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Do Transfer Costs Matter for Foreign Remittances? A Gravity Model Approach

Junaid Ahmed and Inmaculada Martínez-Zarzoso

Abstract

Using bilateral data on remittance flows to Pakistan for 23 major host countries, in the first study of its kind, the authors examine the effect of transaction costs on foreign remittances. They find that the effect of transaction costs on remittance flows is negative and significant; suggesting that a high cost will either refrain migrant's from sending money back home or make them remit through informal channels. This can be better understood in terms of migrant networks and improvements in home and host country financial services. Distance, which has been used in previous studies as an indicator of the cost of remitting, is found to be a poor proxy.

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Keywords Remittances; geographical distance; transaction cost; financial services; Pakistan

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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, 1999; Stark and Taylor, 1991). The costs incurred during the migration process are considered to increase with distance from the migrant sending to the migrant hosting country, and decrease as social networks in the hosting country grow (Özden and Schiff, 2006). As migration is often thought to be a family decision (Borjas, 1999), the resulting remittances should be a central element of familial arrangements (Rapoport and Docquier, 2006). As a result, the physical distance between the migrant and the staying-behind household can affect remittance patterns (Rapoport and Docquier, 2006). Remittances might decrease with distance in the following three ways: Firstly, remittances might be motivated by altruistic reasons, and altruism might be solvable in distance. Secondly, migration to far-off lands might reinforce strategic behavior as greater distance from the family may reduce the enforcement capability of any family arrangement agreed prior to migration. Finally, remittances may decrease with distance if the latter were a good proxy for transfer costs (Lueth and Ruiz-Arranz, 2008; Frankel, 2011). At the other end of the spectrum, remittances may increase with distance in the context of loan repayment hypothesis (De Sousa and Duval, 2010). An increase in physical distance between migrant home and host countries can result in an increase in remittances in return for the high migration cost paid by the family (De Sousa and Duval, 2010). However, these interpretations are conflicting. A competing interpretation is that the cost of transferring money might be unrelated to geographic distance and hence sending remittances should not necessarily be related to geographical features. There are two ideas behind this interpretation. Foremost, financial assets are “weightless” and are not subject to transportation costs (Portes and Rey, 2005). Furthermore, distance is unable to pick up technological changes. Conversely, remittances costs may indeed reflect technological developments and increase competition in the financial-services industry. These factors reduce the cost of sending remittances through the formal financial sector (Freund and Spatafora, 2008). Beck and Pería, (2011) additionally illustrate that corridors with a larger number of migrant’s and higher competition exhibit consistently lower costs, indicating that migration networks could also influence the cost of remitting .

Remittances sent to developing countries via the official channel have increased more than tenfold over the last decade. The amount reached \$404 billion in 2013, growing by 3.5 percent compared with 2012 (World Bank, 2014a). This overwhelming growth in remittances is partly due to increase migrant stocks and rising remittances per immigrant. It may also be attributed to the better recording of data as well as a shift from informal to formal channels induced by falling cost of remitting money home. However, the prevalence of informal transactions is still likely to be substantial. Freund and Spatafora (2008) argue that informal

remittances amount to about 35-75 percent of recorded remittances to developing countries. This is due to lower transaction fees generally charged by informal channels¹. Compliance with regulations to counter terrorism financing and anti-money laundering could be a major cost factor putting upward pressure on prices, thus leading sizeable flows to underground channels (World Bank, 2014a).

The main aim of this paper is to evaluate the importance of transaction cost and migration networks in attracting remittances. We also question the use of geographical distance as a proxy for transaction cost, which has been a common practice in previous research. More specifically, we estimate a gravity model using panel data for remittances from 23 sending countries² to Pakistan over the period from 2001 to 2013. The model is augmented with a new proxy for cost of remitting that has not been used before in the related literature. To the best of our knowledge, this is the first paper that incorporates into the model a variable that measures the cost of sending remittances. Moreover, we also include migration networks in the analysis as an important factor explaining the variation of remittances over time.

We focus on Pakistan because it is among the top ten remittance receiving countries in the world and relies heavily on international transfers. The development potential of these transfers is therefore of great importance.

The rest of the paper proceeds as follows. Section 2 presents Pakistan's migration and remittance main features. Section 3 discusses remittances cost. Section 4 reviews the literature, focusing particularly on bilateral remittance determinants. Section 5 employs a gravity model framework to examine the main determinants of remittance flows using bilateral data. Results are presented in section 6. Section 7 concludes and outlines a number of policy implications.

2- Overview of Bilateral Migration and Remittances to Pakistan

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 to participate in the development of the newly-rich oil economies. By 2013, about 5.7 million Pakistani immigrants were estimated to reside abroad, compared with 3.7 million in 2000 and 3.6 million in 1990³ (United Nation, 2014). This shows that 54 percent of this growth in migrant's stock took

¹ According to Sander (2004), the average cost of remitting at 3 to 5 percent in most cases when using informal channel, whereas Orozco (2003) suggest the costs to be less than 2 percent of the principal value in the case of informal source such as hawala or *hundi*

² The countries considered 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.

