient countries, political stability, stability in government policies, and financial institutions influence the flow of remittances. Sultonov (2013) used quarterly data over the period 2003:1-2011:4 for Tajikistan, and emphasized that overall economic conditions in both source and recipient country are important in influencing remittances.

Recent literature has also highlighted the importance of geographical distance and other bilateral variables in driving remittances. Empirical evidence in this regard is limited because of limited data availability concerning bilateral remittances over time. Together with economic size of the recipient and the source country (measured in GDP), the transaction cost between the source and the receiving country (sometimes measured in terms of bilateral geographical distance) is considered a determinant of remittances. For example, Lueth and Arranz (2008) model remittances for eleven countries in Asia and Europe for the period 1980-2004. They construct a dataset of bilateral remittance flows for a set of 33 developing countries with remittances to 11 recipient countries: Bangladesh, Croatia, Indonesia, Kazakhstan, Macedonia, Moldova, Philippines, Serbia and Montenegro, Slovenia, Tajikistan and Thailand. Many of the explanatory variables that appear frequently in the trade literature are also used as determinants of remittances, namely the GDP of receiving and source countries, geographical distance, common language, colonial ties, stock of immigrant's, political risk, etc. The estimated results from a gravity model indicate that economic activity in the source and receiving country and other gravity variables account for more than 50 percent of the variation in remittances. Similarly, Frankel (2011) using the dataset from Lueth and Arranz (2008) finds that distance is negatively associated with remittances while income per capita of the source country is positive and highly significant across all specifications. However, other gravity variables such as common border and common language variables are not statistically significant.

The opposing nature of the results regarding the significance of geographical distance is reflected in the study of Schiopu and Siegfried (2006) that employs a panel dataset of bilateral remittances from 21 European sending countries to 9 European receiving countries over the period 2000-2005. They find evidence indicating that the decision to remit is driven more by altruistic reasons rather than for investment motives. Contrary to the evidence in the abovementioned studies, they find that geographical distance plays no role in driving remittances. However, the effect is positive if the countries have no common border. In another empirical study, De Sousa and Duval (2010) examine remittance flows to Romania originating from various sending countries during the period 2005-2009. The study finds that both recipient and source countries' economic size and geographical distance appear to positively impact bilateral flows. The positive relationship between remittances and distance was supported by the loan repayment hypothesis: an increase in physical distance between migrant sending and receiving countries results in an increase in remittances in return for the high migration cost paid by the family.

A few studies have tried to analyze the remittance motives in the Pakistani context. For example, Bouhga-Hagbe (2006) argues that altruistic motives proxied by “agriculture GDP” as a major driver of remittance flows to Egypt, Jordan, Morocco, Pakistan, and Tunisia. Kock and Sun (2011) suggest that skill level, investment return in both source and recipient countries, nominal and real exchange rates, and domestic economic conditions are the main factors explaining remittances to Pakistan.

A discussion of the existing literature shows that though the role of recipient and source country economic conditions has often been explored and found to be an important determinant of migrant’s remittances, the role of geographical distance used as a proxy for transferred cost needs further analysis. To date, few studies have examined the bilateral macroeconomic determinants of remittances<sup>4</sup> and hence this study aims at closing this gap in the literature.

## **Data and Methodology**

### **4.1- Data and Variable Description**

We collected data on remittances from 23 source countries<sup>5</sup> to Pakistan. These countries account for about 90 percent of remittance flows to Pakistan during the examined period (see Table 1). The selection of countries depends on the availability of bilateral remittances data. For factors explaining bilateral flows, we use both country-specific and bilateral variables taken from different sources. In particular, bilateral remittances in US \$ million come from the State Bank of Pakistan (SBP). The limitation of the reported data is that they most likely underestimate the volume of remittances sent through informal channels (Hawala or Hundi).

In what follows, we describe the variables that are considered important factors in influencing remittance flows. The GDP for source country in millions of US dollars comes from UNCTAD and is the most obvious factor that influences higher remittances to recipient countries (Vargas and Huang, 2006). In general, improved economic conditions in the source country allow migrant’s to enhance both their employment and earnings prospects and hence, send more remittances. The expected sign of the economic activity in the source countries is expected to be positive, regardless of the motivation of the migrant to remit.

The second explaining factor is the income level (measured in term of GDP) in the recipient country, which has an ambiguous effect on remittances depending on the prevailing motive to remit. On the one hand, when the altruistic motivation dominates the remitting behavior, migrant’s will tend to send more remittances if the earning prospect of the migrant’s recipient country income decreases, in order to assure the same level of satisfaction. On the other hand, remittances could decrease with recipient income if the motivation to remit is driven by portfolio investment.

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<sup>4</sup> Previous studies have merged different data to obtain bilateral remittances, which allows for more comprehensive conclusions. However, in the absence of international harmonization, remittances are documented in a different way in each recipient country (De Sousa and Duval, 2010). In this study, the datasets used are constructed in a more homogenous way for a single recipient country (i.e. Pakistan), which implies using a smaller sample, but avoids the drawbacks of previous datasets concerning measurement differences.

<sup>5</sup> These source countries include: Australia, Bahrain, Belgium, Canada, Denmark, France, Germany, Greece, Ireland, Italy, Japan, Kuwait, the Netherlands, Norway, Oman, Qatar, Saudi Arabia, Spain, Sweden, Switzerland, UAE, the UK, and the US.

