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The Macroeconomics of Remittances In the Philippines

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Abstract

The literature on remittances has in the past concentrated on the microeconomic aspects of the remittance process: the determinants of remittances, impact of remittances on household allocation decisions, and their impact on poverty. Only recently has there been more attention on the macroeconomic impact of remittances. It is to be expected that, when remittance inflows are as large as they are in the Philippines, they are likely to have significant macroeconomic effects.

Our paper first explores the cyclical dynamics of remittances to the Philippines and secondly, analyses the macroeconomic impact of remittances and the monetary policy implications. In this second endeavour, our paper uses a dynamic structural quarterly macroeconometric model of the Philippines to trace the various channels along which remittances affect the main macroeconomic variables.

In the assessment of the impact of the recent global recession 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, like aggregate demand, money supply and interest rates, exchange rate and labour supply and wages. We have also established that the fluctuations in remittances flows over the years are of a magnitude that is significant enough for policy makers to take notice. 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 pro-cyclicality of remittances.

Keywords

Remittances, Monetary policy, Exchange rate

The Macroeconomics of Remittances in the Philippines [1]

1 Introduction

Remittances are a crucial financial flow to the Philippines: in recent years annual inflows amounted to ten per cent of 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 created by shocks to remittances for monetary policy.

Globalization exposes developing countries to the volatility of international markets. In the literature on financial globalization there is considerable attention for the volatility of capital flows (e.g. Prasad et al. 2003). The 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 also remittances are subject to shocks. The ups and downs of capital flows and remittances have direct effects on aggregate demand, on liquidity of financial markets, on foreign exchange markets, etc. and, in that way, volatility of financial flows creates significant challenges for monetary policy.

Some studies suggest that remittances are anticyclical, increasing during hard times at home and thus providing an automatic stabiliser 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 explore statistically the cyclical dynamics of remittances to the Philippines and, secondly and more importantly, we will analyse the macroeconomic impact of remittances and the monetary policy implications.

We will use correlation analysis and Granger causality tests 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 remittances are also procyclical with Phillipine real GDP. In the second endeavour we analyse monetary policy behaviour in a quarterly structural macroeconometric model for the Philippins (see Bayangos 2007). To a large extent, our macro model shares features with New Keynesian

[1] Veronica B. Bayangos works at the Bangko Sentral Sentral ng Pilipinas (BSP) while Karel Jansen at the Institute of Social Studies in the Hague. We are grateful to BSP Deputy Governor for Monetary Stability Sector Diwa C. Guinigundo and BSP Director from the Center for Monetary and Financial Policy, Francisco G. Dakila and an anonymous referee for their comments. The usual institutional disclaimer applies.

model (see Ball 1999) that assumes inflation and output to be backward-looking. We have also assumed that there is excess capacity in the economy and the asset markets are imperfect. Central to our macro 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 a new version of the model, developed for this paper, we have made remittances endogenous. Shocks to remittances arise from the business cycle in the main host countries (USA) and these shocks have an impact on disposable income, personal consumption, money supply, the domestic market interest rate and the labour 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 organised 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 cyclicality of remittances and the subsequent sections introduce the model and the model simulations. The final section concludes.

2 Background

In the literature on financial globalization the volatility of capital flows has been approached using the dichotomy of 'push' and 'pull' (e.g. Taylor and Sarno 1997). The pull factors are country-specific indicators that pull capital to the country. They include the expected return on assets in the country and the country risk, reflected in indicators like the growth rate, inflation, current account, external debt, international reserves. The push factors reflect conditions in the major source countries (OECD), such as interest rates and output gap. When these are not favourable, capital will flow out of OECD in search for higher returns elsewhere.[2]

Empirical work suggests that both push and pull factors are important in explaining capital flows. Push factors may be most important in explaining the total level of capital flows to developing countries while pull factors determine their distribution over individual countries (see e.g. Taylor and Sarno 1997, Mody and Taylor 2004, Hernandez et al. 2001).

The push and pull approach raises the issue of the interaction between capital flows and business cycles. The push factors suggest a relationship between capital flows to developing countries and the business cycle in the OECD. The pull factors suggest a relationship between capital inflows and the

[2] Mody and Taylor (2004) follow a slightly different approach; they set up a demand-supply model to explain capital flows with the possibility of credit rationing due to asymmetric information. Demand for capital in developing countries is mainly driven by country-specific factors (like the pull factors) while supply is dependent on country-specific factors but also on global push factors.

business cycle in developing countries. Kaminsky et al. (2004) formulate the following stylized facts from an analysis of data of a large sample of developed and developing countries[3] : (1) net capital flows are pro-cyclical in developing countries; (2) fiscal policy tends to be pro-cyclical and monetary policy is pro-cyclical in most developing countries; and (3) in developing countries the capital flow cycle and the macroeconomic policy cycle re-enforce each other.

Where the literature on capital movements has its push and pull factors to explain the flows, the literature on remittances has its own dichotomy: remittances are driven by altruistic or investment motives (see e.g. Alleyne et al. 2008, Bouhga-Hagbe 2004, Buch et al. 2002). The first sees remittances as a form of altruism on the part of relatives overseas; they care for the family back home. The investment motive states that the overseas worker will have a tendency to invest her savings in the home country. But behind this simple dichotomy there lies a more complex set of factors.

There may be pure altruism where the overseas worker has the family welfare in her utility function and supports the family, certainly during hard times at home. But such support may also be driven by self-interest. If the worker expects to return home at some stage she needs to maintain the home base or her transfers may ensure her share in the family wealth. Migration may also be analyzed as household strategy to manage risk. Sending one family member abroad diversifies income sources and reduces risk. Such an insurance motive would be stronger when credit markets are imperfect and cannot be used to compensate shocks. Remittances can also be seen as a re-payment. The family has invested in the education of the migrant worker and may have financed travel cost and other cost related to moving abroad and the remittances are the re-payment on this investment.

