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Identifying the Determinants of Overseas Filipinos' Remittances: Which Exchange Rate Measure is Most Relevant?

By Francisco G. Dakila, Jr. and Racquel A. Claveria

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ABSTRACT

The study considers which exchange rate measure is the most relevant determinant of overseas Filipinos (OF) remittances. The study employs a microeconomic framework (involving a utility maximizing household) to help form the basis for selection of variables to be included in the estimations. Different versions of the vector autoregressions (VARs), which vary by the particular exchange rate measure utilized, were estimated to quantify the impacts of the major influences on OF remittances. An OF deployment-based effective exchange rate index was constructed in the study which proved to be a significant predictor of the movement of OF remittances. Moreover, an incidental but significant finding of the study is the procyclical nature of OF remittances.

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IDENTIFYING THE DETERMINANTS OF OVERSEAS FILIPINOS' REMITTANCES: WHICH EXCHANGE RATE IS MOST RELEVANT?

By Francisco G. Dakila, Jr. and Racquel A. Claveria [1]

I. INTRODUCTION

Remittance inflows have increased substantially as the stock of overseas Filipinos (OFs) has grown and shifted towards more skilled jobs.[2] Aside from exports of goods and services, remittances have become the largest foreign exchange source for the Philippines. Remittances have also tended to act as a relatively stable source of foreign exchange compared to direct investment and other private capital flows. Geographic diversification of OFs may also have contributed to this stability.

OF remittances have increased steadily since 2001 and averaged approximately US$9 billion or about 10 percent of GDP during the 2001-2006 period (Figure 1).[3] Moreover, remittances have become the second largest foreign exchange source for the Philippines, next to exports of goods and services (Figure 2). Figure 2 likewise shows that remittances have also tended to act as a relatively stable source of foreign exchange compared to private flows such as direct and portfolio investments.

[1] The authors are, respectively, Officer-in-Charge and Acting Bank Officer IV, of the Center for Monetary and Financial Policy, Bangko Sentral ng Pilipinas (BSP). The views expressed are those of the authors and do not necessarily reflect the official stance of the BSP.

[2] As defined by the Commission on Filipino Overseas (CFO), overseas Filipinos (OFs) consist of: a) permanent residents or Filipino immigrants or legal permanent residents abroad whose stay do not depend on work contracts; and b) overseas Filipino workers (OFWs). The latter refers to temporary workers, or those whose stay overseas is employment-related and who are expected to return at the end of their work contracts; and irregular workers, including those not properly documented, without valid residence or work permits, or who are overstaying in a foreign country.

[3] The significant rise in OF remittances in 1998 is due in part to the change in the data reporting system. In January 1998, transactions reported under Form 1 of then Foreign Exchange Department (FED) of the BSP as Peso Conversion of Foreign Currency Deposits (FCDs) of the BOP Services account were reclassified into specific transaction accounts. The bulk went into Personal Income (i.e., what we presently refer to as OF remittances), explaining the big jump in remittances, and a small portion into Travel Receipts. The Peso Conversion Account included those withdrawals from the FCD account which were converted to pesos.

Figure 1. OF Remittances: Levels and Growth Rates

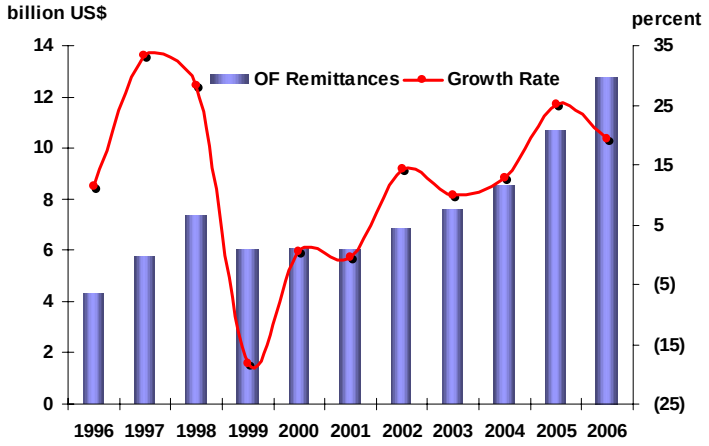
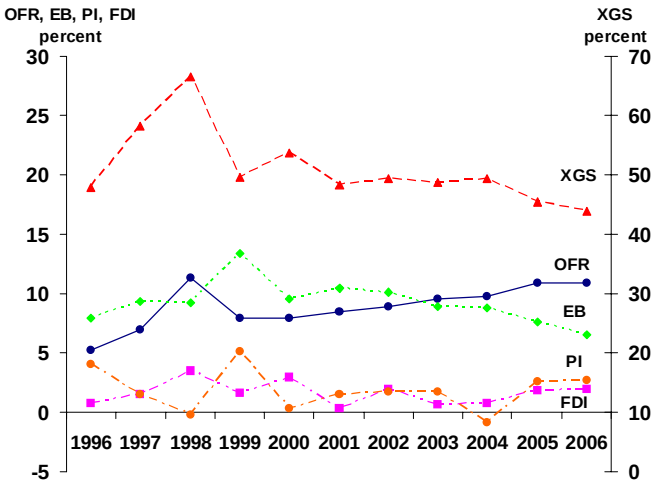


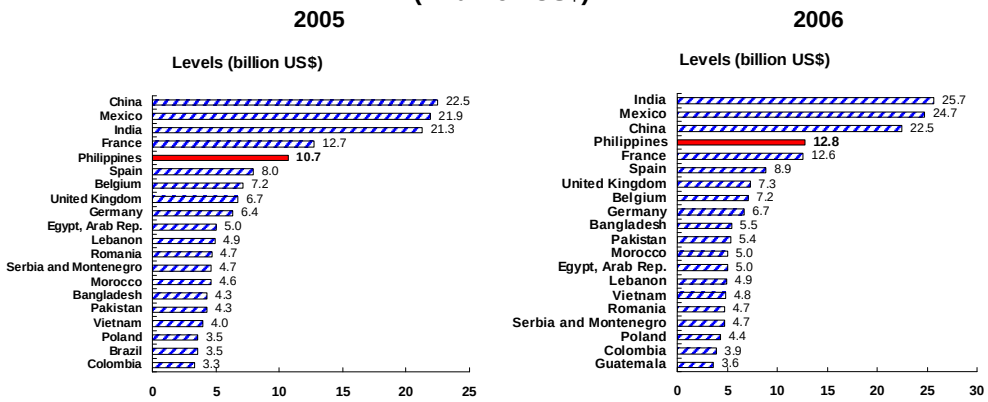
Figure 2. Sources of Selected Foreign Exchange Inflows[1/] (as percentage of GDP)



[1/]XGS – Exports of Goods and Services OFR – OF Remittances
EB – External Borrowing PI - Portfolio Investments FDI – Foreign Direct Investments
Source of data: BSP Department of Economic Statistics, authors' calculations

Globally, the Philippines's rank in the roster of top remittance-recipient countries climbed to the fourth place in 2006 from fifth in 2005 (Figure 3).

Figure 3. Top 10 Remittance-Remittance Recipient Countries (in billion US$)



Sources of data: World Bank Global Economic Prospects 2006*: Economic Implications of Remittances and Migration*
Migration and Remittances Factbook <http://www.worldbank.org/prospects/migrationandremittances>

Given OF remittances' increasing trend and growing importance to the Philippine economy, their determinants, apart from their macroeconomic implications, merit greater attention. However, it would be worthwhile to distinguish first the determinants of remittances on the theoretical level (i.e. the motivations of migrant workers to remit) and on the empirical level (i.e. the measurable microeconomic and macroeconomic factors affecting the OFs' decision to remit).