The migrant's stock in the source country is also considered a crucial factor in determining remittance volume (Freund and Spatafora, 2005). The data of Pakistani migrant's stock in the source countries are taken from the Bureau of Immigration and Overseas Employment (BIOE, 2013) and from the Organisation for Economic Co-operation and Development (OECD, 2013). For North America, Europe, and the Asia-Pacific region, where labor receiving countries are located, we use the OECD database for two main reasons. First, the BIOE dataset only contains legal outflow per year of workers looking for employment, thus excluding migratory movements for education, family union as well as illegal migrant's (Amjad, 2012). Second, it does not track returning workers, which makes it impossible to accurately estimate the country's migrant stock. We estimate the stock of migrant's for Middle Eastern countries using the BIOE dataset assuming that the returning workers represent around 4 percent of the total migrant stock. This figure is based on Iqbal and Khan (1981), who computed the share of returning migrant's to be 3.4 percent of the Pakistani migrant's stock in the Middle East. It is important to note that migration can be both temporary and permanent and that migrant can be classified according to their skill level into skilled, semi-skilled or unskilled groups. These distinctions are crucial to understand the relative importance of the determinants of remittances. It is broadly accepted that temporary migrant's send most of their earnings in the form of remittances (Dustmann and Mestres, 2010) because their family cannot join them in the destination country. The impact of remittances in terms of skills is still inconclusive. On the one hand, Schioupou and Siegfried (2006) claim that high-skilled migrant's send more remittances. On the other hand, Faini (2007) suggest that high-skilled migrant's send fewer remittances. Docquier et al. (2012) argue that skilled migrant's send more remittances in the presence of more restrictive immigration policies. Unfortunately, in this study, we are unable to use data at a disaggregated level, both on type and skill level of migration, because the data are not available for bilateral flows.

Next, we describe physical distance and transaction cost. Geographical distance is measured as the distance from Islamabad, Pakistan's capital, to the corresponding capital of the remittances-sending country. The variable comes from the CEPII database. The geographical distance variable has been commonly used to proxy the transaction costs of remitting. The existing evidence concerning the sign and significance of the relationship between remittances and geographical distance is mixed. Some studies argued that remittances are negatively related to physical distance, as reported in the trade literature (Lueth and Arranz 2008; Frankel, 2011; Docquier and Rapoport, and Salomone, 2011), while other studies find a non-significant correlation (Schiopu and Siegfried, 2006). However, taking common borders into account in the regression leads to a significant and positive relationship as reported in José de Sousa & Laetitia Duval (2010). We also use estimated transaction costs, which is expected to have a negative effect on remittance flows from the source country. For example, when the cost of remitting money via formal channels increases, this should eventually decrease the level of remittances (Freund and Spatafora, 2005).

The transaction cost variable is estimated by using data from the World Bank Remittances Prices Worldwide for major sending corridors to Pakistan (See Figure 2). To obtain data for each destination and time period, we formulate two assumptions. First, we pretend that transaction cost of sending remittances from the UAE to Pakistan is similar to that of the neighboring countries Oman, Kuwait and Qatar. Similarly, the remittances cost from the US is also used for Canada. Moreover, the cost of remittances from Norway to Pakistan has been used to proxy for the cost from Germany, France, Italy, Sweden, Denmark, Greece and Switzerland. Secondly, we assume that the cost of remittances is determined by migrant's stock in the remittance-source country and financial development in both source and recipient

countries. We use three-year data for the cost of remittances from 2010-2012 to estimate transaction costs for each source country. The resulting predicted values are used to estimate the value of remittances for the remaining years from 2001-2009.

The bilateral exchange rate of Pakistani rupees (PKR) in term of foreign currency is also an important determinant of remittances (Dakila & Claveria, 2007). The bilateral exchange rate of PKR is obtained from DataStream. The relation between remittances and exchange rate is a priori ambiguous. Remittances could decrease or increase with recipient country currency depreciation depending on the motive to remit. If the migrant are driven by altruistic motives, recipient country currency depreciation will reduce remittances as less source-country currency is needed to purchase the same basket of goods before depreciation (Leuth and Ruiz-Arranz, 2008). In the case of appreciation, migrant tend to send more money in foreign currency to insure the same amount of income in the domestic currency. A counterintuitive possibility would be that migrant send more remittances in order to keep the same utility level of their family compared with their own personal utility level.

On the other hand, if migrant choose to invest (partly in the real estate) in the recipient country, then migrant might send more remittances in order to take advantage of depreciation (Faini, 1994; Dakila & Claveria, 2007). The increase in remittances through depreciation may increase remittances in the short run but in the long run, it might undermine the sender's confidence in the recipient economy (Bouhga and Hagbe, 2004). Some studies also found no relation between exchange rate dynamics and remittances (Straubhaar 1986; Higgins, 2004; Faini, 2006).

With respect to financial sector development for source and recipient countries, we use domestic credit to the private sector as a percent of GDP for both receiving and sending countries. The data comes from WDI. Financial development is another important factor that makes remittances easier and cheaper and hence, stimulates the flows via official channels (Freund and Spatafora, 2005; Singh et al., 2011).

As a proxy for the rate of return on financial assets, we use interest rate differentials. These are computed by subtracting the recipient country interest rate from the corresponding measure of the source country interest rate. In most cases, interest rate refers to a country's money market rate. However, for Belgium, France, and Greece, government treasury bills are used, and in case of the Netherlands, the deposit rate is taken as the country's interest rate<sup>6</sup>. The effect of the interest rate differential (interest rate of recipient country relative to interest rate of source country) is also ambiguous for two possible reasons. First, a positive interest rate differential means that migrant's take advantage of attractive returns on savings in their country of origin, and at the same time, reduce savings in the source country (Kemegue et.al, 2011). It may also reflect instability in the source economy resulting in higher remittances sent back home if altruism is the prevailing motive (Elbadawi and Rocha 1992) or lower remittances if investment motives prevail (Singh, et al., 2011). In both cases, remittances would increase, but it is difficult to ascertain whether the increase is driven by altruism or self-interest.

The unemployment rate is taken from DataStream. The lower the unemployment, the higher the remittances from sending to recipient country will be (Sultonov, 2011).

