

Effects of International Remittances on the Philippine Economy: A Cointegration Analysis

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This paper examines the effect of international remittances on the Philippine economy, both in the short run and in the long run, using a standard cointegration method. Results of the analysis show that remittances have a positive significant effect on the Philippine economy in the long run. This translates to a 0.018% increase in the economy's gross domestic product when the remittances sent by overseas workers to the Philippines increases by 1%. However in the short run, remittances negatively affect the economy's output, which implies that an increase in remittances sent to the country is associated with a decline in the economy's output.

Keywords: remittances, Philippine GDP, time series, cointegration, short run dynamics

INTRODUCTION

International migration has grown rapidly due to the globalization of economic activity and its ensuing effects on labor migration (United Nations Population Fund, 2006). This global migration has been receiving mounting interest from government, and from academics and the media due to the fact that this phenomenon depicts a continuous growth and an increasing trend. This international movement, mainly from developing countries into developed countries, has generated a significant improvement in the lives of migrants and their families. These international migrants receive higher wages and their families who are left in their country of origin benefited through the remittances (Migration Information Source, 2008).

Over the past two decades, developing countries have experienced a significant increase in the bulk of remittances sent by international migrant workers. The World Bank's official record of remittance flow for year 2010 show that \$325 billion was transferred to developing countries, which signaled a recovery after the global financial crisis. This accounts for almost 75% of the world's total remittances which amounted to \$440 billion in 2010. Remittance flows to developing countries are expected to grow at lower but more sustainable rates of 7-8 percent annually from 2011 to 2013, to reach \$404 billion by 2013 (Mohapatra, S. et. al, 2011).

The Philippines occupies a prominent position among remittance-receiving and labor-exporting countries. According to the Philippine Overseas Employment Administration (POEA), in 2010

the total number of deployed overseas Filipino workers, both land-based and sea-based, was close to 1.5 million Filipinos; and the estimated global stock of overseas Filipinos as of 2009 was over 8.5 million. This large number of Filipinos abroad has positioned the country to be one of the highest recipients of international remittances. According to the World Bank, the Philippines is reputed to be the world's fourth highest remittance recipient country, next only to India, China and Mexico. Available data from the Bangko Sentral ng Pilipinas (BSP) indicates that in 2010, remittances of overseas Filipino workers coursed through banks reached a record high level of \$18.8 billion (up by 8.16 percent from 2009 figures). The total amount contributed close to 10% of the country's gross domestic product (GDP). BSP pointed out that major driving factors that help accelerate growth in remittances are: sustained demand abroad for Filipino workers diversity of destinations; and the skills of overseas Filipino workers. This surge in remittances has continued to fuel a strong domestic demand for consumption goods, boosted the peso, alleviated the international debt burden, tamed inflation, increased foreign exchange reserves and contributed in general to a better picture of the economy.

However, there are still contradicting views as to what effect remittance flows have on the migrants' origin country. Some argue that remittances create negative effects on the origin country, as remittances have been used mostly for consumption, rather than to increase the productive capacity. Also, remittances present a moral hazard or dependency syndrome that will likely impede economic growth, as recipients tend to reduce participation in productive activities (Chami, et. al, 2003). On the other hand, many studies suggest that the utilization of remittances on consumption has its multiplier effect in terms of increasing the demand for goods and services, and of indirect investment, especially when the money is used for purposes of health and education, and for real estate, all of which have positive effects on human development (Ramirez

and Sharma, 2006; Giuliano, et.al, 2006; and Jongwanich, 2007).

Given the abovementioned views, this paper aims to apply a standard cointegration method to evaluate the effects of remittances on the performance of the Philippine economy. This study utilized a simplified macroeconomic model to investigate the short-run and long-run effects of remittances on the Philippine economy. A lot of conflicting issues can be found in the literature which argues that remittances either support economic growth or retard it. This study will attempt to provide information that will help to probe the conflicting effects of remittances on the Philippine economy. It will evaluate the effects of remittances sent only through formal channels (e.g. banks) from 1977 to 2006. However, it should be noted that the effects of remittances coursed through informal channels are beyond the scope of this study. In addition, this study will fill the gap in the literature on remittances and output because few studies which are limited in scope have employed the cointegration method to analyze the effects of remittances on the Philippine economy.

The rest of the paper is organized as follows: Section II presents the review of related literature; Section III outlines the methods explored in this paper; Section IV presents the findings of the study; and the last section presents concluding remarks.

REVIEW OF RELATED LITERATURE

This section presents some of the highlights as to how remittances affect the recipient country's economy. There are contrasting results given in the literature with regard to the effect of remittances on economic growth. Some studies suggest that remittances support economic growth, while others argue that they retard economic growth. Given these, it can be observed that the effects of remittances may depend on the recipient country's capacity to manage remittances and to maximize the benefits out of it, or to minimize the associated negative effects of remittances on the economy.

Remittances Support Economic Growth

According to the UNDP (2005), remittances are important for developing countries as the amount can provide access to additional financial resources and ultimately, to the creation and sustainability of livelihoods. Ratha and Maimbo (2005) examine the importance of workers' remittances as a stable source of external funding in developing countries. The economic effect of remittances increases the recipient's household income and the foreign exchange reserves of the recipient's country. Remittances contribute to output growth if invested, and generate a positive multiplier effect if they are consumed. Ramirez and Sharma (2006) conducted a study in Latin American countries using a panel unit root and cointegration analysis. The results of the study suggested that remittances have a positive and significant effect on economic growth. Moreover, the impact of remittances on growth is more pronounced in the presence of the financial development variable. The availability of a strong and viable financial institution is the key point in maximizing the benefit from the remittances. Mundaca (2005) stressed that the level of financial development in Central America, Mexico and Dominican Republic tends to increase the responsiveness of economic growth to remittances. This means that the effect of remittances on growth in the long run is influenced by making financial services more generally available. Another study on the link between remittances and growth, which used a newly-constructed cross country series for remittances covering about 100 developing countries, found that remittances boost growth in countries with less developed financial systems, by providing an alternative way to finance investment and help overcome liquidity constraints (Giuliano, et.al, 2006). Jongwanich (2007), in his study on the impact of workers' remittances on growth in 17 developing Asia-Pacific countries, which used panel data over the period 1993-2003, found that a one percent increase in remittances would tend to increase economic growth by 0.43. However,

the impact is only marginal, operating as it does through domestic investment and human capital development.