On the theoretical level, altruism and self-interest constitute the two opposite ends in the spectrum of motives of migrant workers to remit income earned overseas.[4] In general, altruistic motives prevail when a decline in the recipients' income leads to a rise in remittances while self-interest or profit-driven motives dominate when an increase in the recipients' income induces an increase in remittances. Of late, the remittance literature has paid greater attention to the investment and portfolio allocation considerations of migrants to remit. Under this approach, migrants decide how large a share of their incomes should be remitted to their home country to be invested there. As a consequence, remittance flows tend to respond positively to improvements in home country conditions when remittances are channeled to investments in real estate, business and capital goods.

On the empirical level, the remittance literature tends to focus broadly on three sets of macroeconomic determinants. These are: (1) those associated with the recipient country (e.g. output, stock and skill level of migrants, unemployment and interest rates, measure of income inequality and the size of the informal economy in the home country); (2) those related to the host country (e.g. output, inflation and interest rates); and (3) those pertaining to the relationship between the host and recipient country, along with factors affecting both countries simultaneously (e.g. bilateral exchange rate, inflation differential, bilateral export flows, indicator for the development of the financial nexus between the host and home countries).

In this paper, we take a closer look at the determinants of OF remittances on the empirical level to gain understanding on what motivates OFs' decision to remit at the theoretical level. We focus on the third set of empirical determinants of remittances, particularly the exchange rate. A novel contribution of this paper is the construction of an effective exchange rate index based on the deployment of OFs.

[4] In between the two extreme motives are what Lucas and Stark (1985) termed as "tempered altruism" and "enlightened self-interest".

Such exchange rate index proves to be a significant predictor of the movement of OF remittances and more importantly, shows that OFs are induced by profit-driven (particularly investment) rather than altruistic motives. These results square well with the incidental finding of this paper that remittances are procyclical, disputing previous claims that OF remittances are compensatory in nature. Hence, this paper in effect contributes to two strands in the remittance literature, i.e. the impact of the exchange rate movements on remittances and the procyclicality of remittances.

The structure of the paper is as follows: Section II reviews the literature on the impact of exchange rate changes on remittances and the relationship between growth and remittances, with focus on the Philippine case. Section III develops a theoretical framework that underlies the relationship between the exchange rate and remittances. Section IV shows the estimation methodology employed in the study with a special focus on the various exchange rate measures compiled by the Bangko Sentral ng Pilipinas (BSP). Section V presents the estimation results. Section VI introduces an exchange rate index based on OF deployment and shows that such index is a significant predictor of remittances. Section VII presents an incidental finding of the paper on the procyclicality of OF remittances. Section VIII concludes and offers some policy prescriptions.

II. REVIEW OF LITERATURE

On the whole, a comparatively small proportion of research has incorporated formal econometric estimates of the relationship between the exchange rate and remittances, despite the exchange rate being probably the most important link between the overseas worker and the recipient families. With regard to the Philippines, only a couple of studies (Yang, 2006; Leuth and Ruiz-Arranz, 2006) included the impact of exchange rate changes on OF remittances in their empirical investigation. Yang (2006) found that OF remittances tend to increase when the peso depreciates relative to currencies OFs' destination countries. Meanwhile, the panel estimation of Leuth and Ruiz-Arranz (2006) for 11 developing countries , including the Philippines showed that depreciation of home country's currency reduces remittances as less amount of host country's currency could buy the same basket of goods as before the depreciation. For other studies that covered several Asian, Caribbean and Latin American countries, the results are likewise varied. Some found that a real depreciation leads to an increase in remittances (Faini,1994; Loser et al., 2006[5]) while others showed that a real appreciation prompts a rise in remittance flows (e.g. Leuth and Ruiz-Arranz, 2006). Meanwhile, several researches yielded insignificant impact of exchange rate movements on remittances (Higgins, 2004; Faini, 2006; Vargas-Silva, 2007).[6]

The various pieces of empirical evidence on the relationship between the exchange rate and remittances in previous studies lend support to the notion that the impact of exchange rate changes on remittances is a priori ambiguous. Theoretical discussions in the remittance literature generally show that a real depreciation in the home country could either lead to a rise or fall in remittances sent by overseas workers depending on their motives to remit and on their labor supply behavior. A depreciation of the currency in the home country constitutes a positive income shock

[5] For a subsample of countries covered by the study that included Columbia and El Salvador

[6] Results of studies on the impact of the exchange rate on remittances are summarized in Appendix 1.

to the recipients of remittances since each unit of foreign currency would be converted to more units of local currency once remitted. If the migrant worker is driven by altruistic motives such that the purpose of the transfer is to meet the required expenses of the household, then the migrant will reduce the amount of foreign currency that he/she is sending back home. On the other hand, if the overseas worker is motivated by profits or the desire to finance an investment in the home country, then the migrant could take advantage of the depreciation by sending more remittances to the home country.

However, when the labor supply behavior of migrants becomes intertwined with the motives to remit, the impact of exchange rate changes on remittances is not as clear-cut. The labor supply behavior of migrant workers likewise reacts to exchange rate movements via the impact of the latter on the income level of the migrant when expressed in home currency. The depreciation of the home currency increases the migrant's wage value when denominated in the home currency. With higher wages, the migrant could either increase his/her labor supply as leisure becomes relatively expensive (substitution effect) and hence remit more. Alternatively, the higher value of the migrant's remuneration brought forth by the depreciation of the home currency could induce him/her to decrease labor supply (i.e. prefer leisure from work) once the recipients' estimated need of the migrants' wage income is satisfied (income effect) and therefore remit less. Hence, remittances could either rise or fall depending on whether the substitution or income effect dominates. The dominance of the income effect (i.e. the desire to maintain remittances' purchasing power) is more easily reconcilable with altruistic behavior than with a quest for profits. Meanwhile, the dominance of the substitution effect (i.e. the desire to take advantage of the depreciation by remitting more) is deemed more consistent with profit-driven (most plausibly investment) motives of migrants.

Meanwhile, empirical studies on the procyclicality of remittances that included the Philippines in the estimations are likewise sparse. Noteworthy is the study of Chami et al. (2003) that employed a sample of 113 countries (including the Philippines) for the years 1970-1998 in their panel estimation. Chami, et al. found that remittances are countercyclical (i.e. tend to rise during economic downturns) and compensatory (i.e. tend to make up for bad economic outcomes) and that motives for remitting are predominantly altruistic. In order to validate the main findings of the Chami, et al. study and gauge their applicability to the Philippine situation, the BSP (2003) re-estimated the main equations of the study using Philippine data. The results of the BSP's replication of Chami et al. (2003) indicated that while a negative relationship between remittances and growth appears in OLS estimates for the Philippines, this relationship vanishes when the appropriate correction is made for serial correlation. The diversed results obtained by Chami et al. (2003) and BSP (2003) may indicate a need to exercise greater care in applying the results from a panel estimation of different countries to all the countries included in the panel, because of possible heterogeneity in the characteristics of the sample included in the study. Burgess and Haksar (2005) have also re-examined the link between remittances and growth, using Philippine data specifically. As with the BSP study, they did not find empirical support for the hypothesis that remittance flows exert a short term stabilizing effect on consumption. Moreover, the authors noted that measurement issues, as well as endogeneity of regressors and the resulting problem of finding adequate instruments, can complicate the estimation of the remittances-growth relationship using macroeconomic data. In addition, Tuaño-Amador et al. (forthcoming) analyzed the cyclical components of GDP and OF remittances and found that OF remittances tend to be procyclical. Interestingly, the finding of Tuaño-