As a proxy for institutional quality in the recipient country, we use a political stability indicator from the World Governance Indicators from the World Bank. Political stability may

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<sup>6</sup> The choice of the interest rate variable is driven by data availability.

encourage remittances, since such an environment favors investment (Singh, et.al 2011). On the other hand, political instability may also encourage remittances to compensate for the loss of purchasing power of the family back home. High political instability in the country is one of the main reasons for the decision to emigrate (Collier et.al, 2011).

It has also been argued that common language and religious ties tend to affect the choice of destination countries. For instance, larger shares of Pakistani migrant's reside in the Middle East and in the countries with similar official language. We expect a positive sign for these two variables. Table 2 provides descriptive statistics for all the above-mentioned variables.

**Table 2:** Descriptive statistics

| Variables and definitions  | Source  | Mean    | S.D     | Min    | Max      |
|--|---|---------|---------|--------|----------|
| <b>Dependent variable</b>  |   |         |         |        |          |
| Bilateral remittances  | State Bank of Pakistan  | 215.4   | 455.6   | 0      | 2670     |
| <b>Gravity variables</b>   |   |         |         |        |          |
| GDP in millions (USD) in current prices                                  | UNCTAD  | 126084  | 42380.5 | 67981  | 209315   |
| GDP in millions (USD) in current prices                                  | UNCTAD  | 1463337 | 2723448 | 7970.8 | 1.51e+07 |
| Geographical distance  | CEPII   | 5435    | 2637    | 1801.4 | 11392.8  |
| Common language  | CEPII   | .2174   | .4133   | 0      | 1        |
| Transaction costs  | World Bank Remittances Prices Worldwide and author's calculations | 2.3437  | .50304  | 1.0576 | 3.1491   |
| <b>Other control variables</b>   |   |         |         |        |          |
| Exchange rate  | DataStream  | .099    | .36     | .003   | 2.01     |
| Domestic credit to private sector as percent of GDP in recipient country | WDI   | 25.21   | 3.91    | 18.4   | 29.8     |
| Domestic credit to private sector as percent of GDP in source country    | WDI   | 114.9   | 56.4    | 27.3   | 234.5    |
| Interest rate differential   | Author's calculation based on IFS data                            | 1.409   | 1.587   | .810   | 8.647    |
| Unemployment rate as a percentage of labor force in the source country   | DataStream  | 6.49    | 3.27    | 1.42   | 21.6     |
| Population density in recipient country                                  | WDI   | 209.13  | 12.08   | 190.51 | 228.53   |
| Migrants stock   | BIOE and OECD   | .020    | .049    | .0003  | .29      |
| <b>Institutional variables</b>   |   |         |         |        |          |
| Political stability  | World Wide Governance Indicator, World Bank                       | .79     | .068    | .6     | .98      |

Note: All the variables are in levels. Period 2001-2011.

#### 4.2- Theoretical base of the gravity equation

Tinbergen (1962) and Pöyhönen (1963) each independently developed gravity models for the empirical analysis of bilateral trade. In its basic formulation, the gravity model explains bilateral trade flows analogous to Newton's universal law of gravitation (Head, 2003). The underlying premises of the gravity model are that bilateral trade is an increasing function of the trading partners' economic sizes (GDP or GNP) and a decreasing function of

transportation cost reflecting the distance between the capitals of the trading partner (Frankel and Rose, 2002).

$$X_{ij} = A \frac{Y_i^{\alpha_1} Y_j^{\alpha_2}}{D_{ij}^{\alpha_3}} \quad (1)$$

where  $X_{ij}$  is the volume of bilateral trade between the trading partners,  $Y_i$  and  $Y_j$  represent the economic size of the trading partners, and  $D_{ij}$  is the geographical distance between the corresponding countries.

The linear form of the equation (1) is as follows,

$$\ln(X_{ij}) = \alpha_0 + \alpha_1 \ln(Y_i) + \alpha_2 \ln(Y_j) - \alpha_3 \ln(D_{ij}) + \varepsilon_{ijt} \quad (2)$$

For evaluation of bilateral international trade, Anderson (1979), Bergstrand (1985, 1989, and 1990), Helpman (1987), Feenstra et al. (2001) and Anderson van Wincoop (2003) have provided the theoretical justification for the gravity model. The model has been further extended for the analysis of international capital flows as well as for international migration (Mayda, 2010; Karemera et al. 2000; Lewer and Berg, 2008) then apply it to explain remittances (De Sousa, J., Duval, L., 2010; Lueth and Ruiz-Arranz, 2008) and more extensively, for FDI flows (Hattari and Rajan, 2008; Demekas et al., 2005).

In this study, we employ a parsimonious model which includes commonly-used determinants while focusing on specific bilateral variables. Similar to the gravity model used in the trade literature, the starting point of the gravity model of migration is the hypothesis that immigration is driven by the differences in economic size and impeded by migration costs (Borjas, 1989, 1991). Lueth and Ruiz-Arranz (2008) argue that bilateral remittances can be explained to a large extent by the gravity model. Here, we follow the basic gravity type framework which argues that bilateral remittances are directly proportional to the economic size of the source and recipient country measure by GDP, and inversely proportional to the distance between the two countries (Lueth and Ruiz-Arranz, 2008). The greater the distance between two countries, the higher the cost of remitting, thereby reducing the amount of remittances to the country.

The gravity model of remittances is given by,

$$REM_{srt} = A \frac{(GDP_{st} * GDP_{rt})^{\alpha_1}}{(Dist_{sr})^{\alpha_1}} Z_{srt} \quad (3)$$

where GDP denotes income in source (s) and recipient (r) country. Pakistan is considered the “recipient country” and the rest of the 23 source countries are used as “source countries”. Dist denotes geographical distance between capitals of countries s and r, and Z represents a number of control variables.