In the Philippines, several studies have evaluated the effect of remittances on the economy. Ang (2007), in his study on workers' remittances and economic growth in the Philippines, found that on the national level, remittances do influence economic growth positively and significantly. According to, Economic Planning Secretary Cayetano Padrenga Jr. as quoted by Riza Olchondra of the *Philippine Daily Inquirer*, remittances will lead to continuing consumption demand, which will also lead to continuing growth in sectors that have been growing in the past, thereby fueling economic growth. In addition, Alcuaz (2007) of Bloomberg found positive correlations between remittances and economic growth.

On the household level, Tabuga (2007) investigated the general relationship between remittances and household expenditures in the Philippines by doing a cross-sectional analysis of the 2003 Family Income and Expenditure Survey (FIES). Tabuga showed that there is evidence that households receiving remittances tend to consume consumer items more, but they also invest more on education, housing, medical care and durable goods. He reported that this has a beneficial effect on the economy because it potentially creates an impact on local development.

Remittances hamper economic growth

A panel data analysis, which utilizes remittances data for 28 years from 113 countries, indicates that remittances do have a negative effect on economic growth, indicating that the moral hazard problem brought by remittances is severe (Chami, R., Fullenkamp, C. and Jahjah, S., 2003). Recipients of remittances tend to decrease labor participation, reduce labor effort, limit job searches and invest in riskier projects. Chami, et al (2008) also mentioned that households are reluctant to pressure the government in enacting policy reform facilitating economic growth,

since remittances protect them against adverse economic shock. Cáceres and Saca (2006) found that in El Salvador, remittances lead to a decrease in economic activity, international reserves, and money supply; and an increase in the interest rate, imports, and consumer prices. Ang (2007) found that on the regional level, remittances do not affect economic growth in the Philippines. This further indicates that benefits from remittances can hardly be translated into development and growth. On the household level, Ang, et. al (2009) examined the role of remittances in increasing household consumption and investment and their potential for rebalancing economic growth. Results of the study showed that remittances negatively influence the share of food consumption in the total expenditure, implying that remittances do not contribute toward rebalancing growth by creating domestic demand.

In remittance-receiving countries, the Dutch disease effect is manifested by strong empirical evidence to the effect that remittances are positively correlated to real exchange rate appreciation (Chami, R. et al., 2008). Tũaño-Amador, et al. (2007) found that there is evidence to suggest that remittances have led to some symptoms of the Dutch disease phenomenon in the Philippines. In particular, the strong remittance trend may have contributed to the recent appreciation of the peso in real terms; but they do not find a sharp decline in economic growth when compared to countries that suffer from the disease.

Burgess and Haksar (2005) studied migration and remittances in the Philippines. Their findings revealed that the empirical evidence does not clearly support the purported short-term stabilizing effect on consumption of remittance flows. Furthermore, as in other countries, the longer term economic effect of remittance is ambiguous. This finding is consistent with what Ratha and Mohapatra (2007) presented in the G8 outreach event on remittances, which was that the evidence on the effect of remittances on long-term growth is inconclusive. Remittances may increase consumption and per capita income levels, and reduce poverty and inequality; but

they do not directly impact growth. On the other hand, a large outflow of workers can reduce growth in the countries of origin. However when remittances are used to finance education and health, and to increase investment, then they could have a positive effect on economic growth; which makes ambiguous the effect of remittances on the economy.

Motivation to remit and cyclicity of remittances

To further understand the behavior of remittances and their effect on the economy, it is logical to delve into the motivation of workers to remit. Bouhga-Hagbe (2006) looked for potential evidence of altruistic motives behind the decision to remit by workers in selected countries in the Middle East and Central Asia. The results of the study suggest that in the long run, remittances tend to be negatively correlated to agricultural GDP. This supports the view that altruism could play an important role in the workers' decision to remit. By altruism, Bouhga-Hagbe (2006) means the willingness of someone, in this case a worker living outside his or her home country, to provide financial assistance to another who is in a situation of "hardship".

So if remittances are altruistically motivated, then one would expect the counter-cyclicity nature of remittances. Tũaño-Amador, et al. (2007) showed that in the Philippines, remittances are quite the opposite; they are procyclical in nature. Procyclicity suggests that portfolio and investment considerations are as important as altruistic considerations in influencing trends in remittances. Their methodology revealed that the output differential impacts positively on remittances after one quarter. This supports the finding that remittances are procyclical. However, this finding is in contrast to what Chami, Fullenkamp and Jahjah (2003) found, which is that remittances behave counter-cyclically in developing countries. On the other hand, Ratha (2003) argues that remittances are more stable than private capital flows in the form of either debt or equity, which often move procyclically, tending

to boost income during good times and to lower income during bad times. Ratha and Mohapatra (2007) noted that remittances used for investment purposes behave procyclically, just as other investment flows do; while remittances are more likely to be countercyclical in poor countries.