The investment motive is similarly complex. If the migrant worker expects that her time abroad will be limited and that eventually she will return home, she will have an incentive to invest her savings in the home country. Even if she expects to stay abroad for longer she may have good information about investment opportunities at home and networks to implement these opportunities. But there is reason to be sceptical about the investment motive: if the investment opportunities in the home country are so good there would be little reason to migrate.

One oft-cited advantage of remittances is that they are not so volatile. IMF (2005) uses data for a large group of developing countries over the period 1980-2003 to establish that the volatility of remittances (measured by the standard deviation of its ratio to GDP) is smaller than that of aid, FDI, private capital flows and exports. Buch et al. (2002) analysed 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 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.

[3] The study uses data for 104 countries over the period 1960-2003 (see Kaminsky et al. 2004).

TABLE 1
Relative Magnitude and Volatility of Selected Foreign Exchange Inflows, 1996-2007[1/]

	OF Remittances		Exports of Goods and Services		External borrowings [2/]		Foreign Direct Investments		Portfolio Investments	
Year	Level	% of GDP	Level	% of GDP	Level	% of GDP	Level	% of GDP	Level	% of GDP
1996	4.31	5.2	14.91	18.0	2.89	3.5	3.62	4.4	4.15	5.0
1997	5.74	7.0	15.56	18.9	3.47	4.2	0.84	1.0	3.07	3.7
1998	7.37	11.3	20.66	31.7	4.83	7.4	2.02	3.1	3.31	5.1
1999	6.80	8.9	32.62	42.8	6.24	8.2	1.25	1.6	3.92	5.1
2000	6.05	8.0	35.48	46.7	6.85	9.0	2.24	3.0	0.26	0.3
2001	6.03	7.9	29.03	38.2	7.98	10.5	0.20	0.3	1.08	1.4
2002	6.89	8.4	32.40	39.6	7.22	8.8	1.54	1.9	1.37	1.7
2003	7.58	8.9	33.38	39.1	7.21	8.4	0.49	0.6	1.38	1.6
2004	8.55	9.1	37.02	39.5	5.47	5.8	0.69	0.7	-0.80	-0.9
2005	10.69	10.0	38.92	36.4	4.07	3.8	1.85	1.7	3.62	3.4
2006	12.76	10.0	46.66	36.6	1.05	0.8	2.92	2.3	4.61	3.6
2007	14.45	9.2	50.40	32.1	0.79	0.5	2.93	1.9	3.57	2.3
Average	8.10	8.7	32.25	35.0	4.84	5.9	1.72	1.9	2.46	2.7
SD	3.04		11.04		2.42		1.08		1.73	
CV	37.48		34.22		50.07		62.92		70.36	

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 loans of the BSP.

SD= Standard deviation

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

Still, when remittances are a significant share of GDP, even modest volatility can result in fluctuations in the inflows that are of macroeconomic significance.[4] Economic policy makers will be concerned about such fluctuations and will need to understand the determinants of the patterns in the flows. The main motives for sending remittances suggest possible cyclical patterns. Three scenarios could be suggested.

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 so that 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 (a-cyclical). 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 co-movement occurs the remittance flows will appear procyclical.

In the second scenario the migrant worker has a clear idea about how much money she wants to transfer home over the longer term but she will adjust the installments to the conditions in the home country. When economic times at home are hard she will send some more and then compensate when times are good. In this scenario remittances will be clearly countercyclical and perform a welcome stabilization function.

[4] The average annual change in the remittances to GDP ratio in table 1 is 1.29 percentage points, certainly a magnitude that should concern policy makers.

In the final scenario the migrant worker acts as an investor. She has gone abroad to build up life-time assets and is looking for the best opportunities to invest her savings. Given her knowledge of, and contacts in, the home country and her desire to eventually return there she will be quite interested in good investment opportunities at home. This behaviour 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 behaviour could be more complex. The portfolio of the overseas investor is likely to contain financial and non-financial 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 home and host country are synchronized a boom will lead to no adjustment in the portfolio.

This interaction becomes even more complex through the increasing synchronization of business cycles around the world. There is some evidence that the growing intensity of trade and financial integration, which are part of the rapid globalization of the last two decades, have led to an increased co-movement of business cycles amongst OECD countries and between OECD countries and main emerging market economies (see Kose et al. 2003, Kose et al. 2005, Imbs 2004 and 2006).

The literature on the cyclicality of remittances is inconclusive. Is there a correlation between cyclical fluctuations of GDP and remittances? Many argue that remittances are countercyclical as more money is sent home during hard times but this is not the general case. Loser et al. (2006) see a countercyclical pattern in the remittances flows to seven Latin American countries that they study and they quote a number of other studies that come to the same conclusion. Sayan (2006) studies 12 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 (forthcoming) 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. Guiliano et al. (2005) correlate the cyclical components of remittances and GDP for a sample of about 100 developing countries over the period 1975-2002 and find in about two thirds of the cases a positive correlation (i.e. remittances are pro-cyclical).

Dean Yang has done a number of interesting studies on remittances in the Philippines. He starts by observing that the correlation between (the cyclical components of) GDP and remittances do not say much about causality as there are various possible interactions. Remittances may be invested by the receiving household and lead to income growth. But remittances may also induce households to reduce their work effort and thus reduce income. And remittances may respond to income shocks that hit the household. To deal with this problem, Dean tries to identify exogenous shocks and then trace their impact on remittances. In one paper (Dean and Choi 2007) regional variations

in rainfall are used to instrument for changes in household income. In households that have a migrant working abroad there is a significant negative relationship: when the household is hit by a negative income shock remittances increase. In households without migrants no such relationship between income shock and remittances can be observed.

