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**Centre d'Analyse Théorique et de
Traitement des données économiques**

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**REMITTANCES,
DUTCH DISEASE,
AND COMPETITIVENESS -
A BAYESIAN ANALYSIS**

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Remittances, Dutch Disease, and Competitiveness - A Bayesian Analysis

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Abstract

We look for symptoms of Dutch disease in the Pakistani economy arising from international remittances. The presence of endogeneity and uncertainty in our model due to the managed float of Pakistani Rupee prevalent during most of the studied period requires the use of a probabilistic rather than a standard frequentist technique. Therefore, we carry out an IV Bayesian analysis using the Gibbs algorithm. We find evidence for both spending and resource movement effects, both of them in the short as well as the long-run. Remittances cause an appreciation of the real exchange rate and loss of competitiveness of Pakistan's exports sector along with a concomitant rise in the share of the non-tradable sector in the economy. These impacts are stronger and different from those the Official Development Assistance and the FDI exert. We find that while aggregate remittances and the remittances from Persian Gulf contribute to the Dutch disease in Pakistan, those from North America and Europe do not.

Résumé

Cet article étudie la possibilité que l'économie pakistanaise souffre du syndrome hollandais dû aux transferts de fonds. La présence potentielle de l'endogénéité et de l'incertitude dans notre modèle, en raison du taux de change administré, peut être mieux analysée en utilisant les techniques probabilistiques. Par conséquent, nous employons la méthode Bayésienne IV. Nous trouvons l'évidence de l'effet dépense et l'effet de réallocation de ressources, tout les deux. Les transferts de fonds causent l'appréciation du taux de change réel et une baisse de la compétitivité du secteur des biens échangeables, en même temps que la part du secteur non-échangeable monte en importance. Les symptômes du syndrome hollandais sont présents à court terme ainsi qu'à long terme. Ces impacts sont plus forts que ceux de l'assistance officielle et des investissements directs étrangers, et différents de ceux-ci. A l'échelle régionale, les transferts de fonds venant du golfe persique contribuent à cela, mais ceux de l'Amérique du Nord et de l'Europe ne montrent pas de signes du syndrome.

Keywords: Remittances; Real Exchange Rate; Dutch Disease; Competitiveness; Bayesian Analysis; Pakistan.

JEL Classification: F40, F41, O10

1. Introduction

Remittances to Pakistan have seen a sharp and sustained rise in the recent years, increasing from under \$1 billion in 1999 to over \$10 billion today (State Bank of Pakistan, 2011). This has not gone without leaving its macroeconomic impact. Anecdotal evidence points to links with higher price levels and added reliance on imports (State bank of Pakistan 2007). The launch of Pakistan Remittances Initiative (PRI) in 2009 by The State Bank, Ministry of Finance and Ministry of Overseas Pakistanis to attract more remittances in order to cover the chronic current account deficit can end up exacerbating these adverse effects.

Remittances are an important source of foreign exchange for developing countries. The volume of remittance transfers to many developing countries, including Pakistan, exceeds that of foreign private capital and official development assistance. These inflows have led to lower poverty, higher savings and more funds for investment, increased consumption and improved human capital of the recipient households and communities. Remittances are found to promote economic growth (Faini, 2002; Garcia-Fuentes and Kennedy, 2009; Stark and Lucas, 1988). Rise in remittances has also made the developing countries governments less reliant on other financial inflows for their foreign exchange requirements. Remittances are also purported to be a stable source of foreign exchange (Mughal and Makhlouf, 2011), more so than FDI and portfolio inflows, and help countries cope up with difficult economic conditions. For instance, in the presence of remittances above a threshold of 3 percent of a developing country's GDP, the relationship between a decreasing stock of international reserves and a higher probability of current account reversals is found to become weak (Bugamelli and Paterno, 2009). Migrants often lend a helping hand to their home countries in the wake of natural disasters through altruistic money transfers. Remittance inflows to Pakistan, for instance, rose substantially in the aftermath of the October 2005 earthquake and the country's worst floods in July 2010¹.

¹ The amount remitted to the country jumped by 9 percent in the aftermath of the October 2005 earthquake, in contrast to an average monthly growth of 1 percent in the period 1996 – 2010.

Remittances, however, can lead to the overshooting of a country's exchange rate and hurt its competitiveness, a phenomenon known as the Dutch disease². The overvaluated exchange rate makes the country's exports relatively expensive, imports cheaper, and thus puts pressure on the country's current account³. The additional demand arising from remitted money raises prices in the non-tradable sector while the prices can not move much in the tradable sector in a small open economy. This shifts resources from industry and agriculture (tradable sectors) to services (non-tradable sector), making the country's tradable sector less competitive. Why does this matter? In the words of Rajan and Subramanian (2010): "a number of studies (Jones and Olken (2005) and Rodrik (2007)) have argued that the traded goods sector is the channel through which an economy absorbs best practices from abroad. The absence of these learning-by-doing spillovers, which may be critical to long run productivity growth, could be one constraint on growth".

The aforementioned spending and resource shifting effects of the Dutch disease which lead to lower competitiveness have been examined for various developing countries. For example, in their study of 13 Latin American and Caribbean countries, Amuedo –Dorantes and Pozo (2004) find that a 100 percent rise of remittances cause the real exchange rate (REER) to appreciate by 22 percent. Similarly, Bourdet and Falck (2006), in their empirical analysis of the Cape Verdean economy, find evidence of adverse effects of remittances on the country's competitiveness. Acosta et al. (2009) examine a panel of 109 developing countries for the period of 1990 to 2003 and find that capital flows from abroad help the exchange rate go up. Kapur (2004) argues that the exchange-rate appreciating effect of remittances is stronger among smaller developing countries.

Remittances have also been associated with declining competitiveness through a decrease in the labour supply in the remittance-receiving country (Amuedo-Dorante and Pozo, 2006; Bussolo and Medvedev, 2007; Görlich et al., 2007; Kim, 2007; Rodriguez and Tiongson, 2001). However, there is no consensus on the deleterious

² The phenomenon can be caused by any large foreign exchange inflows, such as natural resource boom, development assistance, remittances or foreign direct investments.

³ For instance, Kappler et al. (2011) show that within three years after a major appreciation, the current account balance on average deteriorates by three percentage points of GDP, savings are reduced while export growth slows down substantially. These effects are particularly visible in the developing countries.

effects of remittances on external competitiveness. Rajan and Subramanian (2005), for instance, find remittances to be different from other financial flows in this sense. Mongardini and Rayner (2009) look for the impact of worker remittances in Sub-Saharan Africa, and find no link with rise in exchange rate. Grabel (2008) suggests that the short-term impacts of remittances are similar to those of other financial inflows, with the differences mostly due to different economic policies.

Remittances, being financial inflows, are intrinsically associated with the country's monetary aggregates, and hence, influence and may in turn be influenced by the country's monetary policy. Any model studying the impact of worker remittances on a developing economy will therefore contain an element of uncertainty present due to the role of the country's central bank. Whether by performing sterilization operations in the open market or controlling money supply to combat inflation acceleration, the central bank appears in the remittances – real exchange rate equation in one way or the other. Given this uncertainty, and the availability of limited number of observations, significant number of parameters and potential endogeneity issue make the use of standard Ordinary Least Squares (OLS) techniques unsuitable for the problem at hand. The use of probabilistic Bayesian paradigm can help in such a situation.

Though the use of probabilistic approach is increasing in economic studies, particularly those dealing with financial economics, this is probably the first application of the technique in a study of Dutch disease effects.

The question of Dutch disease in Pakistan has previously been examined in some studies. Hyder and Mahboob (2006), for instance, estimate that an increase in workers' remittances of one percentage point of GDP is associated with an appreciation of Pakistan's real effective exchange rate by 0.16 percent. Other studies include Ahmed (2009), Haque and Montiel (1992, 1998), Janjua (2007), and Rehman et al (2010). However, these studies treat the impact of remittances briefly and suffer from several methodological and data limitations. For instance, the resource movement effect of remittances has not been studied. This paper is an attempt at giving a fuller, clearer picture. Appropriate instrumental variable has been used to tackle the potential endogeneity of remittances due to reverse causality between the money remitted and the country's real exchange rate. Moreover, in assessing the

remittances' impact on the REER, remittance flows are also disaggregated with respect to remitting regions. This helps better gauge the differential impact of remittance transfers pertaining to different Pakistani migrant communities. The question of Dutch disease is examined using both annual as well as monthly data, examining the periods 1980-2008 and July 2000-March 2009 respectively.