METHODOLOGY

Empirical Model

To shed some light on the contrasting effect of remittances on the Philippine economy, this study employs a macroeconomic model, based on what Glystos (2002) used to evaluate the impact of remittances on consumption, investment, imports and output in Mediterranean countries. It is worth mentioning that the factor of income used by Glystos (2002) is a kind of national income consisting of GDP plus migrant remittances. However in this study, the model was extended to include initial GDP and to incorporate additional sources of external funding, such as foreign direct investment (FDI) and development aid (ODA). The inclusion of FDI and ODA is proposed in this study so as to control other sources of external funding, since remittance is a form of external funding too. In his study Glystos (2002) introduced the inclusion of remittances into a macroeconomic model; for which reason it is also considered valid to include FDI and ODA to serve as control variables to analyze the effect of remittances on the Philippine economy. The dynamism of the model is captured by introducing a year lag of the economy's output. Intuitively, the previous performance of the economy affects the current performance.

The model is thus postulated as follows:

$$Y_t = c_0 + c_1 Y_{t-1} + c_2 Cons_t + c_3 Inv_t + c_4 Gov_t + c_5 Nex_t + c_6 Remit_t + c_7 FDI_t + c_8 Aid_t + \varepsilon_t \quad (1)$$

where Y_t is the economy's output measured in terms of real GDP at constant prices at time t ; Y_{t-1} denotes the initial level of real GDP; $Cons_t$

refers to the consumption; Inv_t to investment; Gov_t to government expenditure; Nex_t refers to the net exports (Exports – Imports); $Remit_t$ to the remittances sent by migrant workers; FDI_t and Aid_t are the other external sources of funding, foreign direct investment, and official development assistance; and ε_t is the error term. Since all variables were estimated in logarithmic form, estimates yield the elasticity of variables.

The main concern in this study is to see how remittances affect the performance of the Philippine economy. If remittances support growth in the economy, then it is expected that c_6 is positive, meaning the surging increase of remittances is positively associated with growth in the economy, which is similar to what Ramirez and Sharma (2006), Giuliano, et al. (2006), Jongwanich (2007) and Alcuaz (2007) found out. On the other hand if c_6 is negative, it implies that an increase in remittances sent to the Philippines is associated with slowing down the growth of the economy (Chami, et al., 2003; Burgess and Haksar, 2005; and Ang, et al., 2009). This study hopes to find information that would help clear the argument as to what effect remittances have on the economy by evaluating their effects both in the short run and in the long run. This study performs a cointegration test to understand the long-term relationship between output and remittances. The short-term dynamics of the postulated model will be estimated, using error correction models if the variables involved are cointegrated.

Data Used

The main source of data in this study is the World Development Indicator (WDI). Moreover, OECD.stat¹ was also used to retrieve data on official development assistance. The period of coverage of this study is from 1977 to 2006 (29 observations)². Based on the national income accounting, constructed were regression equations which represent the household sector, the private sector, the government sector and the external sector. Table 1 presents the description of data used in this study.

Table 1.**Data Description**

Variables	Description
Y	Real Gross Domestic Product
Y _{t-1}	Initial Real Gross Domestic Product
Cons	Consumption of durable goods, nondurable goods and services (Personal Consumption Expenditure)
Inv	Net additions to the (physical) capital stock in an accounting period, or, to the value of the increase of the capital stock (Gross Capital Formation)
Gov	Government Consumption/Expenditure
Nex	Net Exports (Exports – Imports)
Remit	Overseas remittance coursed thru banks
FDI	Foreign Direct Investment
Aid	Official Development Assistant Received

Note: units used are standardized in 2000 constant prices US\$

Unit Root Test Using Augmented Dickey Fuller Test

Prior to estimating the regression model (1), each variable was tested for the presence of unit root to ensure stationarity of the series. Stationarity of the data should be justified so that a regression analysis can be conducted meaningfully. To verify the hypothesis that the time series variables are non-stationary the Augmented Dickey Fuller (ADF) test was carried out, using the Akaike and Schwarz info criterion to determine the maximum lag length. The test was first conducted at levels and if unit root was detected, testing was conducted at first difference. Two auxiliary regressions were considered in ADF test³; an intercept with time trend (2) and with intercept only (3).

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta Y_t = \beta_1 + \delta_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-1} + \varepsilon_t \quad (3)$$

In the two equations, the parameter of interest is δ . The null hypothesis (H_0) and the alternative (H_A) were formulated as follows: $H_0: \delta = 0$ and $H_A: \delta < 0$. The null hypothesis indicates that variable has unit root, whereas the alternative hypothesis shows no unit root. The estimated t-statistic is then compared with the appropriate critical value in the Dickey Fuller table to determine if the null hypothesis is valid.

Cointegration test

Doing a cointegration test requires that variables involved have unit roots. It is suspected that variables have unit roots at levels but become stationary after first differencing. These would indicate that variables are integrated to the order of 1 or I(1). The idea of a cointegration analysis is that although two or more variables are non-stationary, their linear combination might be stationary. If variables are cointegrated, this suggests that there exists a long-term equilibrium or long run relationship between dependent and independent variables.

Two cointegration tests were explored in this study. The first test used the usual ADF test applied on the residuals of equation (1). This was verified by testing the residuals of the postulated model to determine whether residuals are stationary or not. In testing whether the variables are cointegrated, a new variable will be defined as e_t ,

$$\varepsilon_t = Y_t - (c_0 + c_1 Y_{t-1} + c_2 \text{cons}_t + c_3 \text{Inv}_t + c_4 \text{Gov}_t + c_5 \text{Nex}_t + c_6 \text{Remit}_t + c_7 \text{FDI}_t + c_8 \text{Aid}_t) \quad (4)$$

The ADF test was administered to the residuals of the cointegrating equation. If null hypothesis of unit root in (e_t) is rejected in favor of the $I(0)$ alternative, then this implies that the variables are cointegrated.