Amador et al. on the procyclicality of OF remittances using pairwise correlation techniques is supported by the validation exercise that they also performed on the study of Chami et al. These results are, therefore, in line with the previous caution on generalizing the results obtained from a panel of countries.[7]

III. THE LINK BETWEEN THE EXCHANGE RATE AND OF REMITTANCES: THEORETICAL FRAMEWORK

We consider a representative household that maximizes the present value of its expected utility stream, defined as

$$U = E_0 \sum_{t=0}^{\infty} \beta^t u(c_t) \quad (1)$$

where $0 < \beta < 1$ is a subjective rate of discount, c_t represents total household consumption at time period t, and u is the instantaneous utility function, assumed to be a strictly increasing and nonnegative function of c. The household has a fixed labor endowment L at each point in time, and derives income from supplying some amount

$$l_t \leq L \quad (2)$$

of such endowment to the labor market.

Given a wage rate w_t , the household's income level y_t is

$$y_t = w_t l_t \quad (3)$$

and at any moment of time, the household's asset accumulation is described by the relationship

$$A_{t+1} = (1 + r_t)(A_t - c_t) + y_{t+1} \quad (4)$$

where r_t is some measure of the relevant interest rate that represents the returns to the household from allocating some of its resources to asset accumulation. Combining this with the previous equation yields the following sequence of budget constraints for the household:

$$c_t + \frac{A_{t+1}}{1 + r_t} = A_t + \frac{w_{t+1} l_{t+1}}{1 + r_t} \quad (5)$$

We extend this basic framework to the decision processes of OF households by observing the following essential difference: that an OF household supplies labor to a factor market in which the remuneration is denominated in a foreign currency. Suppose that there are two labor markets open to the household—a domestic market and a foreign market, to which the household supplies amounts l_t and l_t*, respectively. The labor supply constraint (2) should now be modified to

$$l_t + l_t^* \leq L \quad (6)$$

Given this view, we now think of some measure of the foreign wage rate, w_t*, and modify (3) to

$$y_t = w_t l_t + e_t w_t^* l_t^* \quad (7)$$

To sum up, the OF household's utility maximization problem can now be described as[8]

[7] The main findings of the studies on the cyclicality of OF remittances are summarized in Appendix 2.

Maximize

$$U = E_0 \sum_{t=0}^{\infty} \beta^t u(c_t) \tag{8}$$

subject to

$$c_t + \frac{A_{t+1}}{1+r_t} = A_t + \frac{w_{t+1} l_{t+1} + e_{t+1} w_{t+1}^* l_{t+1}^*}{1+r_t}$$

$l_t + l_t^* \leq L$, and

$c_t \geq 0$

At this point, we note that the forward-looking analysis injects several sources of uncertainty into the framework. In particular, these pertain to the wage rate, the interest rate and the exchange rate. The wage rate is typically subject to longer-term contractual arrangements, and is relatively more predictable.[9] On the other hand, while the implications of variability of the interest rate on household asset accumulation are an important issue, especially in terms of the impact on the monetary transmission mechanism, the issue is not unique to OF households. In this paper, therefore, we focus on the link between the exchange rate and remittances.

IV. ESTIMATION AND METHODOLOGY

Our framework forms the basis for our selection of variables to be included in our equation system. In order to quantify the impacts of the major influences on OF remittances, we utilized vector autoregressions[10] (VARs) estimated using quarterly data on the following variables: real T-bill rate, exchange rate measure, GDP per capita, OF deployment per capita, and OF remittances per capita, for the sample period 1980-2005.[11] In the absence of appropriate wage rate data for OF households for the Philippines, we used gross domestic product (GDP) as a proxy for the wage rate as an indicator of earnings opportunities. In this respect, it can be noted that variation in the level of GDP can be expected to induce substitution and

[8] Note that the specification of the household's budget constraint assumes that foreign wage earnings enter into the asset accumulation equation using the exchange rate at the time that the foreign compensation was earned – in effect, that the household converts remittances into pesos on receipt. A more complicated model would introduce a separate portfolio management decision of the household. It should be noted, however, that, if the domestic foreign exchange regime is sufficiently liberal, the decision of when to remit becomes independent of the portfolio allocation decision.

[9] This statement is perhaps less true of OF households compared to the typical Filipino household. However, for the duration of the contract of the overseas worker, it would still be the case that the compensation would be predictable. Over a longer-run period, however, there may be greater variability in incomes for overseas workers families. The implications of this on labor supply and other relevant aspects of household behavior constitutes an important research topic.

[10] A vector autoregression is defined as a system of simultaneous equations that describes the behavior of a set of endogenous variables in terms of the lagged values of all the endogenous variables in the system.

[11] For consistency of the inflation measure across the sample period, we used the 2000-based consumer price index.

income effects on the level of remittances, in the same manner as variation in the wage rate. While it would be an interesting exercise to compile an index of earnings opportunities for countries in which OFs are deployed, including this in the VAR would have implications on the degrees of freedom, given the available data sample.

Several different versions of the VARs were estimated, which vary by the particular exchange rate measure utilized. As a first step, we specified the VAR using the exchange rate measures and indices regularly compiled by the BSP, namely, the peso-dollar exchange rate (nominal and real bilateral) and six trade-weighted exchange rate indices computed by the BSP (three nominal effective exchange rates, NEER broad, NEER narrow, and NEER major, corresponding to different currency baskets, each of which is then adjusted for inflation differentials to come up with three corresponding real exchange rate measures, REER broad, REER narrow, and REER major). Box 1 describes the effective exchange rate indices compiled by the BSP in greater detail.

Box 1. Effective Exchange Rate Indices of the BSP

The Nominal Effective Exchange Rate (NEER) indices for the peso are the weighted average exchange rate of the peso vis-à-vis a suitably chosen basket of foreign currencies, unadjusted for the effects of inflation. This is computed as the summation of the percentage change in the peso cross rates with respect to each currency in the basket multiplied by the corresponding country weight. The individual country weights, in turn, are calculated from their total trade shares, i.e., exports plus imports.

The Real Effective Exchange Rate (REER) indices of the Peso are the corresponding NEER indices of the peso adjusted for inflation rate differentials with the countries whose currencies comprise the NEER basket. This is simply the peso's NEER index multiplied by the ratio of the domestic price index to the weighted price index of the countries whose currencies comprise the NEER basket. The base year used for the consumer price indices of the Philippines and countries included in currency baskets is 1980.

The NEER and REER indices are computed for three groupings of countries as summarized in the following table:

Composition of Currency Baskets

Country	Narrow	Broad	Major
United States			ü
Japan			ü
European Monetary Union (EMU)			ü
United Kingdom			ü
Singapore		ü	
South Korea		ü	
Taiwan		ü	
Malaysia	ü	ü	
Thailand	ü	ü	
Indonesia	ü	ü	

V. ESTIMATION RESULTS:

A shock to the i-th variable not only directly affects the i-th variable but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure of the VAR. An impulse response function (IRF) traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. The response functions from the various VARs therefore provide a measure of the sensitivity of OF remittances to the various exchange rate measures.

