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Remittances in Pakistan—Why have they gone up, and why aren't they coming down?

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Abstract

The flow of workers' remittances to Pakistan has more than quadrupled in the last eight years and it shows no sign of slowing down, despite the economic downturn in the Gulf Cooperation Council (GCC) and other important host countries for Pakistani workers. This paper analyses the forces that have driven remittance flows to Pakistan in recent years. The main conclusions are: (i) the growth in the inflow of workers' remittances to Pakistan is in large part due to an increase in worker migration; (ii) higher skill levels of migrating workers have helped to boost remittances; (iii) other imporant determinants of remittances to Pakistan are agriculture output and the relative yield on investments in the host and home countries.

2

I. INTRODUCTION

The flow of workers' remittances to Pakistan has more than quadrupled in the last eight years. It has reached more than $7 billion in 2008, or 4.2 percent of GDP. The strong increase in remittances makes them the most important source of foreign exchange after exports of manufactured goods. There is no sign of slowing down, despite the economic downturn in the countries of the Gulf Cooperation Council (GCC) and other important host countries for Pakistani workers. This paper analyzes what is behind this strong increase in workers' remittances to Pakistan.

Our methodology for analyzing remittances builds on and departs in some key aspects from traditional studies of drivers of remittances. Most of these studies, while aiming to explain individual motives for remittances, actually analyze aggregated flows of remittances. We focus instead on remittances at the individual migrant/immigrant level. From this micro perspective, the study identifies earning power in the host countries (proxied by skill-type of jobs held prior to emigration) as a key driver of remittances. In addition, we regard remittances as part of an investment decision of the migrant/immigrant, which is influenced by factors that affect relative financial returns in both the home and host countries, such as interest rates, inflation, and exchange rates. We incorporate these new perspectives in the empirical investigation of Pakistan's remittances from a diverse group of host countries.

The main conclusions are: (i) the growth in the inflow of worker's remittances to Pakistan is in large part due to an increase in worker migration; (ii) higher skill levels of migrating workers have helped drive and sustain the increase in remittances; (iii) other important determinants of remittances to Pakistan are agriculture output in Pakistan and the relative return on investments in the host and home countries.

Section II presents stylized facts of worker remittances in Pakistan. We look at recent trends in source and volume of remittances, trends in volume and destination of worker migration, and we compare Pakistan to other countries that rely heavily on workers' remittances. Section III briefly surveys existing literature on modeling remittance behavior and then discusses empirical results based on a model that focuses on remittance per migrant worker. Second IV concludes.

II. STYLIZED FACTS

Remittances are an important and growing source of foreign exchange for Pakistan. Remittances have quadrupled in the last eight years to more than $7 billion in 2008 (4.2 percent of GDP; Figure 1).[2] The recent increase in the flow of remittances to Pakistan originates mainly from host countries in the Gulf (Figure 2). The rise in remittances from the United Arab Emirates has been particularly strong (a doubling in 2006/7–2008/9), bringing remittances from that country close to the level of remittances from the United States ($1.7 billion in 2008/09). Remittances from

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[2] Data on remittances are vulnerable to changes in measurement and only include remittances processed through formal (banking) channels. One should therefore be cautious in interpreting the data. In particular, in early 2000, Pakistan's foreign exchange system was liberalized, and since then spreads between the official exchange rate and the curb rate have been small. This may have resulted in a shift of remittance transfers from the Hawala system to formal channels.

Saudi Arabia and other GCC countries tripled in 2005/06–2008/09, while remittances from the United States and Europe (including the United Kingdom) have only risen moderately.

Figure 1. Pakistan: Total Remittances, 1976–2008

Sources: World Bank, IMF, and IMF staff calculations.

Figure 2. Pakistan: Remittances by Host Country, 2004/05–2008/09
(In millions of U.S. dollars)

Sources: IMF, State Bank of Pakistan, and IMF staff calculations.

By 2007 remittances had become the second most important source of foreign exchange after exports of manufactured goods. Even in the boom years of 2005–07 remittances were a more

important source of foreign exchange inflows than direct and portfolio investment. Currently, remittances provide enough foreign exchange to finance almost 80 percent of Pakistan's oil imports. Historically, remittances have been relatively stable compared to direct investment and portfolio inflows; more recently, remittances have also been more stable than aid inflows.[3] The steadily growing remittances have become an important stabilizer for Pakistan's external account balance.

Table 1. Volatility of Remittances and Other Balance of Payments Flows

	Remittances	Exports	Aid 1/	FDI	Portfolio
1980-2009	50	15	47	96	227
1980-1989	22	15	39	42	121
1990-1999	32	4	31	34	144
2000-2009	31	6	59	73	444

Note: Volattility is defined as the coefficient of variation.
1/ Aid includes official transfers and official loans to government.

Source: IMF and Fund staff calculations.