On the other hand, the Johansen cointegration test uses the maximum likelihood procedure to determine presence of cointegrating vectors. The Johansen test assumes that the dependent variable is $I(1)$. All variables at $I(1)$ are grouped together and tested for cointegration, using the Johansen cointegration test. In this study, the cointegration test considers linear deterministic trend in the data; and a test was conducted both to include intercept and trend, and to use intercept only. The Johansen cointegrating test is based on the trace statistics and maximum eigenvalue. The null hypothesis indicates that there are no cointegrating relationships among the variables. If null is rejected in favor of the alternative, then there is sufficient evidence to indicate that cointegration is present among variables.

Error Correction Model

When variables are cointegrated, the results suggest the use of the error correction model (ECM). The error correction model will allow us to understand the short-run dynamics of the relationship between independent variables and dependent variable. The error correction model is postulated as follows:

$$\begin{aligned} \Delta Y_t = & c_0 + \sum_{h=0}^a c_1 \Delta Y_{t-1} + \sum_{h=0}^b c_2 \Delta \text{Cons}_{t-h} + \sum_{h=0}^c c_3 \Delta \text{Inv}_{t-h} + \sum_{h=0}^d c_4 \Delta \text{Gov}_{t-h} + \sum_{h=0}^e c_5 \Delta \text{Nex}_{t-h} \\ & + \sum_{h=0}^f c_6 \Delta \text{remit}_{t-h} + \sum_{h=0}^g c_7 \Delta \text{FDI}_{t-h} + \sum_{h=0}^h c_8 \Delta \text{Aid}_{t-h} + c_9 \text{ECT}_{t-1} + \varepsilon_t \end{aligned} \quad (5)$$

where na , nb , nc , nd , ne , nf , ng and nh are the lengths of lags included for each specified variable, and ECT is the error correction term. ECT is computed based on the cointegrating vectors. If the variables in (1) are not cointegrated, then the error correction term from (5) is eliminated; and the variables will be analyzed in first difference using the OLS method.

RESULTS AND DISCUSSION

It is imperative in any time series data to do visual inspection of the series before proceeding to empirical analysis. Appendix 1 shows the linear graph of each variable plotted against time. It can be observed that GDP, consumption and government expenditures seem to be trending upward, although government expenditures did not display a smooth trend. The level of investment, and the bulk of remittances and aid show an unsmooth and rough trend; but it still seems to be moving upward. The level of aid extended to the Philippines shows an increasing trend until the mid-1990s; and then it gradually decreases. Net exports and foreign direct investment displays no clear trend. However, it might be suspected that a trend is present in foreign direct investment.

Since it is apparent that the presence of a trend is observable among the majority of the variables involved, this suggests that the data set is not stationary, hence the unit root test is deemed necessary.

Unit Root Test

Table 2 and 3 presents the results of the unit root test conducted at levels and first difference, respectively. The results show that net export has no unit root both in the Akaike and Schwarz info criterion. This implies stationarity of the net

exports data at levels. Foreign direct investment too was detected to have no unit root; but using both criteria with trend and intercept included but with only intercept included, unit root is present in the data set. However, other variables have contradicting results in terms of the presence of unit root between Akaike and Schwarz info criterion. GDP, consumption and investment have no unit root ,using Akaike with trend and intercept included; but Schwarz indicates presence of unit root. Remittances and ODA were consistently detected to have unit roots, implying non-stationarity.

Table 2.

Unit root test for Stationarity at Levels

Variables	Akaike Info Criterion		Schwarz Info Criterion	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
Real GDP	2.15	-3.51*	2.15	-2.83
Consumption	3.34	-3.60*	1.95	-2.49
Investment	-1.12	-4.42**	-1.91	-1.12
Government	-0.40	-2.45	-0.40	-2.45
Net Exports	-4.65***	-4.92***	-4.65***	-4.92***
Remittances	-0.16	-2.85	-0.16	-2.85
FDI	-2.49	-3.88**	-2.49	-3.88**
ODA	-1.71	-1.49	-1.71	-1.49

*, **, *** Significant at 10%,5% and 1%

Table 3.

Unit root test for Stationarity at First Difference

Variables	Akaike Info Criterion		Schwarz Info Criterion	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
Real GDP	-0.98	-4.63***	-2.90*	-4.63***
Consumption	-1.28	-2.18	-1.28	-2.18
Investment	-3.78**	-2.72	-4.02**	3.95**
Government	-3.84***	-3.80**	-.384***	-3.80**
Net Exports	-	-	-	-
Remittances	-8.17***	-8.22***	-8.17***	-8.22***
FDI	-7.91***	-2.55	-7.91***	-7.77***
ODA	-6.33***	-7.13***	-6.33***	-7.13***

*, **, *** Significant at 10%,5% and 1%

After first differencing, most variables reject the null hypothesis of unit root (Table 3). However, consumption variable still has unit root. Result of consumption is somehow strange, because at levels, it indicates that at 10% level of significance it has no unit root, but first difference result suggests presence of unit root. Another unexpected result of first difference unit root test is FDI. At levels, it indicates no unit root at 5%; but surprisingly it indicates presence of unit root at first difference, with trend and intercept included. After second differencing⁴, all variables show no evidence of unit root. Thus, stationarity of data set is achieved.

Results of the unit root test indicate that net export variable is stationary at levels, and consumption variable attains stationarity at second difference. The rest of the variables are integrated to order of 1 or I(1), that is, stationary at first difference.

