

## EFEITOS MACRO-ECONÔMICOS DAS REMESSAS EM FILIPINAS

VERONICA BAYANGOS  
KAREL JANSEN\*

\*Veronica B. Bayangos trabalha no Banco Central de Filipinas (bsp, pelas suas siglas em filipino) e Karel Jansen trabalha no Instituto de Estudos Sociais da Haya (Universidade Erasmus).

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Correio eletrônico:  
vbayangos@bsp.gov.ph  
jansen@iss.nl

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Este artigo, em primeira instância, explora a dinâmica cíclica das remessas, e adicionalmente, analisa seu impacto macro-econômico e as implicações que tem na política monetária. Para esta tarefa usamos como exemplo o caso da Filipinas, um dos países onde as remessas têm uma alta importância. Utilizou-se um modelo dinâmico estrutural macro-econométrico trimestral das Filipinas para identificar os diversos canais através dos quais as remessas exercem um impacto sobre as principais variáveis econômicas.

Ao avaliar o impacto da crise financeira global de 2008 as remessas também devem ser consideradas como um canal de transmissão. Conseguimos estabelecer que as remessas estão impulsionadas pelo ciclo econômico dos países com maior população imigrante e que, em consequência, a recessão atual trará como resultando uma diminuição nas transferências. Através do nosso modelo pudemos definir o impacto das mudanças nas remessas sobre importantes variáveis econômicas tais como a demanda agregada, a oferta monetária e os tipos de juros, o tipo cambial, a oferta trabalhista e os salários.

**Classificação JEL:** F24, F43, E58, O53.

**Palavras chave:** remessas, política monetária, tipo de câmbio, fluxos de capital, modelo dinâmico estrutural.



# THE MACROECONOMICS OF REMITTANCES IN THE PHILIPPINES

VERONICA BAYANGOS  
KAREL JANSEN\*

This article first explores the cyclical dynamics of remittances, and then, analyzes the macroeconomic impact of remittances and the monetary policy implications. In this endeavor, we use the case of the Philippines, one of the countries where remittances are substantial. A dynamic structural quarterly macroeconometric model of the Philippines is used to trace the various channels through which remittances affect the main macroeconomic variables.

In the assessment of the impact of the 2008 global financial crisis, we should also consider the remittances as a transmission channel. We have established that remittances are driven by the economic cycle of the main host countries and that the ongoing recession will thus lead to a decline in transfers. Through our model, we have been able to trace the impact of changes in remittances on important economic variables such as aggregate demand, money supply and interest rates, the exchange rate, and labor supply and wages.

**JEL classification:** F24, F43, E58, O53.

**Keywords:** remittances, monetary policy, exchange rate, capital flows, dynamic structural model.

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\*Veronica B. Bayangos works at the Bangko Sentral ng Pilipinas (BSP); Karel Jansen works at the Institute of Social Studies in The Hague (Erasmus University).

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E-mails:  
vbayangos@bsp.gov.ph  
jansen@iss.nl

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## I. INTRODUCTION

Remittances are a crucial financial flow to the Philippines; in recent years annual inflows amounted to ten per cent of the gross domestic product (GDP). It is thus not surprising that remittances have been the subject of intensive research. Studies have focused on determinants of remittances and on their impact on economic growth and poverty alleviation. In this paper we focus on the short-run macroeconomic effects of remittances; we are mainly interested in the cyclical dynamics of remittances and the challenges this creates for short-term macroeconomic management. Specifically, we will argue that remittances to the Philippines are procyclical and we will explore the challenges for the monetary policy generated by shocks to remittances.

Globalization exposes developing countries to the volatility of international markets. In the literature on financial globalization there is considerable attention has been given to the volatility of capital flows (*e.g.* Prasad *et al.*, 2003). Surges of inflows and flight of capital have severe effects on the economy. In many developing countries remittances are a financial flow that is as important, and in some cases more important, as capital flows. It is often noted that remittances are more stable than capital flows to developing countries, but even so, remittances are also subject to shocks. The ups and downs of capital flows and remittances have direct effects on aggregate demand, liquidity of financial markets, and foreign exchange markets. In such a scenario, the volatility of financial flows creates significant challenges for monetary policy.

Some studies suggest that remittances are countercyclical, increasing during hard times at home and thus providing an automatic stabilizer that reduces the need for monetary policy action, but other studies suggest a procyclical pattern.

The remainder of this paper will make two contributions to these discussions. First, we will statistically explore the cyclical dynamics of remittances to the Philippines; second and more important, we will analyze the macroeconomic impact of remittances and the monetary policy implications.

We will use correlation analysis to assess the cyclical dynamics of remittance flows to the Philippines. We find that remittances are strongly procyclical with economic activity in major host countries, such as the USA, and that they are also procyclical with the Philippine GDP. In the second endeavor, we analyze monetary policy behavior in a structural quarterly macroeconometric model for the Philippines (see Bayangos, 2007). To a large extent, our macroeconomic model shares features with the New Keynesian model (see Ball, 1999), which assumes inflation and output to be backward-looking. We have also assumed that there is excess capacity in the economy and that the asset markets are imperfect. Central to our macroeconomic model are important nominal rigidities in describing the Philippine macroeconomy. In addition, there are lags in the transmission mechanism.

In the benchmark version of the model remittances are exogenous and do not affect monetary policy. In the new version of the model, developed for this paper, we have made remittances endogenous. Changes in remittances are seen to affect important economic variables such as disposable income and personal consumption expenditure, money supply and interest rates, the exchange rate, labor supply and wages. Shocks to remittances arise from the business cycle in the main host countries (US) and have an impact on disposable income, personal consumption, money supply, the domestic market interest rate and the labor force. We simulate the impact of a shock to the US GDP on the Philippine economy in the two versions of the model. Our results show that the impact is very different when remittances are included in the model and that the appropriate monetary policy response is significantly different.

The paper is organized as follows. The next section goes over the relevant literature on remittances: their determinants and impacts. Section three provides some basic information on remittances to the Philippines. Section four estimates the cyclicity of remittances, and the subsequent sections introduce the model and the model simulations. The final section concludes.

## II. BACKGROUND

In the monetary policy literature there is considerable attention for the impact of capital flows on monetary policy. Monetary authorities have several reasons to be concerned about large capital inflows, particularly when they are routed through financial institutions. The first is the impact the inflows have on domestic credit growth and aggregate demand. This is likely to result in pressures on prices of goods and assets. The inflows may also lead to an appreciation of the real exchange rate, undermining export competitiveness. A second concern relates to the volatility of international financial markets. Funds that flow in may suddenly be withdrawn.

While there is considerable attention given to the impact of capital flows on monetary stability, there is less concern about the impact of fluctuations in workers' remittances. One claimed advantage of remittances is that they are less volatile. Buch *et al.* (2002) analyzed the volatility of remittances and found that in 107 out of 135 countries the volatility of remittances is smaller than that of private capital flows, in 70 countries it is lower than that of official capital flows and in 62 countries remittances are less volatile than both private and official flows. Lueth *et al.* (2007) observe that remittance receipts in Sri Lanka are less volatile than ODA, FDI and portfolio flows. Table 1 confirms these findings for the case of the Philippines.

Still, when remittances are a significant share of the GDP, even modest volatility can result in fluctuations in the inflows that are of macroeconomic significance. The average annual change in the remittances-to-GDP ratio in Table 1 is 1.1 percentage points, certainly a magnitude that should concern policy makers. For this reason, monetary authorities are interested in the determinants of remittance flows.

The literature on remittances claims that remittances are driven by either altruistic or investment motives (see *e.g.* Alleyne *et al.*, 2008; Bouhga-Hagbe, 2004; and Buch *et al.* 2002). The first sees remittances as a form of altruism from relatives overseas; they care for their family back home. The investment motive states that the overseas workers will have a tendency to invest their savings in the home country. These motives for sending remittances suggest possible cyclical patterns. Three scenarios can be suggested.

Table 1  
Relative Magnitude and Volatility of Selected Foreign Exchange Inflows,  
1996-2008<sup>1</sup>

Year	OF Remittances		Exports of Goods and Services	
	Level	% of GDP	Level	% of GDP
1996	4,31	5,2	14,91	18,0
1997	5,74	7,0	15,56	18,9
1998	7,37	11,3	20,66	31,7
1999	6,80	8,9	32,62	42,8
2000	6,05	8,0	35,48	46,7
2001	6,03	7,9	29,03	38,2
2002	6,89	8,4	32,40	39,6
2003	7,58	8,9	33,38	39,1
2004	8,55	9,1	37,02	39,5
2005	10,69	10,0	38,92	36,4
2006	12,76	10,0	46,66	36,6
2007	14,45	9,2	50,40	32,1
2008	16,43	9,8	58,40	35,0
Average	8,10	8,8	32,25	35,0
SD	3,71		12,82	
CV	45,82		39,74	

Source of data: Department of Economic Statistics, Bangko Sentral ng Pilipinas; authors' computation.