Despite the recent surge in nominal terms, Pakistan's remittance inflow remains modest as a percentage of GDP, and it is sourced from a limited number of host countries. In 2008, Pakistan's remittances were only 4.2 percent of GDP, which is significantly lower than some of its peers (Figure 3). Other developing and middle-income countries such as Lebanon (24 percent), Jordan (22 percent), and the Philippines (11 percent) seem to benefit much more from the export of their labor. More than half of the remittances originate from the GCC region, with the United States (22 percent) and the United Kingdom (8 percent) as other important sources (Figure 4). This regional pattern mirrors closely the destinations of Pakistani labor migrants. According to official estimates there were about 4 million registered overseas Pakistani (workers and students) in 2004, of whom 1.9 million were employed in the Middle East (most in Saudi Arabia), followed by Europe (1.1 million, of whom about 800,000 are in the United Kingdom), and the United States and Canada (850,000). Including illegal immigrants, the total number of overseas Pakistanis is estimated at around 7 million.[4] The majority of these workers are employed in construction, while many others are employed in retail, transportation services, and tourism.

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[3] The high volatility of FDI is associated with the privatization of public enterprises.

[4] Government of Pakistan (2006).

Figure 3. Remittances in Selected Low- and Middle-Income Countries, 2008
(In percent of GDP)

Source: World Bank.
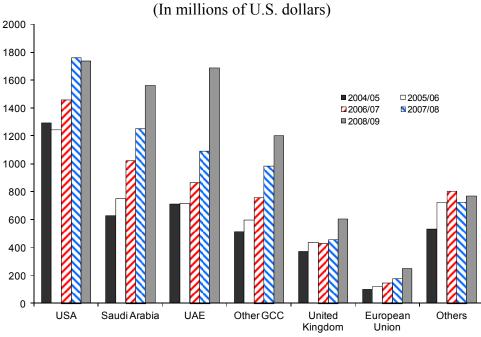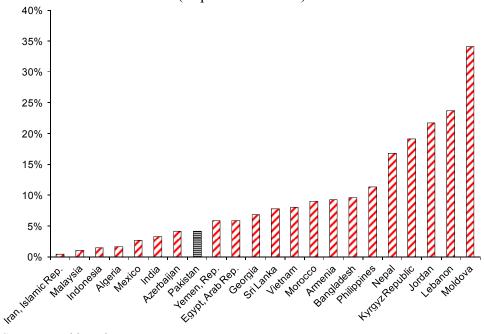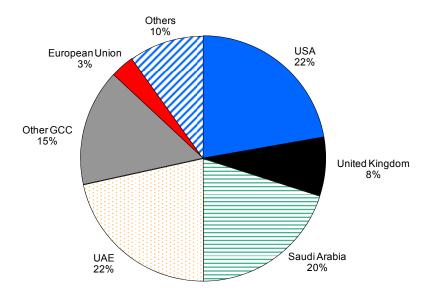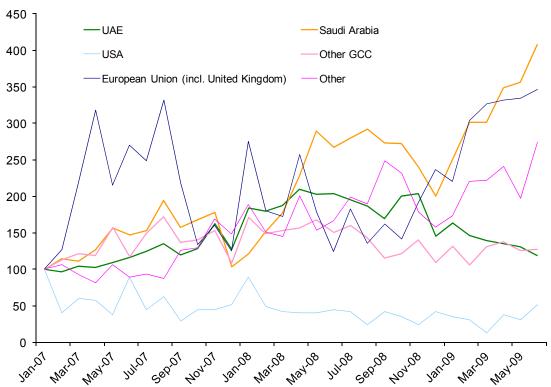
Figure 4. Pakistan: Remittances by Host Country, 2008/09

Sources: IMF, State Bank of Pakistan, and IMF staff calculations.

The recent increase in workers' remittances to Pakistan appears to have coincided with a sharp rise in migration. For example, migration has doubled since January 2007 to almost 38,000 per month in June 2009. Worker migration to the United Arab Emirates, however, has declined by 43 percent from its peak in April 2008 to about 12,000 workers in June 2009 (Figure 5). While in 2008 the United Arab Emirates was the destination for about half of all Pakistani migrants, in the second quarter of 2009 it received only one-third of all Pakistani migrant workers. The drop in migration to the United Arab Emirates was offset by an increase in migration to Saudi Arabia (from a monthly average of 11,500 in 2008 to 18,400 in the second quarter of 2009).[5] Labor migration to the European Union (including the United Kingdom) tripled from January 2007 to June 2009, but the volumes are still small (400–600 workers per month). Labor migration to the United States is also small (only a few dozen workers per month), which indicates that the high volume of remittances from this host country comes from the large Pakistani diaspora—as is also true for the United Kingdom.

Figure 5. Pakistan: Labor Migration Indices by Host Country, January 2007–June 2009
(January 2007 = 100)

Sources: Pakistan Bureau of Overseas Employment and IMF staff calculations.

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[5] Saudi Arabia is an important source of remittances not just for Pakistan, but for many countries in the region. See Box 4 in IMF (2009).