By taking natural logs of equation (3), we adopt a similar empirical specification as in Lueth and Arranz (2008) and De Sousa and Duval (2011). The linearized gravity model of remittance flows from source (s) to recipient country (r) is expressed as,

$$\begin{aligned} \ln(REM_{srt}) = & \alpha_0 + \alpha_1 \ln(GDP_{st}) + \alpha_2 \ln(GDP_{rt}) \\ & + \alpha_3 \ln(DIST_{sr}) + \alpha_3 \ln(BilExc_{srt}) + \alpha_3 \ln(MigStock_{srt}) + \mu_s \\ & + \varepsilon_{srt} \end{aligned} \quad (4)$$

In our baseline specification, bilateral remittances (in natural logarithms) between the source country  $s$  and the recipient country  $r$  at time  $t$  ( $REM_{srt}$ ) are related to GDPs in the source and recipient countries, geographical distance, migrant's stock, and bilateral exchange rate.  $REM_{srt}$  comprises funds classified as workers' remittances, compensation of employees, and migrant transfers.

The explanatory variables  $GDP_{st}$  and  $GDP_{rt}$  stand for the nominal gross domestic products for the source country ( $s$ ) and recipient country ( $r$ ) in period  $t$ , and  $DIST_{sr}$  is the physical distance between the capitals of the recipient and the source country.  $BilExc_{srt}$  is the bilateral exchange rate denominated in home country currency.  $MigStock_{srt}$  denotes the stock of migrant's from  $r$  that live in country  $s$  at time  $t$ .

$\mu_s$  denotes the country specific effect in order to control for unobservable heterogeneity. The last term  $\varepsilon_{srt}$  denotes the error term that is assumed to be well-behaved.

The baseline model is augmented with additional source and recipient-country characteristics that influence remittances.

$$\ln(REM_{srt}) = \alpha_0 + \alpha_1 \ln(GDP_{st}) + \alpha_2 \ln(GDP_{rt}) + \alpha_3 \ln(DIST_{sr}) + \alpha_4 \ln(BilExc_{srt}) + \alpha \ln(MigStock_{srt}) + \sum_{k=1}^K \alpha_k Z_{srkt} + \mu_s + \varepsilon_{srt} \quad (5)$$

In the first extension of the model, the other controls are introduced as additional regressors  $Z_{srt}$  referring to the vector of all control variables that relate to both countries, and either the source or recipient country. This includes unemployment rate in  $s$ ; domestic credit to private sector (as a percent of GDP) in country  $s$  and  $r$ , and interest rate differential between  $s$  and  $r$ . Similarly, the political stability in country  $r$  is included to measure political uncertainty prevailing in the recipient country. Moreover, proxies for common official language and common religion are also included in the model in order to measure the cultural similarity between  $s$  and  $r$ .

In the next specification, the log of transaction costs is introduced instead of physical distance, in order to estimate the impact of the cost on remittances to the recipient country.

$$\ln(REM_{srt}) = \alpha_0 + \alpha_1 \ln(GDP_{st}) + \alpha_2 \ln(GDP_{rt}) + \alpha_3 \ln(Remcost_{sr}) + \alpha_4 \ln(BilExc_{srt}) + \sum_{k=1}^K \alpha_k Z_{srkt} + \mu_s + \varepsilon_{srt} \quad (6)$$

$Remcost_{sr}$  is the transaction cost of sending remittances from the source country to the recipient country. Since most variables are in natural logs (except dummy variables), the estimated coefficients can be interpreted as elasticities.

#### 4- Estimation methods

A variety of empirical techniques are employed in the study. The model is first estimated using a pooled OLS as a benchmark with standard errors corrected for heteroskedasticity. However, the pooled OLS is only consistent when unobserved fixed effect and explanatory variables are uncorrelated (Wooldridge, 2002). In the presence of correlation between the individual effects and the error term, a pooled OLS suffers from unobserved heterogeneity bias (Hsiao, 2003). In order to take into account the presence of unobserved heterogeneity, we use a panel data approach i.e. fixed and random effects rather than pooled OLS. A fixed-



effects model can be estimated by including dummy variables for each cross-sectional unit (minus one) to deal with unobserved heterogeneity (Wooldridge, 2002; Baltagi 2005). One drawback of using this estimator is that it eliminates all time-invariant variables present in the model. On the other hand, the random-effects model includes the individual effect in the error term (Wooldridge, 2002; Baltagi 2005). Restricted F-statistics, Breuch and Pagan (1980) LM and Hausman (1978) specification tests are used in order to choose between pooled OLS vs fixed effects, pooled OLS vs random effects, and fixed vs random effects models.

First, to test whether pooled OLS or fixed effect is the appropriate model, we use the restricted F test. If the null hypothesis of common intercept is rejected, we can proceed with fixed effects. Second, the Breuch Pagan (1980) LM test checks whether pooled OLS or random effects is the appropriate model (Christopher, 2006 p229). The null hypothesis under this test is that the variance of the time invariant part of the error term is zero. Hence, if we reject null hypothesis, then we can proceed with the random effects model. Finally, the null hypothesis under the Hausman test checks whether the random effects model is consistent using the null hypothesis that the unobserved heterogeneity is uncorrelated with the regressors (Greene, 2012, p. 421). If the null hypothesis is rejected (with a probability lower than 10%) then only the fixed-effect model is considered unbiased and consistent. When the Hausman test indicates that the individual fixed effects are correlated with the regressors, then both OLS and random effects yield biased results.