1/ Consistent data on OF remittances and other indicators started in 1996.

2/ Include short, and medium-to long-term debt of the BSP.

SD = Standard deviation

CV = Coefficient of variation, computed as standard deviation/average \* 100

In the first scenario, conditions in the host country determine remittance flows. When the host economy is booming employment opportunities abound and wages are good; therefore, migrant incomes rise and they can send more to the family back home. In this scenario remittances are driven by the business cycle of the host country and are not associated with the cycle of the home country (acyclical). It is possible that remittances are one of the channels through which the business cycle of the home country becomes correlated with the cycle of the host country. If such a comovement occurs, the remittance flows will appear procyclical.

In the second scenario, migrant workers have an altruistic motivation. When economic times at home are hard they will send some more money and then compensate

External Borrowings%		Foreign Direct Investments		Portfolio Investments	
Level	%of GDP	Level	%of GDP	Level	%of GDP
2,89	3,5	3,62	4,4	4,15	5,0
3,47	4,2	0,84	1,0	3,07	3,7
4,83	7,4	2,02	3,1	3,31	5,1
6,24	8,2	1,25	1,6	3,92	5,1
6,85	9,0	2,24	3,0	0,26	0,3
7,98	10,5	0,20	0,3	1,08	1,4
7,22	8,8	1,54	1,9	1,37	1,7
7,21	8,4	0,49	0,6	1,38	1,6
5,47	5,8	0,69	0,7	-0,80	-0,9
4,07	3,8	1,85	1,7	3,62	3,4
1,05	0,8	2,92	2,3	4,61	3,6
0,79	0,5	2,93	1,9	3,57	2,3
1,81	1,1	1,28	0,8	-2,58	-1,5
4,84	5,5	1,72	1,8	2,46	2,4
2,47		1,04		2,17	
50,99		60,65		88,12	

when times are good. In this scenario remittances will be clearly countercyclical and perform a welcome stabilization function.

In the final scenario, migrant workers act as investors. They moved abroad to build up life-time assets and are looking for the best opportunities to invest their savings. Given their knowledge of —and contacts in— the home country, and their desire to eventually return, they will be quite interested in good investment opportunities at home. This behavior may lead to a procyclical pattern in remittances as investment opportunities at home are better when the economy is booming. However, in this case the investment behavior could be more complex. The portfolio of the overseas investor is likely to contain financial and nonfinancial assets of the home and of the



host country. Portfolio theory tells us that the investor will always hold a diversified portfolio and that adjustments to the portfolio follow changes in relative returns on assets. If the boom in the home country is accompanied by a recession in the host country, the investor will shift to home assets, but if the business cycles of the home and host countries are synchronized, a boom will lead to no adjustment in the portfolio, although the overall level of investment may increase.

The literature on the cyclicalities of remittances is inconclusive. Loser *et al.* (2006) see a countercyclical pattern in the remittance flows to seven Latin-American countries that they study and quote a number of other studies that come to the same conclusion. Sayan (2006) studies twelve developing countries in which remittances are significant and finds that only four show a statistically significant cyclical pattern: in two countries remittances are countercyclical and in two they are procyclical. Lueth *et al.* (2007) show that remittances in Sri Lanka are strongly procyclical. For the case of Mexico, Vargas-Silva (2008) finds that remittances are countercyclical with respect to Mexico's business cycle, but this result is not robust to the use of different measures of remittances. Giuliano *et al.* (2005) correlate the cyclical components of remittances and GDP for a sample of about 100 developing countries over the 1975–2002 period and find a positive correlation (*i.e.*, remittances are procyclical) in about two thirds of the cases. Dean Yang has carried out a number of interesting studies on remittances in the Philippines based on household data (Yang and Choi, 2007; Yang, 2008). Both these studies are consistent with the altruistic or insurance approach to remittances. These microeconomic studies would thus suggest a countercyclical pattern of remittances. This is in sharp contrast with the conclusions of studies that use a macroeconomic approach to analyze the cyclicalities of remittance flows to the Philippines. From a panel of 113 countries for the 1970–1999 period, Chami *et al.* (2003, 2006) showed that in the case of the Philippines, remittances are not profit-driven but are compensatory in nature, and hence, have a strong negative correlation with growth. Chami *et al.* (2003, 2006) argued that remittances do not appear to be intended to serve as capital for the economic development, but as compensation to poor economic performance. However, the BSP reestimated the same equation using ordinary least squares (OLS) and revealed that such relationship fades away when the appropriate correction is made for serial correlation (Dakila and Claveria, 2007). Tuaño-Amador *et al.* (2007) do a simple correlation test between (detrended) GDP and remittances, and conclude to procyclicality. Dakila and Claveria (2007) come to the same conclusion using VAR analysis. On the other hand, Burgess and Haksar (2005) find that the correlation between the growth of GDP and remittances is very low and not significant, and their VAR analysis does not find an impact of

GDP shocks on remittances. Our own analysis (see sections IV and V of this paper), using an economy-wide macroeconometric model of the Philippines, reveals that overseas Filipino remittances are procyclical not only with the Philippine output, but with those of major host countries, including the US.

In the Philippines remittances are large relative to the economy and shifts in the remittance flows will have short-term macroeconomic effects to which monetary policy has to respond. In many countries monetary authorities use the Taylor rule (Taylor 1993) when deciding on monetary policy interventions. According to this rule they are concerned about inflation and about the output gap (unemployment), and they adjust the policy instrument in response to price or output shocks. Our work on monetary policy in the Philippines has shown that the BSP (Philippine Central Bank) also responds to exchange rate shocks (see Bayangos, 2007). It is thus relevant to ask how inflation, output and the exchange rate are affected by fluctuations in remittances.

The impact on output is the result of a complex set of reactions. First of all, an increase in remittances will have direct effects on aggregate demand as the purchasing power of remittance-receiving households rises. Most studies (see *e.g.* Chami *et al.*, 2003) find that the majority of remittances are consumed. Part of this will be spent on traded goods and imports will rise. The increased demand for nontraded goods will push up their prices.

The increase in the price of nontraded goods will increase domestic cost of production. The inflow of remittances on the foreign exchange market may also lead to an appreciation of the nominal exchange rate. Both these effects will hurt the competitiveness of exporters. Many studies have confirmed this effect (see *e.g.* Amuedo-Dorantes and Pozo, 2004; Loser *et al.*, 2006). Tuano-Amador *et al.* (2007) find some evidence for the Dutch disease effect.

Higher remittance flows will increase liquidity in financial markets, which may push down the interest rate and lead to an expansion of credit. A lower interest rate may invite an increase in expenditure. Increased investment of remittances in real estate or the stock market can push up asset prices, which may exert a wealth effect. The total demand impact of an increase in remittances is the sum of these various effects: the direct expenditure effect, the multiplier effect and the interest rate effect will have a positive impact, while the exchange rate appreciation could have a negative impact.

There could also be a supply effect. Some have argued that an increase in remittance income will induce the household to supply less labor or to reduce work effort (Chami *et al.* 2003). Yang (2008) finds that the increase in remittances to the Philippines during the Asian crisis had no significant effect on the total number of hours worked<sup>1</sup>.

The net effect of all these effects on the output gap is an empirical matter. If the positive demand effect and labor supply effect dominate the negative export competitiveness effect, the output gap will tighten.

The increase in remittances will also have an effect on inflation. The demand pressures generated by the higher expenditure will push up prices and the adverse labor supply effect may push up wages, while the exchange rate appreciation will reduce the domestic prices of imported goods. If the demand pressures dominate, inflation will increase.

A monetary authority that follows a Taylor rule will respond to these changes. If, indeed, the output gap tightens and inflation rises in response to an increase in remittances, the policy rate should be increased. And if the whole process of adjustment would indeed lead to a deterioration of the current account balance, the need for a tighter monetary policy would further increase. It is possible that the monetary authority is also concerned about the exchange rate and worried that its appreciation might undermine the competitiveness of the export sector. Such a concern could reduce the willingness to increase interest rates.

In the impact assessment it is also relevant to take into account any second round effects. Studies about the determinants of remittances have established that changes in the exchange rate, the interest rate, inflation and home income may influence the decision to remit funds. The empirical evidence on these relationships is often mixed. For instance, Alleyne *et al.* (2008) find a positive impact of the interest differential (domestic minus foreign interest rate) but Bougha-Hagbe (2004) finds a negative relationship. However, it is clear that shocks to remittances will lead to shifts in economic variables that, in turn, will lead to new changes in remittances. Moreover, the monetary policy response to the original shock in remittances changes economic variables, which will invite adjustments to remittances.

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<sup>1</sup> However, he did find a significant effect on children. The increase in remittances meant that more children were kept in school and children spent less time working (Yang 2008). It should be noted though that this study only looks at the very short-term impact of the increase in remittances.