³ This corresponds to around 2.2 percent of the country population in 2013 residing abroad compared to 2.9 percent in 2000 and 5.9 percent in 1990.

place during the period 2000-2013. Factors driving this wave of migration include economic slowdown, increasing poverty, rapid population growth and substantial wage differentials (Ministry of Finance, 2013).

Among the immigrant's destination countries, the Middle East is the most popular destination region accounting for more than half of Pakistani migrants, followed by North America, Europe, and Asia Pacific (UN, 2014). Saudi Arabia and the United Arab Emirates (UAE) host the largest Pakistani migrant's communities, possibly due to geographical proximity and cultural affinity. Moreover, the Gulf region also has attracted a large proportion of immigrants due to the availability of medium- and low-skilled jobs (Arif, 2009).

The United States (US), Canada, the United Kingdom (UK), Italy, and Spain are also 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, 2014). The presence of such a significant number of immigrants 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).

For many developing countries facing a weak balance of payments situation such as Pakistan, remittances have emerged as a large source of foreign exchange earnings. The flows reached \$14 billion in 2013, compared with \$1 billion in 2001(see Table 1). Similarly, this increase in remittances has outpaced that of net ODA and FDI, which accounted for only \$2.02 billion and \$1.31 billion in 2012 and 2013 respectively (WDI, 2014). Likewise, compared to FDI and foreign aid, remittances tend to be resilient and increase during periods of economic turmoil (Ahmed and Martinez, 2013, Mughal and Makhoulf, 2011).

Table 1: Remittance flows per immigrant by host countries

Host Countries	Remittances by host countries		Share of remittances from host with total remittances. (in percent)		Share of remittances per immigrant	
	2001	2013	2001	2013	2001	2013
GCC	693.22	8462.78	63.83	60.79	251.08	1354.61
-Bahrain	23.87	282.83	2.20	2.03	367.23	2405.61
-Kuwait	123.39	619.00	11.36	4.45	1142.50	3453.78
-Qatar	13.38	321.25	1.23	2.31	243.27	3209.20
-Saudi Arabia	304.43	4104.73	28.03	29.48	178.87	1214.14
-UAE	190.04	2750.17	17.50	19.75	307.01	1423.61
-Oman	38.11	384.80	3.51	2.76	179.76	715.39
North America	139.71	2363.59	12.86	16.98	474.70	4763.44
-Canada	4.90	177.19	0.45	1.27	61.78	1127.75
-USA	134.81	2186.40	12.41	15.70	627.02	6448.11
Euro Area	112.87	2371.59	10.39	17.04	235.02	3013.14
-Belgium	1.10	3.34	0.10	0.02	275.00	256.92
-Denmark	3.83	25.03	0.35	0.18	900.33	1973.04
-France	2.22	36.26	0.20	0.26	222.00	1842.85
-Germany	9.20	83.18	0.85	0.60	262.86	2122.59
-Greece	0.00	11.18	0.00	0.08	0.00	455.42
-Ireland	0.20	90.07	0.02	0.65	66.67	11982.17
-Italy	0.55	35.74	0.05	0.26	27.50	499.80
-Netherlands	3.60	5.45	0.33	0.04	327.27	459.22
-Norway	5.74	37.84	0.53	0.27	410.00	1861.84
-Spain	0.06	53.44	0.01	0.38	4.00	709.87
-Switzerland	4.24	30.37	0.39	0.22	1060.00	6927.46
-Sweden	0.74	13.68	0.07	0.10	246.67	1248.40
-UK	81.39	1946.01	7.49	13.98	229.92	4087.02
Asia Pacific	8.08	182.34	0.74	1.31	384.76	4133.76
-Japan	3.93	177.19	0.36	1.27	491.25	16681.42
-Australia	4.15	149.73	0.38	1.08	319.23	4471.15
Other	132.69	568.88	12.22	4.09		
Total	1086.60	13921.70			305.52	1837.91

Source: State Bank of Pakistan and author's own calculations.

Table 1 also indicates that Saudi Arabia, the USA, the UAE, and the UK represent Pakistan's main remittance sending countries. The Middle East region accounts for more than 60 percent of overall remittances, which are mainly sent from Saudi Arabia and the UAE. Overall, the share from major remittances corridors has increased over the period 2001-2013. Remittances per immigrant, however, portray a somewhat different picture, with more flows coming from developed nations such as the USA, Australia, and the UK.