The fixed effect estimator, however, does not provide the coefficient of time invariant variables. One solution for this is to use the Mundlak approach (Mundlak, 1978) who proposed approximating the country specific effects as a function of the mean of time-variant variables. This is an alternative procedure to the fixed effects model, which include averages of time-varying explanatory variables (Wooldridge, 2002), instead of using dummy variables or the within transformation. Baltagi et al. (2003) suggests using another alternative procedure, based on Hausman and Taylor (1981) when some of the regressors are endogenous. This Hausman-Taylor approach uses the means of the exogenous time-variant variables as instruments for the endogenous variables (Christopher, 2006, p.229). Also, to overcome the reverse causality or endogeneity issue, we used a classical instrumental variable method (IV) that uses external and internal instruments.

Finally, in order to check for the quality of our estimations, we carry out several post estimation tests. For collinearity between the explanatory variables, we look for simple bivariate correlation between the explanatory variables. The variables which are highly interdependent are dropped from the regression. For autocorrelation, the Wooldridge test has been conducted under the null hypothesis that there is no first order autocorrelation against the alternative hypothesis of the presence of autocorrelation. The Breusch-Pagan test has been used to test for heteroskedasticity. The null hypothesis states that the residual variance is constant over time against the alternative hypothesis of the presence of heteroskedasticity. All standard errors are robust in the estimated specifications of the gravity model.

## **5.1- Empirical Findings**

In this section, we discuss our main empirical results. The benchmark estimates presented in Table 3 provide results for the baseline model using several estimation methods. The first column provides OLS results, the second column provides fixed effects estimates, the third column presents random effects estimates, the fourth column presents Mundlak estimates, the fifth column presents Hausman and Taylor estimates, and finally, the instrumental variables

fixed-effect estimates are presented in the last column. The panel data estimations take into account unobservable heterogeneity with the country's specific fixed effects<sup>7</sup>. To choose between fixed and random effects, the Hausman test has been used, which indicates that the country fixed effects are correlated with the regressors, and therefore, both OLS and random effects yield biased results. The results are presented in the bottom of estimation tables. However, one problem in the fixed effects estimator is that it does not provide the coefficient of time invariant variables used in this study. As a result, we use Mundlak (1978) and Hausman-Taylor (1981) techniques in order to take care of the time invariant aspects of the selected model. Similarly, the model may suffer from endogeneity due to possible reverse causality between remittances and migrant's stock<sup>8</sup>, which may render the estimates inconsistent. Therefore, to deal with the problem, we use a fixed effects two-stage least squares estimator (FE 2SLS). This approach requires selecting instruments that are correlated to migrant's stock but uncorrelated with the error term. We use three instruments: The first and second lags of migrant stock (as a proxy for past migration or migrant network) in the destination country (Woodruff and Zenteno, 2001; McKenzie, 2005) and population density in the recipient country (Javorcik, et.al, 2011)<sup>9</sup>. It is expected that all three variables positively influence the stock of migrant in the labor-receiving countries by keeping all other variables unchanged. We check for the validity of these instruments by using a Hansen-J statistics presented in the bottom of the estimation tables.

In the first specification, the log of remittances is regressed on GDPs of source and recipient countries, geographical distance, bilateral exchange rate, and migrant's stock. Concerning the effect of remittances on economic activity in the recipient country, we find that the GDP of the receiving country has a positive and statistically significant effect on remittances to the country regardless of the choice of methods (Columns 1-6 in Table 3). This reflects that Pakistani migrant's send more remittances when the economic conditions back home improve, which in principle contradict the altruistic motive. This result is consistent with earlier studies Kock and Sun (2011), Lueth and Arranz (2008), and Docquier (2011). However, remittance flows to Pakistan do not seem to respond to the source country's economic conditions. This is in contrast to the findings of Straubhaar (1986), Schiopu and Siegfried, (2006), Vargas-Silva and Huang (2006) and Kemegue et al, (2011) who argue that remittances are more responsive to the host country's economic conditions than to the economic conditions of the recipient country. The results can be explained by considering the extent of the migrant integration into the formal sector of the source economy. Similarly, this could also be explained by the loan repayment hypothesis stating that remittances are fixed loan payments made by the emigrant's to the households (Vargas-Silva and Huang, 2006). It may be for these reasons that the recent economic crunch has not adversely affect remittance flows to the country.

The geographical distance that is used as a proxy for transaction cost is not statistically significant in any of the estimated models in Table 3. The mixed results in the previous findings for geographical distance indicate that distance is not an important driver of remittance flows to Pakistan. The estimated results corroborate the graphical illustration in Figure 2 indicating that the cost of transferring money to Pakistan is unrelated with geographical distance. Another possible interpretation of why distance is a poor proxy for remittance costs is that the cost of sending money from a developed to a developing country

<sup>7</sup> However, the time effects for common shocks have not been used in order to identify the effect of variables specific to Pakistan

<sup>8</sup> The number of migrant's in the destination countries affects the size of remittances. The desire to remit also influences the migration level (Niimi and Ozden, 2006). For instance, migrant's stock in the remittance-sending countries are likely to be associated with the error term.

<sup>9</sup> Population density has been the important push factor that stimulates emigration (Javorcik, et.al, 2011).

is significantly larger than the cost of remitting in the opposite direction, whereas distance is the same. Evidence shows that remittance cost is high in the same bilateral corridor depending on the direction of the flow (Ratha and Shaw, 2007). As a result, the cost of remitting money is more related to financial sector development rather than geographical distance.

In regards to the effects of migrant's stock on remittances, our results suggest that remittances depend positively and significantly on migrant's stock (even after controlling for endogeneity) in the destination countries. This means that countries with an increasing size of migrant's stock attract higher volume of remittances (Freund and Spatafora, 2005). The results are robust and consistent with our expectations based on the literature. In Table 3 (Col. 5), the over identification test p-values (for the Hansen J-statistic) exceed 5 percent, therefore, we cannot reject the null hypothesis that our instruments are valid. Concerning the exchange rate variable, our findings are in line with those of Singh et Al. (2011), which also find that remittances are not responsive to bilateral exchange rates.