In another study (Yang 2008) the shock is the sudden change in exchange rates during the Asian crisis. At that time the peso depreciated strongly with respect to the currency of main migrants' host countries (such as Middle East, USA) while at the same time households in the Philippines were suffering from the negative impact of the crisis. Comparing household surveys of June 2007 and October 2008 the study observes that a 10 per cent depreciation of the peso was followed by a 6 per cent increase in peso remittances.[5]

Both these studies are consistent with the altruistic or insurance approach to remittances. The migrant's utility function includes the welfare of the family back home and she decides on the level of remittances in view of the shocks that occurred. 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 analyse the cyclicality of remittance flows to the Philippines. From a panel of 113 countries for the period 1970-1999, Chami et al. (2003, 2006) showed that in the case of the Philippines, they found support to the view that 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 re-estimated the same equation using 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 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 an economy where remittances are important shifts in the remittances flows will have short-term macroeconomic effects to which policy makers may need to respond. 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 and that the small part that is saved is not invested

[5] This implies that the dollar amount remitted was reduced but that the peso amount that the household received was increased. This is what you would expect if the utility function of the migrant includes both her own and her family's consumption.

very productively (e.g. in real estate).[6] Part of this will be spent on traded goods: imports will rise and exports may fall so that the trade balance deteriorates. The direct effect on the current account will, however, be positive as part of the increased remittances will be spent on non-traded goods. This increased demand for non-traded goods will push up their prices. These direct demand effects will be re-enforced by the multiplier effect.

The increase in the price of non-traded goods will increase domestic cost of production. The inflow of remittances on the foreign exchange market may also lead to an appreciation of the exchange rate, the so-called Dutch disease effect. Both these effects will hurt the competitiveness of exporters. If these effects are strong, together with the demand effects on the trade balance, the total impact may well be that the current account deteriorates. Many studies have confirmed this effect (see e.g. Dorantes and Pozo 2004, Loser et al. 2006). Tuano-Amador et al. (2007) find some evidence for the Dutch disease effect.

The higher remittances flows will increase liquidity in financial markets which may push down the interest rate and lead to an expansion of credit. The 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 labour 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.[7] Potentially, the labour supply effects in the Philippines could be strong. The number of overseas Philippinos is above 8 million and this number has increased significantly in recent years. This is equivalent to more than 20 per cent of the Philippine labour force. It could be expected that the withdrawal of such a large group from the labour market would have an effect on wages (i.e. a Dutch disease effect working through the labour market) and that it would have a negative impact on production. This may be particularly the case if, as seems to be the case in recent years, migration concentrates on skilled workers. If, on top of that, the receipt of remittances would induce households to reduce work effort, the impact would be even more severe.

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[6] Yang (2008) finds no significant effect of the increase in remittances on consumption in answer to the exchange rate shocks of the Asian crisis. That may be because he is looking at the short term impact of a shock that was sudden and may have been perceived as temporary. In line with the Permanent Income Hypothesis such shocks will not lead to immediate adjustment of consumption patterns.

[7] But 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). But it should be noted that this study only looks at the very short-term impact of the increase in remittances.

The net effect of all these effects on the output gap is an empirical matter. If the positive demand effects dominate the negative exchange rate and labour supply effects, 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 labour 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.

In the impact assessment it is also relevant to take into account any second round effects. Studies into the determinants of remittances have established that changes in the exchange rate, the interest rate, inflation, 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.

When we assume a monetary authority that follows a Taylor rule, we would expect monetary policy to respond to these changes. If indeed the output gap tightens and inflation rises, 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 would be worried that the appreciation of the exchange rate would undermine the competitiveness of the export sector. Such a concern could reduce the willingness to increase interest rates.

In deciding on the appropriate monetary policy response, the cyclicality of the remittances is crucial. If remittances are procyclical, the above policy conclusions stand. The booming economy itself would already 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 at the same time that the increase in remittances will make the monetary policy less effective. As noted above, the increase in remittance inflows increase liquidity on financial markets and put a downwards pressure on the interest rate and monetary policy action will have to be strong to counter these impacts. At the same time, monetary policy can easily become perverse: if the central bank tries to cool down the booming economy and the spurt in remittances through an increase in the interest rate, 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 the inflationary effects of the increase in remittances is also likely to be less strong.

We noted above that globalization has increased the co-movement of business cycles (Imbs 2006, Kose et al. 2003, Kose et al. 2005). When the business cycles of home and source country are synchronous a recession would reduce earnings in the source country and thus make it more difficult to send

money home while at the same time the hard times at home increases the need for compensating inflows. While during the boom it will be easier to send money but the need would be less, although the investment motive will be stronger.

3 Recent Trends in Migration and Remittance Flows in the Philippines

The 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.

Figure1 and Table 2 show that the magnitude of remittances to the Philippines has been significant, both in absolute terms and as a percentage of GDP and other economic indicators. As of end-December 2007, remittances reached US$14.5 billion, the highest level since the 80s. Latest available data in 2008 (January to October) showed the OF remittances at US$13.7 billion.