We also look at the sector-wise effect of remittances to determine which sectors are losing competitiveness as a result of remittance flows. By doing this, we are able to monitor both the spending and the resource movement aspects of the Dutch disease.

We are mainly interested in answering the following questions:

Has Pakistan's real exchange rate gone up as a result of remittance inflows?

If so, remittance flows from which regions have contributed the most?

Has the country's competitiveness suffered as a result? How, if so, have the inflows altered the country's economic structure?

In the rest of the paper, we attempt at analyzing these questions. First, we present some salient features of the Pakistani economy during the period under examination (Section 2). Section 3 introduces the model and describes the econometric technique used. The results are presented and interpreted in section 4, both for the yearly and short-run monthly models. Section 5 analyzes the impact of remittances on the reallocation of resources between the tradable and non-tradable sectors. The last section concludes the paper and provides some policy recommendations.

2. Remittances and Exchange rate of Pakistan: Some Stylized facts

Pakistan is one of the significant migrant sending countries in Asia. An estimate of the number of overseas Pakistanis ranges from the official 4 million (United Nations, 2009) to the estimated 7 million (GoP Economic Survey, 2009-10), to the anecdotal 8 to 10 million. The major concentrations of the diaspora are found in Saudi Arabia, the United Kingdom, the United States, the United Arab Emirates and Canada. Pakistanis resident in these five countries constitute more than 80 percent of the overseas Pakistani population Oda (2009). Historically, remittances sent by the overseas Pakistanis have ranged from 1 to 10 per cent of the country's annual output, average during the last thirty years being 5%. This compares favourably with other foreign capital inflows (figure 1), as well as with many developing countries. Figure 2 depicts

remittance flows to Pakistan and other South Asian countries. The Persian Gulf, North America and Europe are country's principal remittance sources (figure 3). Remittances to Pakistan first picked up in the 1970's, when the construction boom in the Persian Gulf engaged millions of Pakistani temporary migrants. The amounts remitted by these migrants peaked in early 1980's, when they surpassed exports as the biggest source of foreign capital. These flows slowed down during the cheap oil period of late 1980's and the 1990's with the weakening of Arab economies. The Gulf war in the early 1990's also had a dampening effect on remittances. The second and ongoing phase of growth in official remittances began in the aftermath of the tragic events of September 11, when in the financial year 2001-02, formal remittances to Pakistan more than doubled. Besides the curbs on illegal money transfer mechanisms, called Hundi or Hawala, fears among the migrants in the Western countries, such as stricter scrutiny of their capital investments, risk to life or property etc convinced them to transfer their savings back home. Strengthening currencies, booming real estate sector and well performing stock markets in the home country also played their role. Free float of Pakistani Rupee, that slashed the official – market exchange rate spread, also channelled more remittances towards the formal means of money transfer. Though the receipts from all the destinations have been substantial, remittances from the United States have risen the most, from a mere \$73.3 million in 2000 to over \$1.7 billion in 2008. The United States thus became Pakistan's biggest source of remittances, taking over Saudi Arabia, which has been the top remitting economy since the 1970s.

This recent boom has taken the share of remittances in the Pakistani economy to the highest levels since the late 1970s and early 1980s. Remittances have now become the second most important source of foreign exchange after cotton and textile exports (which make up half of the country's exports), and under current trends, may soon surpass them⁴. Being such a substantial source of foreign exchange, remittances must generate some effect on Pakistan's exchange rate. This raises the possibility of the economy facing the Dutch disease. A cursory look at figure 4 shows a correlation between the remittance flows and the Real Effective Exchange Rate (REER) of the Pakistani Rupee. Pakistan's REER index gradually fell during the 1980s and 90s. It maintained its downward trend in early 2000s despite the aforementioned jump in

⁴ Pakistan's textile exports in 2009 stood at US \$9.72 billion.

remittance inflows. This was mainly because of higher inflation in the country compared to its major trade partners, as well as an even sharper nominal rise of other major currencies against the US Dollar than the Pakistani Rupee. However, by the middle of the decade, the Rupee had begun losing its competitiveness and the REER index was on the rise⁵. For much of the 1980s and 90s, Pakistan's central bank, State Bank of Pakistan (SBP), followed a fixed or managed float policy, before officially free-floating the Rupee in July 2000. These days, the bank targets interest rates to pursue the twin goals of growth and price level adjustment. It sells and purchases treasury bills, and intervenes in the open market to inject or mop up money to balance the monetary system. In spite of this occasional intervention policy, money growth in the economy has remained somewhat high, consistently in the double digits during the current decade,⁶ and inflation rate has remained above the comfort zone⁷, putting the country's export sector under increasing pressure. Pakistan competes with other developing countries in mostly agricultural and low-cost industrial products. Major items include cotton, textiles and apparels, rice, leather goods, fish, surgical instruments, sporting goods, light machinery, cement, and petroleum products. Margins for these products are often low in the international market, and even small fall in productivity and price competitiveness can cost the exporters their market share. Figure 5 gives a nonparametric estimation of the relationship between remittances to Pakistan and its exports and imports. Prima facie, there is a negative relationship between exports and remittances (elasticity between remittances and exports as a share of GDP is, *ceteris paribus*, -0.20 as against +0.16 for imports).

This preliminary evidence of the Dutch disease needs to be substantiated. For this, we proceed and study the drivers of real exchange rate (REER) in Pakistan.

3. Empirical Analysis

3.1. Econometric strategy

First, we analyse the impact of our selected annual variables on Pakistan's real effective exchange rate. Our model can be written as:

⁵ Pakistan's real exchange index had the same value in June 2009 as in Jan 2001.

⁶ For example, the mass of money in circulation increased by 19.5 per cent in the year 2006-07 (SBP).

⁷ For instance, the inflation rate rose by 24.3 per cent in the financial year 2008-09. In cumulative terms, the economy experienced an inflation of 66 per cent between June 2007 and Oct 2010 (SBP 2010).

$$REER_t = \theta_0 + \theta_1 TOT_t + \theta_2 OPEN_t + \theta_3 CPI_t + \theta_4 GOV_t + \theta_5 GRO_t + \theta_6 FDI_t + \theta_7 REMIT_t + \theta_8 ODA_t + \varepsilon_t \quad (1)$$

Equation 1 can be rewritten as: $REER_t = X_t \theta + \varepsilon_t$ where X is matrix of explanatory variables. Here, FDI represents the foreign direct investments, ODA represents the official development assistance (the two taken as a share of GDP), TOT represents the terms of trade, OPEN stands for the trade openness as a share of GDP, GOV represents the public expenditure to GDP, and PROD is the proxy for productivity⁸. Besides, POP indicates the demographic change, M2 growth the growth in money supply, 2000 the dummy variable for exchange regime change, and disaster the dummy indicator for natural disaster hitting the country. θ is the parameter to be estimated and ε stands for the errors. All the variables except for the growth of money supply and the dummy variables are taken in their log form (The variables and the reasons for their inclusion are explained below in section 3.3). Summary statistics are shown in table (1).

Table 1 Summary statistics					
Yearly variable	Label	Min.	Mean	SD	Max.
REER	Real effective exchange rate index (2005 = 100)	96.91	134.27	40.382	228.16
Rem	Workers' remittances and compensation of employees, received (% of GDP)	1.454	4.747	2.430	10.248
Open	Trade (% of GDP)	25.59	31.13	3.348	38.23
TOT	Net barter terms of trade index (2000 = 100)	57.63	107.71	21.689	150.00
GOV	Expense (% of GDP)	7.781	11.347	2.382	16.805
GDPpcw	GDP per capita weighted	11399	15686	1466.366	18851
GDPpcp	GDP per capita (current US\$)	372.4	523.4	91.965	702.8
Pop	Age dependency ratio (% of working-age population)	70.26	84.87	7.101	93.17
ODA	Net ODA received (% of GDP)	0.939	2.242	0.957	4.984
FDI	Foreign direct investment, net inflows (% of GDP)	0.102	0.984	0.975	3.904
IV	Instrumental variable for remittances	1345	2057	5344.937	31128
ME	Remittances from Middle East (current US\$)	0.920	2.977	2.177	7.950
Europe	Remittances from Europe (current US\$)	0.12	0.46	0.246	0.93
America	Remittances from North America (current US\$)	0.110	0.547	0.397	1.500
Money growth	Money growth rate	4.314	14.967	5.832	29.301
TNT	Tradable to non-Tradable ratio				
	Monthly variables	Min.	Mean	SD	Max.