**Table 3:** Baseline panel gravity model estimates

|  | <b>Pooled<br/>OLS</b> | <b>Fixed<br/>Effects</b> | <b>Random<br/>Effects</b> | <b>Mundlak<br/>Approach</b> | <b>Hausman<br/>and Taylor<br/>Approach</b> | <b>Fixed Effect<br/>(IV)</b> |
|--|-----------------------|--------------------------|---------------------------|-----------------------------|--|------------------------------|
| GDP (source)                               | 0.00014<br>(0.080)    | 0.264<br>(0.308)         | 0.027<br>(0.233)          | 0.255<br>(0.314)            | 0.262<br>(0.220)                           | 0.219<br>(0.252)             |
| GDP (recipient)                            | 1.847***<br>(0.230)   | 1.149***<br>(0.341)      | 1.589***<br>(0.303)       | 1.204***<br>(0.349)         | 1.145***<br>(0.264)                        | 1.267***<br>(0.412)          |
| Migrant's stock                            | 0.919***<br>(0.084)   | 1.658***<br>(0.420)      | 1.263***<br>(0.220)       | 1.660***<br>(0.428)         | 1.656***<br>(0.190)                        | 1.627*<br>(0.915)            |
| Bilateral<br>exchange rate                 | 0.075*<br>(0.045)     | -0.049<br>(0.255)        | -0.030<br>(0.109)         | 0.044<br>(0.258)            | -0.062<br>(0.188)                          | 0.010<br>(0.265)             |
| Geographical<br>distance                   | -0.516<br>(0.481)     |                          | 0.455<br>(1.007)          | -0.547<br>(1.383)           | 0.830<br>(1.153)                           |                              |
| Common official<br>language                | 1.311***<br>(0.411)   |                          | 0.422<br>(0.678)          | 1.294<br>(1.104)            | -0.265<br>(1.088)                          |                              |
| Number of<br>observation                   | 249                   | 249                      | 249                       | 249                         | 249  | 241                          |
| R-squared                                  | 0.775                 | 0.719                    | 0.7538                    | 0.7775                      |  | 0.706                        |
| Hausman test<br>Fixed Vs<br>Random effects |                       | Prob>chi2<br>0.0281      |                           |                             |  |                              |
| Hansen J stat.                             |                       |                          |                           |                             |  | P-val.<br>0.0742             |

**Note:** \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard errors in parenthesis. All the variables except dummies are in natural logs. The endogenous variables in the Hausman and Taylor approach are GDP (source country), GDP (recipient country) and migrant's stock.

Now, we turn to the extended estimated model that includes other important control variables that are likely to have an impact on remittance flows, namely, unemployment rate for the source country, domestic credit to private sector as percent of GDP for source and receiving countries, political stability for the receiving country, and relative interest rate between receiving and source countries. The results for the augmented model are presented in Table 4<sup>10</sup>. The inclusion of all the other control variables does not alter the magnitude and significance of most of the baseline covariates.

<sup>10</sup> The correlation matrix (see Table 1 in the Appendix) of the variables indicate that there is a high positive correlation between the unemployment rate of the recipient country and its GDP. Also, common religion and geographical distance are highly correlated. We dropped unemployment rate and common religion as this might affect the direction and significance of the effect of other variables on the dependent variable.

With regard to the interest rate differential, remittances are positive and significantly associated with the interest rate differential between Pakistan and the remittances-sending countries. This result corroborates the findings of Freund and Spatafora (2005) and Lin (2010) who find that the interest rate differential is an important driver of remittance flows. A higher interest rate and hence, a high interest rate differential may reflect economic instability in the recipient country (Singh et.al, 2011). If that is the case, then remittances play a significant role as a negative shock absorber. However, it also indicates some sensitivity to financial investment opportunities at home. This claim seems to be counterintuitive and depends on the motive of the migrant's whether driven by altruism or investment.

**Table 4:** Augmented semi-gravity model

|   | Pooled<br>OLS        | Fixed<br>Effects    | Random<br>Effects   | Mundlak<br>Approach | Hausman<br>and<br>Taylor | Fixed IV            |
|---|----------------------|---------------------|---------------------|---------------------|--------------------------|---------------------|
| GDP (source)                                  | -0.206*<br>(0.107)   | -0.083<br>(0.419)   | -0.292<br>(0.233)   | -0.051<br>(0.408)   | -0.233<br>(0.234)        | -0.153<br>(0.278)   |
| GDP<br>(recipient)                            | 1.328***<br>(0.218)  | 1.063**<br>(0.485)  | 1.337***<br>(0.353) | 1.102**<br>(0.483)  | 1.227***<br>(0.260)      | 1.239***<br>(0.315) |
| Migrant's<br>stock                            | 1.174***<br>(0.094)  | 1.497***<br>(0.353) | 1.300***<br>(0.165) | 1.290***<br>(0.195) | 1.426***<br>(0.173)      | 1.483***<br>(0.277) |
| Common<br>language                            | 0.390<br>(0.422)     |                     | 0.332<br>(0.697)    | -0.038<br>(0.592)   | 0.058<br>(0.890)         |                     |
| Geographical<br>distance                      | 0.856<br>(0.521)     |                     | 0.441<br>(1.278)    | 1.411<br>(1.032)    | 0.692<br>(1.142)         |                     |
| Unemployment<br>rate (source)                 | -0.875***<br>(0.084) | 0.001<br>(0.303)    | -0.170<br>(0.238)   | 0.018<br>(0.299)    | -0.133<br>(0.146)        | -0.003<br>(0.223)   |
| Credit to<br>private sector<br>(source)       | 0.352**<br>(0.178)   | 0.920<br>(0.792)    | 1.055<br>(0.680)    | 1.058<br>(0.800)    | 0.995***<br>(0.273)      | 0.919**<br>(0.470)  |
| Credit to<br>private sector<br>(recipient)    | 1.040**<br>(0.419)   | 1.022***<br>(0.286) | 1.041***<br>(0.276) | 1.003***<br>(0.294) | 1.045***<br>(0.255)      | 1.067***<br>(0.272) |
| Bilateral<br>exchange rate                    | -0.116***<br>(0.044) | -0.081<br>(0.297)   | 0.007<br>(0.109)    | -0.034<br>(0.304)   | -0.018<br>(0.158)        | -0.034<br>(0.219)   |
| Interest rate<br>differential                 | 0.221***<br>(0.042)  | 0.085*<br>(0.047)   | 0.103**<br>(0.044)  | 0.097**<br>(0.042)  | 0.098**<br>(0.042)       | 0.072*<br>(0.037)   |
| Political<br>stability<br>(recipient)         | -2.951<br>(2.023)    | -2.287**<br>(0.972) | -2.476**<br>(1.000) | -2.343**<br>(0.996) | -2.433**<br>(0.953)      | -2.592**<br>(1.304) |
| No. of<br>observation                         | 249                  | 249                 | 249                 | 249                 | 249                      | 241                 |
| R-Squared                                     | 0.832                | 0.757               | 0.7929              | 0.8404              |                          | 0.748               |
| Hausman test<br>Fixed Vs<br>Random<br>Effects |                      | Prob>chi2<br>0.0494 |                     |                     |                          |                     |
| Hansen J stat.                                |                      |                     |                     |                     |                          | P-val. =<br>0.2404  |