In deciding on the appropriate monetary policy response, the cyclicality of the remittances is crucial. If remittances are procyclical, the policy conclusions are straightforward. The booming economy itself would require cautious monetary policy, and the increase in the remittances would have impacts on the output gap and inflation that would strengthen that need. It should be noted that, at the same time, the increase in remittances will make the monetary policy less effective. As noted above, the increase in remittance inflows increases liquidity on financial markets and puts a downwards pressure on the interest rate; therefore, monetary policy action will have to be strong to counter these impacts. At the same time, monetary policy can easily become perverse when the Central Bank tries to cool down the booming economy and the spurt in remittances through an increase in the interest rate, and the growing interest rate differential may invite even more remittances or private capital flows.

If remittances are countercyclical, the policy response will be different. When a domestic recession is compensated by an increase in remittances, the increase in expenditure is welcome as they compensate the decline in domestic demand, and therefore, monetary policy can be less active than would have been desirable in the absence of the remittances. In an economy with slack capacity utilization, the inflationary effects of the increase in remittances are also likely to be less strong.

### III. RECENT TRENDS IN MIGRATION AND REMITTANCE FLOWS IN THE PHILIPPINES

Remittances in this paper cover transfers sent by both Filipino migrants and overseas workers. In the Philippines, remittances data are sourced from the balance of payments statistics. Overseas Filipino (OF) remittances surged particularly in the 1990s.

Graph 1 and Table 2 show that the magnitude of remittances to the Philippines has been significant, both in absolute terms and as a percentage of the GDP and other economic indicators. As of end-December 2008, remittances reached US\$16.4, the highest level since the 80s. Latest available data in 2009 (January to March) showed the OF remittances at US\$4.06 billion.

In 1996, remittances accounted for only 5.2 percent of the GDP. This has risen to around 10 percent in recent years. Túaño-Amador et al. (2007) presented three major

factors behind the uptrend in OF remittances since 1996. First, there is a trend rise in the number of deployed workers and immigrants, as indicated by the stock of overseas Filipino workers and migrants.

Second, there has been a change in the skill composition of Filipino workers and migrants. From 1995 to 2007, there was a significant rise in the number of deployed Filipino workers in the services and professional categories. In fact, in 2007 the number of higher-paid and skilled workers, such as those working in the medical, healthcare, information technology, and food and hotel services continued to rise, despite the decline in the number of professional workers.

Graph 1  
Overseas Filipino Remittances, 1980–2009 (January–March)

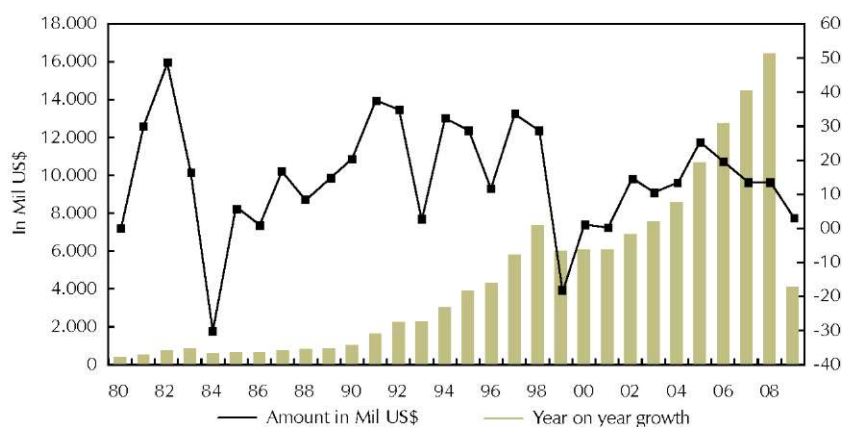


Table 2  
Relative Size of Overseas Filipino (OF) Remittances: Level, Growth Rate and as a Percentage of Selected Economic Indicators<sup>1/</sup>

Year	Level (US\$B)	Growth Rate (%)	As % of GDP	OF Remittances as % of -			
				XGS	FDI	GIR	DSB
1996	4,3	11,3	5,2	28,9	118,9	36,6	85,7
1997	5,7	33,3	7,0	36,9	681,1	65,3	102,6
1998	7,4	28,3	11,3	35,7	365,5	68,0	144,6
1999	6,0	-18,3	8,9	20,8	544,9	40,0	91,5

Table 2  
Relative Size of Overseas Filipino (OF) Remittances: Level, Growth Rate and as a  
Percentage of Selected Economic Indicators<sup>1/</sup> (Continued)

Year	Level (US\$B)	GrowthRate (%)	As%of GDP	OFRemittancesas%of -			
				XGS	FDI	GIR	DSB
2000	6,1	0,5	8,0	17,1	270,1	40,2	96,6
2001	6,0	-0,3	7,9	20,8	3.092,8	38,4	92,4
2002	6,9	14,2	8,4	21,3	446,6	42,1	88,7
2003	7,6	10,1	8,9	22,7	1.543,4	42,4	95,4
2004	8,6	12,8	9,1	23,1	1.242,7	52,7	118,5
2005	10,7	25,0	10,0	27,5	576,5	57,8	140,2
2006	12,8	19,4	10,0	27,3	436,9	55,6	161,5
2007	14,5	13,2	9,2	28,7	493,5	30,6	204,8
2008	16,4	13,7	9,8	28,1	1.283,6	43,8	223,4

Source of data: Department of Economic Statistics, Bangko Sentral ng Pilipinas.

1/ Refers to cash remittances passing through the banking system.

GDP= gross domestic product

XGS = exports of goods and services

FDI = foreign direct investment

GIR = gross international reserves

DSB = debt service burden

And third, the measures adopted by the BSP and the banks to encourage OFs to channel their remittances through the financial system are also essential. BSP initiatives are geared towards enhancing transparency and promoting competition in the remittance market; improving access to financial services, especially the transfer of funds to beneficiaries in remote areas of the country; encouraging OFs and their families to increase savings and investment; and increasing financial literacy among OFs and beneficiaries.

The bulk of remittances continued to come from the United States, Saudi Arabia, Canada, the United Kingdom, Italy, the United Arab Emirates, Singapore, Japan, and Hong Kong (Table 3). However, it should be noted that, except for the Americas, all other regions showed an uptrend from the average in the 1990s.

Tuaño-Amador *et al.* (2007) argued that higher incomes in source countries serve as attraction to those whose skills are in demand overseas. In addition, globalization and aging populations in some source countries, together with rising global labor mobility, also encourage the movement of Filipino workers.

The ADB (2004) study —based on survey data— provided some information about the potential source of remittances for capital formation and development. The study specifically addressed the issue on how remittances can be channeled to strategic areas and sectors of the economy. The constraints reported by the survey included the difficulty experienced by OFs in accessing remittance services in host countries (or source countries). However, the gap was addressed by Philippine banks, courier services, and informal channels of transmission. The ADB (2004) also revealed that 80 percent of respondents regularly remit through banks and other regulated channels. Nevertheless, out of this group of respondents, 90 percent were able to save some money, but only 45 percent had a savings account.

Table 3  
Source of Overseas Filipino Remittances, 1985-March 2009

Region/Country	Average % Share				
	1985-89	1990-99	2000-07	2008	Jan-Mar 2009
<b>TOTAL *</b>	100,0	100,0	100,0	100,0	100,0
<b>ASIA</b>	5,4	8,6	12,9	11,5	12,8
of which:					
Japan	2,7	2,9	4,7	3,5	4,6
Hong Kong	1,2	3,3	3,2	2,5	2,2
Singapore	1,1	1,6	2,3	3,2	4,1
<b>AMERICAS</b>	41,8	69,1	58,0	56,1	51,8
of which:					
USA	41,5	68,7	55,7	47,6	41,3
Canada	0,3	0,3	1,7	8,0	10,1
<b>OCEANIA</b>	0,8	1,0	0,5	0,9	0,9
of which:					
Australia	0,8	0,9	0,4	0,8	0,8
<b>EUROPE</b>	5,2	7,7	12,9	16,2	18,7
of which:					
Italy	0,1	1,1	3,9	4,1	3,8
Germany	0,9	2,2	1,1	1,9	2,7
United Kingdom	1,6	2,6	3,2	4,7	4,8
<b>MIDDLE EAST</b>	32,5	4,2	14,1	15,2	15,6
of which:					
Kuwait	1,0	0,5	0,9	0,8	0,5

Table 3  
Source of Overseas Filipino Remittances, 1985-March 2009 (Continued)

Region/Country	Average % Share				
	1985-89	1990-99	2000-07	2008	Jan-Mar 2009
Saudi Arabia	30,5	3,5	9,9	8,4	9,0
UAE	0,0	0,1	2,2	3,8	3,7
<b>AFRICA</b>	<b>0,0</b>	<b>0,0</b>	<b>0,1</b>	<b>0,1</b>	<b>0,1</b>
<b>OTHERS</b>	<b>14,3</b>	<b>9,5</b>	<b>1,5</b>	<b>0,0</b>	<b>0,0</b>

\* Breakdown may not add up to totals due to rounding off.  
Source: Department of Economic Statistics, Bangko Sentral ng Pilipinas.