3- Cost of remitting to Pakistan

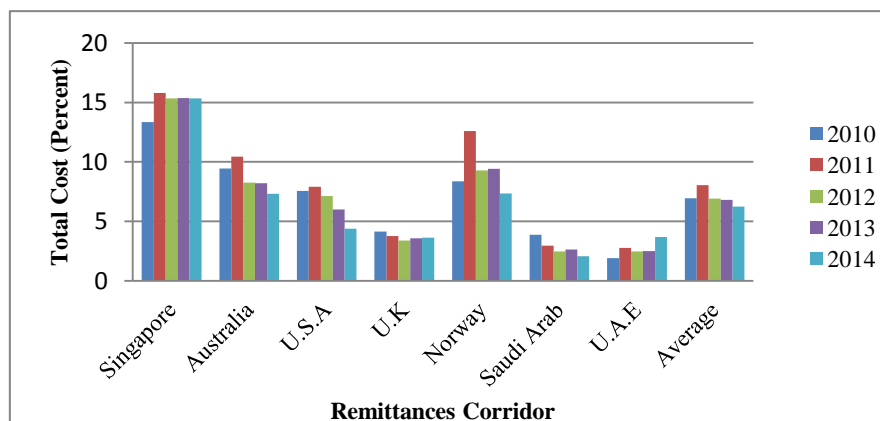
Pakistani migrants use various channels to send money from the host country to their families back home. These include banks, money transfer operators such as Western Union and Money Gram, family members, and friends as well as the so-called "hawala or *hundi*"⁴.

⁴ This is an informal method, which is comparatively cheaper than the formal transaction channel. The sender contacts a broker who acts as an intermediary and arranges the transfer. The sender remits a certain amount in Saudi Riyal and the broker contacts a counterpart in Pakistan, who makes the payment in Pakistani rupees to the family. Throughout the whole procedure, no money crosses the border, and no official records exist for this transaction.

Family, friends, and *hundi* are considered informal channels and are not recorded in the official statistics. In a study of remittances to Pakistan from Saudi Arabia, Arif (2009) points out that in 2009 about 38 percent of the remittances were transferred through the banking system, 28 percent through *hundi*, 17.9 through friends/relatives and 13.7 percent through migrant’s home visits. There is no difference in the reported cost of transfer money either through bank or *hundi*. However, the distance from the closest bank and the amount of time required for each transaction are the main factors pushing migrants and their families to use the *hundi* system. In another study, Amajd et al. (2013) mentioned that the time required to withdraw money from the nearest bank and the high transaction costs are the main barriers to using the banking channel. Therefore, the transaction costs of sending remittances and in particular the fees paid to intermediaries continue to be a significant concern for immigrants, development agencies, and other actors involved in the process.

The World Bank has constructed a database that contains the cost of sending remittances to families back in the home country. The average cost for sending remittances from the major remittances corridor was 8.0 percent in 2011 and has fallen to 6.2 percent in 2014. Figure 1 shows the cost of sending remittances across corridors. There is significant heterogeneity across sending countries.

Figure 1. Average cost for sending remittances to Pakistan from major remittances corridors

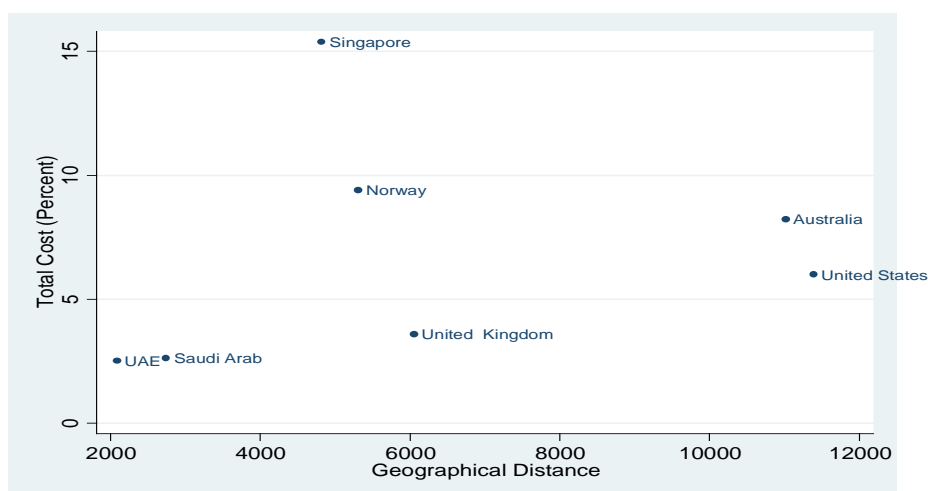


Source: World Bank Remittances Prices Worldwide. All figures are percentages.

