Working Paper
No. 492

Remittances and Competitiveness:
the Case of the Philippines

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February 2010

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Table of Contents

Abstract

The paper looks at the impact of workers' remittances on the competitiveness of the receiving economy. It extends existing research that concentrated on the exchange rate effects of remittances, the so-called Dutch disease effect, by adding labour market effects. The results show that the labour market effects of emigration and remittances have a significant impact on competitiveness that goes beyond the traditional exchange rate effect.

Keywords

Remittances and Competitiveness: the Case of the Philippines [1]

1   Introduction

Workers' remittances are a financial inflow of increasing importance for many developing countries (World Bank 2006, GEP). In recent years the amounts remitted have increased sharply and, for developing countries as a whole, remittances now far exceed inflows of development aid and many other types of capital inflows. Estimates for 2008 in *Global Development Finance 2009* show that workers' remittances are the most important financial flow to developing countries after FDI: remittances outnumber official flows and private debt flows (World Bank 2009).

It is thus not surprising that remittances have received increasing attention in development research. Much of this research is focused on households: how receipt of remittances affects poverty and household decisions, e.g. with respect to education and health care.

In this paper we are concerned with the macroeconomic impact of workers' remittances. Remittances constitute an inflow of finance and, like capital inflows, this may have an impact on the exchange rate; the so-called Dutch disease effect. The inflow of remittances may lead to an appreciation of the real exchange rate undermining the competitiveness of the traded-goods sector and, in particular, of exports.

However, an increase in remittances may affect competitiveness also through other channels. An increase in remittances inflows is likely to be associated with an outmigration of workers who take up jobs overseas so that the domestic labour force declines. Moreover, households receiving remittances may use the higher income to reduce work effort and increase leisure which will further reduce the labour supply. The reduction of the labour supply may lead to an increase in the wage level which will increase production cost and reduce competitiveness.

This paper will analyze these various channels along which migration and remittances can affect the competitiveness of the economy and will use the experience of the Philippines to assess the importance of these effects. The Philippines is an interesting case study. It is one of the relatively small group of countries for which workers' remittances are a major source of foreign exchange receipts. The Philippines are located in Southeast Asia but it is generally not considered to be part of the Asian Miracle.[2] Over the long run growth rates have been below those of other countries in the region. In other countries in Southeast Asia income growth has been export-driven but export

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[2] The seminal World Bank study *The Asian Miracle* of 1993 did not rank Philippines among the High-Performing Asian Economies (HPAE) (see World Bank 1993).

growth in the Philippines has been rather modest. It is thus relevant to investigate whether there is a link between the inflow of remittances and export performance. To do so the paper will apply a quarterly macroeconometric model to simulate the impact of changes in remittances on competitiveness and export performance.

The rest of the paper is organized as follows: the next section reviews the literature on the macroeconomic impact of remittances. In section 3 we present the main recent trends in emigration from and remittances to the Philippines. The fourth section presents the main features of the macroeconomic model that we apply to test the impact of remittances and secion 5 presents the results of the simulations of the model. The final section presents our conclusions.

2 Literature review

In the literature it is argued that a significant capital inflow may lead to an appreciation of the real exchange rate which will undermine the competitiveness of the export sector; the so-called Dutch disease effect. There is evidence that remittances may have a similar effect (see Acosta et al. 2007, Bourdet and Falck 2006, Amuedo-Dorantes and Pozo 2004, Lartey et al. 2008).

An increase in the inflow of remittances, first of all, increases the supply of foreign exchange on the exchange markets and may thus lead to an appreciation in the nominal exchange rate. Moreover, the jump in remittances is followed by an increase in spending by the households receiving the transfers. The spending will be on traded and on non-traded goods and, as the supply of non-traded goods is constrained in the short-run, this will lead to an increase in the price of non-traded goods or an appreciation of the real exchange rate (defined in this case as the relative price P_t/P_n). This appreciation may be stronger in the short run, when the production factors are fixed than in the medium and longer run, when labour can shift towards the non-traded sector or when new investment will expand production capacity in the sector.

Econometric testing confirms the existence of the Dutch disease effect; Bourdet and Falck (2006) use co-integration analysis to assess the long-term relationship between remittances and the real exchange rate in Cape Verde and their basic model shows that a ten per cent increase in remittances leads to an appreciation of the real exchange rate of 1.2 per cent. Amuedo-Dorantes and Pozo (2004) pool annual data for 13 Latin American and Caribian countries and find that a doubling of remittances per capita raises the real exchange rate by 23 per cent. Also Lartey et al. (2008) find a significant impact of remittances on the real exchange rate. They use panel data for 109 developing and transition countries and using GMM estimation methods conclude that an increase in remittances lead to an appreciation of the real effective exchange rate. Their results suggest that a one percentage point increase in the remittances/GDP ratio leads to an appreciation of the real effective exchange rate of between 20 to 40 per cent (depending on the regression model used). They also regress the composition of output (the ratio of traded over nontraded output) on remittances and find an one percentage point increase in

6

the remittances to GDP ratio leads to an one percentage point fall in this output ratio: remittances have thus a persistent impact on resource allocation. These studies suggest that the Dutch disease effect is significant and often substantial.