Cointegration Test

Since the unit root test indicated that variables involved have unit roots except for net exports, cointegration tests were carried out to examine whether variables have long-run relationship. Using the ADF test for testing the presence of unit root at levels in the residuals of equation (1), it is shown that ADF test statistic is highly significant in both Akaike and Schwarz info criterion, including intercept only. However, if trend and intercept were included, ADF test statistic is significant at 5% and 10% in Akaike and Schwarz info criterion, respectively. This

implies that variables are cointegrated. This reaffirms the claim that although two or more variables are I(1), their linear combination might be stationary.

Similarly, the result of a cointegration test using the method proposed by Johansen shows that variables are cointegrated. In the context of the Johansen cointegration test, net export variable was not included in the test since it attains stationarity at levels. Nevertheless, a cointegration test including net export, shows that variables are cointegrated; but results were not reported. Table 5 presents the cointegration test using Johansen's test. Two test statistics were considered, such as the Trace and the Max-eigen statistics. These statistics were compared to their corresponding critical value set at 5% significance level. Results show that the Trace test indicates that there are five (5) cointegrating vectors at 5% level of significance. As shown in Table 5, the Trace statistic is lower than 5% in hypothesized cointegrating vector at most four ($r \leq 4$). Likewise, the Max-eigen value test rejects the null hypothesis of at most 1 cointegrating vector. This indicates two (2) cointegrating equations at 5% level of significance.

Based on the two cointegration tests, there is sufficient evidence to indicate that variables involved in this study are cointegrated. This strongly implies that there exists a long-run relationship between GDP and the other variables. The postulated model can well explain the long-term movements of GDP in terms of national income plus migrants' remittances, while holding for other external sources of funding.

Table 4.

ADF Test for Presence of Unit Root of Residuals at Levels

Variables	Akaike Info Criterion		Schwarz Info Criterion	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
ADF Test Statistic	-4.12***	-3.28*	-4.12***	-4.11**

*, **, *** Significant at 10%, 5% and 1%

Table 5.
Johansen Cointegration Test

Statistic	$H_0: r = 0$	$r \leq 1$	$r \leq 2$	$r \leq 3$	$r \leq 4$	$r \leq 5$	
	$H_A: r \geq 0$	$r \geq 2$	$r \geq 3$	$r \geq 4$	$r \geq 5$	$r \geq 6$	
Trace Statistic		125.62*	95.75*	69.82*	47.86*	29.79*	15.49
(p-value)		0.0000	0.0000	0.0009	0.0058	0.0187	0.0626
Max-Eigen Statistic		63.57*	47.00*	31.21	23.42	18.51	11.19
(p-value)		0.0003	0.0071	0.1008	0.1561	0.1121	0.1451

Notes: r denotes the number of cointegrating vectors. The asterisk (*) indicates the rejection of the null hypothesis of no cointegration at 5% significance level

Long-Term Dynamics of the Model

Table 6 shows the regression result by modified OLS. The main concern of this study is to evaluate the effect of the surging flow of remittances sent by migrant workers to recipient families in the Philippines. Results suggest that in the long run, a 1% increase in remittances would increase output by 0.018%, holding other factors constant. The estimate is highly significant (Table 6). This is indeed plausible since remittances are private transfers directly affecting the household level; and these transfers are stable in the sense that migrant workers are motivated to send remittances back home to sustain their family. Remittances sent by migrant workers are invested in education, land, and household enterprises that are likely to improve their lives in the long run (Yang, 2004). The investment of remittances in safe, profitable ventures and in human capital could boost and

enhance economic growth in the long run. This finding validates the claim that remittances support economic growth in the Philippines.

Looking at the estimates of the three sources of external funding, remittances, and foreign direct investment, one can posit a positive relationship to output, but aid shows a negative relationship. In comparison with FDI, remittances have a higher impact on the economy. This result is consistent with the trend of the level of remittances now exceeding foreign direct investments (World Bank, 2007). Thus, its effect is greater than other sources of external capital or funding.

With regard to other variables included, the regression model implies that in the long run, initial GDP, consumption and level of investment have a positive impact on output and is highly significant. These results are consistent with those suggested in the literature. However, government expenditure, net exports and level of aid were

Table 6.
Estimate of the model by OLS for the whole period

Variable	C	$\ln Y_{t-1}$	$\ln \text{Cons}_t$	$\ln \text{Inv}_t$	$\ln \text{Gov}_t$	$\ln \text{Nex}_t$	$\ln \text{FDI}_t$	$\ln \text{ODA}_t$	$\ln \text{Remit}_t$
Estimates	5.7251	0.420	0.5166	0.143	-0.3355	-0.0007	0.008	-0.023	0.0181
Std Error	0.9209	0.1075	0.1265	0.0304	0.097	0.0028	0.0036	0.0087	0.0052
p-value	0.00	0.0009	0.0006	0.0001	0.0025	0.8197	0.0362	0.0137	0.0022

reported to have a negative relationship with the GDP. This should be interpreted with caution; it will require further investigation which is beyond the scope of this study.

Error Correction Model

Even though the variables involved are cointegrated, (i.e. there is equilibrium relationship among them in the long run), disequilibrium in the short-run is plausible. Thus to understand the short-run dynamics of the model, this necessitates the estimation of error correction model. The error correction terms are computed based on the cointegrating vectors reported in the Trace test (Table 5).

Appendix 2 shows the result of the estimation of the error correction model with two lags⁶. Results show that the error correction term is negative and significant at 5%. This strongly implies that there exists short run equilibrium

among the variables involved. The error correction model can explain the behavior of the GDP very well given $R^2=0.9991$. The error correction model can be simplified by eliminating the insignificant variables in the equation.

Short Run Dynamics of the Model

Table 7 presents the estimates of the error correction model. Estimates show the short run effect of the variables to economy's output. It is interesting to note that the level of consumption in the first and second period lag has a negative impact on the level of GDP. Government expenditure negatively affects GDP in the current period; but in the first lag period it turns out to be positively affecting GDP. This may imply that in the short run, it takes a year before government expenditure translates its benefit to the economy. Also, the net export exhibits the same behavior with government expenditure; but net export's

Table 7.