TABLE 2
Relative Size of Overseas Filipino (OF) Remittances: Level, Growth Rate and as a Percentage of Selected Economic Indicators[1/]

Year	Level	Growth Rate	As % of				
	(US$B)	(%)	GDP	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
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	15.3	9.2	28.7	493.5	30.6	204.8

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

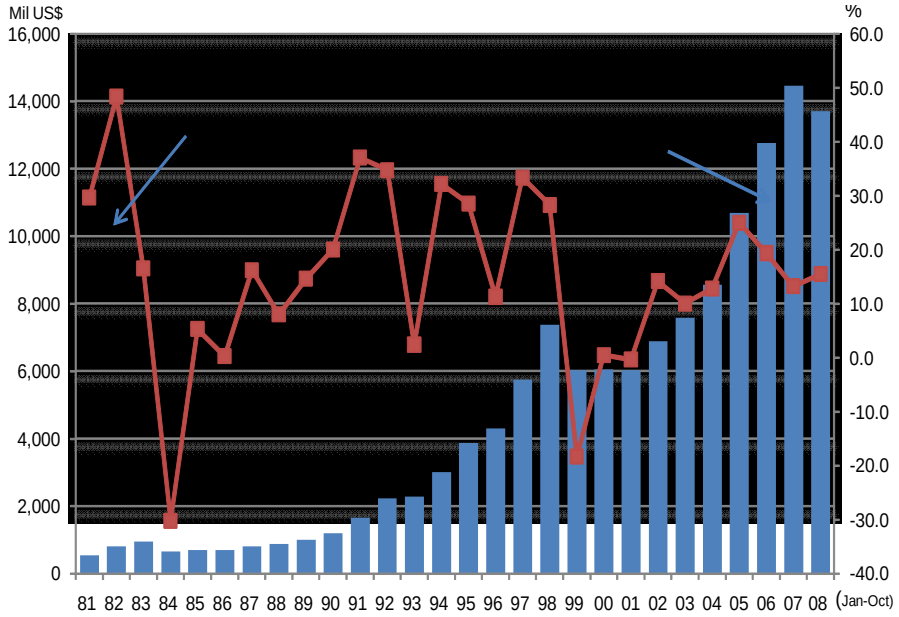
XGS = exports of goods and services

FDI = foreign direct investment

GIR = gross international reserves

DSB = debt service burden

FIGURE 1
Overseas Filipino Remittances, 1981-2008



In 1996, remittances accounted for only 5.2 percent of GDP. This has risen to around 10 percent in recent years.

Tuaño-Amador et al. (2007) presented three major factors behind the uptrend in OF remittances since 1996. One, there is a trend rise in the number of deployed workers and immigrants, as indicated by the stock of overseas Filipino workers and migrants.

For another, there has been a change in the skill composition of Filipinos 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, food and hotel services continued to rise, despite the decline in the number of professional workers.

And still for another reason, the measures adopted by the BSP and the banks to encourage OFs to channel their remittances through the financial system are also essential. The BSP's 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 as well as aging populations in some source countries together with rising global labour mobility also encourage the movement of Filipino workers.

TABLE 3
Source of Overseas Filipino Remittances, 1985-October 2008

	Average % Share				
					January-October
Region/Country	1985-89	1990-99	2000-07	2008	2007
T O T A L *	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
A S I A	**5.4**	**8.6**	**12.9**	**11.1**	**10.9**
of which:					
Japan	2.7	2.9	4.7	3.3	3.0
Hong Kong	1.2	3.3	3.2	2.5	2.6
Singapore	1.1	1.6	2.3	3.1	2.7
A M E R I C A S	**41.8**	**69.1**	**58.0**	**56.1**	**55.1**
of which:					
USA	41.5	68.7	55.7	48.1	50.8
Canada	0.3	0.3	1.7	7.5	3.8
O C E A N I A	**0.8**	**1.0**	**0.5**	**0.9**	**0.8**
of which:					
Australia	0.8	0.9	0.4	0.8	0.6
E U R O P E	**5.2**	**7.7**	**12.9**	**16.5**	**16.9**
of which:					
Italy	0.1	1.1	3.9	4.3	4.4
Germany	0.9	2.2	1.1	1.9	1.6
United Kingdom	1.6	2.6	3.2	4.8	4.9
M I D D L E E A S T	**32.5**	**4.2**	**14.1**	**15.4**	**16.1**
of which:					
Kuwait	1.0	0.5	0.9	0.8	1.3
Saudi Arabia	30.5	3.5	9.9	8.5	8.3
UAE	0.0	0.1	2.2	3.9	4.0
A F R I C A	**0.0**	**0.0**	**0.1**	**0.1**	**0.1**
O T H E R S	**14.3**	**9.5**	**1.5**	**0.0**	**0.0**

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

The ADB (2004) study provided some information based on survey data on the potential source of remittances for capital formation and development. The study specifically addressed the issue on how remittances can be channelled to strategic areas and sectors of the economy. Among the constraints reported by the survey included the difficulty experienced by OFs

in accessing remittance services of host country (or source country). 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. However, out of this group of respondents, 90 percent were able to save some money, but only 45 percent had a savings account.

The studies so far of the impact of remittances on the economy have relied either on partial equilibrium analysis based on econometric estimation, or survey approaches. The study of Goce-Dakila and Dakila (2006) utilized an economy-wide (general equilibrium) approach that allows for interactions between all major sectors in economy. The empirical results of the study revealed that the main beneficiary (measured in peso terms) of remittances increases are the middle income classes, across all regions. The second best beneficiaries are the low-income households, again for all regions, with the notable exception of the National Capital Region and Mindanao, where the high-income households are the second highest beneficiaries of remittances.

4 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 comprise 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. 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.

Baxter and King (1995) proposed the use of a band-pass filter to obtain the cyclical component of a series. The Baxter-King filter is usually preferred over high pass filters (e.g. Hoddrick and Prescott 1997), because in addition to removing low frequency components it also removes high frequency components (irregular or fast moving components). However, limitations of Baxter-King filter ensue when the time series is short.