In particular, the figure reveals that it is significantly cheaper to send remittances to Pakistan from Saudi Arabia, UAE and the UK than from the other considered countries. Hence, the Middle East region is the least expensive corridor with the cost being between 1.9 and 3.8 percent. Conversely, Singapore and Norway show the highest transfer costs, going up to around 15.5 percent in 2014 in Singapore. It is the most costly for a Pakistani resident to send

money back home from Singapore with the cost being over 15 percent of the transfer. Sending money from Norway consistently costs more than twice, on average, than from the UK. This high transaction cost is probably one of the main obstacles that deters the use of remittances in the development process (Orozco, 2003, World Bank, 2014a). Some studies have shown that these flows are very sensitive to cost and are more likely to rise with a drop in costs (Gibson et.al, 2006). Therefore, high transaction costs, duration of the transfer, lower fees on informal transactions and lack of access to convenient remittance services encourage migrants to use informal channels. As an option to reduce these costs, the Pakistan Remittance Initiative (PRI) was launched in 2009 as a joint project of the Ministry of Overseas Pakistanis and Human Resource Development, the State Bank of Pakistan (SBP), and the Ministry of Finance (Ministry of Finance, 2013). Under this scheme neither the remitter nor the beneficiary is supposed to pay any fee to the transfer company. In 2012, the National Database and Registration Authority (NADRA) has launched the ‘National Cash Remittance Program’ to enable more than 117 NADRA centers to process inward home remittances from overseas for the general public using smart national identity cards. Similarly, the adoption of improved technology, such as cell-phone services help to enable remittances⁵ (World Bank, 2014a). The implementations of targeted government policies as well as the use of better technologies aimed at easing remittances are both putting downward pressure on the cost of remitting to the country.

Figure 2: Comparison of geographical distance and transaction cost of remittances to Pakistan from selected host 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.

⁵ For example, in a short period of time Pakistan has become mandated in branchless banking with over 1percent of the population holding branchless banking accounts with key services such as Easypaisa, UBL Omni and services from banks and the Pakistan Post office obtaining traction (Oak , 2013).

A comparison between transaction costs and geographical distance could be illustrative of the important differences between both variables. 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 cost of transferring the same amount from Norway is 9.41 percent, 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 home country (see Figure 2).

4- Factors behind bilateral remittances flow. A brief literature review

Recent literature has highlighted the importance of geographical distance and other bilateral variables in driving remittances. Empirical evidence in this regard is still scarce mainly due to limited data availability concerning bilateral remittances over time. We discuss in this section the related literature, starting by studies covering different countries and region and focusing next on existent studies for Pakistan. To the first group of studies belong Lueth and Arranz (2008). The authors model remittances for eleven countries in Asia and Europe for the period 1980-2004 and construct a dataset of bilateral remittance flows for a set of 33 developing countries with remittances to 11 home countries: Bangladesh, Croatia, Indonesia, Kazakhstan, Macedonia, Moldova, Philippines, Serbia and Montenegro, Slovenia, Tajikistan and Thailand. They include several variables that appear frequently in the trade literature as determinants of remittances, namely the GDP of home and host countries, geographical distance, common language, colonial ties, stock of immigrant's, political risk, etc. Their results indicate that economic activity in the host and home country and other gravity variables account for more than 50 percent of the variation in remittances. Similarly, Frankel (2011), using the same dataset, finds that distance is negatively associated with remittances while income per capita of the host 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 opposite result regarding the significance of geographical distance is found by Schiopu and Siegfried (2006) when using a panel dataset of bilateral remittances from 21 European sending countries to 9 European receiving countries over the period 2000-2005. They find that geographical distance plays no role in explaining remittances. However, the effect is positive if the countries have no common border. In another related study, De Sousa and Duval (2010) examine remittance flows to Romania originating from various sending

countries during the period 2005-2009. The authors find that both home and host countries' economic size and geographical distance appear to positively impact bilateral flows. The positive relationship between remittances and distance is supported by the loan repayment hypothesis, according to which 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.

Only two studies have analyzed the remittance motives in the Pakistani context. The first study by Bouhga-Hagbe (2006) points to the existence of altruistic motives for sending remittances. Those are proxied by "agriculture GDP" and are found to be a major driver of remittance flows to Egypt, Jordan, Morocco, Pakistan, and Tunisia. The second, by Kock and Sun (2011), suggests that skill level, investment return in both host and home 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 home and host country economic conditions has often been explored and found to be an important determinant of migrants' 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 and hence this study aims at closing this gap in the literature. 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 country (De Sousa and Duval, 2010). In this study, the datasets used are constructed in a more homogenous way for a single home country (i.e. Pakistan), which implies using a smaller sample, but avoids the drawbacks of previous datasets concerning measurement differences.

Summarizing, we extend the literature in two important ways. Firstly, by focusing on a new factor, the cost of sending remittances, and emphasizing that distance cannot be used as a proxy for this factor, and secondly by using a homogenous dataset.