#### IV. ESTIMATING THE CYCLICALITY OF REMITTANCES

Economies indeed undergo significant cyclical variations of distinct pattern and origin with differences in depth and length. In duration, a cycle varies from more than 1 year to 12 years, and comprises a boom (or expansionary phase) and a recession (or contractionary phase). In order to estimate the cyclical fluctuation of a macroeconomic series, it is common to use a filter to decompose the series into a slow-moving component (or trend) and a cyclical component.

Several key issues surround the use of the appropriate technique to estimate the cyclical component of a macroeconomic series<sup>2</sup>. This section used the Hodrick-Prescott (HP) filter procedure<sup>3</sup>. After Burns and Mitchell's influential work on pre-Second World War U.S. business cycle regularities, the length of the business cycles were widely accepted to vary between one and a half and eight years. Consequently, filters were specified to cut off components at higher or lower frequencies, in order to better capture the cyclical component. Rand and Tarp (2001) observed

2 Yap (2003) expounded the several research strategies that have been employed for the potential output estimation in the Philippines. A common weakness runs across these; that is, the estimates are largely dependent on the sample period. Changing the sample therefore creates large deviations in the estimates.

3 Some studies suggest that fitting a trend on output using a Hodrick-Prescott (HP) filter yields more benefits in terms of the trend-cycle component of output. However, other studies seem to be weary of using the HP filter. There are of course limitations on using a HP filter as it depends on what adjustment factor has been used in smoothing the time series. There are rules that are widely used in practical work but these are rules of thumb and arbitrary.



that business cycles in developing countries, as opposed to cycles in industrialized countries, are significantly shorter in duration.

Leitner (2005) provides an overall picture of the Philippine business cycles covering the period 1981 to 2003 by characterizing them in terms of volatility, comovement and persistence. As a trend-cycle decomposition technique, the most frequently used Hodrick Prescott filter was applied. The period under investigation brought about three cycles: 1983–1989, 1989–1997, and 1997–2000 with initially very erratic but over time smoother fluctuations.

Remittances of overseas Filipinos refer to transfers sent by both Filipino migrants and overseas workers. In the Philippines, remittances data are sourced from the balance of payments statistics. Output is measured as seasonally adjusted real GDP for all the host countries' output: Hong Kong, Japan, Italy, United Kingdom and Canada. The Philippine output is obtained from the website of the National Statistical and Coordination Board (NSCB), while those of major host countries are obtained from the IMF International Financial Statistics website.

As shown in Table 3 from the previous section, the sources of remittance flows are geographically diverse, reflecting the pattern of migration flows. From 1985 to 1989, the Middle East and the US accounted for around three quarters of the total remittances. Later, the share of the Middle East declined, but in the period 2000–2007 these two regions still accounted for about two thirds of the total flows. Other significant source countries include Canada, the United Kingdom, Italy, Singapore, Japan and Hong Kong.

We estimated the cyclical component of major host countries' business activity. We used the gross domestic product of the United States, Hong Kong, Japan, Italy, United Kingdom and Canada. Initially, we included Saudi Arabia, United Arab Emirates and Singapore. While those of Saudi Arabia and United Arab Emirates are not available, that of Singapore yielded insufficient data. We estimate the cyclical component of the Philippine real GDP from 1994 to 2007 using two methods. One is using the Hodrick-Prescott filter described earlier on and the other is using the updated Deveza (2006) methodology applied to the Philippines. In Deveza (2006), the identification of business cycles involved four major steps. The first step is the selection of the appropriate measure of the economic activity. The second step is the identification of the turning points (peaks and troughs) of the underlying business cycles. The third step involves the validation of results.

After the cyclical components have been estimated, the next step consists of estimating the correlation between the cyclical components of remittances and those of the Philippine real GDP, and those of the Philippine major host countries' output. Using a Pair-wise correlation matrix, Table 4 shows the contemporaneous and lagged (up to three quarters) cross-correlation of the Philippine real GDP and its major host countries' business activity. Remittances in the Philippines (in US dollars and deflated by US CPI) seem to be strikingly procyclical with economic activity in main host countries such as the United States, Hong Kong and Japan. These three countries account for about two thirds of total remittance inflows. However, remittances and business activities of Italy, UK and Canada appeared to be countercyclical.

In particular, remittances and the Philippine GDP, when detrended by the Hodrick-Prescott filter (with no lags), show a correlation of almost 41 percent over the period that goes from 1994 to 2007. Using Deveza methods, remittances appeared to be similarly procyclical with the Philippine real GDP. Meanwhile, the Philippine GDP seems to move along with the business activities of the United States, Hong Kong (albeit not significant) and Japan.

The analysis we have so far reveals that it is reasonable to dig deeper into the macroeconomics of remittances and challenges to Philippine monetary policy. However, there are limitations of our analyses, the most important of which is the issue of endogeneity, that is, remittances are seen as part of the GDP since they are immediately reflected in expenditure, and this leads to a positive correlation that does not mean very much. For instance, Chami *et al.* (2003) use the two-stage least squares (instrument variable) approach. This problem is aggravated in a panel data framework due to potential dynamic heterogeneity over the cross sections. The study of Alleyne *et al.* (2008) showed how the fully modified ordinary least squares (FOMLS) can be adjusted to make inferences in cointegrated panels with heterogeneous dynamics, while overcoming the problems in OLS, including endogeneity. In our model, we used Chami *et al.* (2003) method of two-stage least squares to address the issue of endogeneity.

Table 4  
Cross Correlation Matrix, Remittances,  
Philippines and Its Major Host Countries' Output, 1994-2007

	No lag			Lag of one quarter			
	Remit		Philippines	Remit		Philippines	
Remit	1,000			1,000			
Philippines	0,410	*/	1,000	0,400	*/	1,000	
US	0,133	*/	0,442	*/	0,126	*/	0,412
Hong Kong	0,002		-0,361	*/	0,233		0,254
Japan	0,293	**/	0,522	*/	0,262		0,426
Italy	-0,084		0,284	**/	-0,086		0,131
UK	-0,141		0,594	*/	-0,175		0,501
Canada	-0,257		0,421	*/	-0,260		0,283

Note: \*/ significant at 5% level of confidence; \*\*/ significant at 10% level of confidence; the remaining coefficients are not significant.

## V. THE MACROECONOMICS OF REMITTANCES

The purpose of this section is to determine the impact of remittances on the Philippine macroeconomy<sup>4</sup>.

Indeed, the literature on the relationship between remittances and growth is controversial. Moreover, the empirical relationship between remittances and growth is complicated by problems of endogeneity, associated difficulties in finding adequate instruments to explain the behavior of remittances, and measurement issues.

In the first part of the paper we argued that the total demand impact of an increase in remittances is the sum of various effects; the direct expenditure effect, the multiplier effect and the interest rate effect have a positive impact on aggregate demand, while the exchange rate appreciation and the labor supply effect have a negative impact. The rise in aggregate demand, the increase of prices of nontraded goods and the increase in wages will push up prices, although the appreciation of

4 Using a lag of two quarters, Bayangos and Jansen (2009) ran the Granger causality test at 10% level of significance. Their findings reveal that the (Granger) causation appears to run from remittances to inflation, remittances to 91-day Treasury bill rate, real money supply to remittances, real deposit liabilities to remittances, remittances to nominal peso-dollar rate, real disposable personal income to remittances, nonagriculture real compensation index, a proxy for wages to remittances, remittances to current account balance.

	Lag of two quarters			Lag of three quarters		
	Remit		Philippines	Remit		Philippines
1,000				1,000		
0,394	*/		1,000	0,373	*/	1,000
0,079	*/		0,334	0,029	*/	0,233
0,469	*/		0,115	0,666	*/	0,029
0,292	**/		0,212	0,343	*/	0,021
-0,082			0,082	-0,104		-0,024 */
-0,222			0,328 */	-0,292 */		-0,023
-0,259			0,085	-0,311 */		-0,087

the exchange rate may dampen the inflationary effects. In the previous section we established the correlation between remittances and a number of economic variables. This suggested that remittances are part of a complex set of economic interactions. In an economy where remittances are significantly large, such as in the Philippines, these interactions need to be taken into account when analyzing economic shocks and economic policies. In this section we include these effects in a quarterly macroeconomic model. We address the endogeneity and measurement issues by using two state least squares on some important indicators.

#### A. STRUCTURE OF THE MODEL<sup>5</sup>

Our study builds on Bayangos (2007) dynamic structural quarterly macroeconomic model for the Philippines. Our dataset covers the period from March 1989 to December 2008. To a broad extent, the dynamic structural quarterly, macroeconomic model presented here is New Keynesian *à la* Ball (1999). It can be noted that the Ball (1999) model assumes that inflation and output are backward-looking. It thus deliberately abstains from any optimizing foundation. In addition, a purely backward-looking specification is appealing in that it resembles the empirical macroeconomic

<sup>5</sup> The theoretical properties and fundamental equations of the Bayangos (2007) macroeconomic model are found in Chapter 5: Model Specification and Estimation Results, Inflation Targeting and Exchange Rate Uncertainty, pages 124-134, Shaker Publishing.

models used by many central banks (Ball, 1999; BIS, 1995; Rudebusch and Svensson, 1999). Central to this model are important nominal rigidities in describing the macroeconomy, typical of the New Keynesian approach. In addition, there are lag effects in the transmission mechanism.