The effect of remittances on the real exchange rate is an important channel through which the competitiveness of exports is reduced but it is not the only channel. Emigration and remittances also have labour market effects that will affect competitiveness. In the Philippines official statistics estimate the number of Filipinos abroad at 8.7 million by end 2007 against a total number 33.7 million employed people in the Philippines. The overseas Filipinos are about 25 per cent of the labour force.

Such a large withdrawal from the local labour market will have an effect on local wages. Yabuuchi and Chauduri (2007) use an analytical model with three sectors and skilled and unskilled workers. Their interest in primarily in wage inequality but the model also shows that an emigration of either unskilled or skilled workers leads to an increase in the wages of both skilled and unskilled workers. Mishra (2006) estimates wage equations for the various skill categories of the Mexican labour force which include a variable measuring the proportion of that category that emigrated and he finds that a ten per cent reduction in the labour supply in a skill-group leads to a four per cent increase in the wages in Mexico. The increase in wages will undermine the competitiveness of the traded sector and will, moreover, reduce the return on capital in the sector and this is likely to reduce investment in the sector.

There could also be a further labour supply effect. It is argued that an increase in remittance income will induce the households receiving the remittances to supply less labour or to reduce work effort (Chami et al. 2003). Yang (2008) finds, on the basis of analysis of household data that the increase in remittances to the Philippines during the Asian crisis had no significant effect on the total number of hours worked.[3] Our own time-series estimations show that there is significant effect of remittances on labour supply.

The increase in the wage level could be compensated by an increase in labour productivity. When emigration of workers reduces unemployment and underemployment in the Philippines, average labour productivity will rise. Other channels may be suggested. The Dutch disease effect induces a resources shift from the traded to the nontraded sector (see Lartey et al. 2008).

It is generally assumed that the nontraded sector has a lower level and slower growth of labour productivity and so this shift implies a reduction of overall labour productivity. Secondly, the increase in wages means a fall in profits and lower investment demand and thus a slower growth in the capital-labour ratio and labour productivity.

On the other hand, the inflow of remittances may have aggregate demand effects and may result in a decline in the interest rate on financial markets which could support investment. And some remittances may be directed at

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[3] 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.

investment opportunities in the home country, although most research finds that remittances at most increase investment in real estate and not in productive investment.

There are also studies that suggest that remittances are used to finance investment in human capital (Rapoport and Docquier 2005). Calero et al. (2008) use household survey data for Ecuador to show that remittances are used to finance schooling, particularly of girls and in rural areas, and help to prevent children from dropping out of school when the family is hit by negative shocks. This investment in human capital could increase productivity in the longer run. But Beine et al. (2008) suggest that there may be a more immediate effect as well. They observe that educated workers have a greater chance to migrate and that this prospect of migration may invite investment in education. They use immigration data for OECD countries to calculate migration rates by educational level for a large number of source countries and they use these rates to show that skilled migration significantly increase the ex ante (pre-emigration) human capital stocks. Of course, most of this human capital disappears with emigration but some remain in the home country. Simulations in Beine et al. (2008) suggest that, in absolute numbers, there is a small positive effect on the number of skilled workers that are available in the source countries and this would stimulate productivity.

Taken together, the remittances could thus affect the competitiveness of exports through their impact on the nominal exchange rate and the real exchange rate but also through their effect on the labour supply and the work effort, wages and labour productivity. The increase in wages induced by emigration and remittances could furthermore reduce profits and so undermine incentives for investment in the traded goods sector.

It should be recognised that competitiveness is a complex concept. In this paper we focus on the impact of remittances on the real exchange rate, on wages and on labour productivity. Together these factors determine the dollar unit labour cost of exports. Unit labour cost is clearly only one of the determinants of the competitiveness of a country. The World Economic Forum publishes an annual competitiveness ranking of countries which is based on 12 aspects: Institutions, Infrastructure, Macroeconomic Stability, Health and Primary Education, Higher Education and Training, Goods Market Efficiency, Labour Market Efficiency, Financial Market Sophistication, Technological Readiness, Market Size, Business Sophistication and Innovation.[4] We may assume that many of the aspects are determined by longer-term processes and will change only slowly and are not much influenced by fluctuations in remittances.