It is possible, however, for the IRF results to be sensitive to the ordering of the variables in the VAR. As a guide to the appropriate ordering, pair-wise Granger causality tests were performed. The results (Table 1) indicate that the chain of (Granger) causation runs from remittances to the exchange rate, and then on to the real interest rate, and finally, to GDP. There is some bi-directional causality between remittances and OF deployment. The VAR ordering broadly follows these results, but we have placed deployment as the last variable in the VAR, since we expect the decision to work abroad as responding largely to longer-term considerations.

Table 1. Pairwise Granger Causality Tests

Sample: 1980Q1 2005Q4	Lags: 4		
Null Hypothesis:	Obs	F-Statistic	Probability
LOG(EXCHANGE RATE) does not Granger Cause LOG(OF REMITTANCES)	64	0.28484	0.88659
LOG(OF REMITTANCES) does not Granger Cause LOG(EXCHANGE RATE)		2.86607	0.03148
REAL 91-DAY T-BILL RATE does not Granger Cause LOG(OF REMITTANCES)	64	1.26525	0.29475
LOG(OF REMITTANCES) does not Granger Cause REAL 91-DAY T-BILL		2.17251	0.08412
LOG(GDP) does not Granger Cause LOG(OF REMITTANCES)	64	0.51658	0.72383
LOG(OF REMITTANCES) does not Granger Cause LOG(GDP)		0.14448	0.96469
LOG(OF DEPLOYMENT) does not Granger Cause LOG(OF REMITTANCES)	60	3.08158	0.02389
LOG(OF REMITTANCES) does not Granger Cause LOG(OF DEPLOYMENT)		2.51231	0.05297
REAL 91-DAY T-BILL RATE does not Granger Cause LOG(EXCHANGE RATE)	100	0.13088	0.97075
LOG(EXCHANGE RATE) does not Granger Cause REAL 91-DAY T-BILL RATE		4.46923	0.00242
LOG(GDP) does not Granger Cause LOG(EXCHANGE RATE)	96	2.17177	0.07880
LOG(EXCHANGE RATE) does not Granger Cause LOG(GDP)		15.3135	1.6E-09
LOG(OF DEPLOYMENT) does not Granger Cause LOG(EXCHANGE RATE)	96	1.08002	0.37142
LOG(EXCHANGE RATE) does not Granger Cause LOG(OF DEPLOYMENT)		0.82554	0.51243
LOG(GDP) does not Granger Cause REAL 91-DAY T-BILL RATE	96	0.62625	0.64503
REAL 91-DAY T-BILL RATE does not Granger Cause LOG(GDP)		12.6510	3.7E-08
LOG(OF DEPLOYMENT) does not Granger Cause REAL 91-DAY T-BILL RATE	96	0.40956	0.80131
REAL 91-DAY T-BILL RATE does not Granger Cause LOG(OF DEPLOYMENT)		2.48193	0.04959
LOG(OF DEPLOYMENT) does not Granger Cause LOG(GDP)	92	0.96959	0.42870
LOG(GDP) does not Granger Cause LOG(OF DEPLOYMENT)		1.84331	0.12828

Our initial assessment of the relevance of the various exchange rate measures in explaining the magnitude of remittances measures considers the response of the latter to a one-standard deviation shock in the former, as indicated in the IRF. The nominal and real peso-dollar rate, plus six other real and nominal trade-weighted exchange rate indices were tested, namely, the real effective and nominal effective exchange rates for the broad, narrow and major-trading partners basket of currencies. The composition of the various estimated VARs are summarized in Table 2. The impulse responses corresponding to the different VARs are presented in Figure 4, and can be summarized as follows:

- **Response to nominal peso-dollar rate**. As discussed in Section II, a depreciation of the currency implies greater purchasing power for each dollar of remittance, and should therefore encourage remittances. This constitutes a substitution effect, and implies positive values for the IRF of remittances to both the nominal and real peso-dollar rate. On the other hand, it may happen that the OF families' expenditure baskets include some fixed, recurrent items that are denominated in pesos, including education and rentals, for example. In this case, a peso depreciation tends to reduce remittances, so that, as with most other price changes, the direction of this income effect is opposite to that of the substitution effect. In most cases, the substitution effect can be expected to dominate the income effect. However, the estimated responses to the nominal peso-dollar rate from the IRF are statistically insignificant and generally of the opposite direction from the expected response. It can be noted that the insignificant result is in accordance with the Granger causality tests presented in Table 1.

- **Response to real peso-dollar rate**. It is possible that the insignificant result from the preceding estimates is due to the failure of the nominal exchange rate to account for differences in the purchasing power of the peso vis-à-vis foreign currencies. As a first step, we examined the IRF from a VAR incorporating a real bilateral exchange rate measure (US$/~~P~~), which was defined such that an increase in the measure represents an appreciation of the peso against the US dollar, in order to align this measure with the other exchange rate indices computed by the BSP. In contrast to the results for the nominal exchange rate, the IRF for the real bilateral rate shows a statistically significant response of remittances. However, contrary to expectations (i.e., assuming dominance of the substitution over the income effect), an appreciation of the peso induces an increase in remittance flows, which is quite sustained over the ten-quarter simulation period. The results indicate that the motive to finance expenditures that are fixed in peso terms can be dominant among OF families. Moreover, the results also run counter to the widely-held belief that remittances are countercyclical. In fact, if weakening of the peso is associated with downtrends in the economy, and vice-versa, then the results can indicate a potential for remittance flows to actually exacerbate the cyclicality of economic activity. We also note that, for both the nominal and real peso-dollar rate, the results support dominance of the income effect over the substitution effect.

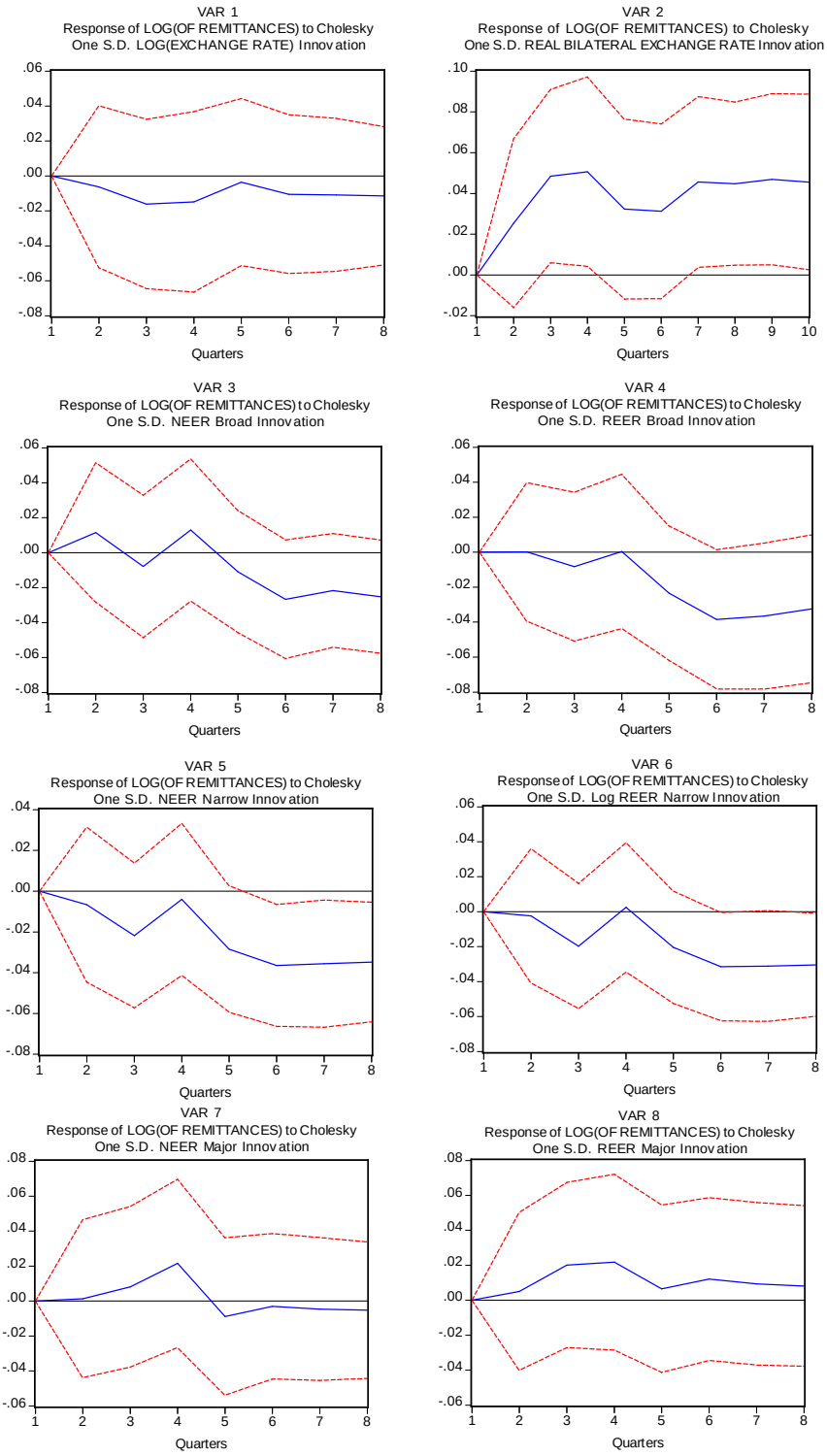
- **Response to various nominal and real exchange rate measures**. All the nominal (NEER) and real (REER) effective exchange rate indices are defined so that an increase in the index represents an appreciation of the peso against the basket of currencies comprising the index. Broadly significant