The agents in this macro model include (1) households, (2) domestic firms, (3) the government, (4) the rest of the world—which provides capital, goods and services demanded by the domestic economy and a market for domestic production—and (5) the Central Bank. In this model, the Central Bank has the task of anchoring the nominal side of the economy. The Central Bank adopts an inflation-targeting framework (IT) and is a flexible inflation targeter that sets a short-term interest rate to achieve an inflation target, consequently providing nominal stability. There are lags and delays between a change in the interest rate and inflation. Given these lags, and price and wage rigidities, the use of a simple interest rate rule is required to anchor inflation in the long run.

Moreover, this model describes an economy in which there is an excess supply; hence, aggregate output is demand-determined in the short to medium run<sup>6</sup>.

The transmission mechanism starts with the BSP domestic interest rate policy. The overnight reverse repurchase rate  $r^p$  is prescribed as the nominal interest rate, which follows a behavioral equation required to anchor inflation in the long run (Clarida, Gali and Gertler, 2000). The overnight RRP adjusts to inflationary pressure measured by the difference between the inflation forecast and the inflation target announced by the Government and the output gap. This is seen as:

$$r_t^p = \alpha + \beta(\pi_t^f - \pi_t^*) + \rho(q_t - q_t^*) + \varepsilon_t, \quad (1)$$

where  $r^p$  is the RRP,  $\alpha$  connotes the neutral monetary policy stance<sup>7</sup>,  $\pi^f$  is the one-quarter ahead inflation forecast,  $\pi^*$  is the medium-term inflation target announced by the Government,  $q$  is real output,  $q^*$  is potential real output, and an error term,  $\varepsilon$ .

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6 Typically Keynesian approach in describing an economy. See Gochoco-Bautista (2000), Yap (2006), Bautista et al. (2004), Balisacan and Hill (2003), Vos and Yap (1996) for a discussion on the economic structure of the Philippines.

7 In some studies, the constant represents the desired RRP rate that is expected to prevail when inflation and output are at their target growth.

The RRP rate is transmitted to the benchmark interest rate,  $r$ , through the natural arbitrage condition. In this model, the benchmark interest rate is the 91-day Treasury bill rate. As seen in equation (2),  $r$  is also affected by other variables, such as the overnight RRP  $r^p$ , inflation rate  $\pi$ , foreign interest rate  $r^f$ , real money supply  $m$  and an error term  $\varepsilon$ .

$$r_t = \alpha + \beta r_t^p + \rho \pi_t + \gamma r_t^f - \theta m_t + \varepsilon_t, \quad (2)$$

Equation (2) states that the higher the RRP rate, the higher benchmark interest rate is, and the higher the inflation rate, the higher the foreign interest rate and the lower the level of money supply are. In this equation, there is a direct channel from the BSP policy rate to the benchmark interest rate.

Changes in the benchmark interest rate are then carried over to changes in the other market interest rates, such as savings and lending rates, through the natural arbitrage condition. It is also assumed that the short-run domestic inflation is relatively sticky, indicating that inflation expectations for the short term are similarly sticky. This further implies that by controlling the nominal overnight RRP rate, the BSP can also affect the short-term real RRP rate or the difference between the short RRP rate and short-term inflation expectations. Through market expectations of future real rates, longer real rates (that is, longer than overnight rates) also are affected. Thus, lowering of the overnight RRP is expected to lower short and longer real interest rates, and consequently affect economic activity.

Changes in the RRP rate affect changes in the nominal exchange rate. This model embeds the Uncovered Interest Parity (UIP) cum risk premium to exchange rate determination, while a fully flexible exchange rate regime is assumed. This assumption underlies the baseline dynamics of nominal exchange rate for an important reason. Indeed, the UIP condition relies on arbitrage arguments that are expected to be true. Although arbitrage is often subject to limits (Shleifer and Summers 1990; Shleifer and Vishny 1997; Wollmershauser 2003), it is nonetheless one of the basic building blocks of economic decision making. The UIP is seen as:

$$E_t e_{t+1}^n - e_{t+1}^n = r_t^f - r_t^d + u_t^e, \quad (3)$$

where the difference between the foreign interest rate  $r^f$  and the domestic interest rate  $r^d$  represents the interest rate differential,  $E_t e_{t+1}^n$  is the expected nominal exchange rate and  $u_t^e$  is the risk premium (Leitemo and Soderstrom, 2004; West,

2003; and Wollmershauser, 2006). This risk premium is assumed to follow the stationary process:

$$u_{t+1}^e = \rho_e u_t^e + \varepsilon_{t+1}^e, \quad (4)$$

where  $0 \leq \rho_e < 1$ . In this equation,  $\rho_e$  could capture the UIP disturbances or effects of persistent movements in the risk premium. Equation (4) then feeds into the BSP reaction function in equation (1). To determine the link between the real exchange rate and the nominal exchange rate, it is assumed that deviations from purchasing power parity occur in the short-run.

The nominal exchange rate is allowed to transitorily deviate from the purchasing power parity (PPP) so that movements occur in the real exchange rate. In addition, the nominal short-term interest rates play the leading role as the instrument of monetary policy, with the money supply having a limited role in describing the monetary stance.

The main features of Bayangos (2007) model are the following: (1) the policy interest rate of the BSP responds to inflationary, output gap, and exchange rate pressures; (2) changes in the BSP policy rate affect changes in the nominal exchange rate, based on the uncovered interest parity (UIP) condition; and (3) the nominal exchange rate is an effective transmission mechanism, as both direct and indirect pass-through effects to inflation are relatively above average.

The original model (Bayangos, 2007) did not give much attention to remittances. The remittances were an exogenous inflow on the current account. Shocks to remittances would lead to changes in the current account balance and this would have a small effect on the exchange rate, which would subsequently affect imports and exports. The innovation of this paper is that we have explicitly introduced remittances into the model as an endogenous variable with a number of impacts on the macroeconomy.

$$R_t = \alpha + \delta C_t + \beta(r_t - \pi_t^f) + \theta Y_t^f + \varepsilon_t. \quad (5)$$

Remittances are positively related with real consumption  $C$ , indicating that they do not stabilize consumption, as found in most studies. This relationship indicates that remittances increase when demand for consumption accelerates and they decrease when demand for consumption deteriorates. We look at the interest rate differential  $(r - \pi^f)$  to determine whether investment considerations are at play. In addition, we look at the income of host countries  $Y^f$  to determine the cyclical of remittances

with the income of host countries. This latter specification is based from the discussions in Sections IV.

$$Y_t^d = \alpha + \delta R_t - \theta Y_t^T + \varepsilon_t. \quad (6)$$

Following Chami *et al.* (2003), equation (6) shows that remittances add to real disposable income  $Y_t^d$  and, through this, to real private consumption expenditure  $C_t$  in equation (7).

$$C_t = \alpha + \delta Y_t^d + \lambda m_t - \theta(r_t^d - \pi_t^e) + \varepsilon_t. \quad (7)$$

The impact of remittances  $R$  is seen as directly affecting deposit liabilities  $D_t$  in equation (8).

$$D_t = \alpha + \delta Y_t + \lambda R_t + \varepsilon_t. \quad (8)$$

Equation (8) is also driven by real output  $Y$ . As in Bayangos (2007), the money supply process follows the typical estimation of deposit liabilities of the monetary system, such as demand, savings and time deposits as well as deposit substitutes, and currency in circulation. Total domestic liquidity is determined by adding real deposit liabilities and real currency in circulation. Equation (8) shows that real bank deposits are driven by remittances so that any change in remittances will have an impact on the money supply. And this has, as equation (2) shows, an impact on the 91-day Treasury bill rate.

$$L_t = \alpha - \delta R_t - \lambda W_t + \varepsilon_t. \quad (9)$$

Following Chami *et al.* (2003) and Yang (2008), equation (9) shows that an increase in remittances  $R$  will have a negative effect on the labor force supply  $L$ . In addition, members of households receiving remittances reduce their work effort  $W$ .

The model traces the impact of changes in remittances on important economic variables, such as disposable income, personal consumption spending, money supply and interest rates, exchange rate, labor supply and wages. All the changes in spending behavior, when added up across the whole economy, generate changes in aggregate spending. Total domestic expenditure plus the balance of trade in goods and services reflects the aggregate demand in the economy, and is equal to the gross domestic product (GDP).



Potential output and the resulting gap as measure of future inflationary pressures have regained importance under the IT framework. The output gap in this model is estimated based on Dakila (2001), in which it is expressed as the difference between the log of a one quarter moving average of supply side GDP (deseasonalized series) and the potential output.