It has been observed that some countries face rising unit labour cost but still show a strong export performance (see e.g. Fagerberg 1988). Fagerberg et al. (2004) argue that the competitiveness of a country is determined not just be cost but also by factors like technology, the capacity to exploit technology, and the production structure. Technology can be either imitated (catching up) or

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[4] In the 2008/09 ranking the Philippines is ranked 71 out of 134 countries, below regional neighbours like Korea, Malaysia, China, Thailand, Indonesia and Vietnam. (see WEF 2008).

developed through innovation. Countries differ in their ability to exploit existing or new technology. This capacity can be built through human capital, infrastructure, etc. Moreover, the production (or export) structure of a country may consist of products with high income elasticity (new, high-tech and high quality products) or low elasticity goods. The empirical work of Fagerberg et al. (2004) shows that rich countries tend to grow slowly as they are already at the technology frontier and further technological advance depends on innovation but, on the other hand, they have a high capacity to exploit technology and they concentrate on high elasticity products. Developing countries are catching up on technology and have little own capacity at developing new technology and often their capacity of applying and exploiting new technology is low. Moreover, their production and export composition is biased towards products with lower income elasticity. For these developing countries, therefore, the cost competitiveness is crucial.

3 Recent Trends in Migration and Remittance Flows in the Philippines

Remittances have been an important financial flow to the Philippines: since the late 1990s they have been rising sharply and in recent years annual inflows amounted to about ten per cent of GDP.

Table 1

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

Year	Level (US$B)	Annual Growth (%)	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
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	10.8	23.9	576.5	57.8	140.2
2006	12.8	19.4	10.9	24.1	436.9	55.6	161.5
2007	14.5	13.2	10.0	24.4	495.5	42.8	202.0
2008	16.4	13.7	9.8	28.1	1,080.7	43.7	223.4
2009 (Jan-Jun)	10.0	3.8	11.2	39.6	950.7	24.8	207.6

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

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

Table 1 shows 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 2008, remittances reached US$16.4 billion, the highest level since the 80s. Latest available data in 2009 (January to June) showed the OF remittances at US$10 billion. In 1996, remittances accounted only 5.2 percent of GDP. This has risen to around 11 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 essential. The BSP's initiatives are geared towards enhancing

Table 2

Stock Estimates of Overseas Filipinos
As of December 1998, 2007

	Permanent			Temporary			Irregular			Total		
Region/Country	1998	2007	Growth Rate (%)	1998	2007	Growth Rate (%)	1998	2007	Growth Rate (%)	1998	2007	Growth Rate (%)
				a/								
WORLD TOTAL	2,333,843	3,692,527	58.2	2,767,954	4,133,970	49.4	1,913,941	900,023	(53.0)	7,209,038	8,726,520	21.0
Africa	67	1,983	2,859.7	33,162	69,880	110.7	7,062	18,540	162.5	40,291	90,403	124.4
Asia, East and South	52,594	213,736	306.4	953,944	747,069	(21.7)	589,847	258,640	(56.2)	1,596,385	1,219,445	(23.6)
Hong Kong	399	11,471	2,774.9	156,000	116,066	(25.6)	2,000	3,000	50.0	158,399	130,537	(17.6)
Japan	48,939	133,528	172.8	128,465	38,239	(70.2)	48,000	30,700	(36.0)	225,404	202,557	(10.1)
Malaysia	281	26,002	9,153.4	83,166	90,965	9.4	396,813	128,000	(67.7)	480,260	244,967	(49.0)
Taiwan	1,542	2,357	52.9	176,232	67,153	(61.9)	4,250	4,500	5.9	182,024	74,010	(59.3)
Asia, West	890	4,082	358.7	1,038,775	2,055,647	97.9	107,561	121,850	13.3	1,147,226	2,181,579	90.2
Kuwait	89	94	5.6	40,959	129,708	216.7	20,900	10,000	(52.2)	61,948	139,802	125.7
Saudi Arabia	214	350	63.6	627,049	1,046,051	66.8	22,951	20,000	(12.9)	650,214	1,066,401	64.0
United Arab Emirates	318	703	121.1	100,000	493,411	393.4	20,000	35,000	75.0	120,318	529,414	340.0
Europe	20,486	284,987	1,291.1	450,723	555,542	23.3	254,716	112,990	(55.6)	725,925	953,519	31.4
Germany	6,861	44,130	543.2	743	8,106	991.0	351,000	2,100	(99.4)	358,604	54,336	(84.8)
Italy	1,131	24,598	2,074.9	126,644	82,594	(34.8)	43,356	13,000	(70.0)	171,131	120,192	(29.8)
Spain	964	27,537	2,756.5	39,562	10,543	(73.4)	6,000	3,700	(38.3)	46,526	41,780	(10.2)
Americas/Trust Territories	2,059,126	2,943,812	43.0	252,440	354,352	40.4	936,759	354,843	(62.1)	3,248,325	3,653,007	12.5
Canada	313,867	410,626	30.8	8,043	49,309	513.1	75,000	3,000	(96.0)	396,910	462,935	16.6
United States	1,716,401	2,517,833	46.7	58,681	128,910	119.7	844,046	155,843	(81.5)	2,619,128	2,802,586	7.0
Oceania	200,680	243,927	21.6	38,910	84,927	118.3	17,996	33,160	84.3	257,586	362,014	40.5
Australia	197,215	221,892	12.5	398	19,455	4,788.2	2,000	9,000	350.0	199,613	250,347	25.4
Region Unspecified	193,300	-	-100.0	-	266,553	100.0	-	-	-	193,300	266,553	37.9