In addition, over the past decade all host countries have seen the increase in the outflow of remittances to Pakistan outpace the inflow of workers from Pakistan, except for the European Union (Figure 6) indicating rising per capita remittances. The trend growth in per capita remittances has been particularly strong from host countries in the Gulf, with similar pattern for the United States and the European Union (including the United Kingdom).
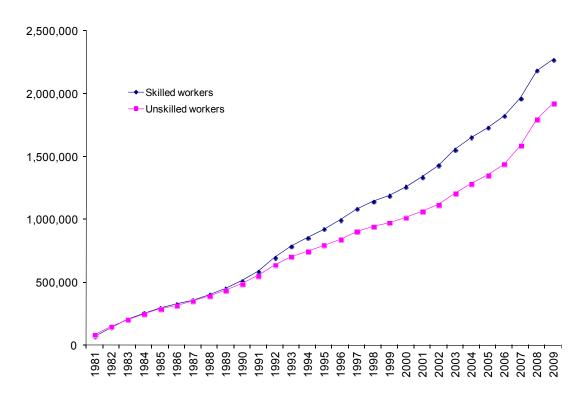
Figure 6. Remittances and Worker Migration, 1997–2008
(1997 = 100)

Source: Pakistani authorities and Fund staff calculations.

One potential explanation for the increase in remittances per migrant worker —which we will explore further in the next section—is the increase in the share of skilled labor exported by Pakistan. In recent years, the proportions of skilled and unskilled workers migrating from Pakistan have been about even. From 1994–2003, however, the share of skilled workers was 60 percent. As a result, the current pool of Pakistani workers overseas is likely to be more skilled than two decades ago (Figure 7), which may help explain why remittances from the Gulf countries increased faster than the number of Pakistani workers migrating to these countries. Skilled workers are less likely to be laid-off during a recession, which may also explain why the global crisis so far has had no impact on the flow of remittances to Pakistan. This is also consistent with micro-data analysis by Nishat and Bilgrami (1993), who somewhat counterintuitively suggest that higher-skilled workers remit about 5.5 percent less than semi-skilled and unskilled workers. They also find, however, that remittances are highly correlated with income ; high-skilled workers increase their remittances more than semi-skilled and unskilled migrants do.

Figure 7. Pakistan: Labor Migration by Skill Level, January 1981–June 2009
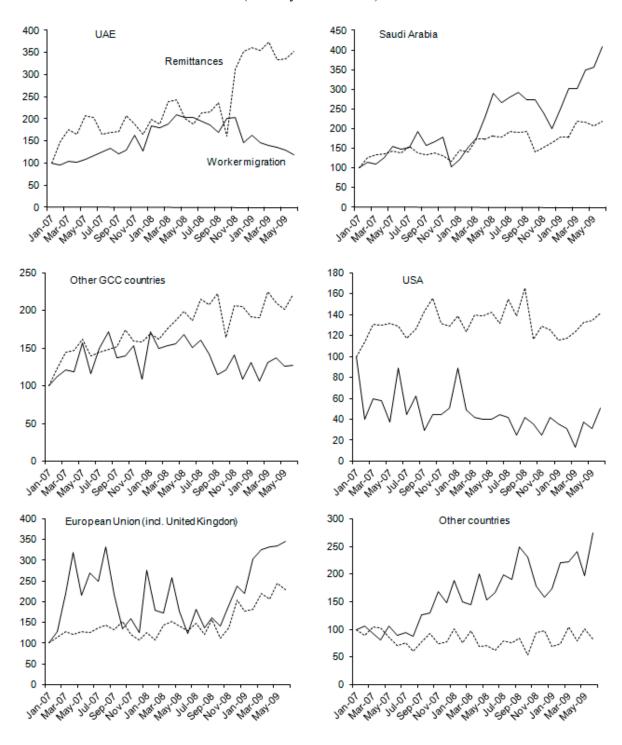(cumulative)

Sources: Pakistan Bureau of Overseas Employment and IMF staff calculations.

Another interesting observation is the shift in the pattern of labor migration from Pakistan since the beginning of the global crisis and the contrast with remittances (Figure 8). The number of Pakistani workers migrating to the United Arab Emirates has gradually declined since mid-2008, while the opposite is true for migration to Saudi Arabia and a diverse set of other countries (although the absolute numbers are much smaller for that group of host countries). However, the total remittance flow from the United Arab Emirates has actually increased, while the increase in the number of Pakistani workers migrating to Saudi Arabia outstripped the increase in remittances from Saudi Arabia. For the United Arab Emirates we observe a surprising break in the amount of remittances in November 2008. In the nine months before that date, average monthly remittances were $98 million, compared to $162 million in the nine months thereafter. Both the shift in host country and the jump in remittances from the United Arab Emirates may be related to the global crisis, which has had different impact in Saudi Arabia and the United Arab Emirates. In Saudi Arabia the impact of the global crisis has been mitigated by a large fiscal stimulus package, the absence of a real estate boom, and relatively sound banking practices. The United Arab Emirates, on the other hand, was hit hard when the real estate bubble collapsed. This may help explain the shift in migration of Pakistani workers from the United Arab Emirates—where many Pakistani workers are employed in the construction sector—to Saudi Arabia. It may also explain the sharp jump in remittances from the United Arab Emirates as workers who have been laid off return to Pakistan and transfer their savings. These shifting remittance patterns suggest that remittances are clearly affected not just by wage income, but also by other factors such as savings and investment decisions by immigrant workers.