responses are obtained for the real and nominal indices for the "Broad" and "Narrow" groups of countries. This contrasts to the insignificant results obtained for the "Major" country grouping, which consists of some developed country trading partners of the Philippines. Moreover, in contrast to the results for the bilateral exchange rates, the impulse responses for the foregoing indices are in the "expected" direction (i.e., with the substitution effect dominating the income effect). This points out further the need to explain the variance of the results for the bilateral exchange rates from the "expected" response. In brief, exchange rate indices that measure the "expensiveness" of domestic products vis-à-vis a basket of products of competitor countries appear to elicit the expected substitution effect, in contrast to movements in the peso-dollar rate. We return to this issue in Section V.

Table 2. Specification of Estimated Vector Autoregressions (VARs)

Variable	VAR1	VAR 2	VAR 3	VAR 4	VAR 5	VAR 6	VAR 7	VAR 8
Log(OF Remittances)	ü	ü	ü	ü	ü	ü	ü	ü
Exchange Rate (₱/$)	ü							
Real Exchange Rate ($/₱)		ü						
NEER Broad			ü					
REER Broad				ü				
NEER Narrow					ü			
REER Narrow						ü		
NEER Major							ü	
REER Major								ü
Real 91-day T-bill Rate	ü	ü	ü	ü	ü	ü	ü	ü
Log(GDP)	ü	ü	ü	ü	ü	ü	ü	ü
Log(OF Deployment)	ü	ü	ü	ü	ü	ü	ü	ü

Figure 4. Impulse Responses of OF Remittances from VARs 1-8



VI AN EXCHANGE RATE MEASURE BASED ON OF DEPLOYMENT

The optimization framework developed in Section III emphasized that since the household supplies labor both to the domestic and international markets, the labor supply decision depends on among other factors, the domestic and international wage rates and the exchange rate. The situation becomes more complicated when the international labor market is heterogeneous, such that markets offer compensation in different currencies. Another implication is that, since the US dollar is typically the currency in which remittances are made, then OFs may choose to retain their incomes in their respective currencies during periods when the peso is strong against the US dollar, and to remit otherwise. Thus, in this case the decision of when and how much to remit becomes entangled with portfolio allocation decisions, so that the impact of exchange rate movements on behavior becomes more complicated.

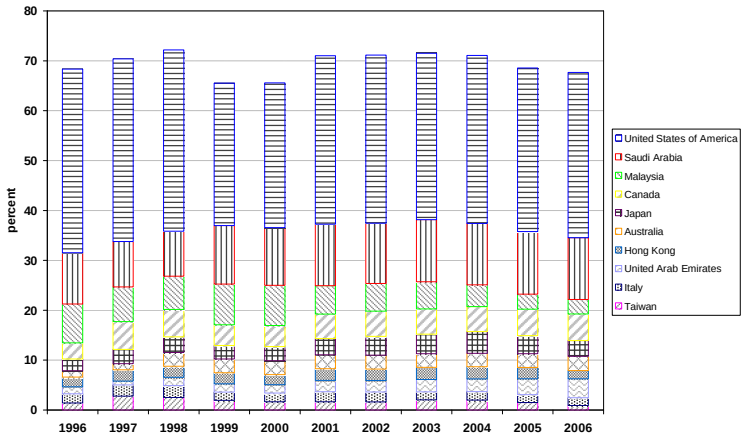
Theoretical considerations point out that the relevant exchange rate measure that should enter into the decision-making process should be measured in real terms, i.e., adjusted for price differentials across economies. However, all the exchange rate indices that have so far been constructed use trade shares as weights for the different currencies. Such indices are more suited to explaining trade flows between countries. Given the rising importance of remittances as a source of foreign exchange for emerging market economies, and given the foregoing theoretical considerations, it may be useful to evaluate the utility of constructing exchange rate indices specifically for the purpose of helping to explain the behavior of remittances.

This section describes our attempt in constructing such indices, and presents estimates that incorporate the index into systems of vector autoregressions. The methodology for computing the OF deployment-based exchange rate index parallels that of the trade-based effective exchange rate indices complied by the BSP, as discussed in Box 1, with OF deployment utilized in place of trade weights. The top 10 countries of destination of OFs from 1996-2005 determined the choice of currencies to be included in the basket as well as the weights attached to them.[12] Figure 5 illustrates the distribution of OFs in the major countries of destination, led by USA, and followed by Saudi Arabia, Malaysia, Canada, Japan, Australia, Hong Kong, United Arab Emirates, Italy and Taiwan. It can be seen that around 70 percent of OFs, on average, are deployed in these countries. The percent share of each country to total deployment of OFs for each year were re-weighted so that individual country weights to be used in the construction of the new exchange rate when summed up will add up to one.[13]

[12] The data series for deployment of OFs based on countries of destination are sourced from the CFO and DFA and are available from 1996 onwards.

[13] Appendix 3 details the weights for the currencies in the NOER and ROER.