Some studies suggest that fitting a trend on output using Hodrick-Prescott (HP) filter yields more benefits in terms of trend-cycle component of output. However, other studies seem to be weary of using HP filter (Ravn and Uhlig 1997; Cogley and Nelson 1995). There are of course limitations on using 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.

This section used the HP filter procedure. 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 capture better the cyclical component. Rand and Tarp (2001) observed 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, co-movement 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 (NSCB) while those of major host countries' output are obtained from the IMF International Financial Statistics website.

As shown in Table 3 in the previous section, the sources of remittance flows are geographically diverse, reflecting the pattern of migration flows. In 1985 to 1989, the Middle East and the USA accounted for around three quarters of 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 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 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 Philippine real GDP from 1994 to 2007 using two methods. One is using the Hodrick-Prescott filter described earlier on and the other 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 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 correlation between the cyclical components of remittances and those of Philippine real GDP and those of the Philippine major host countries' output. Using Pairwise correlation matrix, Table 4 show the contemporaneous and lagged (up to three quarters) cross correlation of 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 counter-cyclical.

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

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

	No lag				Lag of one quarter				Lag of two quarters				Lag of three quarters			
	Remit		Philippines		Remit		Philippines		Remit		Philippines		Remit		Philippines	
Remit	1.000				1.000				1.000				1.000			
Philippines	0.410	*/	1.000		0.400	*/	1.000		0.394	*/	1.000		0.373	*/	1.000	
US	0.133	*/	0.442	*/	0.126	*/	0.412	*/	0.079	*/	0.334	*/	0.029	*/	0.233	
Hong Kong	0.002		-0.361	*/	0.233		0.254		0.469	*/	0.115		0.666	*/	0.029	
Japan	0.293	**/	0.522	*/	0.262		0.426	*/	0.292	**/	0.212		0.343	*/	0.021	
Italy	-0.084		0.284	**/	-0.086		0.131	*/	-0.082		0.082		-0.104		-0.024	*/
UK	-0.141		0.594	*/	-0.175		0.501	*/	-0.222		0.328	**/	-0.292	**/	-0.023	
Canada	-0.257		0.421	*/	-0.260		0.283	**/	-0.259		0.085		-0.311	**/	-0.087	

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

Granger causality is a technique for determining whether a time series is useful in explaining another. Using a lag of two quarters, we run Granger causality test to determine whether the null hypothesis holds: the coefficients on the lagged indicators are statistically significant in explaining the behaviour of other indicators. We run Granger causality tests on the following indicators at 5% and 10% levels of significance: component of US (USGDP) and Philippine real GDP (GDPHP), inflation (2000 base), overseas Filipino workers remittances (REMIT), real personal consumption expenditure (PCE), real disposable personal income (DISY), real money supply (MS), real bank deposit liabilities (DEPLIAB), nominal peso-dollar rate exchange rate (FXR), current account balance (CA), overnight RRP (RRP), 91-day Treasury bill (TBILL), labour force (LF) and compensation index for non-agriculture workers (1985 base). Except for RRP and TBILL, all variables are in logarithm.

At 10% level of significance, the (Granger) causation appears to run from remittances (REMIT) to inflation (INFL), remittances to 91-day Treasury bill rate (TBR91), real money supply (MS) to remittances, real deposit liabilities (DEPLIAB) to remittances, remittances to nominal peso-dollar rate (FXR), real disposable personal income (DISY) to remittances, non-agriculture real compensation index, a proxy for wages, (QSE1P) to remittances, remittances to current account balance (CA). Table 5 also shows that there is bi-directional causality between remittances and real personal consumption (PCE), real

TABLE 5
Pairwise Granger Causality Tests

Sample: 1994Q1 2007Q4
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.	Significance
LOG(PCE) does not Granger Cause LOG(REMIT)	40	6.680	0.014	5%
LOG(REMIT) does not Granger Cause LOG(PCE)		5.908	0.020	5%
INFL does not Granger Cause LOG(REMIT)	40	2.966	0.093	10%
LOG(REMIT) does not Granger Cause INFL		2.896	0.073	10%
TBR91 does not Granger Cause LOG(REMIT)	40	2.384	0.131	Not significant
LOG(REMIT) does not Granger Cause TBR91		3.159	0.084	10%
LOG(MS) does not Granger Cause LOG(REMIT)	40	5.493	0.025	5%
LOG(REMIT) does not Granger Cause LOG(MS)		0.057	0.813	Not significant
LOG(DEPLIAB) does not Granger Cause LOG(REMIT)	40	5.550	0.024	5%
LOG(REMIT) does not Granger Cause LOG(DEPLIAB)		4.284	0.071	10%
FXR does not Granger Cause LOG(REMIT)	40	2.890	0.118	Not significant
LOG(REMIT) does not Granger Cause FXR		3.061	0.097	10%
LOG(GDPHP) does not Granger Cause LOG(REMIT)	40	4.487	0.041	5%
LOG(REMIT) does not Granger Cause LOG(GDPHP)		7.853	0.008	5%
LOG(DISY) does not Granger Cause LOG(REMIT)	40	3.465	0.071	10%
LOG(REMIT) does not Granger Cause LOG(DISY)		2.089	0.082	10%
LOG(XINFL) does not Granger Cause LOG(REMIT)	40	2.542	0.120	Not significant
LOG(REMIT) does not Granger Cause LOG(XINFL)		0.344	0.561	Not significant
RRP does not Granger Cause LOG(REMIT)	40	1.215	0.277	Not significant
LOG(REMIT) does not Granger Cause RRP		0.652	0.425	Not significant
LOG(LF) does not Granger Cause LOG(REMIT)	40	2.865	0.099	10%
LOG(REMIT) does not Granger Cause LOG(LF)		3.638	0.064	10%
LOG(QSE1P) does not Granger Cause LOG(REMIT)	40	4.086	0.048	5%
LOG(REMIT) does not Granger Cause LOG(QSE1P)		3.018	0.065	10%
CA does not Granger Cause LOG(REMIT)	40	0.367	0.548	Not significant
LOG(REMIT) does not Granger Cause CA		4.753	0.036	5%
LOG(USGDPHP) does not Granger Cause LOG(REMIT)	40	4.566	0.039	5%
LOG(REMIT) does not Granger Cause LOG(USGDPHP)		18.636	0.000	5%