Geopolitical events can also affect remittances, especially in the case of Pakistan. In the wake of the September 11, 2001 terror attacks the United States and other Western countries increased scrutiny of bank accounts of Pakistani nationals. Some anecdotal evidence suggests that to avoid the risk of their funds being frozen or confiscated, Pakistanis abroad transferred part of their accumulated savings to Pakistan and increased the share of their monthly savings held in Pakistan.

Figure 8. Remittances and Worker Migration, January 2007–June 2009
(January 2007 = 100)

Source: Pakistani authorities and Fund staff calculations.

III. EMPIRICAL STUDY

As previewed in the last section, remittances seem to have been driven by a host of factors such as migration, worker's skills, and economic conditions in the host country. This section tries to analyze empirically the various drivers for remittances after a brief review of the existing literature.

A. Existing Empirical Studies and Our Model

The economic literature on remittances has been growing and falls into two broad categories: the drivers for remittances and the impact of remittances on growth, investment, and consumption in the receiving country. Chami et al. (2008) provides a comprehensive recent overview of the theoretical and empirical literature on remittances.

The literature on remittance behavior at the individual level identifies two motives for remitting: altruism or self-interested exchange (see for example Johnson and Whitelaw (1974) for reference on altruism, and Lucas and Stark (1985), Hoddinott (1994) for modeling remittances as a self-interested exchange from the remitter since family left behind provides certain services—child care, financing of emigration, agents for tending left behind businesses, among others). These two motives can be operative simultaneously in a remitter's decision to remit, while the work of Becker (1991) on merit goods provides a theoretical framework for a more unified analysis (see also Chami (1998) and Mulligan and Philipson (2000)). A particularly important relationship between remitter and relatives in the home country is protection from income shocks which can be in both directions. For example, Yang and Choi (2007) show that agricultural families in the Philippines use remittances to compensate for income shocks, while in Amuedo-Dorantes and Pozo (2006), the family provides insurance to the remitter, with the remittances as the insurance premiums.

Regardless of the motive to remit, the amount remitted is determined by the economic fortunes of the remitter and the recipient, among other variables. Economic growth in the host country is often used a proxy for the economic fortune of the remitter, with higher growth leading to higher remittances. Similarly, economic growth in the home country is used as a proxy for the recipient's economic fortune, with lower growth leading to higher remittances. Another important factor that drives remittances is the real value of remittances—which depends on the exchange rate (including black market exchange premiums) and inflation in the recipient's country—because it is the amount of real resource represented by remittances that has a direct bearing on the recipient's welfare. Many empirical studies also include factors that affect the opportunities available for use of the remittances, which may include financial variables such as interest rates in the home country and proxies for political risk.

Either by design or by omission, many existing empirical studies are limited to analyzing remittances using aggregate level data to explain essentially individual behavior, namely the motivation of the individual remitter to remit. For example, most studies focus on which macro-economic variables affect the total amount of worker remittances and by how much—sometimes scaled in either host or home countries' GDP. This deficiency seems to reflect to a large extent the paucity of micro data on remittances.
In our empirical model, we depart from this approach in several ways. First, we try to model the remittance behavior at a more micro level by focusing on per capita remittances, instead of

aggregated remittances or the growth of remittances. As explained before, while remittance theory is often postulated at the individual remitter's level, existing cross-country studies that we are aware of focus on aggregate remittances, often scaled by the host country's GDP, as a way to control for cross-country difference. This makes it difficult to interpret the results, because worker migration is often not accounted for.[6] In this study, we scale the aggregate remittance by immigrant population, and study behavior of per capita remittances.

Second, we draw a close link between remittances and remitters' earning capacity with a belief that higher earning power leads to more remittances. The earning capacity is determined by the immigrant's human capital which is reflected in the type of job he or she held in the home country prior to emigration. Clearly migrant workers who have held more skilled jobs before immigration are more educated and have higher human capital, and tend to have more skilled jobs with higher earnings after immigration, and will therefore remit more. This complements the traditional macroeconomic link between the host country's general economic conditions and remittances.

For Pakistani workers going overseas, information on the type of jobs held prior to emigration is collected by the Bureau of Emigration and Overseas Employment. Workers are classified into the following categories: highly skilled, highly qualified, skilled, semi-skilled, and unskilled. Based on these data, we construct a (normalized) skill index as follows with higher weights for more skilled workers:[7]

$$SK \ = \ (1/25)(7HS + 6HQ + 5S + 4SS + 3U)/(HS + HQ + S + SS + U).$$

Where $HS, HQ, S, SS,$ and U denote the number of persons classified in the respective highly skilled, highly qualified, skilled, semi-skilled, and unskilled categories, and the skill index variable (sk) is used to test the hypothesis[8].