Estimate of the error correction model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.125***	0.984	7.243	0.0000
$\Delta \ln \text{GDP}(-1)$	0.683***	0.107	6.373	0.0001
$\Delta \ln \text{CONS}$	0.973***	0.154	6.322	0.0001
$\Delta \ln \text{CONS}(-1)$	-2.114***	0.317	-6.664	0.0000
$\Delta \ln \text{CONS}(-2)$	-0.389**	0.169	-2.307	0.0415
$\Delta \ln \text{INV}$	0.139***	0.017	7.918	0.0000
$\Delta \ln \text{GOV}$	-0.278***	0.052	-5.326	0.0002
$\Delta \ln \text{GOV}(-1)$	0.3457***	0.067	5.155	0.0003
$\Delta \ln \text{NEX}$	-0.008***	0.001	-6.242	0.0001
$\Delta \ln \text{NEX}(-1)$	0.0135***	0.002	6.343	0.0001
$\Delta \ln \text{NEX}(-2)$	0.006**	0.002	2.632	0.0233
$\Delta \ln \text{REMIT}(-1)$	-0.010***	0.002	-4.429	0.0010
$\Delta \ln \text{FDI}$	0.015***	0.002	8.737	0.0000
$\Delta \ln \text{FDI}(-1)$	-0.012***	0.002	-4.936	0.0004
$\Delta \ln \text{ODA}(-1)$	0.045***	0.010	4.154	0.0016
ECT(-1)	-0.738***	0.101	-7.243	0.0000

*, **, *** Significant at 10%, 5% and 1%

second period lag still has a significant positive impact on GDP in the short run. However, foreign direct investment shows a different impact compared with government expenditure and net exports. In the short run, current FDI positively affects economy's output, but first lag period of FDI negatively influence GDP. On the other hand, first lag period of aid positively affects GDP.

The variable of interest in this study, which is remittances, shows that in the short run, current level of remittances does not have an impact on economy's output; but the first period lag exhibits a negative relationship with the output. This result is quite plausible since remittances are mainly used by recipient families to boost household consumption. Remittances are said to increase family income; but it may likewise reduce family members' work effort (income effect)--a moral hazard on labor supply (*Business Mirror*, 2008). For this reason it is probable that in the short run, GDP is negatively affected by level of remittances from the previous year because the recipient family tends to reduce participation in productive activities, given that they receive a relatively higher amount of remittances. This result is consistent with what Chami, et al. (2003) and Chami, et al. (2008) argued. Holding other factors constant, a 1% increase of remittances in the first period lag would tend to reduce the level of GDP by 0.01% in the short run. Relatively, the decline in the short run is less than the gain in the long run, with respect to the effect of remittances in the Philippine economy. Thus managing remittances and harnessing its benefits are good for the economy. The negative effect in the short run will be offset by the larger positive effect in the long run. But it is still worthwhile to be cautioned about the short-run retarding effect of remittances on economic growth.

It is interesting to note that among the three sources of external funding considered in this study, it is the level of official development assistance which shows a positive impact on the economy's output in the first year lag. In the short run, both the previous year's level of FDI and remittances negatively affects GDP; while official aid helps push the economy.

CONCLUSION

The main objective of this research study is to determine the effect of remittances sent by migrant workers to the performance of the Philippine economy from 1977 to 2006, by employing the method of cointegration analysis.

The cointegration test showed that the variables involved in this study are cointegrated. This shows evidence that there is a long-run relationship between the level of GDP and the independent variables considered. The result of OLS estimation showed that in the long run, remittances have a positive and significant effect on the output. Thus, a 1% increase in the bulk of remittances sent by migrant workers would increase the economy's output by 0.018%, holding other factors constant.

With regard to the short-run dynamics of the model, the error correction model shows that the first period lag of remittances negatively affects the level of GDP; but the current level of remittances has a positive but insignificant influence on the GDP. Thus in the short run, holding other factors constant, a 1% increase in the previous year level of remittance would tend to decrease the economy's output by 0.01%.

Remittances exhibit contradicting results with regard to their effect on the performance of the Philippine economy. In the short run, remittances negatively affect the level of GDP; but in the long run, remittances positively affect GDP. The short-run effect of remittances possibly captures the possible moral hazard the migrants' family would be exposed to, by reducing participation in productive activities, since remittances increase their current level of income. But in the long run, when remittances are invested in education, land, household enterprises and other safe and productive ventures, they are more likely to improve the lives of the migrants' families; and would translate to a positive effect on the economy as a whole.

NOTES

- ¹ OECD.stat is an online database for official development assistance
- ² Data on remittances for the Philippines is available online from year 1977 onwards.
- ³ In the ADF test, three auxiliary regressions can be tested. The third regression is without intercept $\Delta Y_t = \delta_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \varepsilon_t$; but for the purpose of this study, only two auxiliary regressions were carried out.
- ⁴ Second differencing of the variable was also conducted, although results are not reported here.
- ⁵ This stipulates that government is expected to provide a framework of political stability, rule of law, sound macroeconomic policy to promote economic growth, and physical and human infrastructures within which an enterprise can flourish.
- ⁶ The maximum lag used was determined through manual iteration of the model. The model was first run using first lag, and then run using second lag. When the third lag was included, Eviews reports error of insufficient observation. Thus, maximum lag included is two.