5- Empirical strategy

5.1 Gravity model of bilateral remittances

We start by estimating a simple gravity equation where the bilateral remittance flows are explained by the GDPs of both the host (i) and the home country (j), and by a set of transaction costs proxies including, in particular, the cost of remitting ($Remcost_{ij}$) and the

geographical distance between a pair of countries ($DIST_{ij}$). The theoretical justification of the gravity equation for bilateral remittances is not as well established as for trade flows (see Anderson, 1979; Bergstrand, 1989; Feenstra et al., 2001 and Anderson van Wincoop, 2003). However, 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) and has been applied to explain remittances (De Sousa, J., Duval, L., 2010; Lueth and Ruiz-Arranz, 2008) and, more extensively, FDI flows (Hattari and Rajan, 2008; Bénassy-Quéré et.al, 2007; 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 differences in economic size and impeded by migration costs (Borjas, 1999).

Lueth and Ruiz-Arranz (2008) argue that bilateral remittances can also be modeled using the gravity model. We start by specifying the basic gravity model, which argues that bilateral remittances are directly proportional to the economic size of the host and home 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,

$$REM_{ijt} = A \frac{(GDP_{ij} * GDP_j)^{\alpha_1}}{(Dist_{ij})^{\alpha_1}} Z_{ijt} \quad (1)$$

where GDP denotes income in host (i) and home (j) country. Pakistan is considered the “home country” and the rest of the 23 source countries are used as “host countries”. $Dist$ denotes geographical distance between capitals of countries i and j , 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 (i) to home country (j) is expressed as,

$$\begin{aligned}
\ln (REM_{ijt}) = & \alpha_0 + \alpha_1 \ln (GDP_{it}) + \alpha_2 \ln (GDP_{jt}) \\
& + \alpha_3 \ln (DIST_{ij}) + \alpha_4 \ln (MigStock_{ijt}) + \alpha_5 (BilExc_{ijt}) + \mu_i \\
& + \varepsilon_{ijt}
\end{aligned} \tag{2}$$

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

The explanatory variables GDP_{it} and GDP_j stand for the real gross domestic products for the host country (i) and home country (j) in period t , and $DIST_{ij}$ is the physical distance between the capitals of the home and the host country. $BilExc_{ijt}$ is the bilateral exchange rate denominated in home country currency and $MigStock_{ijt}$ denotes the stock of migrant's from j that live in country i at time t . Finally, μ_i denotes the host-country specific effects that control for unobservable heterogeneity. The last term ε_{ijt} denotes the error term.

The baseline model is augmented with additional host and home country characteristics that influence remittances.

$$\begin{aligned}
\ln (REM_{ijt}) = & \\
& \alpha_0 + \alpha_1 \ln (GDP_{it}) + \alpha_2 \ln (GDP_{jt}) + \alpha_3 \ln (DIST_{ij}) + \\
& + \alpha_4 \ln (BilExc_{ijt}) + \alpha_5 \ln (MigStock_{ijt}) + \sum_{k=1}^K \alpha_k Z_{ijkt} + \mu_s + \varepsilon_{ijt}
\end{aligned} \tag{3}$$

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

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

$$\ln (REM_{ijt}) = \alpha_0 + \alpha_1 \ln (GDP_{it}) + \alpha_2 \ln (GDP_{jt}) + \alpha_3 \ln (Remcost_{ijt}) + \alpha_4 \ln (BilExc_{ijt}) + \sum_{k=1}^K \alpha_k Z_{ijkt} + \mu_s + \varepsilon_{ijt} \quad (4)$$

$Remcost_{ijt}$ is the transaction cost of sending remittances from the host country to the home country. Since some variables are in natural logs (except dummies, exchange rate, financial development and exchange rate variable), the estimated coefficients can be interpreted as elasticities.

5.2 Data and variable definitions

We collected data on remittances from 23 host countries 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 USD million come from the 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 the host country in billions of USD comes from WDI and is the most obvious factor that influences higher remittances to home countries (Vargas and Huang, 2006). The second explaining factor is the income level (measured in term of GDP) in the home country, which has an ambiguous effect on remittances depending on the prevailing motive to remit. The migrant's stock in the destination country is also considered a crucial factor in determining remittance volumes (Freund and Spatafora, 2005). The data of Pakistani migrant's stock in the host 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. Firstly, 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 migrants (Amjad et. al, 2012). Secondly, it does not track returning workers, which makes it impossible to accurately estimate the country's migrant stock. We estimate the stock of migrants 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 migrants to be 3.4 percent of the Pakistani migrant's stock in the Middle East. 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 transaction cost variable is estimated using data from the World Bank Remittances Prices Worldwide for major sending corridors to Pakistan (World Bank. 2014b). To obtain data for each destination and time period, we formulate two assumptions. First, we assume that transaction costs of sending remittances from the UAE to Pakistan are 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 costs of remittances are determined by migrant's stock in the remittance-host country as well as the financial development in both the home and host countries. Data for cost of remitting are available only for the years 2010, 2011 and 2012. We use data from these three year to estimate the transaction cost for each sending country by regressing the cost of remitting on migrant's stock in the remittance-host country and financial development in both home and host countries as well as extrapolating the resulting predicted⁶ values for the missing time period (2001–2009).