Third, we regard remittances explicitly as part of an investment decision for an emigrant worker, and believe that investment opportunities in the host and home country affect remittance decisions as standard portfolio allocation theory would suggest. This emphasis comes in part from the fact that remittance data for Pakistan include not just the workers' remittances, but also employee compensation and migrants' transfers. The latter two categories have been found to be more pro-cyclical in many empirical studies; for example, Chami et al (2008), noted that "employee compensation and migrants' transfers are procyclical on average, a finding that is more consistent with the behavior of private capital flows than remittances as compensatory income transfers." Similar findings are also noted in Frankel (2009). Anecdotes from Pakistan officials and friends also suggest that a significant part of the change in remittances from the gulf

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[6] One exception is Cuc et al. (2005), which studies remittances and migration in Moldova.

[7] The combined weight for highly skilled and highly qualified workers is 52 percent compared to 40 percent if all skills are equally weighted. So relative to an equally weighted index, this index skews the weights of higher-skilled workers by 30 percent. Other weighting schemes can also be used and results would be similar after adjusting for the weights.

[8] Note that our skill index only measures skills acquired before emigration and does not take into account skills acquired through formal or on-the-job training in the host country.

region (for example Dubai) is associated with changes in real estate investment of Pakistanis in both Dubai and in Pakistan. We therefore model the investment aspect of remittances with such variables as return on investment in the host and home countries and exchange rates, among other variables. We construct an investment return variable for both the host and home countries which tracks the return of a hypothetical portfolio with 80 percent in deposits (considered risk-free) and the remaining in equities:[9]

$$ir = 0.8R^* + 0.2Re,$$

where R^* is the deposit rate, and Re is calculated as returns on stock market index (I_t), i.e. $Re = 100 * (\frac{I_t}{I_{t-1}} - 1)$.

B. Estimation Results

The estimation is based on a panel of 15 countries with bilateral remittance flows to Pakistan, using data from 1997–2008.[10] Sources of the data set and explanatory notes can be found in Appendix I, and a summary plot of main variables by country is in Appendix II. The panel approach helps to overcome certain empirical challenges such as small sample size. Our regression model is based on average remittances per worker (r_1, in U.S. dollars) and four sets of explanatory variables:

- Job-skill index (sk)
- Investment return (ir, ir_{pak})
- Proxy for recipients' economic conditions in Pakistan
- Proxy for real value of remittance

For a good proxy of a recipient's economic conditions in Pakistan, we used output of major agricultural crops (mc_{rpak}). Another variable—total agricultural output—yielded similar results. Both are shown to be better indicators, in terms of statistical significance, than GDP-related variables such as real GDP. Given that Pakistan has a relatively large agricultural sector, which employs the majority of the workforce, and many immigrant workers have families or relatives in the rural areas, this result is not surprising. Both the nominal exchange rate (e) and the real effective exchange rate ($reer$) are used to adjust for fluctuations in the real value of remittances. The estimated equation reads:

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[9] This somewhat arbitrary portfolio basket is consistent with a relatively risk-averse investor which we would surmise to be representative of the average immigrant/migrant given their income/wealth level. Interpretation of the empirical results would need to take into account the composition of the benchmark portfolio. The results for different weights vary somewhat but all are statistically significant.

[10] The countries are Bahrain, Germany, Greece, Italy, Japan, Kuwait, Oman, Qatar, Saudi Arabia, Spain, Sweden, Switzerland, the United Arab Emirates, the United Kingdom, and the United States. The estimation results that we get are an average of the bilateral remittance flows between these countries and Pakistan. In practice the bilateral remittance flows are more important to some countries than to others; consequently the behavior of aggregate remittances is a weighted average of the individual relationships.

$$r_1 = \alpha + \beta_1 sk + \beta_2 reer + \beta_3 ir + \beta_4 e + \beta_5 ir_{pak} + \beta_6 mc_{rpak}.$$

The model is estimated using several techniques. First it is estimated as a pooled model, and then the estimation is carried out allowing fixed and random effects for country-specific intercepts. These models are estimated again using a Bayesian approach, with broadly similar results. For the Bayesian estimation, the maximum likelihood ratios appear not to favor the fixed-effects model under a non-hierarchical prior. Instead the ratios seem to favor slightly the random coefficient model over the pooled model, and fixed-effect under hierarchical prior, but maximum likelihood ratios are rather close.[11] Therefore, the Bayesian results reveal some model uncertainty. Nevertheless, coefficients are broadly similar even under the Bayesian estimation.

With limited data points, no short-term dynamics are attempted; the focus instead is on the long-term relationship, given that many variables are strongly trended. The potential endogeneity issue is not directly addressed due to the limitations of the dataset, and would require some form of system estimation. The results are shown in Tables 2 and 3.

Our analysis yields the following main results:

- The skill level of emigrants appears to be highly significant in explaining the level of remittance using the OLS approach, although less so using the Bayesian approach. Indeed with the inclusion of the skill variable, host country GDP is no longer significant, suggesting that the skill variable is a much superior indicator of earning capacity and driver for remittance.

- The investment return in both the host country and in Pakistan is highly significant, and with expected signs (under both the OLS approach and most Bayesian model), indicating that remitters respond to variations in investment opportunities in the host country and in Pakistan.