**Note:** \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard errors in parenthesis. All the variables except dummies are in natural logs. The endogenous variables in the Hausman and Taylor approach are GDP (source country), GDP (recipient country) and migrant's stock.

The relationship between remittances and source country unemployment is intuitively negative, but it is only statistically significant in the pooled OLS regression (Column 1 in Table 4). We also take into account the receiving country's financial sector development and the quality of institutions prevailing in the source and receiving country. As expected,

remittances are positively and significantly related to financial sector development<sup>11</sup>. The findings show that better financial development in the source and receiving countries are translated into higher remittance flows. The financial improvement in the recipient country would enhance the availability of low cost remittance services that could then direct large amount of remittances through official channels (Freund and Spatafora, 2008; and Wahba, 1991). Thus, countries with well-developed financial markets have more opportunities to attract remittances through formal channels and thereby, are more likely to channel it into more productive uses.

The coefficient of the political stability variable representing institutional quality in the recipient country is negative and significant, suggesting that unstable political environment (associated with lower growth) may encourage larger amounts of remittances. This result supports the notion of altruistic behavior of the migrant that encourages sending more remittances in caring for the families in the home country<sup>12</sup>. Remittances could also increase by higher outflow of emigrant's to other economically well-off destinations due to political turmoil at home. This stabilization role of remittances to compensate for the loss of purchasing power due to political instability indicates that remittances are used to hedge against political turmoil.

**Table 5:** Remittances explained with transaction cost

|                                 | Pooled<br>OLS        | Fixed<br>Effects    | Random<br>Effects    | Mundlak<br>Approach | Hausman<br>and Taylor<br>Approach |
|---------------------------------|----------------------|---------------------|----------------------|---------------------|-----------------------------------|
| GDP (source)                    | 0.195***<br>(0.072)  | 0.331<br>(0.385)    | -0.029<br>(0.201)    | 0.332<br>(0.385)    | -0.021<br>(0.231)                 |
| GDP (recipient)                 | 2.036***<br>(0.310)  | 2.010***<br>(0.594) | 2.370***<br>(0.405)  | 1.995***<br>(0.589) | 2.345***<br>(0.262)               |
| Transaction cost                | -3.533***<br>(0.179) | -0.202<br>(0.467)   | -1.525***<br>(0.306) | -0.227<br>(0.470)   | -0.855**<br>(0.379)               |
| Common language                 | 1.774***<br>(0.250)  |                     | 1.563*<br>(0.905)    | 1.703***<br>(0.653) | 1.360<br>(1.098)                  |
| Bilateral exchange rate         | -0.096*<br>(0.058)   | 0.147*<br>(0.085)   | 0.112<br>(0.091)     | 0.150*<br>(0.085)   | 0.124<br>(0.112)                  |
| Interest rate differential      | 0.246***<br>(0.054)  | 0.064<br>(0.071)    | 0.112*<br>(0.062)    | 0.072<br>(0.066)    | 0.083*<br>(0.050)                 |
| Political stability (recipient) | -0.769<br>(2.905)    | -2.078*<br>(1.140)  | -1.705<br>(1.081)    | -2.093*<br>(1.154)  | -1.916<br>(1.172)                 |
| No. of observation              | 252                  | 252                 | 252                  | 252                 | 252                               |
| R-squared                       | 0.670                | 0.632               | 0.6156               | 0.6317              |                                   |
| Hausman test                    |                      | P-val.<br>0.000     |                      |                     |                                   |

**Note:** \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard errors in parenthesis. All the variables except dummies are in natural logs. The endogenous variables in the Hausman and Taylor approach are GDP (Source) and GDP (Recipient)

Finally, Table 5 reports the estimates of equation (4). In the context of this specification, we include the transaction cost variable instead of geographical distance. Financial development

<sup>11</sup> However, in some of the estimated models, the variable financial sector development in the source countries has a positive sign.

<sup>12</sup> In unpredictable political situations, the cost of capital would increase and consequently, investors will look for more stable investment destinations. Therefore, political instability deters economic growth (Aisen and Veiga, 2013).

and migrant's stock are dropped due to high collinearity with the transaction cost variable. As expected, we found a negative coefficient for transaction cost, indicating that higher transfer costs deter transfer of money back home. However, the coefficient is not always significant when using different estimation techniques. In light of these findings, remittances could be encouraged via official channels to reduce the transfer cost of remittances by devising policies that improve competition in the financial sector in the migrant's recipient and source countries.