a/ The total does not tally with Tan, Edita A. (2009).
Source: Commission on Filipino Overseas; Tan, Edita A., "Migration in An Open-Education Labour Market (2009).

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. Part of the increase in recorded remittances as reported in Table 1 is thus due to better statistical capture as the proportion of remittances through the formal channels increased.

Table 2 shows the stock of Filipinos abroad in 1998 and 2007, where the total number as of end-December 2007 reached 8.7 million, or an increase of 21.0 percent from end-December 1998. In 2007, 1.2 million were in Asia, 2.2 million in the Middle East and 3.7 million in North America and US Territories. Europe took in about 1 million and Oceana, 0.36 million.

As remittances have been growing, the performance of Philippine exports has been comparatively modest as Table 3 shows. The table shows growth rates of exports, measured in dollars.

Table 3

Annual Export Growth of Selected Asian Countries (%), 2000-2008

Year	Philippines	Malaysia	Indonesia	Thailand	Singapore	Korea	China	Vietnam
2000	9.06	17.04	27.64	19.58	20.50	21.22	27.95	25.20
2001	-16.16	-10.62	-12.30	-7.09	-10.77	-14.04	6.80	4.01
2002	9.87	6.14	3.14	4.71	3.05	7.88	22.39	11.17
2003	2.72	12.44	8.36	18.21	14.88	20.73	34.58	20.61
2004	9.78	20.78	10.39	21.64	24.32	30.63	35.39	31.45
2005	3.79	22.16	22.93	14.97	15.45	12.13	28.50	22.51
2006	15.56	13.42	19.00	17.15	18.46	14.84	27.17	22.74
2007	6.42	13.51	13.99	17.05	10.10	14.21	25.63	21.93
2008	-2.65	12.89	18.03	34.21	14.26	14.38	17.23	-
Average	4.27	11.97	12.35	15.60	12.25	13.55	25.07	19.95

- Data not yet available.

Source of basic data: BSP 2009 Selected Philippine Economic Indicators

These two facts: strong dependence on remittances and rather modest export performance may well be related. It is the aim of this paper to analyse the channels of interaction between remittances and exports. To get a first insight into the relationships between the variables we run Granger causality tests on the following indicators: overseas Filipino workers remittances (*REMIT)*, labor force (*LF*), a proxy for wages, real compensation for non-agriculture workers (*QSE1P*), number of workers deployed overseas (*DEPLOY*), nominal peso-dollar exchange rate (FXR), and real effective exchange rate of major trading partners (REERMA).[5]

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[5] Major trading partners of the Philippines include the United States, Japan, European Union (EMU) and the United Kingdom.

Table 4

Pairwise Granger Causality Test
Direction of Causality
Sample: 1994Q1 2009Q1

Variables	Observations (quarters)	Lags (in quarters)					
		One	Prob	Two	Prob	Three	Prob
REMIT and FXR	75	Single	*/	Single	*/	Single	*/
REMIT and QSE1P	75	Single	**/	None	-	Single	*/
REMIT and LF	75	Bi-direction	*/	Single	*/	Single	*/
REMIT and REERMA	75	Single	**/	Single	*/	Single	*/
REMIT and DEPLOY	39	Bi-direction	*/	Bi-direction	*/	Bi-direction	*/

Notes:
Single = causality at single direction
Bi-direction = causality at both directions
None= no causality
*/ Signicant at 5% level of significance
**/ Signicant at 10% level of significance

At 10% level of significance, the (Granger) causation appears to run from remittances to nominal peso-dollar rate, labor force, real compensation for non-agriculture workers, number of deployed workers and real effective exchange rate of broad competitor countries. The table also shows that there is bi-directional causality between remittances and nominal peso-dollar rate, labor force, real compensation for non-agriculture workers, number of deployed workers and real effective exchange rate of broad competitor countries. This analysis shows that remittances are an important force in the Philippines with impacts on exchange rate, wages and employment.