⁸ Most of these are standard determinants of the real exchange rate. For a review of literature on the REER determinants, see for instance, Edwards (1989), Edwards and Savastano (2000) and Rogoff (1996).

REER	Real effective exchange rate index (2005 = 100)	93.02	100.00	3.021	104.10
Rem	Workers' remittances and compensation of employees, received (current US\$)	84.74	371.60	109.390	602.20
FDI	Foreign direct investment, net inflows(current US\$)	18.30	212.20	237.566	1263.00
Money Market Rate	Call Money Rate	0.740	6.336	3.051	11.29
Export	Imports (current US\$)	39560	71550	19783.358	1316
Import	Exports (current US\$)	42880	111100	54946.968	2624
Money Growth rate	Money Growth rate	-0.063	0.016	0.043	0.334
ME	Remittances from the Middle East (current US\$)	44.2	182.5	73.117	333.9
Europe	Remittances from Europe(current US\$)	5.31	31.31	15.125	66.46
America	Remittances from North America(current US\$)	7.73	91.11	40.880	152.30

Along with the impact of aggregate remittance flows, we include three region-wise remittance variables to study the corresponding impact of remittances coming from the three principal remitting geographical zones⁹. The three regions are the Persian Gulf (comprising of six Gulf Cooperation Council states of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates), North America (consisting of Canada and the U.S) and Europe (mainly the United Kingdom). The three regions together account for 90 per cent of Pakistani migrants around the World and a similar proportion of remittances. In the following step, we study the REER using monthly data. We take imports, exports, remittances, FDI, and money growth rate as potential drivers for this analysis. Monthly data for GDP are not available, hence we are unable to determine the Balassa-Samuelson effect. Similarly, terms of trade, demographic evolution and official development assistance are not included due to data unavailability. The monthly data based analysis can show the robustness of the impacts of remittances on the annual REER. Alternatively, it can show the way the impact has deviated in the recent years from the over all trend.

Once the existence of Dutch disease has been inferred through REER appreciation mechanism, we go further and estimate the remittances' association with the tradables to non-tradables ratio (TNT) in the country. The course of this ratio, calculated as the sum of agricultural and industrial value-added weighted by the services sector value-

⁹ The regional regressions are not instrumented as the R packages used for these estimations do not allow multiple variable instruments.

added (Lartey, Mandelman and Acosta, 2008), approximates the magnitude and direction of resource reallocation through the sectoral movement of resources.

Before describing the results, we first briefly mention the technique used in the study.

3.2. The Bayesian paradigm:

The Bayesian method is a rational framework which models all the inputs, implying that the parameters are considered as variables. By taking the unobservable information into account in this way can improve the quality of the estimations and forecasts (Parent and Bernier, 2007). Bayesian inference provides the benefits of exact sample results, integration of decision-making, ‘estimation’, ‘testing’, and model selection, and a full accounting of uncertainty (Rossi et al., 2005). We use the Bayesian Instrumental Variable method to control for endogeneity. We estimate the parameters of the above equation, so our model can be written as

$$\begin{cases} REMIT = \delta PIBH + \varepsilon_1 \\ REER = \beta REMIT + X \gamma_i + \varepsilon_2 & i = 1,..8 \\ (\varepsilon_1, \varepsilon_2) \sim N(0, \sigma) \end{cases}$$

Where:

X is the matrix of explanatory variables defined in the following subsection. PIBH is the instrument for remittances.

The Bayesian approach requires the specification of prior distribution. The prior can be specified as follows:

$$\delta \sim N(m_\delta, A_\delta^{-1}), \quad (\beta, \gamma) \sim N(m_{\beta\gamma}, A_{\beta\gamma}^{-1}) \text{ and } \sigma \sim IW(\eta, V)$$

(The prior values are given in parentheses)

m_δ : prior mean (0)

A_δ : pds prior precision (0 .01)

$m_{\beta\gamma}$: prior mean vector for prior on β, γ (0)

$A_{\beta\gamma}$: pds prior prec for prior on β, γ (0.01)

η : d.f. parm for IW prior on σ (5)

V : pds location matrix for IW prior on Sigma (0)

There are several types of priors. We use the non informative prior (also called flat prior), giving the mean a value 0. A prior distribution is considered noninformative if its impact on the posterior distribution of θ is minimal.

The results are shown in the form of moments of marginal distributions of the parameters (such as the posterior mean and posterior standard deviation). These are the OLS analogues of parameter coefficients and standard errors. To calculate the posterior mean, we apply the Markov Chain Monte Carlo (MCMC) method using the Gibbs algorithm. The Monte Carlo is a method of investigating the behaviour of economic models which are too complicated for analytical solutions to be possible.

A system is started off at a large number of initial positions chosen at random, and followed through a numerical simulation using a sequence of random variables generated using a Markov chain. For the purpose of our study, we use Gibbs sampler, a widely used MCMC method, which provides an accurate estimation of the marginal posterior densities¹⁰.

3.3. Choice of variables

The real effective exchange rate (REER) is considered a major determinant of a country's external competitiveness. It is the relative price of domestic to foreign goods. An appreciation of the REER reduces the productivity and profitability of the export oriented sectors of the economy by raising their relative costs and by making the non-tradables relatively cheaper. Following Edwards (1988; 1989), and Montiel (1999), the Real Effective Exchange Rate (REER) can be considered as the ratio between the relative prices of the tradables and non-tradables, which is determined by various macroeconomic fundamentals driving the internal or external equilibrium. The REER can be measured in different ways, each measure appropriate for a particular line of investigation. We take real effective exchange rate (REER) index as our indicator of choice, defined as the nominal effective exchange rate index adjusted for relative changes in consumer prices.

¹⁰ The annual and monthly estimations are made using the R Bayesm and MCMCpack packages respectively, the latter solves the linear model whereas the former finds the posterior marginal distribution.

Remittances are taken as a share of GDP. Remittances may cause the real exchange rate to appreciate. They can however equally respond to changes in the country's exchange rate. Migrants may vary their remitting behaviour, keeping in mind the welfare of the recipients and their investment plans. In other words, migrants' behaviour, whether altruist, self-interested or compensatory, plays a role in the determination of a country's exchange rate¹¹. This means that remittances may be endogenous to the REER in our model and thus need to be instrumented. We take the per capita output of Pakistan's top ten remittance-sending countries weighted by their respective shares in the country's remittances, as an instrument for remittances¹². The ten top remitting countries being: Saudi Arabia, USA, UAE, UK, Kuwait, Oman, Bahrain, Qatar, Germany and Canada. This instrument is intuitive and passes the required econometric tests of overidentification and weak instruments. It is highly correlated with Pakistan's remittance flows (correlation coefficient being 0.81) and is exogenous to the REER (correlation coefficient being 0.06). Foreign Direct Investments (FDI) and foreign aid (ODA) as shares of the GDP are the other indicators of the country's private and public financial receipts. We do not include portfolio investment in our model, as portfolio inflows have stayed relatively insignificant for most of the period under study¹³.

Following Lartey (2007, 2008), Prati and Tressel (2006), and Rajan and Subramanian (2010), we expect Dutch disease effects for development aid inflows. Foreign assistance to a developing country is often directed at the improvement of institutional and human capital as well as various infrastructure projects. Much of the resulting increase in demand falls on the non tradables, leading to higher prices and an appreciated real exchange rate. These investments may foster higher productivity (especially that of the non-tradable sector relative to the tradable sector) and increased competitiveness in the long run, which may alleviate or even reverse the previously induced Dutch disease effects.

The evidence from extant literature on the Dutch disease effects of FDI is mixed. Lartey (2007) and Saborowski (2009), for instance, find Dutch disease effects for

¹¹ Money remitted for investment motives, for instance, would likely be procyclical and may therefore push the real exchange rate further up; the reverse may happen in the case of altruistic remittances.