The output gap then feeds into the wholesale price index. The whole price index in this model is affected by the average prices of merchandise imports in pesos, the excess liquidity as indicated by real money supply relative to gross domestic product, the average compensation (or wages) for industry and services sectors and the output gap. This specification makes the pricing decision based on a flexible markup.

In this specification, the main link between monetary policy and the wholesale price index, and consequently on inflation, is the output gap. Hence, there is an impact of monetary policy on expenditure. In addition, the real money supply strengthens the link to price level and consequently the link between monetary policy and the production sector.

Meanwhile, changes in the wholesale price drive prices of the industry and services sectors, and finally the final demand prices. Final demand prices are contained in the implicit GDP deflator. This then is the basis of headline inflation.

Because of the forward-looking nature of inflation targeting, the role of inflation expectations in this transmission mechanism becomes crucial. Indicators of inflation expectations include the two-year ahead inflation forecast.

The estimation of long-run inflation expectations follows a hybrid structure that contains both forward-looking and backward-looking expectations. The structure includes a rational component of inflation, indicated by the medium-term (three to five years) inflation target announced by the Government, and contemporaneous and inertial components, indicated by current and past inflation rate. The rational component is based on Demertzis and Viegis (2005) work on inflation targets as focal points for long-run inflation expectations. The idea is that in the absence of concrete information about inflation expectations, the only information that agents have is the quantitative inflation target announced by the Government. In turn, inflation expectations provide the bridge between the relatively short-term RRP to rather long-term market interest rates.

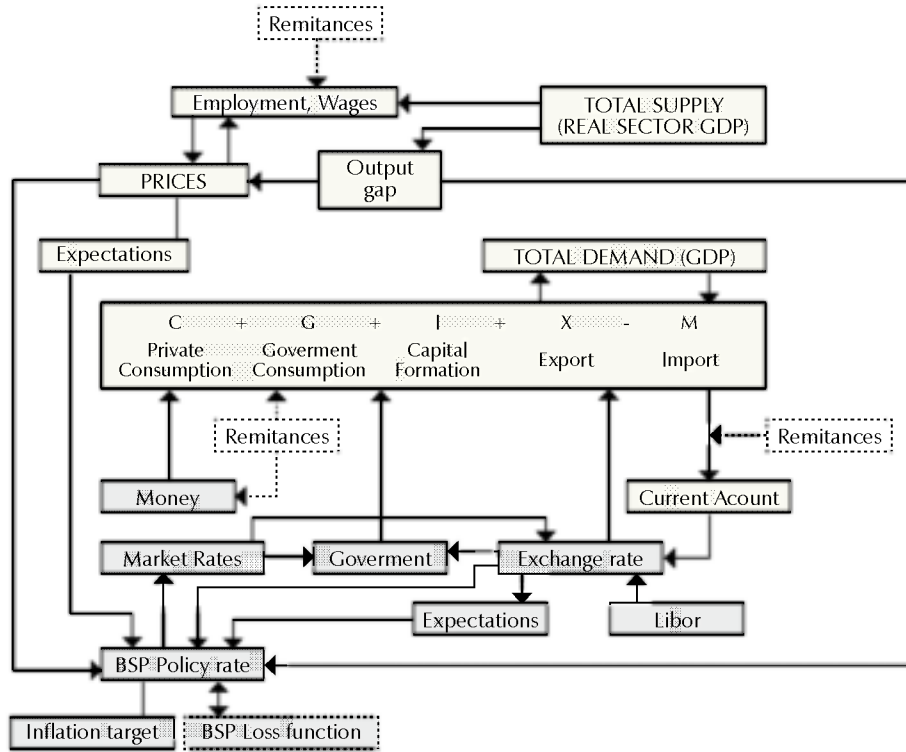
## B. CHANNELS OF REMITTANCES TOWARDS GROWTH AND INFLATION

Graph 2 provides a schematic and simplified overview of overseas Filipino remittances and the Philippine monetary transmission. The 67 equations are grouped into seven major blocks: monetary sector (bottom left), public sector (bottom right), prices (middle left), expenditures including balance of payments (middle right), production (upper right) and employment (upper left). In particular, remittances are seen to affect the supply of money, current account, total demand and labor supply.

Our paper traces the impact of changes in remittances on the Philippine monetary policy transmission mechanism, by adding and respecifying the model in line with the suggestions from the empirical literature in section 2 and the analysis in section 4 of the paper: Appendix 1 details the adjustments to the model that were made to capture the full impact of remittances.

We base the revised model on our empirical finding that remittances are procyclical with the Philippine aggregate demand but they also cause demand to change. This bidirectional causality is captured by Table A1.1 (see Appendix 1) that shows that remittances are determined by real personal consumption demand (PCE) but also by US real output, seasonally adjusted and detrended. Remittances are therefore procyclical both with the Philippine and the US business cycle (which confirms our finding that the US and Philippine cycles are correlated). Remittances are further driven by the interest rate differential as indicated by the difference between the 91-day Treasury bill rate and the 90-day Libor, lagged by one month, and remittances, lagged by one quarter. The table shows that a higher level of US GDP, personal consumption and a higher interest rate differential lead to higher remittances.

Remittances in Table A1.1 (Appendix 1) are positively related with consumption, indicating that they do not stabilize consumption, as found in most studies. The result shows that remittances respond to investment opportunities in the Philippines as much as to altruistic and insurance considerations. Again, this result implies that remittance flows may not be as important to smooth fluctuations or shocks in the economy as commonly believed. Table A1.2 (Appendix 1) shows that remittances add to disposable income and, through this, to private consumption expenditure. This interaction strengthens the procyclical impact of remittances.



Source: Authors

We have re-specified three endogenous equations in the model to capture the impact of remittances on money supply, 91-day Treasury bill rate and supply of labor (or the labor force). Table (A1.3) shows that real bank deposits are driven by remittances, so that any change in remittances will have an impact on the money supply. And this has, as Table A1.4 shows, an impact on the 91-day Treasury bill rate (TBR91). Bayangos (2007) results show that in the original model the response of market interest rates to changes in the policy interest rate is moderate. Our new results suggest that the impact of remittances may be one of the channels that explain this low elasticity. In a booming economy, monetary policy tries to cool down by raising the policy rate at a time that rising remittances increase liquidity on financial markets.

Table (A1.5) shows that an increase in remittances will have a negative effect on the labor force supply. Members of households receiving remittances reduce their work effort. Thus the labor supply falls at a time when the demand impulse from the increased remittances increases the demand for labor. This reduces the unemployment rate and increases wages.

## VI. CHALLENGES TO MONETARY POLICY

We use the open and dynamic macroeconomic model presented in the previous section to identify the economic variables of Philippine monetary policy transmission. All provide important information about the stance of Philippine monetary policy. In this paper we are particularly interested in how shocks to remittances affect the economy and monetary policy effectiveness.

For instance, in standard macroeconomic models, as in the original (Bayangos 2007) version of our model, a recession in the United States will affect the Philippines mainly through the trade balance with a US recession reducing demand for Philippine exports. In the revised model, the US recession would also result in a decline in remittances from the US and a fall in disposable income so that, on top of the decline in export demand, also private consumption demand declines. Moreover, the shock to remittances will also have impacts on the money supply, domestic interest rates and labor supply. The adjustment process will thus be more complex and the task of monetary policy more challenging.

The strategy we follow to assess the impact of remittances on the macroeconomy, in general and on monetary policy in particular, is straightforward. We simulated a sustained one percentage point reduction in the US GDP growth rate on the estimated macroeconomic model from the first quarter of 1994 to the fourth quarter of 2003 through two versions of the Philippine quarterly model. In the first version of the model (the Bayangos 2007 version) remittances are exogenous. A US recession is thus only felt through the trade account and remittances do not change. The second version of the model has made remittances endogenous. In this version the US recession leads to a decline in remittances, which in turn has effects on consumption demand, money supply and interest rates, and labor supply. We compared the out-

comes of the two models, with and without the remittance channel. Annualized quarterly growth and the volatility are computed using the coefficient of variation (CV)<sup>8</sup>.

The impact of a sustained one percentage point reduction in the US real GDP growth on BSP credibility is based on the estimated BSP objective function (or the welfare loss of a policy rule or the “policy loss function”). The idea is to map the impact of simulations to the BSP objective function over time, not to derive the optimizing policy loss function. A welfare or credibility loss (gain) to the BSP is measured by a higher (lower) value of the policy loss function. The impact on interest rates, the exchange rate, the money supply, components of GDP and finally, inflation and inflation expectations, are also assessed.

In the subsequent analysis we will focus on the impact of a one percentage point reduction in the US GDP growth rate during the inflation-targeting (IT) 2001–2003 period (For reference Table 5 also shows the results for the pre-IT and pre-Asian crisis period (1994–1996).

In the basic version of the model, the US GDP shock was felt through trade. As the US economy declines, exports of the Philippines fall and that leads to a fall in aggregate demand and output, a deterioration of the current account and a depreciation of the exchange rate.