disposable personal income, real deposit liabilities, inflation, Philippine real GDP, labour force, non-agriculture compensation and the US real GDP. This analysis shows that remittances are an important force in the Philippines with impacts on many aspects of the economy. Of course the Granger tests conducted here deal only with bi-variable relationships and that, in fact,

a full-fledged macroeconomic model in which the main facts around remittances are integrated.

The initial 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. This is seen as remittances are part of GDP as they immediately are 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. In the study of Alleyne et al. (2008) they showed how the fully modified ordinary least squares (FOMLS) can be adjusted to make inferences in cointegrated panels with heterogenous 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.

5 The macroeconomics of remittances

The purpose of this section is to determine the impact of remittances on the Philippine macroeconomy. 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 behaviour 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 labour supply effect have a negative impact. The rise in aggregate demand, the increase of prices of non-traded goods and the increase in wages will push up prices, although the appreciation of the exchange rate may dampen the inflationary effects. In the previous section we established the correlation, and causality relationship, between remittances and a number of economic variables. These two approaches strongly suggest that remittances are part of a complex set of economic interactions. In an economy where remittances are significantly large, like 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 macroeconometric model. We address the endogeneity and measurement issues by using two state least squares on some important indicators.

5.1 Structure of the model[8]

Our study builds on Bayangos (2007) dynamic, structural and quarterly macroeconometric model for the Philippines. Our dataset covers the period March 1989 to December 2007.

To a large extent, our macroeconometric model shares features with the New Keynesian model of Ball (1999). The Ball (1999) model assumes that inflation and output are backward-looking, thus it deliberately abstains from any optimizing foundation. Central to this model are important nominal rigidities in describing the macroeconomy. In addition, there are lag effects in the transmission mechanism.

We assume there is excess supply in the economy; hence, aggregate output is demand-determined in the short to medium run. However, the goods markets are monopolistically competitive (Blanchard and Kiyotaki 1987), leading to profits for firms that charge non-competitive sticky prices (Calvo 1983), which clear all of domestic production to satisfy demand (net of imports) for consumption, investment, government spending and exports. Firms make a mark-up when setting prices which is responsive to demand and monetary conditions. Meanwhile, households and firms negotiate a non-competitive real wage, engaging in sticky nominal contracts (Calvo 1983).

Nevertheless, asset markets are imperfect. The nominal exchange rate is allowed to transitorily deviate from 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 the 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 peso-dollar 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 macro economy.

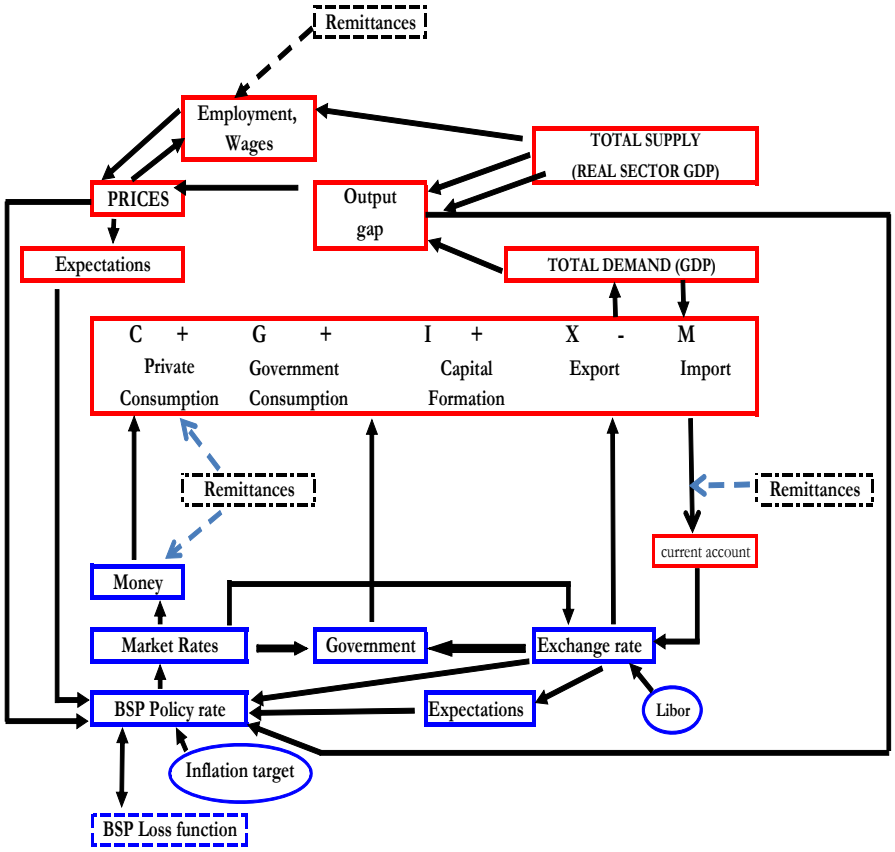
5.2 Channels of remittances towards growth and inflation

Figure 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

[8] The complete specification is found in Bayangos (2007), Chapter 5, Model Specification and Estimation Results, Inflation Targeting and Exchange Rate Uncertainty, Shaker Publishing.