- Remittances are also affected by both the nominal and real effective exchange rates, suggesting that remitters adjust for nominal and real exchange rate fluctuations when deciding on the dollar amount of remittances. This is in line with previous studies.[12]

- The results also confirm that changes in domestic economic fortunes—proxied by the output of major agricultural crops—are significant in explaining remittance behavior. Somewhat surprisingly, we find that better agricultural harvests are related with higher remittances and transfers—i.e. they are procyclical.[13] This result is consistent with other studies as noted earlier, since our data on remittances include migrant transfers which

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[11] Given the uncertainty on the distribution of the coefficients, even the small log marginal likelihood of the non-hierarchical model cannot be used as direct evidence of low model support.

[12] The REER is less significant under Bayesian estimation, but nominal exchange rates are significant in most Bayesian estimations.

[13] The average correlation of per-capita remittances and agricultural GDP is around 0.6 and 0.8 respectively for the two definitions of agricultural GDP.

together tend to behave more like private capital flows. As other studies have shown, remittance-only data often have a small negative correlation with real GDP (see Chami et al. (2008)), which could be true for Pakistan, but we could not verify this because of data constraints. One should also bear in mind that since our results are from a single equation estimation, other variables such as exchange rates (real and nominal), which tend to fluctuate along with the real economy, may have already picked up some of the intended effects on remittances.

IV. CONCLUDING REMARKS

Remittances have become a major source of inflows for Pakistan in recent years, and there are no signs of a reversal. In this paper we use a new approach to explain the strong remittances for Pakistan. The results are encouraging, as they show that the skill level of immigrants, investment returns in the host country and in Pakistan, exchange rates (real and nominal), and Pakistan's economic conditions all play a strong role in explaining remittances.

These results help explain why remittances to Pakistan appear more resilient than those to other countries in the region. In the summer of 2009, at the height of the global crisis, remittances to Pakistan were up 25 percent (June data, y-o-y) compared to 21 percent in Nepal (April data), 17 percent in Bangladesh (July data) and 9 percent in Sri Lanka (May data), while remittances to India declined 31 percent (May data). Sri Lanka, Bangladesh, and Pakistan all experienced a surge in labor migration since 2005, while migration from Nepal and India was stable. GCC countries are the main source of remittances for all of these countries. It thus seems that the increase in remittances in Pakistan can be explained only in part by an increase in worker migration and the economic boom in the GCC countries in the years prior to the crisis. The increase in the share of high-skilled workers in Pakistan's labor migration explains part of this discrepancy.

Given the relatively high skill level of Pakistan migrant workers, the results suggest that remittance flows are likely to continue and help ameliorate the impact of the 2010 floods in Pakistan, which caused severe damage, particularly to the agricultural sector.

In the long run, the question whether Pakistan will be able to sustain the recent increase in remittances depends on whether the rise in labor migration is to continue and, more importantly, if the composition of the migrating workforce continues to tilt in favor of highly skilled workers. Obviously, any positive impact of a continued export of high-skilled labor should be carefully weighed against the potential cost of this 'brain drain'.

Table 2. Regression Results—OLS Approach

$R1 = \alpha + \beta_1 SK + \beta_2 reer + \beta_3 IR + \beta_4 E + \beta_5 IR\_PAK + \beta_6 MC\_RPAK$
(see notation below)

(i) Coefficients (standard errors)

	Pooled model		Fixed effects		Random effects	
α	-73.724	(11.239)	-76.119	(11.252)	-91.189	(7.299)
SK	-0.480	(2.856)	5.885	(2.395)	5.182	(2.339)
reer	1.550	(0.865)	3.379	(0.856)	4.039	(0.709)
IR	-0.071	(0.016)	-0.045	(0.010)	-0.044	(0.010)
E	0.411	(0.035)	1.871	(0.739)	0.436	(0.093)
IR_PAK	0.404	(0.193)	5.386	(0.614)	6.139	(0.463)
MC_RPAK	5.742	(0.788)	0.305	(0.113)	0.339	(0.112)
SER	1.3025		0.660		0.670	
R²	0.5615		0.865		0.606	
Adjusted R²	0.5463		0.848		0.593	
Durbin-Watson stat			1.164		1.099	
F-statistic (p-value)			51.112	(0.000)	44.406	(0.000)

(ii) Error Component

	S.D.	Share of total variance
Cross-section random	0.936	0.668
Idiosyncratic random	0.660	0.332

(iii) Tests of fixed and random effects

Redundant Fixed Effects Tests

Effects Test	Statistic	d.f.	Prob.
Cross-section F	25.64	-14,159	0.000
Cross-section Chi-square	212.59	14	0.000

Hausman random effect tests 1/

Variable	Fixed	Random	Var(Diff.)	Prob.
SK	5.885	5.182	0.266	(0.173)
LOG(REER)	3.379	4.039	0.230	(0.169)
IR	-0.045	-0.044	0.000	(0.465)
LOG(E)	1.871	0.436	0.537	(0.050)
LOG(MC_RPAK)	5.386	6.139	0.163	(0.062)
LOG(IR_PAK)	0.305	0.339	0.000	(0.031)

* Cross-section test variance is invalid. Hausman statistic set to zero.

