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Pakistan: Migration, Remittances, and Development

RIZWANA SIDDIQUI

Introduction

Since labour migration started in response to the boom in Middle East countries, Pakistani labour working in different parts of the world has approached 4 million,¹ with about 2 million in the Middle East including 1.1 million in Saudi Arabia in 2007 (ODA, 2009). If migration through informal channels is also included, this figure approaches 7 million (Jan, 2009). The remittances from these migrant workers constitute one of the main sources of income of households in Pakistan and are expected to have multiple impacts such as on consumption, investment, trade, current account deficit (CAD), poverty and welfare. The importance of remittances can be realized from the fact that at the peak time in 1982-83, remittances were about 10 per cent of GDP, 96.6 per cent of trade deficit, 70 per cent of exports of goods and non-factor services, 84.8 per cent of current account balance, and contribution to GDP growth varied between 14 to 24 per cent (Burney, 1988). Recently, remittances inflow gained momentum again. Increasing with an average growth rate of 20 per cent per annum, they have approached US\$ 5 to 6 billion (Pakistan, 2008-9). Total remittances may be higher if remittances inflows through informal channels such as 'hundi' are also included.²

In the early years of high migration period, the majority of labour from Pakistan which migrated to the Middle East (ME) belongs to the low skill and medium skill³ level. Recently, the shares of unskilled labour and highly qualified professionals have increased from 35 per cent to 50 per cent, and 1.78 per cent to 2.5 per cent, respectively, during 2002 to 2007. The share of all other skill levels has declined (Jan, 2009). Therefore, the impact of remittances may have changed over time, because, it is not only the percentage of the labour force out migrating that determines the impact on the domestic economy, but also its composition. Another issue which is widely discussed in the recent literature from a policy point of view is that poverty impact may be dependent not only on who is sending remittances and but also from where

¹ The definition of overseas Pakistanis is a Pakistani citizen who has migrated to another country or an individual of Pakistani nationality born outside Pakistan (ODA, 2009).

² According to one estimate from the ILO/ARTEP survey, remittances through unofficial channels are 43 per cent of the total.

³ Skill here is not associated with education. In the early years of migration, labour was not highly educated but they are categorized as skilled labour like plumbers, electricians, masons etc.

they are sending – developed or developing countries. Generally, unskilled or low skill labour migrates to the neighbouring developing countries and high skilled labour – professionals – migrate to the developed countries – UK and US. The former belongs to relatively poor households and remittance from them may have a higher poverty reducing impact whereas the latter belong to the relatively rich households and may have a growth enhancing impact. This is because; impact is dependent on how remittances are used – to finance consumption or productive investment.

Over the last several decades, much of empirical research has analyzed the impact of remittances on various dimensions of the economy [see Gilani *et al.* (1981), Amjad (1986, 1988), Irfan (1986), Burney (1987, 1988), Kazi (1988), Malik and Sarwar (1993), Maqsood and Sirageldin (1994), Arif (1999), Iqbal and Sattar (2005), Siddiqui and Kemal (2006)]. The majority of these studies are based on micro level surveys and description of economic changes during the eighties – a period of migration and remittances inflow boom without estimating the causal relationships. Some studies have analyzed the impact of remittances using econometric techniques. But the analysis has been restricted to only one dimension or two. For instance, Malik and Sarwar (1993) focused on the consumption impact of remittances, Iqbal and Sattar (2005) estimated the remittances and growth relationship, Maqsood and Sirageldin (1994) focused on wage earnings, Arif (1999) analysed remittances and investment etc. The macroeconomic inferences based on change in household behaviour or change in one dimension or the other may not be useful for policy formulations.

With several complementary and opposing impacts, migration and remittances influence household income and consumption, directly and indirectly. Direct channels include increase in household income and consumption on the receipt of remittances. Indirect channel works through factor and commodity prices. For instance, remittances are also invested, generally in real estate sector. Hence, they affect other economic sectors through intermediate demand. The change in demand for inputs and resultantly outputs affect household income and consumption. Therefore, they influence incidence of poverty and welfare level in the country. At the macro level, remittances also affect balance of payment position in the country that affect exchange rate, which change the value of international wages in domestic currency. In brief, this is a general equilibrium problem and should be analyzed in with all forward and backward linkages to keep the analysis close to the reality. A comprehensive evaluation of economic benefits of migration and remittances for the labour sending country require application of quantitative methods based on macro models which take into account the whole economy including distributional aspects and that can be used not only for assessing its impact but also for simulating alternative policy strategies (Knerr, 1992). The computable general equilibrium (CGE) model not only allows us to track economy-wide effects but also the distributional

effects propagated in the economy through exogenous shock. It can also be used for simulating alternative policies. Therefore, I have used CGE framework to analyze this issue.⁴

Earlier, Siddiqui and Kemal (2006) have analysed the role of remittance in poverty change during the period of trade liberalization for the year 1990. This study extends the analysis to two time periods, 1990 and 2002, assuming that the structure of labour migrated by skill levels have changed over time due to change in skill of migrated labour.⁵ The study explores the facts related to the questions 'Do international remittance inflows have a colossal impact on poverty and growth?' and 'Do the impacts of remittances differ over time?' The study uses the computable general equilibrium models (CGE) developed in Siddiqui (2009) Siddiqui *et al.* (2009) and Siddiqui (2008) based on social accounting matrices for 1990 (Siddiqui and Iqbal, 1999) and for the year 2002 (Dorosh *et al.*, 2006). The later dynamic CGE model developed in Siddiqui (2009a) is used to explore the contribution of remittance to growth. Lastly, due to missing information on remittances from different regions in SAM (a data base used to operationalize CGE), a partial regression analysis has been conducted to trace the impact of remittances from developing and developed countries on poverty, which will help the government to explore the international labour market for different types of labour in the future.