Figure 5. Top 10 Countries of Destination of OFs, 1996-2006
(percent share to total deployment)



Hence, two deployment-weighted indices were estimated, namely, the nominal OF deployment-based exchange rate (NOER) and the real OF deployment-based index (ROER), or the simply the NOER adjusted for inflation differentials of countries included in the currency basket (using 1980 as the base year, as in the effective exchange rate indices of the BSP). Computationally,

$$NOER_t = \sum_{i=1}^{n} \left\{ \left[\left(\frac{ERPhil_{\$t}}{ERPhil_{\$1980}} \right) \times \left(\frac{ERi_{\$1980}}{ERi_{\$t}} \right) \times 100 \right] \times w_{it} \right\}$$

$$ROER_t = NOER_t \times \left(\frac{CPI_{Phil}}{\sum_{i=1}^{n} CPI_{i\,t} \times w_{it}} \times 100 \right)$$

where	$ERPhil_{\$t}$	is the nominal US$/P exchange rate of the Philippines at time *t*
	$ERPhil_{\$t}$	is the nominal US$/P exchange rate of the Philippines in 1980
	$ERi_{\$1980}$	is the nominal US$/national currency exchange rate of country *i* in 1980

	$CPI_{PHIL\ t}$	is the consumer price index (CPI) level of the Philippines at time t
	CPI_{it}	is the CPI level of country *i* at time *t*
	w_{it}	is the weight of the currency of country *i* at time *t*

The nominal index, NOER, is a weighted arithmetic mean of the changes of the peso relative to each component of a basket of currencies, with the weights being given by annual OF deployment data, while the real index, ROER, adjusts the NOER according to the cost of living differences between the Philippines and each economy whose currency is included in the NOER basket.

Figure 6 compares the behavior of the real index that we have introduced, the ROER index, to that of the real bilateral (₱/$) index where, for comparability, both indices

are measured so that an increase in the index reflects an appreciation of the peso. Although there are some broad similarities in the movements of the two indices, the most striking point is that the peso over the long run has depreciated more against the US dollar than against the OF-weighted currency basket. The bilateral index is also more volatile: for the period 1980:Q1–2006:Q2, the coefficient of variation for the bilateral index is 0.146, against 0.116 for the ROER index. This is to be expected, since the peso is more likely to share characteristics with the currencies of the OF destination countries than with the US dollar, and there should therefore be greater co-movement between the former group of currencies than between the peso and US dollar. A major implication is that, to the extent that the remuneration of the overseas workers are denominated in the currencies of their destination countries, then OF family incomes are made less sensitive to fluctuations in the peso-dollar rate.

Figure 6. Real Bilateral (₱/$) and Real OF Deployment-Weighted Exchange Rates (ROER)

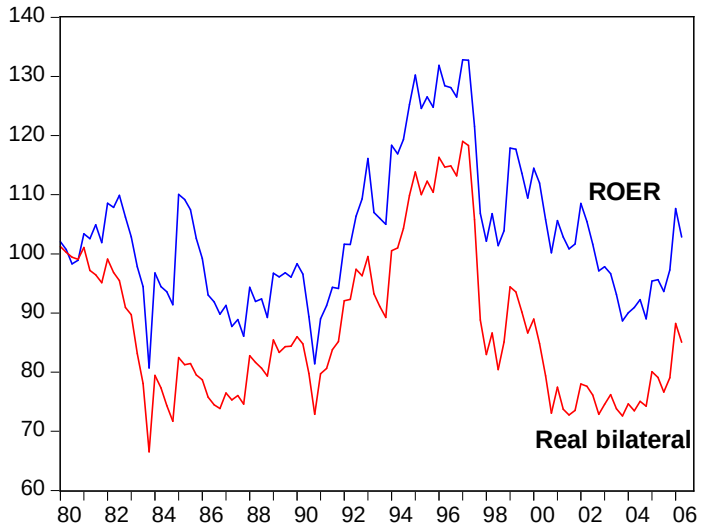
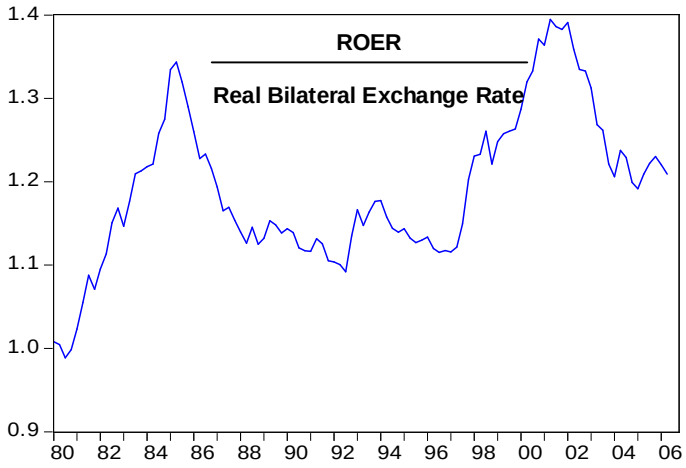


Figure 7 shows the trend, since 1980, of the ratio of the ROER index to that of the real bilateral exchange rate. The ratio can be interpreted as measuring, relative to 1980, the value of the currencies in the ROER basket that can be purchased by one US dollar. It can be seen that, over the long term, the currencies of the OF destination countries have depreciated relative to the dollar. Over the past few years (i.e., since about 2002), however, there has been some reversal, owing to the weakening of the dollar. It should be noted that this can be one major factor that mitigates any adverse impact of the recent appreciation of the peso on OF family incomes.

Figure 7. Relative Movements of ROER and Real Bilateral (₱/$) Exchange Rate



The foregoing considerations argue for inclusion of a deployment-weighted exchange rate index in the vector autoregressions. The specifications of the estimated VARs are summarized in Table 3. VARs 9 and 10 include a single measure of the exchange rate, which is the deployment-weighted measure, in nominal and real terms, while VARs 11 and 12 incorporate two measures simultaneously, one being the nominal or real bilateral ₱/$ rate and the other, the corresponding nominal or real deployment-weighted measure.