R1 = per capita remittances (in US$)
SK = constructed skill index of immigrants
reer = real effective exchange rate
IR = return on investment (constructed)
E = exchange rate (currency per US$)
MC_RPAK = major agricultural crop of Pakistan

Table 3. Regression Results—Bayesian Approach

$$R1 = \alpha + \beta_1 SK + \beta_2 reer + \beta_3 IR + \beta_4 E + \beta_5 IR\_PAK + \beta_6 MC\_RPAK$$

(i) Coefficients (standard errors), followed by nse

	Fixed effects			Random effects			Pooled model			Random coefficients		
α				-0.382	(0.817)	0.0082	-0.450	(1.000)	0.0100	-0.1856	(0.993)	0.0057
SK	0.037	(0.954)	0.0095	0.018	(0.967)	0.0097	-0.266	(0.955)	0.0096	0.5882	(0.985)	0.0057
reer	-0.699	(0.605)	0.0061	-0.501	(0.714)	0.0071	-0.545	(0.632)	0.0063	-1.0793	(0.616)	0.0036
IR	-0.055	(0.013)	0.0001	-0.056	(0.019)	0.0002	-0.070	(0.017)	0.0002	-0.0457	(0.184)	0.0011
E	0.493	(0.101)	0.0010	0.468	(0.129)	0.0013	0.394	(0.037)	0.0004	0.5643	(0.771)	0.0045
IR_PAK	0.496	(0.155)	0.0016	0.494	(0.214)	0.0021	0.537	(0.208)	0.0021	0.25	(0.244)	0.0014
MC_RPAK	0.751	(0.223)	0.0022	0.706	(0.271)	0.0027	0.715	(0.243)	0.0024	0.8358	(0.331)	0.0019
$1/\sigma^2$	1.1645	(0.130)	0.0013	0.746	(0.283)	0.0028	0.624	(0.066)	0.0007	4.2532	(0.554)	0.0032
Log of Marginal Likelihood			-940.9			-332.3			-401.8			-290.3

Appendix I. Data Sources and Explanatory Notes

Data on remittances, interest rates, and stock market indices are collected from Haver analytics. Major agricultural crop and agricultural output data for Pakistan are also from Haver analytics, sourced from the Pakistan Federal Bureau of Statistics. Real effective exchange rate and nominal exchange rate are from the IMF's International Financial Statistics database.

Data for the skill index (SK) is collected from the annual "Statement showing the number of workers proceeded abroad for employment registered by Bureau of Emigration and Overseas Employment, broad categories of workers"[14], which classifies immigrant workers into the following categories: Highly skilled, Skilled, Semi Skilled, Unskilled. The skill index is the constructed as a weighted index of the different skill categories as follows:

$$SK = (1/25)*(7*HS+6*HQ+5*S+4*SS+3*U)/(HS+HQ+S+SS+U), \text{ where}$$

HS = Highly skilled
HQ = Highly qualified
S = Skilled
SS = Semi-skilled
U = Unskilled

The per capita remittance (r_1) is calculated as follows: r_1 = Remittance / estimated immigrant stock (IS)

The immigrant stock series (IS) is estimated using the following transition equation:

$$IS(t) = IS(t-1) + EMI(t), \text{ where}$$

EMI(t) is migration out of Pakistan. The immigrant stock IS in 2004 is based on estimates from the Pakistani authorities (Government of Pakistan (2006)) and the immigrant stock for other years are estimated using data from the Pakistan Bureau of Overseas Employment.
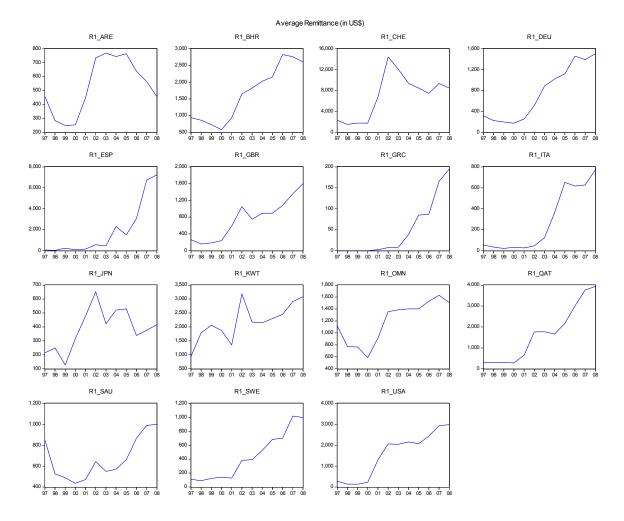
Investor return (r) series are estimated using the weighted average of key deposits rate (80 percent weight) and changes in the main index of the Stock Market (20 percent weight) for the countries in the sample.
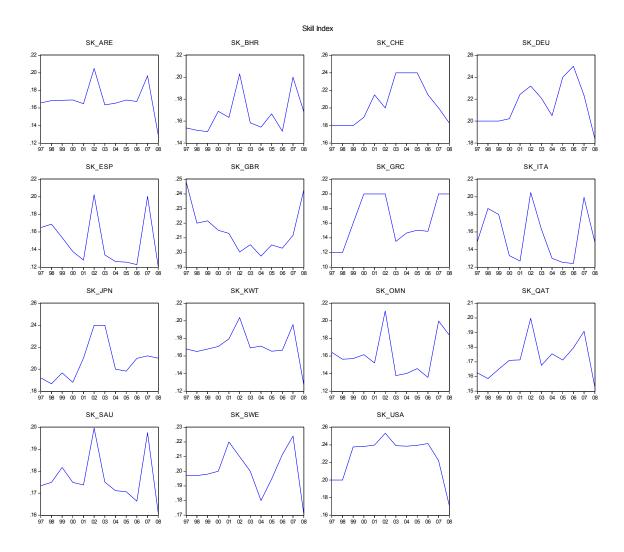
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[14] Source: Bureau of Emigration and Overseas Employment, Ministry of Labor, Employment and Overseas Pakistanis.
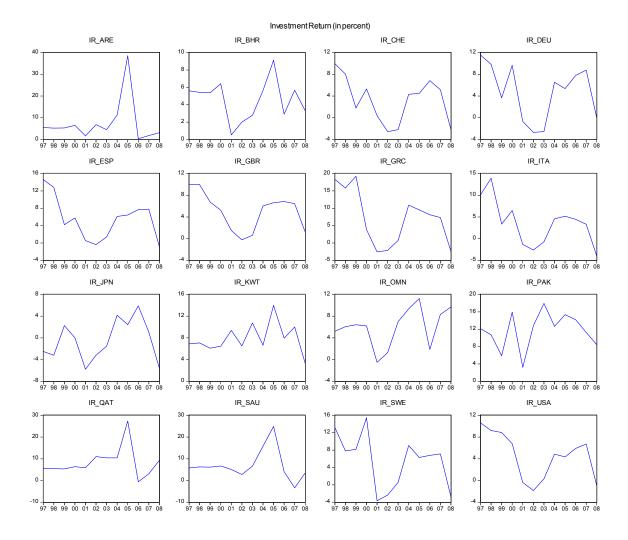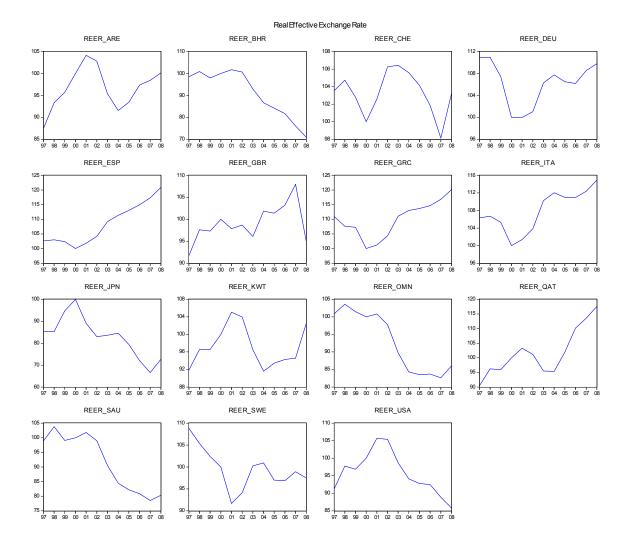
Appendix II. Overview of Regression Variables

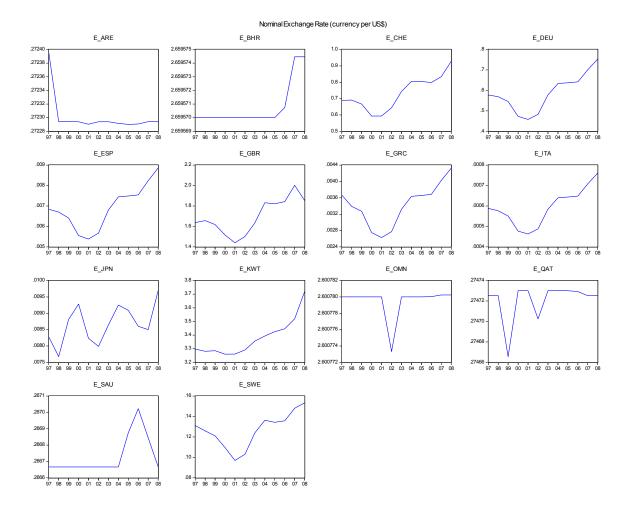In the following charts, the abbreviations used for country names are:

ARE	UAE
BHR	Bahrain
CHE	Switzerland
DEU	Germany
ESP	Spain
GBR	UK
GRC	Greece
ITA	Italy
JPN	Japan
KWT	Kuwait
OMN	Oman
PAK	Pakistan
QAT	Qatar
SAU	Saudi Arabia
SWE	Sweden

Average Remittance (in US$)

Skill Index

Investment Return (in percent)

Real Effective Exchange Rate

Nominal Exchange Rate (currency per US$)

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