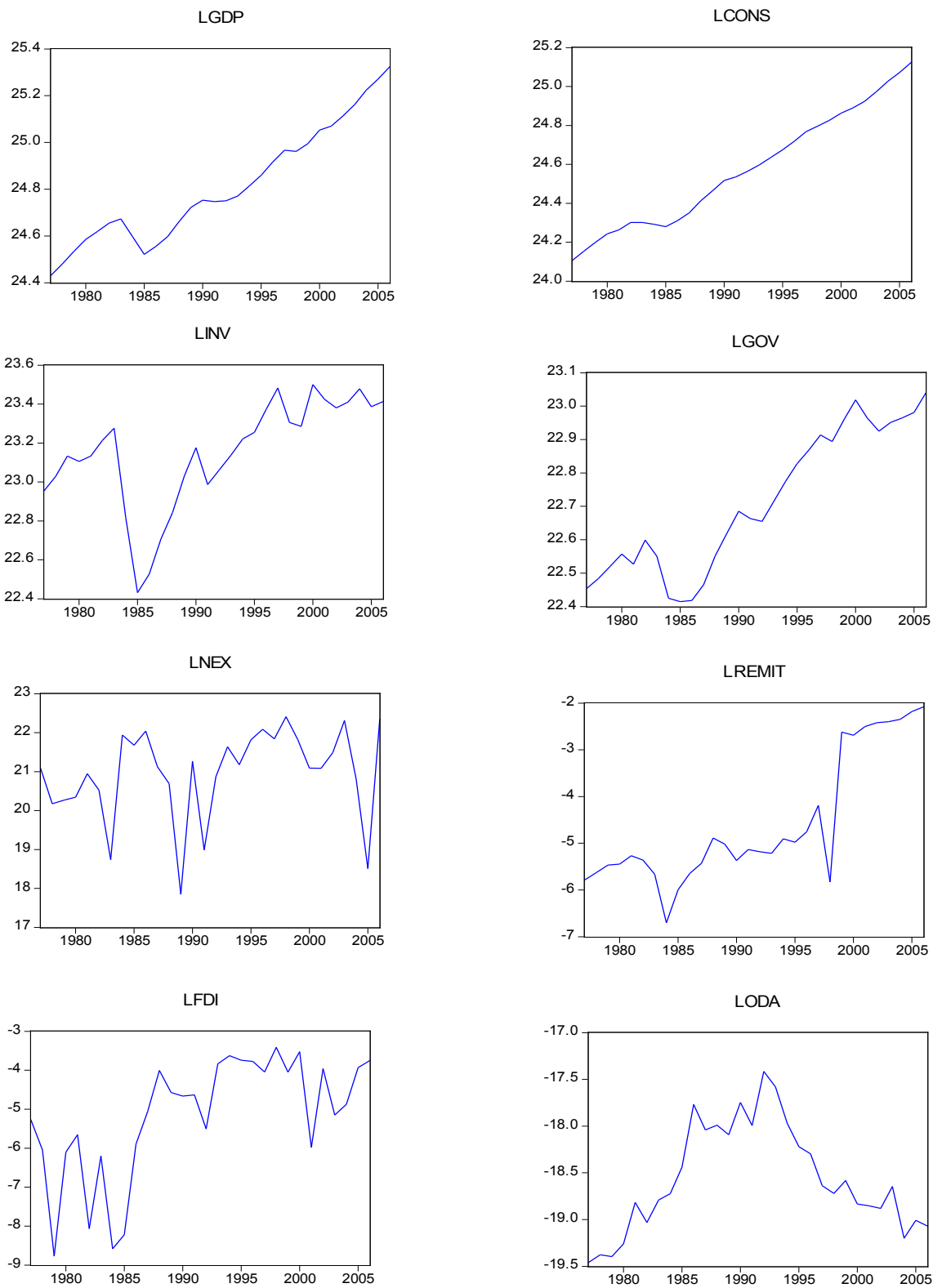
REFERENCES

- Adams, R. Jr., & Page, J. (2005). Do international migration and remittances reduce poverty in developing countries? *World Development*, 33 (10), 1645– 1669.
- Alcuaz, F. Jr. (2007). Philippine economic growth seen slowing on remittances, exports. *Bloomberg*. Retrieved on March 6, 2009 from http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aREj_2bES7vI&refer=asia
- Ang, A. (2007). *Workers' remittances and economic growth in the Philippines*. Social Research Center, DEGIT conference paper, UST, Manila, Philippines.
- Ang, A., Sugiyarto, G., & Jha, S. (2009). *Remittances and household behavior in the Philippines*. ADB Economics Working Paper Series No. 188.
- Asian Development Bank. (2005). Enhancing the efficiency of overseas workers' remittances. *ADB Philippines Study-TA4185*.
- Baak, S. (2008). The bilateral real exchange rates and trade between China and the U.S.. *China Economic Review*, 19 (2), 117-127.
- Bangko Sentral ng Pilipinas (2007, 2008, 2009, 2010). *Status report on the Philippine financial system*. Manila: BSP.
- Barro, R. (1996). Determinants of economic growth: a cross-country empirical study. *National Bureau of Economic Research*, NBER Working Paper 5698.
- Bouhga-Hagbe, J. (2006). *Altruism and workers' remittances: evidence from selected countries in the Middle East and Central Asia*. IMF Working Paper WP/06/130.
- Burgess, R., & Haksar, H. (2005). *Migration and foreign remittances in the Philippines*. IMF Working Paper WP/05/111.
- Business Mirror Online. (2008). *Missing the Migration Gravy Train*. Retrieved on March 18, 2009 from <http://www.businessmirror.com.ph/>
- Chami, R., et al (2008)., *Macroeconomics consequences of remittances, International Monetary Fund, Occasional Paper No. 259*.
- Chami, R., Fullenkamp, C., & Jahjah, S. (2003). Are immigrant remittance flows a source of capital for development? *International Monetary Fund, IMF Working Paper WP/03/189*
- Giuliano, P., & Arranz-Ruiz, M. (2006). Remittances, financial development and growth. *International Monetary Fund, Discussion Paper No. 2160*.
- Glystos, N. (2002). The role of migrant remittances in development: evidence from Mediterranean countries. *International Migration*. 40 (1), 5-26.
- Jongwanich, J. (2007). *Workers' remittance, economic growth and poverty in developing Asia and the Pacific countries*. UNESCAP Working Paper, WP/07/01
- Kocharkov, G. (2004). *Does financial development cause economic growth? Time series evidence from nine countries in Asia and the Pacific*. IUJ GSIR Thesis.
- Migration Information Source. (2008). Retrieved on April 10, 2009 from <http://www.migrationinformation.org>.