The bilateral exchange rate of Pakistani rupees (PKR) in terms of foreign currency is also an important determinant of remittances (Dakila & Claveria, 2007). The bilateral exchange rate of the PKR is obtained from DataStream. The relationship between remittances and the exchange rate is a priori ambiguous. Remittances could decrease or increase with home country currency depreciation depending on the motive to remit.

With respect to the financial sector development for home and host countries, we use domestic credit to the private sector as a percent of GDP for both receiving and sending countries. The data comes from the WDI. Financial development is another important factor that makes remittances easier and cheaper, hence stimulating the flows via official channels (Freund and Spatafora, 2008; Singh et al., 2011). We therefore expect that the overall financial-sector development might lead to greater availability and lower costs for remittance services.

⁶ The predictions were estimated with OLS regression with a linear trend.

As a proxy for institutional quality of the home country, we use a political stability indicator from the World Governance Indicators from the World Bank. The improved political situation may encourage remittances, since such an environment favors investment (Singh, et.al 2011). On the other hand, weak institution may also encourage remittances to compensate for the loss of purchasing power of the family back home. Fragile institutions in the country are among the main reasons behind 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 Pakistan's migrants reside in the Middle East and in the countries with a similar official language. We expect a positive sign for these two variables. The variables bilateral remittances, GDP (host), GDP (home) and bilateral exchange rate are at constant 2005 prices. Table 2 provides descriptive statistics for the above-mentioned variables.

Table 2: Descriptive statistics

Variables and definitions	Source	Mean	S.D	Min	Max
Dependent variable					
Bilateral remittances million (USD)	State Bank of Pakistan	177.17	342.34	.024	1717.62
Gravity variables					
Host GDP in billion (USD)	WDI	1.40e+14	2.77e+14	1.27e+07	1.45e+15
Home GDP in millions (USD)	WDI	1.17e+11	1.83e+10	8.75e+10	1.47e+11
Geographical distance	CEPII	5436.47	2639.01	1801.39	11392.8
Common language	CEPII	0.21	0.41	0	1
Transaction costs	World Bank Remittances Prices Worldwide and author's calculations	15.37	2.37	9.77	19.70
Other control variables					
Exchange rate	DataStream	0.14	0.59	.002	4.45
Domestic credit to private sector as percent of GDP (Home)	WDI	23.30	4.46	15.65	28.74
Domestic credit to private sector as percent of GDP (Host)	WDI	104.65	51.44	27.26	232.10
Migrant's stock	BIOE, OECD, UN- DESA	0.22	0.53	.003	3.13
Institutional variables					
Political stability (Home)	World Wide Governance Indicator, World Bank	0.16	0.07	0.10	0.40

Note: All the variables are in levels. Period 2001-2013.

5.3 Estimation issues

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, given the panel nature of the dataset, the pooled OLS is only consistent when unobserved fixed effect and explanatory variables are uncorrelated (Wooldridge, 2002). In

order to take into account the resulting unobserved heterogeneity, we use a panel data approach i.e. fixed and random effects rather than pooled OLS. 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. The fixed effect estimator, however, does not provide a direct estimation of the coefficients 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 includes averages of time-varying explanatory variables (Wooldridge, 2002), instead of using dummy variables or the within transformation. Baltagi et al. (2003) suggest 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 (Baum, 2006, p.229).

Finally, in order to check for the quality of our estimations, we carry out several post estimation tests. The calculation bivariate correlations between the explanatory variables help us to identify collinearity between the explanatory variables. Variables that are highly correlated are used separately or are dropped from the regression. To test for autocorrelation, the Wooldridge test is used (the null hypothesis is that there is no first order autocorrelation while the alternative hypothesis is that there is a presence of autocorrelation) the Breusch-Pagan test is used to test for heteroskedasticity.

6- Empirical Findings

In this section, we discuss our main empirical results. The benchmark estimates presented in Table 2 provide results for the baseline model using several estimation methods. The first column provides fixed effects estimates, the second column presents random effects estimates, the third column presents results using the Mundlak approach, and finally the fourth column presents Hausman and Taylor estimates. In the first specification, the log of remittances is regressed on the GDPs of host and home countries, geographical distance, the bilateral exchange rates, and migrant's stock. Concerning the effect of economic activity in the home country on remittances, we find that the GDP of the home country has a positive and statistically significant effect on remittances (Columns 1-6 in Table 3). This shows that Pakistani migrants send more remittances when the economic conditions improve at home,

which in principle supports the portfolio investment motive. This result is consistent with the findings in Kock and Sun (2011), Lueth and Arranz (2008), and Docquier et al. (2012). 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 Schioppa 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 home country. The results can be explained by considering the extent of the migrant integration into the formal sector of the source economy. It could also be due to the loan repayment hypothesis stating that remittances are fixed loan payments made by the emigrants to the households (Vargas-Silva and Huang, 2006). It could be for these reasons that the recent economic crunch has not adversely affected remittance flows to the country.