Table 3. Specification of Estimated Vector Autoregressions

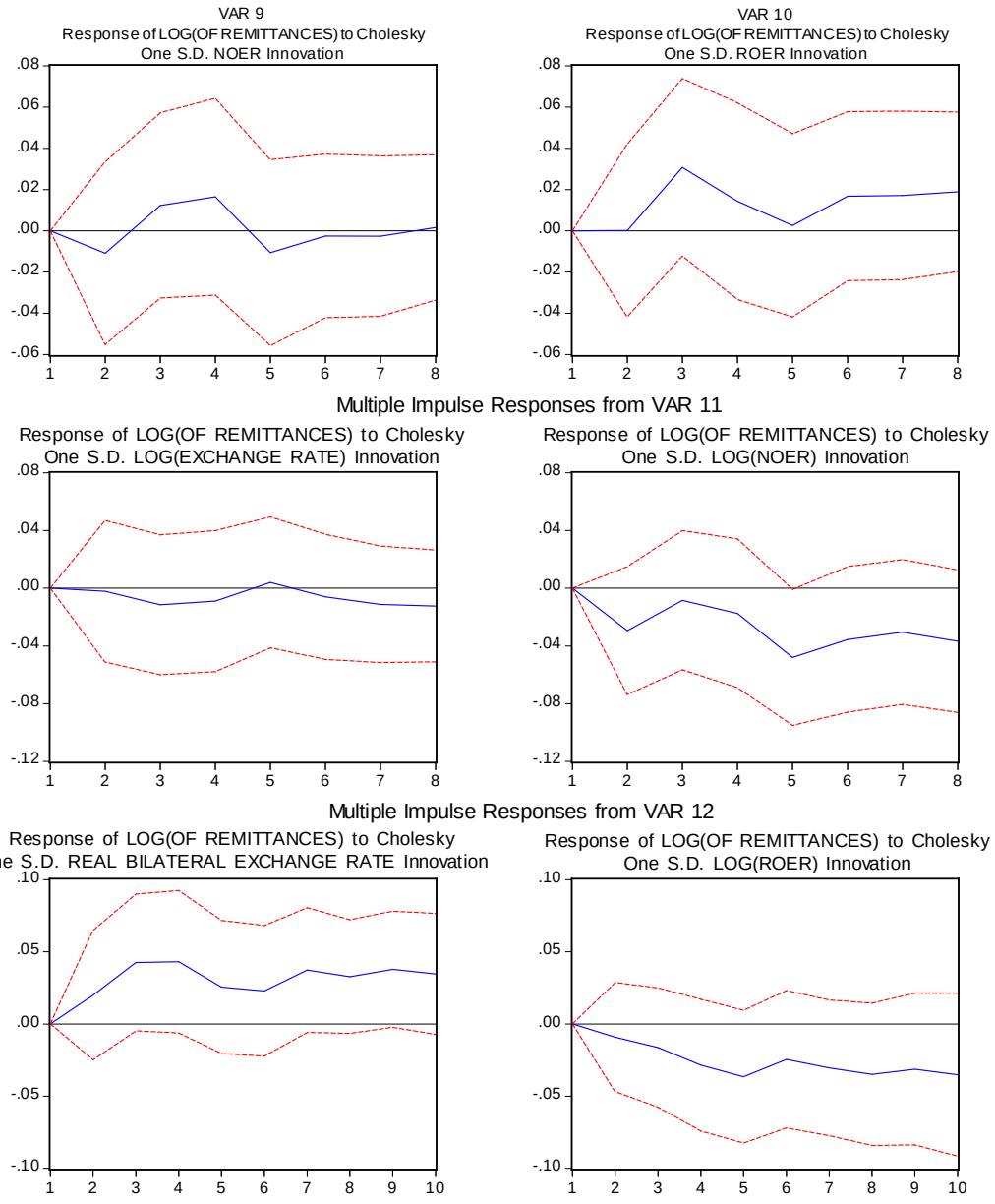
Variable	VAR 9	VAR 10	VAR 11	VAR 12
Log(OF Remittances)	ü	ü	ü	ü
Exchange Rate (₱/$)			ü	
Real Exchange Rate ($/₱)				ü
NEER Broad				
REER Broad				
NEER Narrow				
REER Narrow				
NEER Major				
REER Major				
NOER	ü		ü	
ROER		ü		ü
Real 91-day T-bill Rate	ü	ü	ü	ü
Log(GDP)	ü	ü	ü	ü
Log(OF Deployment)	ü	ü	ü	ü

The relevant IRFs are presented in Figure 8. Including either the nominal or the real deployment-weighted index as the single exchange rate measure in the VAR fails to produce significant results. In as much as the US dollar still remains the currency of choice for transmission of funds across countries, then failure to include the ₱/$ rate

would inadequately account for the exchange rate impact in the VAR system.[14] Hence, it is indeed worthwhile to include both the bilateral and the OF deployment-weighted exchange rates in the estimations, as in VAR 11 and VAR 12, for the nominal and real indices, respectively. The insignificant result for the impact of the nominal peso-dollar rate on remittances in VAR 11 underscores the need to consider differences in the purchasing power of the peso vis-à-vis the US dollar and currencies of major OF host countries. This was addressed accordingly by VAR 12 which yielded the most interesting result, as shown in the lower portion of Figure 8. While an appreciation of the peso relative to the US dollar alone leads to an increase in remittances, the depreciation of the peso relative to the US dollar as well as currencies of major OF destination countries leads to a rise in remittances, indicating the dominance of substitution effect over income effect. This could allow us to peer into the motives of OFs for remitting income earned overseas. As noted in Section II, the dominance of the substitution effect is more in line with investment than with altruistic motives as the increase in remittances brought forth by the depreciation can be seen as a way to take advantage of investment opportunities in the Philippines.

[14] The US dollar remains the currency of choice of OFs for sending remittances to the Philippines because it is a common practice of remittance centers in various host countries to course remittances through US correspondent banks.

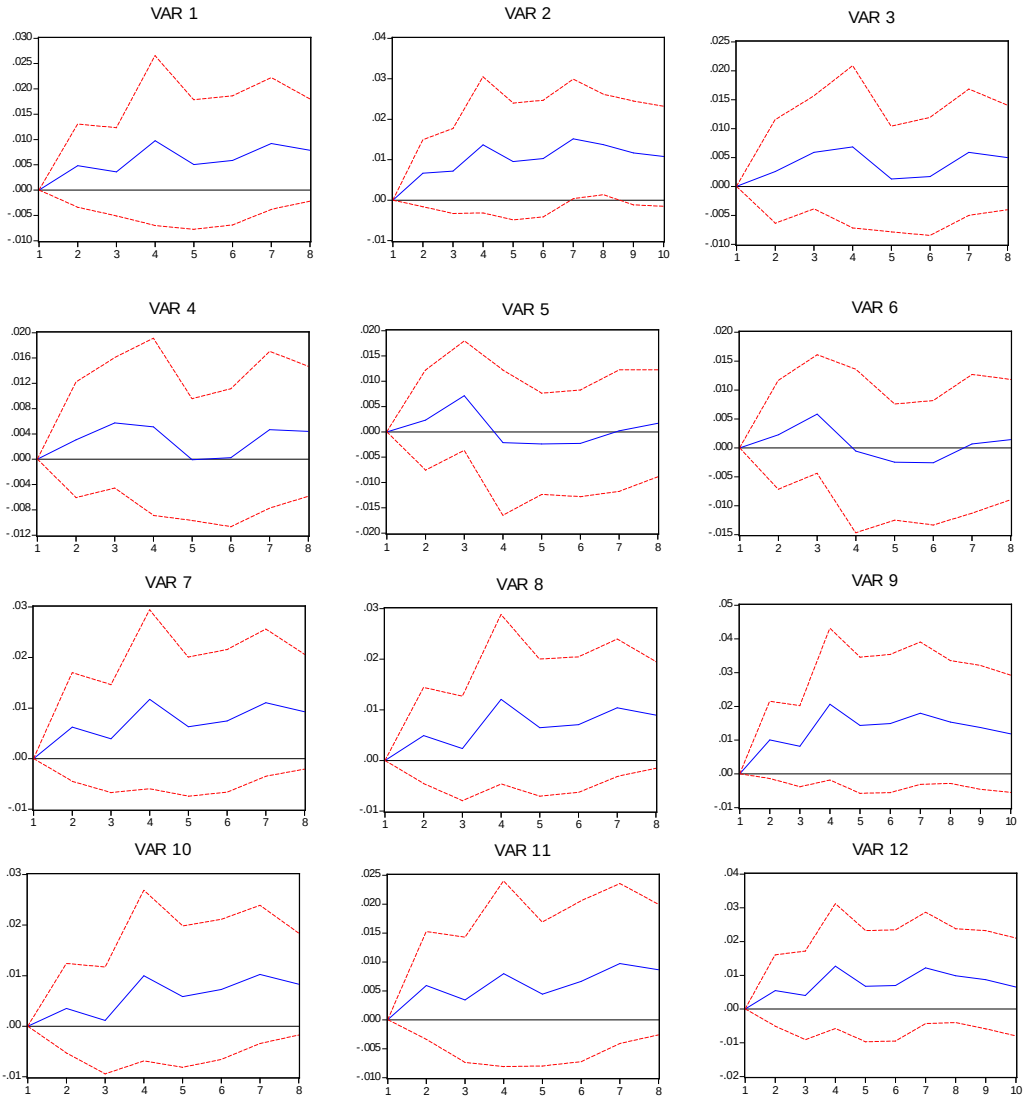
Figure 8. Impulse Responses of OF Remittances from VARs 9-12



VII ARE REMITTANCES PRO- or ANTI-CYCLICAL?