When we introduce remittances into the model the adjustment becomes richer. The remittances become another transmission channel, next to the trade linkage of the US shock. The direct effect on the current account now includes the fall in export demand as well as the decline in remittance transfers; the current account deteriorates to a greater extent: Table 5 shows that while in the original model the current account declines by 1.47 per cent, in the model with remittances the decline is 2.34 per cent. This is despite some mitigating effects: the US GDP shock leads to a fall in remittances with an immediate impact on disposable income and private consumption demand; this reduces imports. The sharper deterioration of the current account also implies a stronger depreciation of the exchange rate with impacts on exports and imports. Moreover, the fall in remittances increases the labor supply, which leads to a fall in wages and prices and thus an improvement of the real exchange rate. All the

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<sup>8</sup> Volatility is a measure of how wild or quiet an indicator is relative to its history. The CV is a comparative measure defined as the ratio of the standard deviation to the mean.

countervailing effects are not so strong as to turn the current account around. The decline in the current account is stronger in the model with endogenous remittances.

The decline in remittances has a direct effect on personal consumption expenditure. In the original version of the model the decline in consumption spending is relatively small (-0.18), a result of the decline in GDP growth due to falling export demand. But once remittances are endogenous the impact is stronger: the decline in remittances, next to the other negative impacts of the US recession, causes private consumption to fall by 1.07 per cent. This deepens the aggregate demand impact of the US recession on the Philippine economy.

In the original model the monetary effects are small. The fall in the GDP growth reduces the money supply and the decline in the output gap lowers inflation. The decline in the output gap and in inflation invites a downward adjustment of the policy rate (RRP) and the market interest rate TBR91 falls as the policy rate and inflation decline. Again, when remittances are endogenous the effects are stronger. The output gap and the money supply fall by more and inflation declines as the output gap and the money supply fall, and wages decline as labor supply increases. The decline in the money supply, induced by the fall in remittances, would lead us to expect an increase in the market interest rate but, in fact, the TBR91 falls. The impact of falling inflation and reductions in the BSP policy rate dominate. But to achieve this effect on market interest rates the BSP has to take stronger policy action: the RRP rate falls by 0.08 in the original version of the model but by 0.16 in the remittances version.

The fall in the market interest rate helps private investment even though the negative impacts of the depreciating currency and the fall in GDP dominate. Still, the decline in capital formation is smaller in the model with remittances.

The larger current account deficit and the stronger fall of the market interest rate have their effect on the nominal exchange rate. While the peso-dollar rate depreciates with 1.08 per cent in the original version of the model, it falls by 1.18 in the new version.

A final impact of declining remittances is felt on the labor market. According to the model, the labor supply increases when remittances decline: households seek

Table 5  
Cross Correlation Matrix, Remittances, Philippines and  
Its Major Host Countries' Output

Economic Indicators	PERCENT CHANGES FROM BASELINE MODEL			
	WITHOUT REMITTANCE CHANNEL			
	1994-96		2001-03	
	Average	CV	Average	CV
<b>GDP components</b>				
Personal consumption (growth)	-0,05	-0,09	-0,18	-0,05
of which: Disposable income (growth)	-	-	-	-
Gross capital formation (growth)	-0,15	-0,08	-1,42	-0,14
Current account (growth)	-1,01	-0,07	-1,47	-0,33
of which: Remittances (growth)	-	-	-	-
Labor force (growth)	0,02	0,03	0,08	0,64
Non-agriculture compensation index (growth)	-0,08	-0,12	-0,13	-0,15
<b>Financial indicators (%)</b>				
Money supply (year-on-year growth)	-0,08	-0,03	-0,15	-0,04
RRP (%)	-0,12	-0,02	-0,08	-0,61
91-day treasury bill rate (%)	-0,09	-0,02	-0,07	-0,09
Nominal peso-dollar rate (growth)	0,39	0,24	1,08	0,21
<b>Macroeconomic indicators (%)</b>				
Real GDP (growth)	-0,07	-0,10	-0,12	-0,08
Output gap (growth)	-0,03	-1,57	-0,33	-1,91
CPI-inflation	-0,10	-0,20	-0,13	-0,87
CPI-inflation forecast (two years ahead)	-0,12	-0,15	-0,15	-0,18
CPI-inflation expectations (long run)	-0,02	-0,02	-0,03	-0,08
<b>BSP objective function</b>				
WITH exchange rate	0,11	0,09	0,08	0,03
WITHOUT exchange rate	0,13	0,08	0,33	0,05

	WITH REMITTANCE MANNED			
	1994-96		2001-03	
	Average	CV	Average	CV
	-0,82	-0,11	-1,07	-0,01
	-1,41	-0,02	-1,48	0,00
	-0,28	-0,19	-0,37	-0,09
	-1,52	-0,39	-2,34	-0,82
	-4,00	-0,03	-4,17	0,00
	0,35	0,10	0,45	0,01
	-0,23	-0,05	-0,32	-0,09
	-1,45	-0,26	-2,93	-1,25
	-0,10	-0,11	-0,16	-0,09
	-0,08	-0,02	-0,12	-0,08
	1,06	0,08	1,18	0,79
	-0,38	-0,14	-0,89	-0,08
	-0,18	-3,89	-1,73	-1,38
	-0,14	-0,10	-0,18	-0,10
	-0,15	-0,13	-0,17	-0,06
	-0,03	-0,10	-0,15	-0,10
	0,05	0,08	0,50	0,12
	0,01	0,08	0,27	0,11



alternative income to compensate the cut in transfers<sup>9</sup>. Table 5 shows a stronger labor force growth in the model with endogenous remittances and, as a result, a stronger decline in nonagricultural wages. This helps to curb inflation.

Comparing the two versions of the model, there is thus a stronger direct effect on aggregate demand, reflected in a much stronger decline in real GDP growth and a decline in the output gap, inflation falls by more and the exchange rate shows a stronger depreciation. These variables are in the BSP objective function and we can therefore expect a different policy response. As shown in Table 5, the policy rate (RRP) declines by 0.08 per cent in the original version of the model but by 0.16 per cent in the model with endogenous remittances.

It should be noted that monetary policy becomes rather complex when remittances are endogenous. The worsening of the output gap invites a stronger monetary policy response and, as the decline in remittances helps to reduce inflation, a stronger policy response seems also feasible. On the other hand, the direct effect of the fall of remittances on the money market creates an upward pressure on the market interest rate; to counteract that pressure, the monetary policy response needs to be stronger. Moreover, the fall in remittances implies a stronger depreciation of the exchange rate, compromising the BSP objective of stabilizing fluctuations around the exchange rate. To stabilize the exchange rate the Central Bank should actually increase the policy rate. They may be reluctant to do so as the depreciation gives some much-needed support to exporters. Thus, there is a trade-off between stabilizing output and stabilizing the exchange rate. Such trade-offs will increase the loss function.

The volatility measure in Table 5 indicates that the BSP's reaction towards inflationary pressure, output gap and exchange rate fluctuations generated, from the baseline, lower volatility of inflation, the two-year-ahead inflation forecast, long-run inflation expectations and output gap but higher in the nominal peso-dollar exchange rate. As real GDP growth slowed and the output gap widened, lower volatility — compared to the baseline— was seen. With these results, the BSP's preference to react towards inflationary pressure, output gap and exchange rate fluctuations resulted in the decline of its credibility, as the policy loss estimate rose. Table 5 shows that losses increase. This is not surprising: a negative shock to the economy affects

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<sup>9</sup> Alternatively, it could be argued that as employment opportunities abroad decline due to the US recession workers stay in the Philippines or return to the Philippines to seek employment.

the output gap negatively and reduces inflation but also leads to depreciation of the exchange rate. While this depreciation is helpful for exporters (and can contribute to improving the output gap), it will push inflation (pass-through). This is the trade-off between the various policy objectives, which is amplified when remittances are endogenous. It should also be noted that the endogenous remittances reduce the effectiveness of monetary policy. In the basic version of the model the fall of the policy rate (RRP) of 0.08 is almost fully translated in the fall of the market interest rate (TBR91) of 0.07. When remittances are endogenous these numbers are -0.16 and -0.12 respectively; the policy rate has less impact on the market rate.

## VII. CONCLUSION

At the time of writing this paper (early 2009) the Philippines is facing a global recession. In the current commentary it is noted that the fall in demand in the US, Europe and Japan will reduce demand for Philippine exports and that the turmoil on global financial markets will reduce capital flows (FDI, portfolio investment, loans) to the Philippines. This will require a painful adjustment and an aggressive policy to mitigate the impact of the recession. This paper has argued that in the assessment of the impact of the global recession we should also consider the remittances as a transmission channel. Remittances are a crucial element of the Philippine economy and we have established that they are driven by the economic cycle of the main host countries, and that an ongoing recession will thus lead to a significant slowdown in transfers (see *e.g.* World Bank, 2008).