Of course the Granger tests conducted here deal only with bi-variable relationships and, in fact, relations are much more complex. The impact of migration and remittances on the real exchange rate, wages and labour productivity are part of a complex set of interactions in the economy. Existing studies often apply a single-equation regression to test the impacts but that may offer only limited insight in complex adjustment processes. In our approach we use a more complete macroeconomic model that include the relevant institutions, markets and agents and the various interactions between them. We believe that this gives a better insight into the impact of remittances.

When studying the impact of remittances we have to deal with 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. Most studies use the two-stage least squares (instrument variable) and generalized method of moments approach. In our model, we used the same methods to address the issue of endogeneity.

In the next section, we will use a full-fledged macroeconomic model in which the main facts around remittances are integrated.

4 Remittances and Competitiveness

In the second section of this paper we identified various channels along which remittances could affect the competitiveness of the Philippine economy. To test the relevance of these channels and to estimate their importance we use a quarterly macroeconometric model.

4.1 Structure of the model, diagnostics and model solution[6]

Our study builds on Bayangos (2007) and Bayangos and Jansen (2009) dynamic, structural and quarterly macroeconometric model for the Philippines. Our dataset covers the period March 1999 to June 2009.

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 inflation, 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 above average.

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

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[6] The complete specification of the basic version of the model is found in Bayangos (2007), Chapter 5, Model Specification and Estimation Results, *Inflation Targeting and Exchange Rate Uncertainty,* Shaker Publishing. For this paper the model has been extended to include the various channels along which remittances affect competitiveness. See Appendix for a discussion of the extensions.

The 29 simultaneous equations are estimated using single-equation methods: 4 are estimated using generalized method of moments, 13 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 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.[7]

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 percent level of significance and in general up to two fitted items, RESET results reveal that there are no specification errors in equations.

J-test is also checked for four equations estimated using GMM at 5% to 10% level of significance. Results show that the four equations are over-identified and are therefore valid equations.

Solving a system simultaneously is indeed difficult. Both deterministic and static simulations are performed using the Fair-Taylor method.[8] 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.

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[7] 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.

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

4.2　Channels of remittances towards the economy

The original model (Bayangos 2007) did not give much attention to remittances: in that model 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. We have modified equations of the original model and added new equations to capture the impact of migration on the labour force and of remittances on the labour supply behaviour of households. These labour supply impacts affect wages. We also introduced the impact of remittances on expenditure (particularly private consumption) and on conditions on financial and foreign exchange markets.

Figure 1 provides a schematic and simplified overview of overseas Filipino remittances and their impact. 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 the labor sector (upper left).

We have introduced into the model the channels suggested by the literature review in section 2. First, we estimated the impact of emigration and remittances on the labour market. Remittances are generated by overseas Filipinos and an increase in remittances receipts is thus associated with an increase in emigration and a reduction of the domestic labour supply. Furthermore, remittances receiving households may use the higher income to opt for more leisure (or more schooling) which will further reduce the labour supply.

The labour force in the model is determined by demographic trends (population of working age) and the level of wages and our regression results show the variation in remittances have a significant effect on the labour force.

The increase in remittances is associated with a decline in the labour supply, a fall in unemployment and, since the level of unemployment is an important determinant of wages, an increase in wages. Wages feed into production cost and sectoral production prices and through these to wholesale and retail price inflation.

The Dutch disease effect is also captured by the model. The inflow of remittances has a direct impact on the nominal exchange rate as it increases the supply of foreign exchange. There is also an indirect effect through the financial markets. The remittances inflow increases liquidity on financial markets which exerts downwards pressure on market interest rates. But the remittances also lead to an increase in spending, and thus a fall in the output gap, and in an increase in inflation. These changes induce the central bank to increase the policy rate and this pushes up the market interest rate. The net effect is an empirical matter. If, on balance, the market rate rises the gap between local and global interest rates gap falls and the nominal exchange rate appreciates.