(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 labour supply.

FIGURE 2
Overseas Filipino remittances and the monetary policy transmission mechanism



Our paper traces the impact of changes in remittances to the Philippine monetary policy transmission mechanism, by adding and re-specifying the model in line with the suggestions from the empirical literature in section 2 and the analysis in section 4 of the paper: Appendix A 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 bi-directional causality is captured by equation 1 (see Appendix A) 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 cycle 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 equation shows that a higher level of US GDP, personal consumption as well as higher interest rate differential lead to higher remittances.

Remittances are positively related with consumption, indicating that remittances 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 also look at interest rate differential to determine whether investment considerations are at play. 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.

Following Chami et al. (2003), equation 2 shows that remittances add to disposable income and, through this, to private consumption expenditure. This interaction strengthens the pro-cyclical impact of remittances.

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 labour (or the labour force). 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 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 equation 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.

Following Chami et al. (2003) and Yang (2008), equation 5 shows that an increase in remittances will have a negative effect on the labour force supply. Members of households receiving remittances reduce their work effort. Thus the labour supply falls at a time when the demand impulse from the increased remittances increases the demand for labour. This reduces the unemployment rate and increases wages.

6 Challenges to monetary policy

We use the open and dynamic macro 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 macro 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 labour 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 macro model from first quarter 1994 to fourth quarter 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 labour supply. We compared the outcomes of the two models, with and without the remittance channel.

Annualized quarterly growth as well as volatility using the coefficient of variation (CV) are computed. 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.

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's 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.

The objective function of the BSP is assumed to exhibit the standard quadratic form, with some modifications:

$$L = \frac{1}{2}\left[\varpi(\pi_t^f - \pi_t^*)^2 + \rho(q_t - q_t^*)^2 + \gamma(E_t\, e_{t+1}^n - e_t^n)^2 \right],$$

where π_t^f is the inflation forecast, π_t^* is quarterly inflation target announced by the government, q_t is actual quarterly real GDP growth, q_t^* is potential real GDP, E_t denotes expectations conditional upon the information set available at time *t* and $e^n{}_t$ is the average quarterly nominal peso-dollar exchange rate. Meanwhile, ϖ, ρ and γ, represent, respectively, the BSP's aversion to

inflationary pressure, real GDP growth fluctuations around the potential (the output gap) and nominal peso-dollar exchange rate fluctuations around the expected rate.[9]

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) period 2001-03 (For reference table 6 also shows the results for the pre-IT and pre-Asian crisis period 1994-96.). In the original model, the US GDP shock was felt through trade. As the US economy declines, exports of the Philippines fall which 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 6 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 increase the labour supply which leads to a fall in wages and prices and thus an improvement of the real exchange rate. All the 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), the 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 labour supply increases. The decline in the money supply, induced by the fall in remittances, would lead us to expect an increase in the market

[9] In the empirical estimation of RRP in Bayangos (2007), inflationary pressure (in equation in the loss function above carried a coefficient of 0.39, implying that the BSP is a flexible inflation targeter. Meanwhile, and are estimated to be 0.35 and 0.29, as the BSP responds to shocks on the output gap and peso-dollar rate fluctuations, respectively.

interest rate (see equation 4 in Appendix A) 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.

TABLE 6
Impact Scenario: A Sustained One Percentage Point Reduction in the US GDP Growth

	PERCENT CHANGES FROM BASELINE MODEL							
	WITHOUT REMITTANCE CHANNEL				WITH REMITTANCE CHANNEL			
	1994-96		2001-03		1994-96		2001-03	
Economic indicators	Average	CV	Average	CV	Average	CV	Average	CV
GDP components								
Personal consumption (growth)	-0.05	-0.09	-0.18	-0.05	-0.82	-0.11	-1.07	-0.01
of which: Disposable income (growth)	-	-	-	-	-1.41	-0.02	-1.48	0.00
Gross capital formation (growth)	-0.15	-0.08	-1.42	-0.14	-0.28	-0.19	-0.37	-0.09
Current account (growth)	-1.01	-0.07	-1.47	-0.33	-1.52	-0.39	-2.34	-0.82
of which: Remittances (growth)	-	-	-	-	-4.00	-0.03	-4.17	0.00
Labor force (growth)	0.02	0.03	0.08	0.64	0.35	0.10	0.45	0.01
Non-agriculture compensation index (growth)	-0.08	-0.12	-0.13	-0.15	-0.23	-0.05	-0.32	-0.09
Financial indicators (%)								
Money supply (year-on-year growth)	-0.08	-0.03	-0.15	-0.04	-1.45	-0.26	-2.93	-1.25
RRP (%)	-0.12	-0.02	-0.08	-0.61	-0.10	-0.11	-0.16	-0.09
91-day treasury bill rate (%)	-0.09	-0.02	-0.07	-0.09	-0.08	-0.02	-0.12	-0.08
Nominal peso-dollar rate (growth)	0.39	0.24	1.08	0.21	1.06	0.08	1.18	0.79
Macroeconomic indicators (%)								
Real GDP (growth)	-0.07	-0.10	-0.12	-0.08	-0.38	-0.14	-0.89	-0.08
Output gap (growth)	-0.03	-1.57	-0.33	-1.91	-0.18	-3.89	-1.73	-1.38
CPI-inflation	-0.10	-0.20	-0.13	-0.87	-0.14	-0.10	-0.18	-0.10
CPI-inflation forecast (two years ahead)	-0.12	-0.15	-0.15	-0.18	-0.15	-0.13	-0.17	-0.06
CPI-inflation expectations (long run)	-0.02	-0.02	-0.03	-0.08	-0.03	-0.10	-0.15	-0.10
BSP objective function								
WITH exchange rate	0.11	0.09	0.08	0.03	0.05	0.08	0.50	0.12
WITHOUT exchange rate	0.13	0.08	0.33	0.05	0.01	0.08	0.27	0.11

The fall in the market interest rate helps private investment although 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 labour market. According to the model, the labour supply increases when remittances decline: households seek alternative income to compensate the cut in transfers.[10] Table

[10] 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.