¹² Several instruments for remittances have been proposed in the literature, such as the stock or flow of migrants, distance from the remittance sending country, remittances to the rest of the world, population, recipient country's latitude, school enrolment, population density etc. Nevertheless, data availability precludes some of them, while others are not found appropriate in our case.

¹³ In the studied period, portfolio investments never went above 0.02 percent of the GDP in contrast to remittances, foreign assistance and FDI which crossed 10, 7 and 4 percent of the GDP respectively.

FDI, while Athukorala and Rajapatirana (2003) and Hyder and Mahboob (2006) find no evidence of real exchange rate overvaluation (appreciation) due to FDI. The competitiveness enhancing impact of FDI crucially depends on the nature of foreign investments. Investments made in export and import-competing sectors lead to improved physical and human capital, technology and technical knowledge spillovers and higher productivity, which should ultimately lead to a more competitive economy. On the other hand, if foreign investors gain access to domestic assets through hasty privatization and the investment amounts to little more than change of asset ownership, the investors may not care to substantially invest in the acquired assets' future, and the investments may not result in higher productivity. FDI may well cause the REER to appreciate in such a case.

In Pakistan, much of the FDI coming during the recent years have gone in the services sector (e.g. finance, information and telecommunication services).

The country has also privatized much of the previously state owned banks and industrial corporations. The cumulative impact of these investments on the REER may well be positive.

Among the REER fundamentals, country's per capita or per worker output (taken as an indicator of productivity) control for the Balassa-Samuelson effect. The Balassa-Samuelson effect (Balassa 1964, Samuelson 1964) could arise both due to the productivity differential between the country's tradable and non-tradable sectors, as well as due to the productivity differential between the country and its trade partners. To examine the latter aspect, we take the ratio between Pakistan's and its ten principal trade partners' GDP per capita, each weighted by the country's corresponding share in Pakistan's trade, as an alternative indicator of productivity besides the standard GDP per capita variable¹⁴. We expect a positive sign for the productivity variables, as rising productivity leads to higher income and increased demand for the non-tradables, thus causing structural inflation. As a result, the REER moves up¹⁵. The sign of trade openness, taken as the sum of exports and imports of

¹⁴ Pakistan's ten major trade partner during the studied period, in descending order, are the United States, Japan, Germany, United Kingdom, Saudi Arabia, China, France, Italy, South Korea, and Malaysia.

¹⁵ This positive association in the developing economies has been extensively shown in the literature see for instance (Choudhri and Khan, 2005; Dumrongritikul, 2011; Lartey et al., 2008).

the country as a share of its output¹⁶, is mostly found in the literature to be negative (see for instance, Candelon et al., 2007; Edwards, 1989; Lee et al., 2008; Saborowski, 2009). It is mainly because opening up to international trade through lower tariff and non-tariff barriers leads to more efficient tradable sector, bringing down the relative prices of the tradables and increasing their consumption. Both spending and resource movement effects occur (the former positively and the latter negatively), over all benefiting the economy's export oriented sectors

On the other hand, the impact of terms of trade can not be judged a priori, and depends on whether the income or the substitution effect dominates (the REER rises in the former scenario and falls in the latter).

The net effect of government consumption is likewise ambiguous. Government expenditure in developing countries is predominantly spent on non-tradables, contributing to real exchange rate appreciation. However, if public money is well spent on infrastructure, development and maintenance of public institutions and human capital improvement, the country's productive sectors should strengthen and the short-term appreciation in the REER should dampen in the long run.

We take age dependency ratio as the primary indicator for demographic change. It is defined as the ratio of dependents (persons under 15 or over 65) to the working-age population. Alternatively, we use population growth rate. Both indicators put upward pressure on a developing country's real exchange rate, so a positive sign can be expected for both of them.

There is some evidence that monetary policy influences a country's real exchange rate, at least in the short term (Rodrik, 2008). For example, money growth, being a nominal variable, is usually not considered among the determinants of the REER. However, several studies, including Lartey et al, (2008) and Lommatzsch and Tober (2004) count it among REER's important drivers. Excess money growth puts upward pressure on prices of non-tradable goods, and is associated with inflationary tendencies and appreciation of the real exchange rate (Lartey et al., 2008).

Similarly, change of exchange rate regime, if not taken into account, too can lead to spurious empirical results (Ball et al., 2010; Caceres and Saca, 2006; Levy-Yeyati

¹⁶ The Sachs - Warner trade restriction index could serve as a better proxy, but the data for this variable are incomplete and hence, can not be considered in our study.

and Sturzenegger, 2005). In a fixed exchange rate regime, an appreciation of real exchange rate increases inflationary pressures through increase in money supply, the spending effect of remittances can not be properly neutralized, leading to a greater resource reallocation (Lartey et al., 2008). On the contrary, real exchange rate appreciation in a flexible regime operates through higher nominal exchange rate. As mentioned above, Pakistan followed a managed float till 1998, and after a brief transition period, officially free floated the Rupee in 2000. We take a dummy variable to account for this de facto change in exchange regime.

Recent literature has proposed natural disasters as another potentially important determinant of the REER in the developing countries (see for instance Barajas et al., 2010, and Christiansen et al., 2009). Since Pakistan has occasionally suffered severe natural catastrophes, we find it appropriate to include the incidence of natural disasters as a driver of the country's real exchange rate. The disaster variable is a dummy variable which takes the value of one for a loss of 1000 or more lives, loss of \$1 billion or 1 million casualties in any given year. In our studied period, six years (1992, 1996, 1998, 1999, 2005 and 2007) meet the above criteria, either due to severe flooding or the 7.6 magnitude earthquake in 2005.

We consider the period from 1980 to 2008 in the annual, and from July 2001 to March 2009 for the monthly analysis. Therefore, we work with 29 yearly and 93 monthly observations. Data for remittances and FDI have been provided by the State Bank of Pakistan, the dependency ratio is taken from the World Bank WDI database, data for our the disaster dummy come from Université Catholique de Louvain's EM-DAT Disaster Database, whereas the remaining variables come from the IFS online database.

4. Results

4.1. Annual REER model

The findings given in Table 2 show that remittances parameter has a positive marginal posterior mean, the posterior mean being +0.29 (Table 2). In other words, an increase in remittances leads to exchange rate appreciation. A look at the quantiles with three quantiles showing a positive sign confirms the positive (though moderate)

nature of the remittances posteriors. Moreover, if the baseline equation is repeated without the remittance instrument, the marginal mean drops to 0.27 which signifies that the impact of remittances is underestimated if endogeneity is not taken into consideration.

Table 2 IV annual REER determinants

	Mean	SD			
Intercept	-0.660	8.291			
Rem	0.29	0.27			
Open	-0.272	0.825			
TOT	-0.226	0.615			
GOV	-0.339	0.451			
GDPpcw	-0.461	0.741			
Pop	2.814	2.104			
ODA	-0.051	0.158			
FDI	0.014	0.153			
Moneygrowth	-0.004	0.009			
Exchange rate regime	-0.068	0.378			
Disaster	0.0362	0.155			
Quantiles					
	2.5%	5%	50%	95%	97.5%
Interspete	-17.340	-14.655	-0.6186	13.077	15.667
Rem	-0.23	-0.12	0.28	0.74	0.87
Open	-1.885	-1.594	-0.2838	1.073	1.327
TOT	-1.449	-1.241	-0.2286	0.769	0.927
GOV	-1.207	-1.055	-0.3604	0.424	0.587
GDPpcw	-1.942	-1.683	-0.4667	0.763	0.965
Pop	-1.460	-0.585	2.7903	6.190	6.901
ODA	-0.373	-0.321	-0.0476	0.203	0.266
FDI	-0.293	-0.231	0.0142	0.266	0.319
Moneygrowth	-0.022	-0.020	-0.0042	0.012	0.014
Exchange regim	-0.816	-0.705	-0.0692	0.542	0.653
Disaster	-0.285	-0.225	0.0403	0.281	0.323

FDI and ODA show a positive and negative sign respectively, though FDI has a weak mean value. Dependency ratio and disaster dummy exhibit positive signs, while the remaining variables show negative signs. Age dependency ratio has by far the strongest impact of all the variables in the model. The same model is estimated using GDP per capita as the productivity indicator, and do not alter our results (Table A2).