Although the matter of the pro- or countercyclicality of OF remittances is not the main topic of the current paper, it can reinforce our preceding finding that motives of OF are predominantly profit-driven or investment-related as seen from the positive impact on remittances of a peso depreciation vis-à-vis currencies of top OF host countries. As we have indicated in Section II, profit-driven motives are apparent when an increase in recipients' income encourages migrants to remit more. Figure 9 collates the impulse response functions from the previously estimated VARs, pertaining to the response of OF remittances to a shock in GDP. Although most of the results are statistically insignificant, the general direction of the responses is consistent across the VAR specifications: a positive GDP shock induces an increase in remittances. Statistically significant results are obtained when the real bilateral (₱/$) exchange rate measure is included in the VAR. These results indicate that OF remittances tend to be procyclical and that motives of OFs to remit are likely to be profit-driven rather than altruistic.

Figure 9. Impulse Responses of OF Remittances to GDP from VARs 1-12
(Response of LOG(OF REMITTANCES) to Cholesky
One S.D. LOG (GDP) Innovation)



VIII. CONCLUSION AND POLICY IMPLICATIONS

As an answer to the question posed by the title of this paper, we showed that an OF deployment-weighted exchange rate index proved to be a significant determinant of remittances, both at the empirical and theoretical levels. A depreciation of the peso vis-à-vis a basket of currencies of major OF destination countries prompts an increase in remittances. This indicates that OFs are driven by investment-related rather than altruistic motives.

The findings of this paper carry important implications. On the significance of an OF deployment-weighted exchange rate index as a determinant of OF remittances, it may be worthwhile to evaluate the utility of constructing exchange rate indices specifically for the purpose of helping to explain the behavior of remittances. On the predominance of investment over altruistic motives of OFs, it underscores the need to develop investment programs that could induce OFs to channel their remittances toward productive investments. To enhance the impact of remittances on savings, investment, and thus economic growth, it is vital to strengthen the incentives to "bank the unbanked". For its part, the BSP has adopted measures to encourage overseas Filipinos to remit through the financial system. These measures are anchored on four principles such as enhancing transparency and promoting competition in the remittance market; improving the country's payment and settlement systems and the access to financial services; encouraging OFs and their families to increase savings and investments; and cultivating financial literacy among OFs and their families.[15] Finally, it is worthwhile to note that OFs will react in the same way as local residents and foreign investors to poor macroeconomic policies—they will reduce local exposure if these policies persist. Thus, authorities need to preserve macroeconomic stability so that remittances will to continue have a positive impact on the economy.

As with previous studies that analyzed the determinants of remittances, this paper calls on future studies to treat remittances as another macroeconomic variable that is endogenous to other home country variables and not as an exogenous flow of money from abroad. Given the significant impact of exchange rate changes to remittances and the profit-driven motives of OFs, as this paper has shown, remittance flows can affect saving and investment behavior and thus future growth. The magnitude of these links depends on many direct and indirect effects and are largely determined by the structural features of the economy and the relevant elasticity values. Hence, tracing these effects requires a general equilibrium model, such as a dynamic stochastic general equilibrium model (DSGE), where endogenous labor supply decisions of OFs are explicitly incorporated and enough sectoral detail exists to allow the transmission of macroeconomic variables affecting remittances to economic growth.[16]

[15] In particular, the measures adopted by the BSP to encourage OFs to remit through formal channels include, among others, the issuance of Circular No. 534 (disclosure of remittance charges and other relevant information) and Circular No. 564 (requirement of valid identification for financial transactions); inclusion of OFW portal in the BSP website; grant of foreign currency deposit unit (FCDU) license to rural banks and cooperatives; interconnection of major automated teller machine (ATM) networks in the country; approval of alternative modes of remittances; and conduct of Financial Literacy Campaign (FLC) among OFs and their beneficiaries.

[16] To this end, initial steps have been undertaken in Dakila and Dakila (2006) which examined the impact of remittances in a multi-region computable general equilibrium model.

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APPENDIX 1:
Studies on Impact of Exchange Rate on Remittances

Author/s	Coverage		Impact of Depreciation on Remittances
	Time Period	Countries	
Faini (November 1993)	1971-1989	Morocco Portugal Tunisia Turkey Yugoslavia Greece Italy Portugal Spain Turkey Yugoslavia	+
Loser, et al (2003)	unspecified	Colombia, The Dominican Republic El Salvador Mexico	Inconclusive (positive only for a subsample of countries covered by the study that included Columbia and El Salvador)
Higgins, et al (2004)	1970-1997	Bolivia Columbia Dominican Republic El Salvador Guatamela Honduras Jamica Mexico Peru	Not significant
Yang (June 2006)	July 1997 – October 1998	Philippines	+
Faini (October 2006)	1990, 2000	38 countries in the Caribbean, Americas, Africa and Asia	Not significant
Lueth and Ruiz-Arranz (2006)	1980-2004	11 countries in Asia, Europe and Middle East	-
Vargas-Silva (March 2007)	January 1995-February 2006	Mexico	Not significant

APPENDIX 2:
Selected Studies on the Cyclicality of Remittances

Author/s	Coverage		Cyclicality of Remittances
	Time Period	Countries	
Chami, et al. (2003, 2005)	1970-1998	113 countries including the Philippines	Countercyclical
BSP-DER (2003)	1970-2003	Philippines	Inconclusive
Burgess and Haksar (2005)	1985-2002	Philippines	Inconclusive
Tuaño-Amador, et al. (forthcoming)	1989-2006	Philippines	Procyclical

APPENDIX 3:
Currency Weightings in the NOER and ROER[1]

Currency	1996[2]	1997	1998	1999	2000	2001	2002	2003	2004	2005
US dollar	0.550	0.526	0.515	0.447	0.454	0.491	0.490	0.483	0.492	0.501
Saudi riyal	0.154	0.131	0.128	0.184	0.181	0.180	0.175	0.180	0.179	0.192
Malaysian ringgit	0.116	0.100	0.094	0.128	0.126	0.083	0.081	0.079	0.064	0.046
Canadian dollar	0.048	0.080	0.078	0.065	0.066	0.071	0.073	0.073	0.073	0.081
Japanese yen	0.035	0.041	0.044	0.042	0.044	0.047	0.055	0.057	0.064	0.055
Australian dollar	0.019	0.018	0.039	0.043	0.043	0.041	0.040	0.040	0.039	0.042
Hong Kong dollar	0.029	0.033	0.031	0.034	0.032	0.034	0.033	0.035	0.036	0.035
Italian lire[3]	0.021	0.040	0.036	0.030	0.026	0.024	0.024	0.030	0.029	0.023
New Taiwan dollar	0.027	0.032	0.034	0.026	0.028	0.030	0.029	0.023	0.025	0.024
Total	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

[1] United Arab Emirates dirham was excluded in the basket of currencies due to lack of available continuous data series. The remaining nine currencies of top OF destination countries were re-weighted so that the weights add up to one.
[2] The currency weightings for 1996 were applied to the earlier period (1980-1995) due to unavailability of OF deployment data for said period.
[3] With the introduction of the euro in 1999, a conversion factor obtained from the European Central Bank website <http://www.ecb.int/bc/intro/html/index.en.html#fix> was used to generate a continuous data series for the Italian lire until 2005.