- Mohapatra, S., Ratha, D., & Silwal, A. (2011). *Outlook for remittance flows 2011-13*. Migration and Development Brief # 16, The World Bank.
- National Economic Development Authority (NEDA) (2010). Philippine medium-term development plan (MTDP) 2004-2010. Retrieved on January 24, 2010 from <http://www.neda.gov.ph/ads/mtpdp/MTPDP2004-2010/PDF/MTPDP2004-2010.html>
- Olchondra, R. (2011). Remittances to fuel economic growth. Philippine Daily Inquirer. Retrieved on September 26, 2011 from <http://globalnation.inquirer.net/news/breaking news/view/20110116-314828/Remittances-to-fuel-economic-growth>.
- Organization for Economic Co-operation and Development OECD (2009). *OECD.stat*. Retrieved on January 31, 2009 from <http://stats.oecd.org/WBOS/index.aspx>
- Philippine Overseas Employment Administration, (2010). *Overseas Employment Statistics*. Retrieved on June 26, 2010 from <http://www.poea.gov.ph/>
- Ramirez, M., & Sharma, H. (2008). *Remittances and Growth in Latin America: a panel unit root and panel cointegration analysis*. Yale University, Economics, Depart. Working paper no. 51.
- Ratha, D., & Mohapatra, S. (2007). *Increasing the macroeconomic impact of remittances on development*. Paper presented at the G8 Outreach Event on Remittances in Berlin, 28-30 November, 2007.
- Tabuga, A. (2007). *International remittances and household expenditures: the Philippine case*. PIDS Discussion Paper Series No. 2007-18.
- Tuaño-Amador, M. C. N., Claveria, R. A., Delloro, V. K., & Co, F. S. (2007). *Philippine overseas workers and migrants' remittances: the Dutch disease phenomenon and the cyclicity issue*. Paper presented at the 45th Philippine Economic Society (PES) Meeting, 14 November, 2007.
- United Nations Population Fund. (2006). Retrieved on February 21, 2009 from <http://www.unfpa.org/swp/2006/>
- World Bank (2009). *World development indicator*.
- Yang, D. (2004). *How remittances help migrant family*. University of Michigan. Retrieved on January 31, 2009 from <http://www.migrationinformation.org/Feature/display.cfm?ID=270>.
- Yang, D., & Martinez, C. (2005). *Remittances and poverty in migrants' home areas: evidence from the Philippines*. University of Michigan. Retrieved on January 22, 2009 from http://www-personal.umich.edu/~claudiap/yangmartinez_poverty.pdf.

APPENDICES

Appendix 1.

Graph of the series

Appendix 2.***Error Correction Model with 2 Lags***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.23804	2.545168	5.201242	0.0350
DLGDP(-1)	0.502922	0.149417	3.365891	0.0781
DLGDP(-2)	0.274315	0.198291	1.383397	0.3007
DLCONS	1.095888	0.128703	8.514879	0.0135
DLCONS(-1)	-2.257729	0.277351	-8.140317	0.0148
DLCONS(-2)	-2.139597	0.724758	-2.952153	0.0981
DLINV	0.161686	0.020751	7.791724	0.0161
DLINV(-1)	0.044938	0.029339	1.531697	0.2653
DLINV(-2)	-0.019214	0.024186	-0.794430	0.5102
DLGOV	-0.492461	0.084274	-5.843568	0.0281
DLGOV(-1)	0.567485	0.101889	5.569624	0.0308
DLGOV(-2)	0.277240	0.116301	2.383813	0.1400
DLNEX	-0.008312	0.001202	-6.912894	0.0203
DLNEX(-1)	0.021041	0.003854	5.459805	0.0319
DLNEX(-2)	0.012164	0.003695	3.292008	0.0812
DLREMIT	0.000935	0.002544	0.367721	0.7483
DLREMIT(-1)	-0.019537	0.004298	-4.546154	0.0451
DLREMIT(-2)	-0.014540	0.005181	-2.806188	0.1070
DLFDI	0.018394	0.001977	9.302216	0.0114
DLFDI(-1)	-0.025376	0.005900	-4.300677	0.0500
DLFDI(-2)	-0.001775	0.002088	-0.850157	0.4848
DLODA	-0.004569	0.008169	-0.559321	0.6322
DLODA(-1)	0.094214	0.023082	4.081657	0.0551
DLODA(-2)	0.017726	0.010294	1.722071	0.2272
ECT(-1)	-1.369931	0.263388	-5.201184	0.0350
R-squared	0.999078	Mean dependent var		0.029220
Adjusted R-squared	0.988014	S.D. dependent var		0.035935
S.E. of regression	0.003934	Akaike info criterion		-8.989080
Sum squared resid	3.10E-05	Schwarz criterion		-7.789231
Log likelihood	146.3526	Hannan-Quinn criter.		-8.632302
F-statistic	90.29911	Durbin-Watson stat		2.035014
Prob(F-statistic)	0.011008			