In terms of region-wise impacts (Table 3), remittances from the Persian Gulf show a strong positive impact. Remittances from North America and Europe, however, do not appear to be associated with REER appreciation.

Table 3: annual determinants (region-wise)

	Mean	SD			
Intercept	-0.595	3.943			
Open	-0.053	0.288			
TOT	-0.268	0.160			
GOV	-0.356	0.127			
Gdppcw	-0.078	0.220			
Pop	1.836	0.913			
ODA	0.002	0.046			
FDI	0.062	0.043			
ME	0.350	0.089			
Europe	-0.004	0.105			
America	-0.109	0.048			
Disaster	0.0001	0.040			
Exchange rate regime	-0.047	0.125			
Quantiles					
	2.5%	25%	50%	75%	97.5%
Intercept	-8.341	-3.126	-0.661	1.936	7.254
Open	-0.620	-0.241	-0.052	0.128	0.531
TOT	-0.586	-0.370	-0.268	-0.164	0.048
GOV	-0.610	-0.439	-0.356	-0.275	-0.103
Gdppcw	-0.518	-0.218	-0.804	0.065	0.3610
Pop	0.0259	1.2441	1.848	2.429	3.5952
ODA	-0.091	-0.027	2.686	0.032	0.0925
FDI	-0.024	0.035	6.276	0.090	0.1510
ME	0.1705	0.293	3.502	0.408	0.5293
Europe	-0.212	-0.073	-4.481	0.061	0.2062
America	-0.206	-0.140	-1.097	-0.078	-0.014
Disaster	-0.079	-0.025	6.262	0.0261	0.0798
Exchange.rate	-0.301	-0.127	-4.824	0.0344	0.1979

4.2. Monthly REER model

The REER lifting effect of remittances is confirmed using the monthly data (Table 4). Remittances and FDI respectively show positive and negative marginal mean values. Exports and imports have intuitive negative and positive marginal means. The region-wise impacts of remittances (Table 5) are similar for Europe. However, remittances from the Persian Gulf appear to negatively interact with the REER. This contradicts the Dutch disease effects found with the annual series. The reason may lie in the difference in the length of the time periods examined in the two cases. The monthly results pertain to 93 monthly observations of the 2000s. During this decade, remittances from The GCC countries have grown almost every year, in both absolute and relative terms. The monthly results are much weaker than the annual ones.

This notwithstanding, if indeed remittances from the Middle East have had no Dutch disease-causing effect during the 2000s, this should portend well for the economy, given the ongoing substantial flows of remittances from the Gulf states.

Table 4: monthly REER determinants

	Mean	SD			
Intercept	4.759	0.165			
Rems	0.0217	0.011			
FDI	0.0057	0.004			
Exports	-0.086	0.028			
Imports	0.0574	0.018			
Money growth	-0.170	0.058			
Quantiles					
	2.5%	25%	50%	75%	97.5%
Intercept	4.437	4.647	4.7603	4.870	5.084
Rem	-0.0003	0.014	0.0218	0.029	0.043
FDI	-0.003	0.002	0.0057	0.008	0.014
Exports	-0.141	-0.105	-0.087	-0.068	-0.03
Imports	0.0214	0.0451	0.0575	0.0697	0.094
Money growth	-0.285	-0.209	-0.170	-0.131	-0.054

Here, a caveat needs to be mentioned: Even though the REER appreciating effects of remittances found in this study are unambiguous and stronger than those found in earlier studies on Pakistani remittances, the effects found over all, are relatively mild (They are just a fraction of the impact exerted by demographic factors, for instance). This may owe to the strong relationship with domestic savings that remittances to Pakistan exhibit (Mughal and Diawara, 2010). Part of the savings that remittances generate goes to the tradable sector, thus limiting the loss to the sector through other channels. Similarly, some of remittances consumed are spent on imported goods, pushing down the real exchange rate (the positive correlation between remittances and imports (fig. 5) is a case in point).

Table 5: monthly REER determinants (region-wise)

	Mean	SD			
Intercept	4.662	0.184			
Asia	-0.038	0.012			
Europ	-0.001	0.015			
America	0.0106	0.0076			
FDI	0.0096	0.00418			
Exports	-0.069	0.0277			
Imports	0.0725	0.0193			
Money growth	-0.136	0.0564			
Quantiles					
	2.5%	25%	50%	75%	97.5%
Intercept	4.308	4.537	4.660	4.782	5.026
Asia	-0.064	-0.047	-0.038	-0.03	-0.013
Europ	-0.031	-0.011	-0.001	0.008	0.0287
America	-0.0043	0.005	0.010	0.015	0.0257
FDI	0.0015	0.006	0.009	0.012	0.0178
Exports	-0.124	-0.088	-0.069	-0.051	-0.016
Imports	0.0341	0.059	0.072	0.085	0.1102
Money growth	-0.248	-0.174	-0.136	-0.098	-0.027

Official development assistance, on the contrary, does not appear to have a damaging impact on the country's exchange rate. This could be due to the fact that these inflows, being official transfers, are not spent in the same way as remittances. Our results provide evidence to the argument that despite wastage of development funds due to bureaucratic red-tape, corruption, and lack of spending capacity, ODA has, in sum, improved the national economy. This is hardly surprising given the fact that foreign assistance is often directed at infrastructure development and provision of public service projects with high social and economic returns in the developing country, adding to the economy's productive capacity. Aid also puts upward pressure on a country's imports, and keeps the real exchange from rising in the long run¹⁷.

FDI shows mixed signs of Dutch disease inducing effects (the correlation with the REER is positive in the annual and negative in the monthly model). This divergence may be due to the remarkably high levels of foreign investment in the 2000s that reflect disproportionately in the monthly results. FDI remained under \$1 billion till 2003, but rose sharply then onwards to cross \$5.4 billion in 2008. This means the monthly FDI series probably represents a level of inflow at which FDI to the country begin inducing Dutch disease symptoms.

¹⁷ See for instance, Tressel et al. (2009) and Torvik (2001) for more on the latter argument.

The effect of FDI on the REER, however, appears to be much weaker than those of the remittances. This can be gauged from the sectoral distribution of these inflows. Foreign investments in Pakistan have involved both services and industrial sectors. FDI to Pakistan has been either in the form of acquisitions of private local concerns (e.g. banks, food and beverage companies) and nationalized corporations, or domestic-consumption-related investments. Oil and gas exploration, fossil-fuel based power plants, communications and financial services together comprised 72 percent of foreign investments in Pakistan during the period from 2001 to 2009.

Among other determinants of REER, terms of trade and trade openness both show a negative correlation with the real exchange rate. In the case of trade openness, the result is expected, and corroborates the evidence generally found in the literature. The negative sign for terms of trade implies that rapid deterioration of terms of trade in the recent years has pushed the real exchange rate upwards¹⁸. The strong relationship between REER and age dependency ratio highlights the important role demographic change is playing in the developing countries. The negligible mean value of money supply growth indicates that this nominal variable plays no role in the long run. The exchange regime dummy shows a negative sign, meaning that Pakistan's adoption of flexible exchange rate regime has made the country's exchange rate more competitive. The disaster dummy shows a small positive impact.

Another notable finding is the lack of support of the Balassa Samuelson hypothesis. This apparently counterintuitive result has been discussed in previous studies such as Rogoff (1996). Dumrongritikul (2011) also find evidence of real exchange rate depreciation among relatively rapidly growing developing countries.

The results so far have confirmed spending effect symptoms of the Dutch disease. We also have some indications of the gradual erosion of competitiveness of Pakistan's export sector (fig. 5). In the next section, we study the resource movement aspect of the Dutch disease.

5. Impact on the tradable sector

¹⁸ After remaining above 100 throughout the 1980s and 1990s, the country's terms of trade sharply fell from 90 in 2001 to 55 in 2008.

In this section, we analyze the impact of remittances on the reallocation of resources between the tradable and non-tradable sectors. This helps distinguish the resource movement effect of remittances from their spending effect (Lartey et al., 2008). The rising spending power of remittances-receiving households that increases the relative demand for services raises the price level of the non-tradable sector. This leads labour and capital movement towards the non-tradable sector at the cost of tradable goods sector, resulting in the loss of export competitiveness. A clear negative relationship will therefore confirm our hypothesis that in Pakistan, remittances have added to the loss of competitiveness of its major exports through resource movement towards the production of non-tradable goods and services.