6 shows a stronger labour force growth in the model with endogenous remittances and, as a result, a stronger decline in non-agricultural 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 thus expect a different policy response. As shown in Table 6, the policy rate (RPP) 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 imply 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. There is thus a trade-off between stabilizing output and stabilizing the exchange rate. Such trade-offs will increase the loss function.

The volatility measure in Table 6 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 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 during the IT period and the forecast IT period.

Finally, we look at the BSP loss function. Table 6 shows that losses increase in all cases. This is not surprising: a negative shock to the economy affects the output gap negatively and leads to adjustments in the exchange rate. These negative impacts on the central bank's objective functions are somewhat mitigated by the decline in inflation but an overall welfare loss remains. When the BSP objective function includes exchange rate stabilization the loss increases more strongly in the model with endogenous remittances. This is the impact of the policy trade-of that we identified above. Without the exchange rate in the objective function there is no much difference in the credibility loss between the two versions of the model.

7 Conclusion

At the time of writing this paper (late 2008) 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 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 remittances are driven by the economic cycle of the main host countries and that the 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 remittances 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, like aggregate demand, money supply and interest rates, exchange rate and labour 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 pro-cyclicality of remittances. Our simulations clearly show that it is desirable that the BSP take this endogeneity into account when formulating monetary policy.

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APPENDICES

Appendix A – Diagnostics, model solution and simulation performance of the Philippine Macro Model

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 square 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 nothing 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 behavioural 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.[11]

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 two and at a 5% to 10% level of significance, Breusch-Godfrey results show that not all equations exhibit serial 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.

[11] 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 re-specification of some of these equations are done.

Model solution

Solving a system simultaneously is indeed difficult. Both deterministic and static simulations are performed using the Fair-Taylor method.[12] 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. Forward solution is similarly used for equations that contain future (forward) values of the endogenous variables.

We report five equations that were (re-)estimated to expand the model so that it could trace more fully the impact of changes in remittances.

Equation 1
Results of Remittances (REMIT) Model
(March 1989-December 2007)

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 R^2 = 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

[12] In technical terms, this is called the Gauss-Seidel algorithm method.

Equation 2
Results of Real Disposable Income (DISY) Model
(March 1989-December 2007)

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 R^2 = 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)

Equation 3
Results of Real Deposit Liabilities (DEPLIAB) Model
(March 1989-December 2007)

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 R^2 = 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.*

Equation 4
Results of the 91-day Treasury Bill Rate (TBR91) Model
(March 1989-December 2007)

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 R^2 = 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)

Equation 5
Results of Labour Force (LF) Model
(March 1989-December 2007)

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 R^2 = 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)*

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:

$$MAPE = (1/n)\sum \left| \ (P - A)/A \ \right| * 100,$$

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.

There are two ways to evaluate the lagged value of the dependent variable: dynamic forecasting and static forecasting. Dynamic forecasting uses the previously forecast values of dependent *Y*, while static forecasting uses the one-step-ahead forecast of the dependent variable. Dynamic forecasting oftentimes requires availability of data for the exogenous variables for every observation in the forecast sample and observed values for any lagged dependent variables at the start of the forecast sample.

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 (Table 7). In general, the mean absolute percent errors (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.

Table 7
In-sample and out-of sample performance of selected endogenous variables

	Variables	Sector	MAPE	
			Dynamic	Static
1	PCE	Real	0.71	0.70
2	CPI94	Real	0.91	0.54
3	PVSR	Real	1.36	0.77
4	*LF*	*Real*	*1.55*	*1.32*
5	INDIV	Fiscal	2.15	2.22
6	*DEPLIAB*	*Monetary*	*2.13*	*4.01*
7	ISEMP	Real	2.22	1.32
8	VSR	Real	2.25	0.53
9	WPI94	Real	2.28	1.35
10	PVIR	Real	3.05	1.35
11	VIR	Real	3.13	2.94
12	QSE1P	Real	4.58	4.41
13	DOMIP	Fiscal	5.39	4.16
14	NONOILM	Real	6.93	5.41
15	*DISY*	*Real*	*7.32*	*6.01*
16	SDR	Monetary	7.68	6.61
17	*TBR91*	*Monetary*	*8.12*	*7.98*
18	DUREQ	Real	8.38	5.85
19	*REMIT*	*External*	*8.43*	*8.12*
20	RRP	Monetary	9.06	8.26
21	XMFG	Real	9.14	8.18
22	PMGDS$	Real	9.45	4.85
23	LR	Monetary	9.81	7.22
24	FXR	Monetary	9.84	3.51
25	XINFL	Real	9.87	9.10
26	XNMFG	Real	10.41	6.66
27	CC	Monetary	10.49	10.01
28	MFUEL	Real	10.75	9.35
29	CONS	Real	11.01	10.08

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 labour force (*LF*) and long-run inflation expectations *(XINFL).* For instance, *CPI94*, *WPI94, REMIT,* and *XINFL* have a MAPE of, respectively, 0.91%, 2.28%, 8.43% and 9.87%.