The geographical distance is not statistically significant in any of the estimated models (see Tables 3 and 4). The mixed results in the previous literature for geographical distance indicate that distance is not always an important driver of remittance flows. 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 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 technological developments and increased competition in the financial-services than geographical distance. In regard to the effects of migrant's stock on remittances, our results expectedly show that remittances depend positively and significantly on migrant's stock. This means that countries with an increasing size of migrant's stock attract a higher volume of remittances (Freund and Spatafora, 2008). The results are robust and consistent with our expectations. Concerning the exchange rate variable, our findings indicate that it has a positive effect on remittances. This suggests that in case of appreciation of the home currency, migrants tend to send more money in foreign currency to insure the same amount of income in the domestic currency. Another possibility could be that migrants send more remittances in order to keep the same utility level of their family compared with their own personal utility level.

Table 3: Baseline panel gravity model estimates

VARIABLES	(1) Fixed Effects	(2) Random Effects	(3) Mundlak Approach	(4) Hausman and Taylor Approach
GDP (host)	-0.014 (0.015)	-0.023* (0.013)	-0.014 (0.015)	-0.015 (0.026)
GDP (home)	1.205** (0.527)	1.690*** (0.526)	1.205** (0.532)	1.184*** (0.340)
Migrant's stock	1.534*** (0.367)	1.211*** (0.171)	1.534*** (0.370)	1.542*** (0.167)
Geographical distance		0.269 (0.493)	-0.384 (1.017)	1.090 (0.813)
Common official language		0.401 (0.438)	1.006 (0.745)	-0.450 (0.904)
Bilateral exchange rate	0.472*** (0.056)	0.467*** (0.068)	0.472*** (0.057)	0.451*** (0.120)
Number of observation	299	299	299	299
R-squared	0.547	0.542	0.547	
Hausman test (Fixed Vs Random effects)	Prob>chi2 = 0.0404			

Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parenthesis. All the variables except dummies and exchange rate are in natural logs. The endogenous variables in the Hausman and Taylor approach are GDP (host country), GDP (home 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, domestic credit to the private sector as a percent of GDP for host and home countries and political stability for the home country. The results for the augmented model are presented in Table 4⁷. The inclusion of all the other control variables does alter the magnitude and significance of GDP (home) in some of the estimated models.

Table 4: Augmented semi-gravity model

VARIABLES	(1) Fixed Effects	(2) Random Effects	(3) Mundlak Approach	(4) Hausman and Taylor Approach
GDP (source)	0.013 (0.010)	0.001 (0.012)	0.013 (0.010)	0.012 (0.023)
GDP (recipient)	0.618 (0.623)	0.903* (0.514)	0.618 (0.629)	0.601* (0.341)
Migrant's stock	1.377*** (0.321)	1.236*** (0.178)	1.377*** (0.324)	1.466*** (0.144)
Geographical distance		-0.626 (0.783)	-0.426 (0.950)	-0.091 (0.768)
Common official language		0.641 (0.683)	1.108 (0.776)	0.063 (0.838)
Bilateral exchange rate	0.356*** (0.058)	0.365*** (0.053)	0.346*** (0.059)	0.348*** (0.108)
Credit to private sector	0.013**	0.012**	0.013**	0.012***

⁷ The correlation matrix of the variables indicates that common religion and geographical distance are highly correlated. We dropped common religion as this might affect the direction and significance of the effect of other variables on the dependent variable.

(source)				
	(0.006)	(0.005)	(0.006)	(0.002)
Credit to private sector (recipient)	0.040***	0.039***	0.040***	0.041***
	(0.010)	(0.010)	(0.010)	(0.012)
Political stability (recipient)	-1.293**	-1.326**	-1.293**	-1.251***
	(0.547)	(0.530)	(0.553)	(0.484)
Observations	299	299	299	299
R-squared	0.647	0.646	0.647	
Hausman test (Fixed Vs Random effects)	Prob>chi2 = 0.0449			

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

We also take into account the financial sector development (the driving factor of transfer cost) for both host and home country. As expected, remittances are positively and significantly related to financial sector development⁸. The findings reveal that better financial development in the host and home countries turn into higher flows of remittances. In addition, financial improvement in the home 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). Countries with improved financial markets thus have more opportunities to attract remittances through formal channels and are thereby more likely to channel it into more productive uses.