Table 6 :remittances and tradable to non-tradable (TNT) ratio

	Mean	SD	Quantiles				
	2.5%	25%	50%	75%	97.5%		
Intercept	5.849	2.890	0.255	3.941	5.825	7.717	11.560
Open	0.175	0.108	-0.042	0.106	0.175	0.245	0.391
TOT	-0.080	0.073	-0.231	-0.127	-0.077	-0.03	0.066
GOV	-0.039	0.070	-0.177	-0.085	-0.040	0.005	0.100
GDPpcp	-0.616	0.209	-1.041	-0.752	-0.615	-0.480	-0.209
Pop	-0.456	0.453	-1.343	-0.752	-0.456	-0.155	0.441
ODA	0.009	0.023	-0.035	-0.004	0.0098	0.025	0.055
FDI	-0.009	0.021	-0.053	-0.023	-0.009	0.004	0.033
Rem	-0.059	0.029	-0.117	-0.078	-0.059	-0.040	-0.001
Exchange.rate	-0.098	0.057	-0.214	-0.135	-0.097	-0.059	0.015
Disaster	0.016	0.020	-0.024	0.002	0.0161	0.029	0.057

Table 6 shows the findings of estimation using the tradable to non-tradable (TNT) ratio as the explained variable. As expected, remittances have a negative average impact on the sectoral output decomposition. However, its impact (marginal posterior mean = -0.06), is much smaller than those of trade openness, productivity, or the

demographic change¹⁹. This behaviour of remittances (strong REER appreciation coupled with a weak relative tradable to non-tradable output.) corroborates the findings of Sosa and Magud (2010).

Pakistan's economic structure has evolved in the last three decades, with an increasingly important role of services at the cost of the share of the agricultural sector²⁰. Remittances also seem to be among the contributors to this trend. This point is borne out by the Kernel density estimation shown in figure 6. Remittances are positively correlated with the country's services sector during the studied period, whereas the tradable sector, comprising industry and agriculture, seems to be negatively associated. A rise in remittance inflows has pushed up the weight of non-tradable sector in the economy at the cost of industry and agriculture. However, it must be noted that agriculture shows the expected negative relationship, whereas the association with industry comes out to be positive. A possible reason for this can be that industry has over the years benefited from the increase in demand for manufactured goods as a result of remittance receiving households' rising purchasing power. Moreover, remittances have sometimes financed small and medium industrial startups, whereas remittance receiving households are often known to neglect or abandon agriculture. This last result nevertheless requires further investigation and is left for future research.

On the other hand, foreign assistance shows a small but helpful influence on the traded goods sector. ODA to Pakistan has often been directed at infrastructure development and provision of health and education, which eventually improves the productivity of the tradable sector. In contrast, FDI's impact on the TNT ratio is small (though slightly in favour of the non-tradable sector), which points to the diverse nature of foreign investments made in the country, ranging from bank acquisitions to fertilizers and pharmaceuticals. This means that FDI exhibit neither the spending nor the resource movement effects of the Dutch disease. However, lack of real exchange rate depreciation effect suggests that the flows of FDI that accelerated in the 2000s have apparently not improve the country's competitiveness, and the purported benefits of FDIs have not materialized.

¹⁹ Lartey et al. (2008), in contrast, find a sizeable 1 percent drop in the tradable to non-tradable ratio for every 1 percent remittances to GDP increase.

²⁰ The share of services in the national production rose from 45 percent in 1980 to 54 percent in 2009, whereas that of agriculture dropped by a equal 9 percent to 20 percent from the previous 29 percent.

Among other findings, the productivity indicator shows a negative relationship with the structural shift ratio. The gradual strengthening of the services sector, mostly at the cost of the agricultural sector, is a common sight in the developing economies. The negative sign of government spending also underscores this point. In Pakistan, much of the federal budget has historically gone on debt servicing, defence, pays and perks of government employees, and provision of education and health services. This confirms the expenditure bias towards non-tradable goods shown in the literature (see for instance, Bergstrand, 1991).

Table 7 : region-wise remittances and tradable to non-tradable ratio

	Mean	SD					
Intercept	7.424	2.989					
Open	-0.037	0.123					
TOT	-0.056	0.066					
GOV	-0.065	0.074					
GDPpcp	-0.537	0.236					
Pop	-0.739	0.448					
ODA	-0.013	0.021					
FDI	-0.022	0.018					
ME	-0.124	0.039					
Europe	0.1285	0.046					
America	-0.035	0.020					
Exchange.rate	-0.125	0.050					
Disaster	0.0264	0.017					
Quantiles							
	2.5%	25%	50%	75%	97.5%		
Intercept	1.552	5.506	7.411	9.345	13.376		
Open	-0.280	-0.119	-0.039	0.041	0.211		
TOT	-0.189	-0.099	-0.056	-0.013	0.075		
GOV	-0.210	-0.114	-0.065	-0.0187	0.080		
GDPpcp	-1.021	-0.684	-0.536	-0.385	-0.062		
Pop	-1.629	-1.029	-0.733	-0.447	0.126		
ODA	-0.057	-0.027	-0.013	0.00009	0.028		
FDI	-0.059	-0.034	-0.022	-0.010	0.015		
ME	-0.203	-0.149	-0.124	-0.098	-0.046		
Europe	0.0363	0.0983	0.128	0.158	0.222		
America	-0.076	-0.048	-0.035	-0.223	0.006		
Exchange.rate	-0.226	-0.158	-0.125	-9.308	-0.025		

The positive sign for the trade openness is intuitive, and supports the broad agreement in the literature on the productivity-enhancing impacts of trade liberalization. In terms of region-wise impact (Table7).remittances from the Persian Gulf and North America both show negative signs. This confirms the anecdotal evidence of remittances financing the real estate boom in the country.

6. Conclusions and policy implications

The above analysis illustrates that the Pakistani economy exhibits symptoms of the Dutch disease as a result of the remittance inflows. Their impact on the country's competitiveness appears to be detrimental, even though many households benefit directly from them. The results lend credence to the argument that remittances have, over the years, caused a shift in resource allocation through consumption of non-tradable goods and services. The phenomenal rise in real-estate and housing, two important expenditures of the overseas Pakistanis, points in this direction. This additional demand of non tradable goods and services has pushed up the price level and made local production relatively expensive. The net effect is that the country's exports have become relatively less competitive in the foreign markets and the imports have become more attractive. The harmful effects of remittances on the country's competitiveness are opposite to what we find for the FDI and particularly, for the official development assistance. The real exchange rate appreciating effect of remittances is more significant than the one caused by other financial flows because unlike foreign capital inflows, remittances are the outcome of a gradually developing social process (that of migration), and are not prone to sudden stops or reversals. Therefore, their REER affecting tendency can be dealt only partially through temporary monetary and fiscal measures. The loss in external competitiveness, in this case, needs to be remediated through improvements in internal competitiveness. More attention is required for channelling remittances towards productive avenues. In the absence of adequate investment opportunities, much of the remittances are spent on conspicuous consumption. By providing investment schemes for overseas Pakistanis, and promoting small-scale enterprises, these remittances can be harnessed in a way that improves the country's productivity. Development of the financial sector is also necessary. Higher financial literacy, a culture of bank deposits and easier and less costly access to banking services can be useful in this regard. In terms of macroeconomic adjustment, the country needs to rethink its monetary policy in light of the increasing importance of remittance receipts. As demonstrated by Chami et al. (2006), a country's optimal monetary policy for a remittance-dependent economy is different from the one for an economy with no significant remittances. The competitiveness-affecting impact of remittances can be further controlled through judicious use of fiscal policy. Improving labour productivity through skill

enhancement programs and making the taxation regime leaner and more transparent can be steps towards this goal.

In the end, it must be said that real exchange rate is only one of the factors defining a country's competitiveness²¹, the WEF Global Competitiveness Index, for instance, is based on over 140 indicators of competitiveness. Pakistan's competitiveness score has fallen in both in absolute and relative terms in the recent years²². In the last few years, it has done poorly in comparison to similar and neighbouring economies, even relative to those who receive more remittances as a share of output than Pakistan. (South Asian neighbours like Bangladesh and Sri Lanka, for instance, receive more remittances relative to GDP than Pakistan, but are ranked above Pakistan in the 2011 GCI ranking). Policymakers, therefore, need to concentrate both on the external as well as internal competitiveness improvements to extenuate the effects of remittance-induced loss of competitiveness.