Figure 1
Overseas Filipino remittances and the monetary policy transmission mechanism
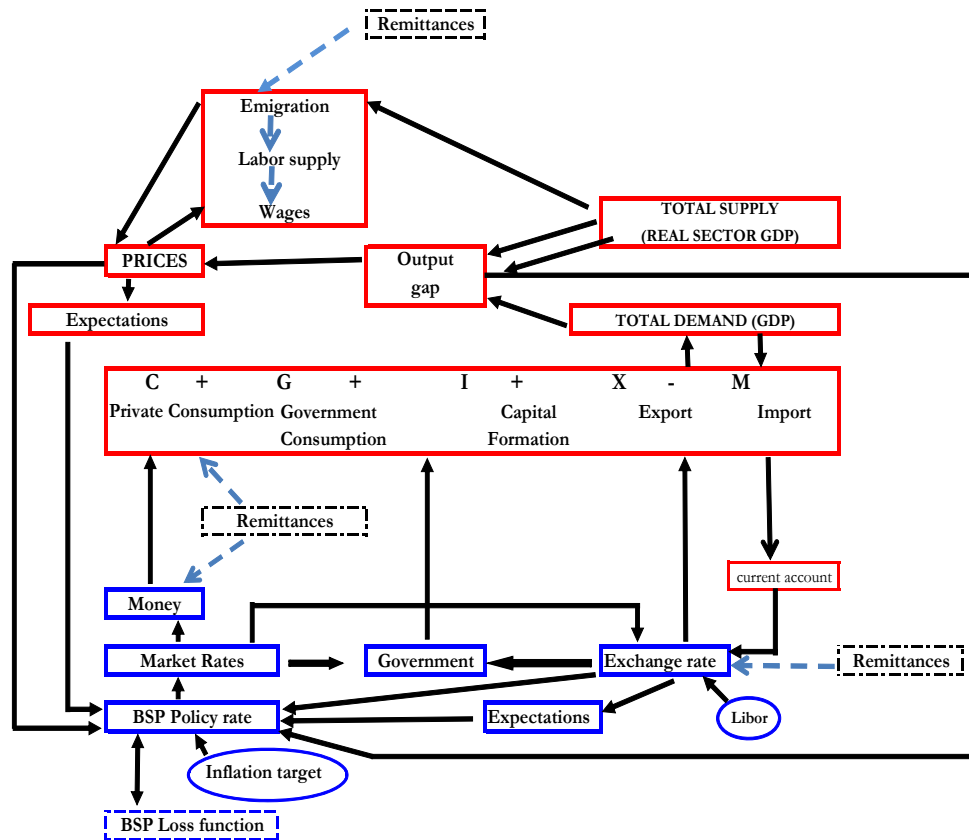
The nominal exchange rate is also sensitive to the level of the current account balance. The direct effect of an increase in remittances on the current account is positive, but there are also indirect effects on exports (through the impact of remittances on competitiveness) and on imports (through the increase in domestic demand that remittances generate) and the overall impact of an increase in remittances is likely to be a deterioration of the current account balance. This would lead to a depreciation of the nominal exchange rate.

The change in the real exchange rate is determined by the change in the nominal exchange rate and the change in relative prices. As the increase in remittances lead to higher demand pressures, local prices increase, bringing an appreciation of the real exchange rate.

As noted the model is Keynesian in nature: it is largely demand driven. We can trace the impact of an increase in remittances on the main demand categories: private consumption, investment and exports.

Private consumption expenditures are mainly driven by disposable income and as remittances increase disposable household income, private consumption

expenditures increase. Part of the increased demand is for imported goods, and affects the trade balance, while the rest is on domestic goods and may push up their prices.

Private investment in the model is driven by output growth, interest cost and the exchange rate. An increase in remittances affects all these variables. The increased demand for domestic goods would lead to an increase in investment demand. The increase in wages induced by remittances will reduce profitability and thus reduce investment demand. Remittances also affect market interest rates and thus the cost of investment. The appreciation of the exchange rate will make imported capital goods cheaper which would push investment demand. It is sometime suggested that remittances may be used to finance residental construction but we could find no econometric evidence for this effect.

Export demand is determined by foreign income and the real exchange rate. Exports suffer from an increase in remittances as the real exchange rate appreciates.

As with the original model, unit root and co-integration tests were conducted to group of indicators which were added and (re-) estimated. These indicators include remittances (*REMIT*), overseas deployment *(DEPLOY)*, nominal peso-dollar rate *(FXR)*, labor force (*LF*) and compensation of non-agriculture workers (*QSE1P*).

The model captures the short-term impact of a shock to remittances. There will be longer-term dynamic effects. The increase in the relative price of non-traded goods may induce a shift of factors towards that sector. The increase in wages will imply a fall in profitability which may suppress private investment. These effects are not captured by our model. Moreover, changes in the exchange rate and in the market interest rate will also affect private investment; these effects are part of the model.

5   Remittances and competitiveness: model simulations

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.

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 1999 to the fourth quarter of 2003.

In our model, the major macroeconomic variables can be predicted within reasonable error margins. Using generalized method of moments, two-stage least squares and ordinary least squares, about 89% of the MAPEs of our

dynamic models fall below 10%. These include key variables in the monetary and real sectors, like the consumer price index (*CPI2000*), remittances (*REMIT)*, labor force (*LF*), 91-day Treasury bill *(TBR91)*, and the nominal peso-dollar rate (*FXR*). For instance, *CPI2000, LF, TBR91, REMIT, and FXR* have a MAPE of, respectively, 0.91%, 1.43%, 5.12%, 5.15% and 8.11%. These results indicate that the simulation properties of the model are reasonable. The results of the MAPE analysis are presented in the Annex.