The coefficient of the political stability variable representing institutional quality in the home country is negative and significant, implying that an unstable political environment (associated with lower growth) may encourage larger amounts of remittances. This result supports the notion that the altruistic behavior of the migrant encourages sending more remittances when the earning prospects of the migrant's home country income decreases, in order to assure the same level of satisfaction⁹. Similarly, the money transfer could also increase by higher outflows of emigrants 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 disorder.

⁸ However, in some of the estimated models, the variable financial sector development in the source countries has a positive sign.

⁹ 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).

Table 5: Remittances explained with transaction cost

VARIABLES	(1) Fixed Effects	(2) Random Effects	(3) Mundlak Approach	(4) Hausman and Taylor Approach
GDP (source)	-0.001 (0.015)	-0.023 (0.019)	-0.001 (0.0148)	-0.008 (0.027)
GDP (recipient)	2.180*** (0.672)	2.260*** (0.648)	2.178*** (0.678)	2.223*** (0.328)
Common language		0.811 (1.073)	1.056 (1.121)	0.750 (1.059)
Transaction cost	-3.424* (1.918)	-3.239* (1.812)	-3.432* (1.930)	-3.276*** (0.675)
Bilateral exchange rate	0.467*** (0.0787)	0.443*** (0.0744)	0.467*** (0.0793)	0.444*** (0.133)
Political stability (recipient)	-2.143*** (0.477)	-2.128*** (0.470)	-2.143*** (0.481)	-2.137*** (0.557)
No. of observations	299	299	299	299
R-squared	0.480	0.478	0.480	
Hausman test (Fixed Vs Random effects)	Prob>chi2 =0.0323			

Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parenthesis. All the variables except dummies and exchange rate 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), which includes the transaction cost variable and drops geographical distance (it was not statistically significant). Financial development and migrant's stock are not included because they were used to predict the transaction cost variable.

We found that high transaction costs significantly reduce remittances regardless of the estimation method used. For instance, a one percent decrease in the transaction cost would yield about 3 percent increase in remittances flows.

It is consistent with the notion that higher transfer costs discourages remitters or pushes them into the informal sector. This seems to suggest that higher transfer costs deter transferring money back home. As discussed, variation in transfer costs has a large impact on remittances. This result is consistent with the two hypotheses. Firstly, migrants remit less in the presence of high transaction costs. Secondly, high official remittance costs lead to migrants resorting to informal remittance channels.

7- Concluding Remarks

This paper explores the relative importance of the determinants that drive the volume of remittance flows to Pakistan with a particular focus on transaction costs. With this aim, we estimate a gravity model using bilateral remittances data for 23 major remittance-sending

countries during the period 2001-2013 and apply a variety of panel data estimation techniques to tackle several econometric issues.

According to our findings, recorded remittance inflows rise with the country's stock of migrant's residing abroad. Similarly, our findings indicate that differences in the financial system and variations in the bilateral exchange rate strongly influence the size of remittance flows to Pakistan. More importantly, decreases in transaction costs seems to foster remittances, suggesting that when the cost on remitting increases, migrant's either refrain from sending money home or use informal channels to remit (hundi or hawala, by hand, through friends, etc). In contrast, no significant effect of geographical distance could be identified. This indicates that geographical distance is not a good proxy for the cost of remitting. This shows that the latter can be better understood in terms of migrant networks and improvements in home and host country financial services.

These empirical findings indicate that policies that aim to facilitate remittances should focus on reducing 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 branchless banking. The reduction of costs will not only increase the volume of remittances but will enhance financial inclusion. The improved financial services will redirect these flows from informal to formal channels in the medium term that will eventually open new door for easing these flows as an important finance source for developing countries.

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Appendix

Table A1: Correlations matrix

	1	2	3	4	5	6	7	8	9	10
1	1									
2	0.05	1								
3	-0.23	0.13	1							
4	0.73	0.00	-0.41	1						
5	0.28	0.00	0.13	0.62	1					
6	0.15	-0.12	-0.16	0.07	-0.10	1				
7	0.45	0.24	-0.48	0.53	0.22	-0.03	1			
8	-0.05	-0.41	-0.07	-0.00	-0.00	0.07	-0.08	1		
9	-0.01	-0.32	-0.05	0.00	0.00	0.03	-0.07	-0.11	1	
10	-0.76	0.00	0.65	-0.88	-0.31	-0.10	-0.73	0.00	0.00	1

Note: Number of observations: 299. 1. GDP (host). 2. GDP (home). 3. Migrant's Stock. 4. Geographical distance. 5. Common language (official) 6. Bilateral exchange rate 7. Domestic credit to private sector (host) 8. Domestic credit to private sector (home) 9. Political stability (Recipient) 10. Common religion.

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