²¹ According to Eichengreen (2008), a competitive real exchange rate is a necessary but not a sufficient condition for a country to satisfactorily exploit its natural, physical and human endowments.

²² Pakistan's ranking in GCI fell from 92nd in 2007-8 to 123rd in 2010-11 (WEF 2007, 2010).

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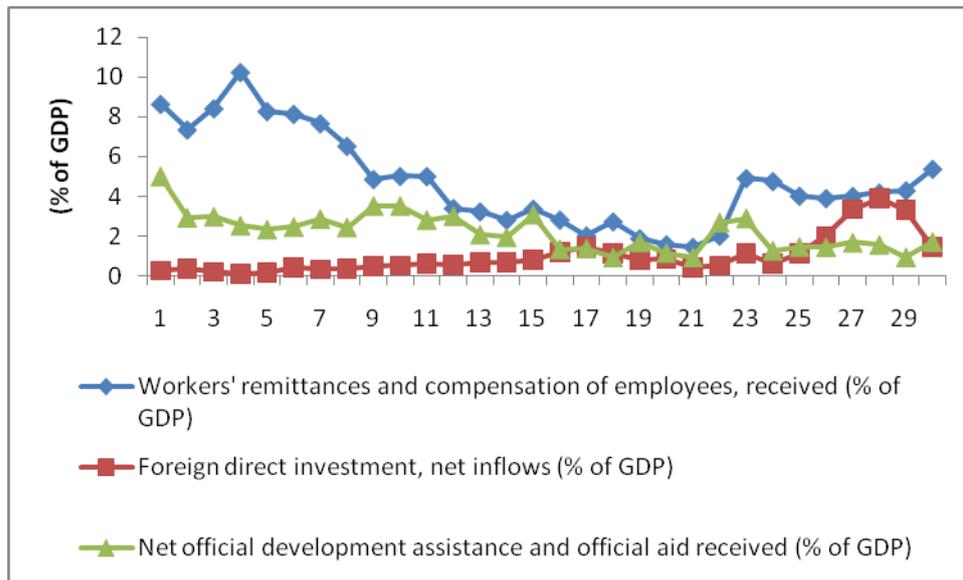
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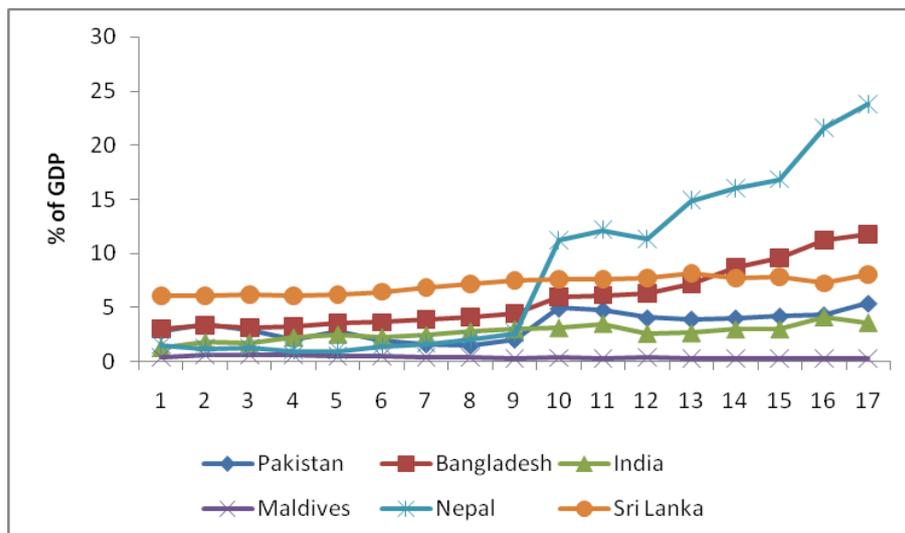
Figures

Figure 1. Financial inflows to Pakistan



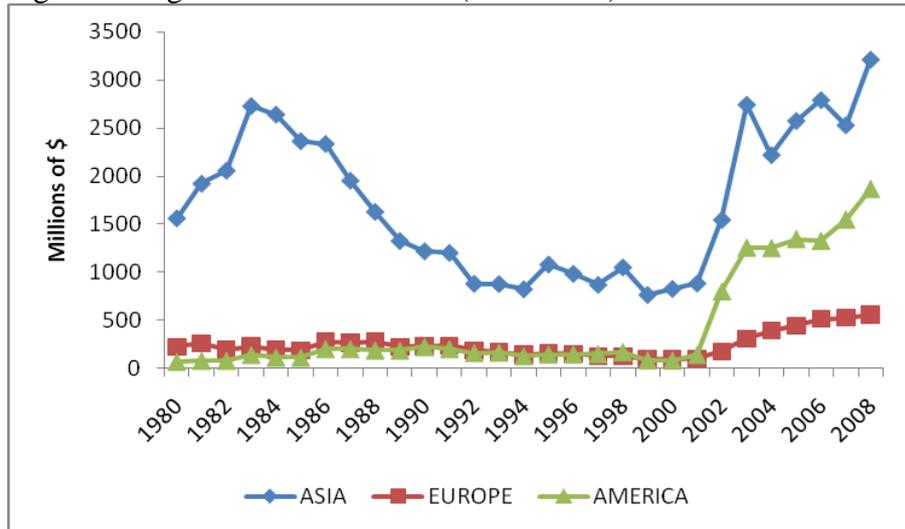
Source: WB Online 'World Development Indicators'.

Figure 2. Remittances to South Asian countries 1994-2009



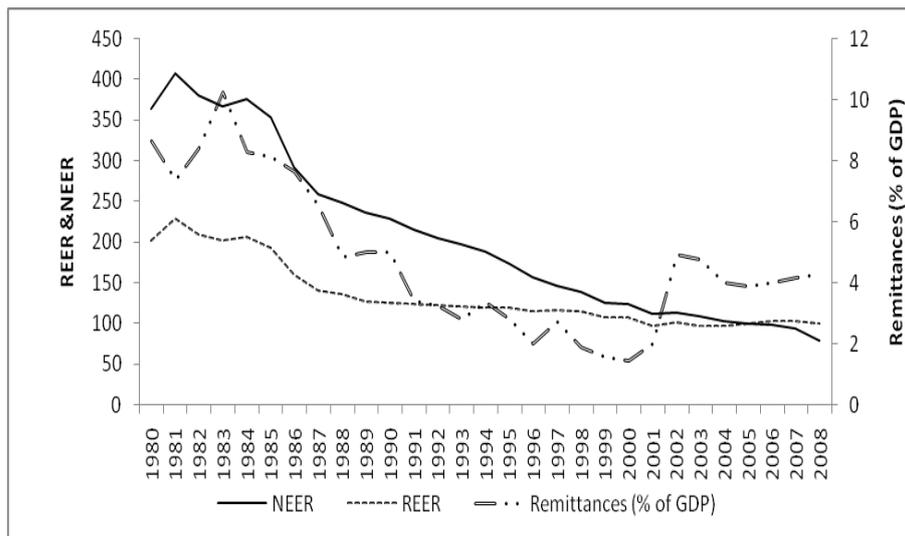
Source: WB Online 'World Development Indicators'.