## **5- Concluding Remarks**

International migration from Pakistan has not only accelerated the country's integration into the global economy, but has also led to a substantial amount of remittance flows to the country. As a result, remittances have tremendous potential to promote economic development of a country experiencing sluggish growth.

In this study, we examined the relative importance of the determinants that drive the volume of remittance flows to Pakistan. With this aim, we estimate a gravity model of remittances using bilateral remittances data for 23 major remittance-sending countries during the period 2001-2011 and present the results obtained applying a variety of panel data estimation techniques to tackle several econometric issues. According to our findings, remittances respond to home economic performance, but no significant effect of host economy output could be identified. The positive coefficient of the recipient country output supports the investment-oriented behaviour of the migrant's. On the other hand, the negative coefficient of the political stability seems to support the altruistic motive in shielding the recipient economy in time of political or economic uncertainty. Finally, interest rate differentials positively affect remittances indicating that migrant's take advantage of attractive returns on financial investment in the recipient country. However, it may also reflect economic instability and hence, result in increased remittances back home if driven by altruistic motives. In both scenarios, remittance volumes increase.

From these findings, it is hard to disentangle which of the two motives for remitting prevails. This finding is consistent with the earlier literature in which remittances are often seen to be driven by a combination of motives. The motives of migrant's crucially depend on whether migrant stays abroad are temporary or permanent. Pakistani migrant's who are permanently settled in the OECD countries along with their immediate families tend to remit less than migrant's in the Persian Gulf working on a temporary work visa. The latter may not only remit more in order to build their financial nest eggs back home, but also because they maintain stronger ties with the home country.

Our findings also suggest that migrant's stock and financial sector development strongly influence the size of remittance flows to Pakistan, with remittances rising as a result of gradually increasing migrant's stock and improvement in the financial sector, respectively. Similarly, another important finding refers to the geographical distance between the recipient and the source countries. Geographical distance is not statistically significant in any of the estimated models. This indicates that geographical distance is not a good proxy for the cost of remitting. The latter can be better understood in terms of migrant networks and improvements in recipient and source country financial services. While the effect of transaction cost is found to be negative, its significance was not strongly supported in our analysis.

Based on the findings in this study, we conclude that remittances to Pakistan react predominantly to the macroeconomic factors of the receiving-end rather than the sending

countries. This suggests that remittance flows are not highly vulnerable to the vagueries of the macroeconomic fluctuations taking place overseas, or the economic crises in the host economies generating job losses.

These empirical findings recommend policy to focus on the transaction cost of sending money. Transaction costs can be lowered by increasing access to financial services in the remote areas through innovations such as mobile banking. The improved financial development will redirect these flows from informal to formal channels in the medium term that will eventually lead to higher remittances. Finally, to ensure economic stability, the government should not rely solely on remittances, but should carry out domestic structural reform to improve the economic climate of the country, and reduce the need for international migration.

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## Appendix

**Table A1:** Correlations matrix

|    | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12   | 13   | 14 |
|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|----|
| 1  | 1     |       |       |       |       |       |       |       |       |       |       |      |      |    |
| 2  | 0.19  | 1     |       |       |       |       |       |       |       |       |       |      |      |    |
| 3  | -0.09 | 0.13  | 1     |       |       |       |       |       |       |       |       |      |      |    |
| 4  | 0.75  | -0.01 | -0.49 | 1     |       |       |       |       |       |       |       |      |      |    |
| 5  | 0.44  | 0.06  | -0.83 | 0.73  | 1     |       |       |       |       |       |       |      |      |    |
| 6  | 0.36  | -0.01 | 0.04  | 0.62  | 0.22  | 1     |       |       |       |       |       |      |      |    |
| 7  | -0.69 | 0.01  | 0.68  | -0.88 | -0.85 | -0.31 | 1     |       |       |       |       |      |      |    |
| 8  | 0.26  | 0.05  | -0.01 | 0.27  | 0.12  | 0.06  | -0.32 | 1     |       |       |       |      |      |    |
| 9  | -0.17 | -0.9  | -0.11 | 0     | -0.06 | 0     | -0.01 | -0.01 | 1     |       |       |      |      |    |
| 10 | 0.67  | 0.19  | -0.49 | 0.79  | 0.86  | 0.42  | -0.81 | 0.18  | -0.2  | 1     |       |      |      |    |
| 11 | 0.02  | -0.07 | -0.04 | 0.01  | -0.18 | 0.01  | -0.01 | -0.07 | 0.03  | 0.01  | 1     |      |      |    |
| 12 | 0.28  | -0.05 | -0.15 | 0.08  | 0.19  | -0.12 | -0.11 | -0.08 | 0.05  | 0.2   | 0.02  | 1    |      |    |
| 13 | 0.22  | 0.42  | -0.04 | 0.01  | 0.2   | -0.1  | -0.03 | 0.06  | -0.42 | 0.21  | -0.28 | 0.54 | 1    |    |
| 14 | -0.03 | -0.14 | -0.02 | 0     | 0.03  | 0     | 0     | -0.03 | -0.03 | -0.01 | -0.14 | 0    | 0.07 | 1  |

**Note:** Number of observations: 253. All variables are in logs except binary variables. 1. GDP (Source). 2. GDP (Recipient). 3. Migrant's Stock. 4. Geographical distance. 5. Remittances Cost. 6. Common language (official) 7. Common Religion. 8. Unemployment rate (Source). 9. Unemployment rate (Recipient). 10. Domestic credit to private sector as percent of GDP (Source). 11. Domestic credit to private sector as percent of GDP (Recipient) 12. Bilateral exchange rate. 13. Interest rate differential. 14. Political stability (Recipient).