The strategy we follow to assess the impact of remittances on competitiveness is straightforward. We simulated a sustained one billion US$ increase in remittances on the estimated macro model from first quarter 1999 to fourth quarter 2003. Table 2 shows that this is a substantial increase; it raises remittances inflows in these years by about 15 per cent.

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

Table 5 presents the results of the simulation. The simulation shows that the increase in remittances leads to a decline in export growth: there is thus an apparent loss of competitiveness. The simulation results show the various channels through which this takes place.

First, all labour force growth declines as workers emigrate and reduce work effort. This has a positive effect on unemployment but leads to a growth in wages (the Non-agricultural compensation index).

There is a significant appreciation of the nominal exchange rate. This is caused by the inflow of foreign exchange but also by the interest rate effect. The inflow of foreign exchange does, in the first instance, increase liquidity on the money market and this places a downward pressure on the interest rate. But there is a monetary policy effect as well: the increase in remittances stimulates aggregate demand. As a result the output gap falls and inflation accelerates. The central bank is following a Taylor policy rule and thus responds by increasing the policy rate and this pushes up the market interest rate (TB rate). As Table 5 shows this policy effect is stronger than the liquidity effect and the market rate rises. As this widens the interest rate gap between LIBOR and the market rate this leads to a further appreciation of the nominal exchange rate.

The increase in remittances reduces exports but increases domestic demand. The increase in remittances translates into a significantly faster growth of private consumption expenditure, which is also fuelled by the increasing wages. In section 2 it was noted that rising wages imply a lower return on capital and thus a reduced investment demand. The increase in the market interest rates will further discourage investment. Still, in the simulation investment grows. This is due to the aggregate demand effect. The inflow of remittances and the resulting higher domestic spending invites capital formation to create the necessary production capacity. The appreciation of the exchange rate makes (imported) capital goods cheaper which also helps to increase investment.

Table 5

IMPACT SCENARIO: A SUSTAINED ONE BILLION US$ INCREASE IN OVERSEAS REMITTANCES

Economic indicators	Percent change from baseline model	
	1999-2003	
	Average	CV
GDP components		
Personal consumption (growth)	2.56	0.39
of which: Disposable income (growth)	1.28	0.22
Gross capital formation (growth)	0.13	0.34
Total exports (growth)		
Merchandize exports of goods (growth)	-1.04	-0.42
Non-merchandize exports of goods (growth)	-1.01	-0.47
Labor sector indicators (%)		
Labor force (growth)	-0.33	-0.06
Non-agriculture compensation index (growth)	1.68	0.32
Unemployment (growth)	-0.70	-0.31
Financial indicators (%)		
Money supply (year-on-year growth)	1.17	0.41
RRP (%)	0.12	0.17
91-day treasury bill rate (%)	0.09	0.13
Nominal peso-dollar rate (growth)	-0.75	-0.56
Macroeconomic indicators (%)		
Real GDP (growth)	0.82	0.21
Output gap (growth)	-0.25	-1.59
CPI-inflation	0.12	0.21
CPI-inflation forecast (two years ahead)	0.04	0.08
CPI-inflation expectations (long run)	0.03	0.05

The faster growth of consumption and investment demand exerts pressure on prices; there is a slight acceleration of inflation. The acceleration of inflation means that the real exchange rate appreciates more than the nominal one.

We can bring these various channels through which remittances affect competitiveness together in the unit labour cost.

$$ULC = \frac{wL}{VA/P} \cdot \frac{1}{e} = \frac{w}{a/P} \cdot \frac{1}{e} \tag{1}$$

Unit labour cost (ULC) in US dollar is the product of the nominal wage rate (w) and the (inverse of) physical labour productivity (employment, L, over the volume of output, VA deflated by the value added deflator, P), and the exchange rate, e, the number of local currency units per one dollar.

The growth of unit labour cost is then the sum of:

$$g_{ULC} = g_w - g_a + g_P - g_e \tag{2}$$

where g_i is the growth rate of wages, labour productivity, prices and the exchange rate respectively.[9] This equation allows us to assess the relative importance of the various channels linking remittances to competitiveness. The first two terms $(g_w - g_a)$ capture the change in labour cost: remittances increase wages and affect labour productivity.

The second term $(g_p - g_e)$ captures the real exchange rate effect. The increase in prices reduces competitiveness and the change in the nominal exchange rate will add to this: a depreciation would compensate for the price increase but an appreciation would further erode competitiveness.

Table 5 shows that the increase in remittances results in a rise in nominal (and real, nominal corrected for inflation) wages and a decline in the labour force.