Figure 3. Region-wise remittances (1980-2008)



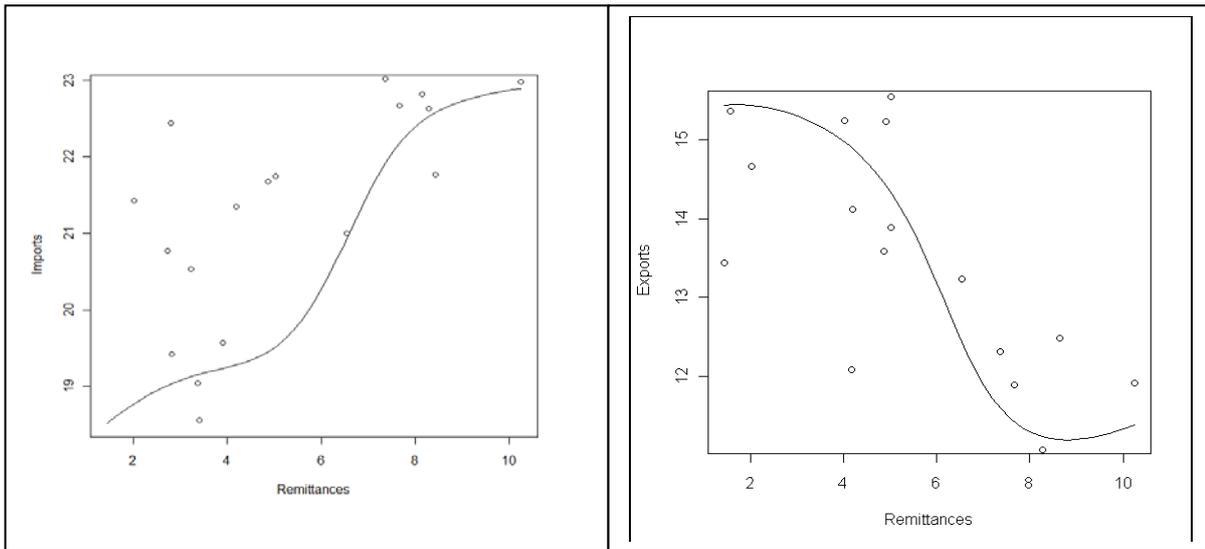
Source: State Bank of Pakistan

Figure 4. REER, NEER and Remittances as a share of the GDP



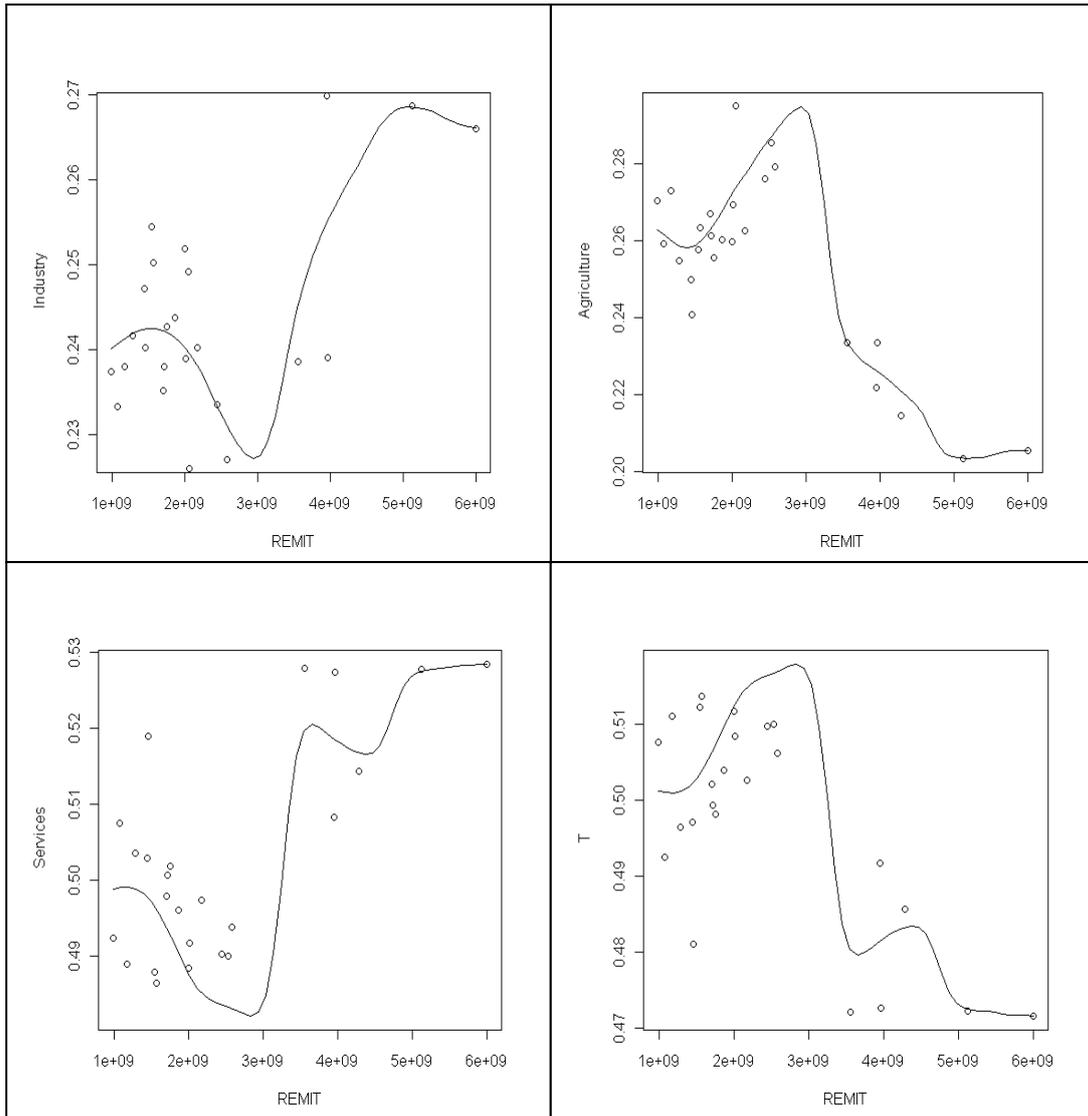
Source: WB Online 'World Development Indicators' & IFS database

Figure 5. Relationship between Remittances, imports, and exports (Kernel density estimation)



Source: authors' calculations based on WB Online 'World Development Indicators'.

Figure 6: Relationship between remittances and sectoral output shares (Kernel density estimation)



Source: authors' calculations based on WB Online 'World Development Indicators'.

Appendix

Table a1 : Linear Determinants REER

	Mean	SD	Quantiles				
	2.5%	25%	50%	75%	97.5%		
Intercept	0.681	4.800	-8.611	-2.487	0.640	3.783	10.167
Open	-0.374	0.309	-0.991	-0.569	-0.375	-0.173	0.247
TOT	-0.192	0.230	-0.655	-0.339	-0.189	-0.042	0.268
GOV)	-0.297	0.171	-0.637	-0.409	-0.296	-0.186	0.036
Gdppcw	-0.614	0.269	-1.148	-0.791	-0.614	-0.436	-0.070
Pop	2.857	1.076	0.7477	2.141	2.852	3.557	4.991
ODA	-0.047	0.066	-0.179	-0.090	-0.047	-0.005	0.084
FDI	0.029	0.060	-0.091	-0.009	0.029	0.068	0.148
Rem	0.270	0.056	0.157	0.233	0.270	0.307	0.384
Exchange.rate	-0.049	0.179	-0.400	-0.166	-0.048	0.066	0.307
Disaster	0.021	0.061	-0.098	-0.018	0.020	0.060	0.142

Table a2 : IV with GDP per capita

	Mean	SD			
Intercept	3.996	8.89			
Rem	0.27	0.27			
Open	-0.309	0.80			
TOT	-0.403	0.53			
GOV	-0.216	0.49			
GDPpcp	-0.913	1.02			
Pop	2.196	1.84			
ODA	-0.133	0.17			
FDI	0.059	0.16			
exchange rate	-0.018	0.41			
Disaster	0.079	0.15			
Quantiles					
	2.5%	5%	50%	95%	97.5%
Intercept	-14.10	-10.60	4.074	18.00	21.37
Rem	-0.25	-0.17	0.26	0.71	0.82
Open	-1.87	-1.59	-0.299	1.00	1.24
TOT	-1.39	-1.23	-0.404	0.45	0.65
GOV	-1.18	-1.01	-0.218	0.59	0.71
GDPpcp	-2.85	-2.55	-0.935	0.78	1.12
Pop	-1.26	-0.73	2.113	5.27	5.76
ODA	-0.47	-0.40	-0.135	0.15	0.21
FDI	-0.25	-0.20	0.063	0.32	0.38
exchange rate	-0.86	-0.68	-0.015	0.66	0.81
Disaster	-0.22	-0.17	0.077	0.33	0.36