We have also established that the fluctuations in remittance flows over the years are of a magnitude that is significant enough for policy makers to take notice.

Through our model we have been able to trace the impact of changes in remittances on important economic variables such as the aggregate demand, money supply and interest rates, the exchange rate, and labor supply and wages. The model simulations have shown that the impact of the US recession on the Philippine economy is more severe once we take account of the endogeneity and procyclicality of remittances. Our simulations clearly show that the BSP should consider taking this endogeneity into account when formulating monetary policy.

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APPENDIX 1:  
DIAGNOSTICS, MODEL SOLUTION AND SIMULATION PERFORMANCE  
OF THE PHILIPPINE MACRO MODEL

A. DIAGNOSTICS

The Philippine quarterly macroeconometric model consists of 67 equations, with 29 simultaneous equations estimated using two-stage least squares and ordinary least squares. There are 32 recursive equations largely estimated using ordinary least squares, and the remaining 6 are identities.

The 29 simultaneous equations are estimated using single-equation methods: 17 are estimated using two-stage least squares and the remaining 12 equations are estimated using ordinary least squares. The choice of instruments for the two-stage least squares is assumed to be all the lagged endogenous variables and all current and lagged exogenous variables in the whole system. These equations are largely overidentified, while the rest are identified. It is argued that there is not anything wrong with overidentified equations since the statistical fit is never perfect anyway (Greene 2003).

Each of the 29 simultaneous equations is assessed for basic and higher order diagnostic tests. The signs and magnitudes of individual coefficients in each equation —such as *t* statistics—, the adjusted  $R^2$ , Durbin Watson and *F* statistics are all examined. In general, all of the behavioral equations pass these tests. In particular, the adjusted  $R^2$  values for all equations are greater than 60% and values in all equations suggest there is no penalty for the number of explanatory variables used. All calculated *F* values are higher than the critical values, at the 5% to 10% level of significance, thereby indicating a significant degree of reliability of coefficients of determination<sup>10</sup>.

Results of higher order test statistics of residuals are similarly examined. Higher order diagnostic tests start with the Jarque-Bera test. This test is designed to ascertain whether the series is normally distributed. Results show that all of the series are normally distributed. With a lag order of up to two and at a 5% to 10% level of significance, Breusch-Godfrey results show that not all equations exhibit serial

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<sup>10</sup> Exact collinearity is similarly checked. Highly collinear regressors lead to spurious estimates. There are a few cases though where exact collinearity is encountered, especially when dummy variables are used; however, a respecification of some of these equations is done.

correlation. There are equations which initially exhibit serial correlation but for which additional lags are incorporated to make the residuals stationary.

White's heteroskedasticity test in the residuals is also used. White's test is a test of the null hypothesis of no heteroskedasticity. Using the 5% to 10% level of significance and in general up to two fitted items, RESET results reveal that there are no specification errors in equations.

## B. MODEL SOLUTION

Solving a system simultaneously is indeed difficult. Both deterministic and static simulations are performed using the Fair-Taylor method<sup>11</sup>. This is an iterative algorithm, where each equation in the model is solved for the value of its associated endogenous variable, treating all other endogenous variables as fixed. Meanwhile, terminal conditions are assumed to hold in a specified time period. Put simply, this means that the values contained in the actual series after the end of the forecast sample are used as fixed terminal values. A forward solution is similarly used for equations that contain future (forward) values of the endogenous variables.

We report five equations that were added and reestimated to expand the model so that it could trace more fully the impact of changes in remittances.

Table A1.1  
Results of Remittances (REMIT) Model  
(March 1989-December 2008)  
Dependent Variable: *LOG(REMIT)*

Variable	Coefficient	t-statistic
LOG(TBR91(-1))-LIBOR90(-1)	0.016	1.895
LOG(PCE(-1)/FXR(-1))	0.402	2.082
LOG(USGDPHP)	1.567	2.996
LOG(REMIT(-1))	0.531	3.799
DUMCRISIS	-0.082	-2.033
DUMASIAN	0.272	2.555

Adjusted R2 = 0.940      Jarque-Bera=0.526(0.631)  
Breusch-Godfrey (2 Lags)=0.611(0.323)      Durbin Watson = 2.00  
White= 0.619(0.781)      Ramsey (RESET) (2 fitted)=1.309(0.154)

<sup>11</sup> In technical terms, this is called the Gauss-Seidel algorithm method.

Table A1.2  
Results of Real Disposable Income (DISY) Model  
(March 1989-December 2008)  
Dependent Variable:  $LOG(DISY)$

Variable	Coefficient	t-statistic
C	2.071	1.877
LOG(REMIT)	0.121	3.338
INDIVTXRT	-6.954	-1.803
LOG(DISY(-1))	0.693	5.468

Adjusted R2 = 0.787      Jarque-Bera= 0.416(0.231)  
Breusch-Godfrey (1lag)=0.211(0.313)      Durbin Watson = 1.979  
White= 0.519(0.314)      Ramsey (RESET) (2 fitted)=2.119(0.312)

Table A1.3  
Results of Real Deposit Liabilities (DEPLIAB) Model  
(March 1989-December 2008)  
Dependent Variable:  $LOG(DEPLIAB)$

Variable	Coefficient	t-statistic
C	1.818	2.839
LOG(GDP(-4))	0.227	4.864
LOG(FXR)	-0.354	-4.727
LOG(REMIT)*%	0.069	2.781
SDR-XINFL	0.540	3.369
LOG(DEPLIAB)	0.578	12.533

Adjusted R2 = 0.870      Jarque-Bera= 0.316(0.159)  
Breusch-Godfrey (2 lags)=0.118(0.413)      Durbin Watson = 1.893  
White= 0.712(0.323)      Ramsey (RESET) (2 fitted)=1.899(0.154)  
\*/ Converted into pesos and deflated by GDP.

Table A1.4  
Results of the 91-day Treasury Bill Rate (TBR91) Model  
(March 1989-December 2008)  
Dependent Variable:  $LOG(TBR91)$

Variable	Coefficient	t-statistic
C	67.951	4.896
RRP	0.149	4.194
XINFL	0.301	3.525
LIBOR90	0.522	2.890
LOG(MS)	-4.533	-4.691

Adjusted R2 = 0.89      Jarque-Bera= 0.181(0.234)  
Breusch-Godfrey (2 lags)=0.111(0.315)      Durbin Watson = 1.89  
White= 0.212(0.411)      Ramsey (RESET) (2 fitted)=2.118(0.215)

Table A1.5  
Results of Labor Force (LF) Model  
(March 1989-December 2008)  
Dependent Variable:  $LOG(LF)$

Variable	Coefficient	t-statistic
C	-0.172	-1.898
LOG(WORKAGE)	0.342	4.308
LOG(QSEIP(-1))	-0.084	-2.279
LOG(REMIT)	-0.021	-3.078
LOG(LF(-2))	0.752	9.937

Adjusted R2 = 0.971      Jarque-Bera= 0.112(0.238)  
Breusch-Godfrey (2 lags)=0.812(0.378)      Durbin Watson = 1.845  
White= 0.113(0.349)      Ramsey (RESET) (2 fitted)=1.116(0.115)

### C. SIMULATION PROPERTIES OF THE MODEL

To gauge the simulation and forecasting performance of the model, the mean absolute percent error (*MAPE*) of selected endogenous variables is computed. As a general rule, the smaller the *MAPE* the better the fit of the model to the actual data. *MAPE* (which is unit free) is computed as follows:

$$MAPE = \left( \frac{1}{n} \right) \sum \left[ \frac{P - A}{A} \right] * 100, \quad (A1.1)$$



where  $A$  refers to the actual value,  $P$  is predicted or simulated by the model and  $n$  is the number of periods covered by the simulation.

The model's forecasting performance over parts of the sample period and the simulated response to some exogenous changes in policy variables are assessed. The simulation period extends from the first quarter of 1994 to the fourth quarter of 2006. The simulation period includes the in-sample (historical) performance from the first quarter of 1994 to the fourth quarter of 2003, while the out-of-sample performance extends from the first quarter of 2004 to the fourth quarter of 2006.

In our model, the major macroeconomic variables can be predicted within reasonable error margins. In general, the *MAPEs* of the static model are lower than those of the dynamic model. In fact, using static model, most of the real and financial sectors have a *MAPE* below the benchmark of 10%, except for two variables; for the dynamic model this is four variables.

Using two-stage least squares and ordinary least squares, about 86% of the *MAPEs* fall below 10%. These include key variables in the external and real sectors, like remittances (*REMIT*), real personal consumption (*PCE*), disposable income (*DISY*), the consumer price index (*CPI94*), the wholesale price index (*WPI94*), the price index for services gross value-added (*PVSR*), the labor force (*LF*) and long-run inflation expectations (*XINFL*). For instance, *CPI94*, *WPI94*, *REMIT*, and *XINFL* have a *MAPE* of 0.91%, 2.28%, 8.43% and 9.87%, respectively.