Overall labour productivity is rising (measured as the difference between the real output growth and labour force growth). This suggests that the emigration of workers from the Philippines mainly reduces unemployment and underemployment but does not affect productive capacity very much.
The nominal exchange rate is appreciating and, as inflation accelerates, the real exchange rate appreciates even more.

Using the numbers of Table 5, we see that

$$G_{ULC} = (g_w\text{-}g_a) + (g_p\text{-}g_e) = (1.68 - 1.15)) + (0.12 - (\text{-}0.75)) = 0.53 + 0.87 = 1.40$$

The unit labour cost increase significantly as a result of the increase in remittances. There is a significant increase in the wage level which is not fully compensated by the strong increase in labour productivity.

The nominal exchange rate appreciation is again quite strong. The real exchange rate appreciates a bit more than the nominal exchange rate as inflation accelerates.

Our findings on the impact of remittances on the real exchange rate confirm other studies that established the Dutch disease impact of remittances. Our estimate of this Dutch disease effect is comparable to that found in the literature. As noted in section 2, Bourdet and Falck (2006) found that a ten per cent increase in remittances led to a real exchange rate appreciation of 1.2 per cent. Amuedo-Dorantes and Pozo (2004) estimated that a doubling of remittances led to an appreciation of 23 per cent and Lartey et al. (2008) found that a one percentage point increase in the remittances to GDP ratio (which at the sample averages implies an increase in remittances of about 60 per cent) leads to an appreciation of between 20-40 per cent. In our results an increase in remittances of about 15 per cent leads to an appreciation of the real exchange rate by almost one percent. In the literature on remittances and Dutch disease it is suggested that the impact of remittances on the real exchange rate is the main channel by which remittances can undermine export performance. Our results show, however, that the labour market effects are as important.

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[9] The nominal exchange rate is defined as the number of local currency units per USD. Growth of the nominal exchange rate is thus a depreciation of the currency and a decline an appreciation.

6 Conclusion

Remittances have a positive impact on many economic indicators. The simulation of an increase in remittances inflows in this paper shows that it will increase consumption, investment, labour productivity and economic growth. But it also leads to a change in the economic structure, in particular a decline in traded goods production and exports and this implies that the dependence on remittances increases. We have been able to trace most of the channels along which remittances affect the competitiveness of the economy.

Our findings on the impact on the nominal and real exchange rate confirm the findings of other studies but our results show that the labour market effects are also highly significant. Emigration cuts into the labour force and the receipt of remittances further reduces labour supply. There is a strong effect on wages. The impact of the higher wages on competitiveness is mitigated by the sharp increase in labour productivity. As the labour force falls output rises implying a more intensive use of labour through a decline in unemployment and underemployment. In the literature it is suggested that migration and remittances may also induce an increase in the investment in human capital – which could also increase productivity – but our model does include these investment and so we have not been able to trace this effect.

It is clear that it is important to include the labour market channel in the analysis of competitiveness. In our simulation the unit labour cost increase by 1.4 per cent and about 40 per cent of that increase is due to the labour market effects. Studies that exclusively focus on the Dutch disease channel thus miss an important other channel affecting the export performance.

It should be noted that the greatest part of the increase in unit labour cost is due to the appreciation of the nominal exchange rate and that this increase in partly driven by the monetary policy response. It could be suggested that monetary policy is overreacting. The output gap is falling and inflation is accelerating but both these movements are not excessive and the policy response of the central bank reinforces the appreciating impact of remittances. This monetary policy response strengthens the negative effect of remittances on competitiveness and it may be justified for the central bank to consider more the exchange rate impacts of its actions.

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Annex

Simulation performance of the model

	Variables	Sector	MAPE Dynamic
1	CPI2000	Real	0.91
2	DEPLIAB	Monetary	1.27
3	PVSR	Real	1.36
4	LF	Real	1.43
5	PCE	Real	1.65
6	INDIV	Fiscal	2.15
7	WPI2000	Real	2.16
8	ISEMP	Real	2.22
9	VSR	Real	2.25
10	PVIR	Real	3.05
11	VIR	Real	3.13
12	QSE1P	Real	4.29
13	TBR91	Monetary	5.12
14	REMIT	Real	5.15
15	DOMIP	Fiscal	5.39
16	NONOILM	Real	6.93
17	DUREQ	Real	7.41
18	DISY	Real	7.43
19	SDR	Monetary	7.68
20	FXR	Monetary	8.11
21	RRP	Monetary	8.12
22	XMFG	Real	9.14
23	PMGDS$	Real	9.45
24	LR	Monetary	9.81
25	XINFL	Real	9.87
26	CONS	Real	9.94
27	XNMFG	Real	10.41
28	CC	Monetary	10.49
29	MFUEL	Real	10.75