The next section briefly describes the background information on migration, remittances, and migration policies adopted by government of Pakistan during 1970s to date. In section 3, model and data base are discussed. In the following section, results from computable general equilibrium model and partial equilibrium model are discussed and the final section concludes the chapter identifying some directions for future work.

Overview of Migration

In 1970s, opening up of the Middle East labour market has induced vast emigration of Pakistani workers, which has slowed down after mid-eighties. As a result, the flow of migrant workers has slowed down but did not fall to zero. Given the importance of the issue, this section presents a brief overview of the pattern of international migration, missing information, and policies adopted by the government of Pakistan.

⁴Some papers describe limitation of the CGE analysis such as perfect competition and extraneous estimates of elasticities the results are dependent on them, and functional forms. I tried to minimize the possible bias introduced due to these factors by estimating elasticities using real data sets. I have estimated income elasticities using household income and expenditure survey data for each type of households. And elasticities used in production function, import aggregation and export transformation function have been taken from empirical studies which estimate them using real data sets.

⁵ One reason to assume that is that households who receive remittance income enhanced the human capital of their children and they migrate with more information. Hence the impact of remittances may change over time.

In the absence of detailed information on the characteristics of migrant labour and the problem of measuring migration through informal channels, migration data distort the picture. According to one estimate, the stock of Pakistani labour that migrated through formal channels is about 4 million (ODA, 2009) and through informal channels is about 3 million in the world (Jan, 2009). Table 3.1 presents the characteristics of the stock of labour that migrated through formal channels during 1971 to 2007. It shows that Middle East is still a major employer of Pakistani labour *i.e.*, 94.7 per cent of migrated labour.

Table 3.1: Distribution of Migrant Workers by Region – 1971 – 2007

Region	Number	Percentages
Middle East	3935403	94.66
Libya	67722	1.63
Malaysia	15932	0.38
South Korea	12571	0.3
UK and USA	12209	0.29
Others	113751	2.74
Total	4157588	100

Source: Jan (2009).

The majority of migrated-labour from Pakistan belongs to unskilled labour. Recently, the share of unskilled labour has further increased from 35 per cent to 50 per cent during 2002-2007 (Table 3.2). The share of highly qualified labour has also increased from 1.8 per cent to 2.5 per cent.

Table 3.2: Distribution of Migrated Labour by Occupational Groups (%)

Occupation	2002	2003	2004	2005	2006	2007
Highly Qualified	1.78	1.27	1.89	2.63	3.12	2.52
Highly Skilled	10.02	10.35	8.95	10.88	8.92	9.27
Skilled	50.85	47.52	44.32	40.66	39.25	35.97
Semi-Skilled	2.20	2.15	2.21	1.88	1.84	2.18
Un-Skilled	35.15	38.71	42.63	43.95	46.88	50.06
Total (numbers)	147422	214039	173824	142135	183191	287033

Source: Jan (2009).

The migration of all other categories of labour has declined over the same time period (Table 3.2). Table 3.3 shows the structure of remittances inflow by region. Before the opening up of the Middle East labour market, the majority of labour migrated to UK, which is also evident from the remittances share. It shows that 44 per cent of remittances were coming from UK and US in 1974-75 and after that, remittances share from Middle East remains higher till 2007. On average, during 1974-5 to 2006-08, remittances share from

Middle East in the total is 66 per cent and remittances share from UK and US is 22 per cent, and 12 per cent is from the rest of the world.

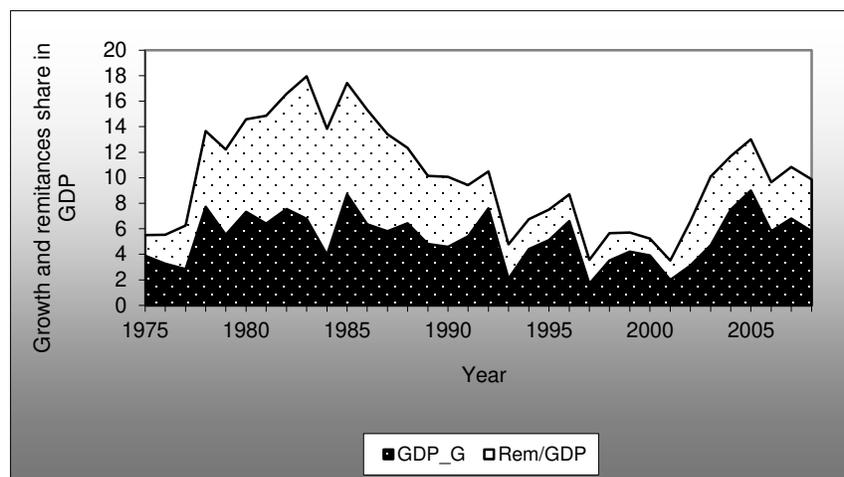
Table 3.3: Remittances Inflows by Region (%)

Year	Share in Total Remittances by Region		
	US and UK	Middle East	Others
1974-75	44.19	39.62	16.19
1976-80	14.56	75.36	10.08
1981-85	9.99	83.11	6.91
1986-90	18.25	72.40	9.36
1991-95	21.43	63.89	14.68
1996-00	19.82	69.70	10.48
2001-05	35.57	49.15	15.28
2006-08	35.25	48.28	16.47
1975-08	22.00	66.25	11.75

Source: Jan (2009).

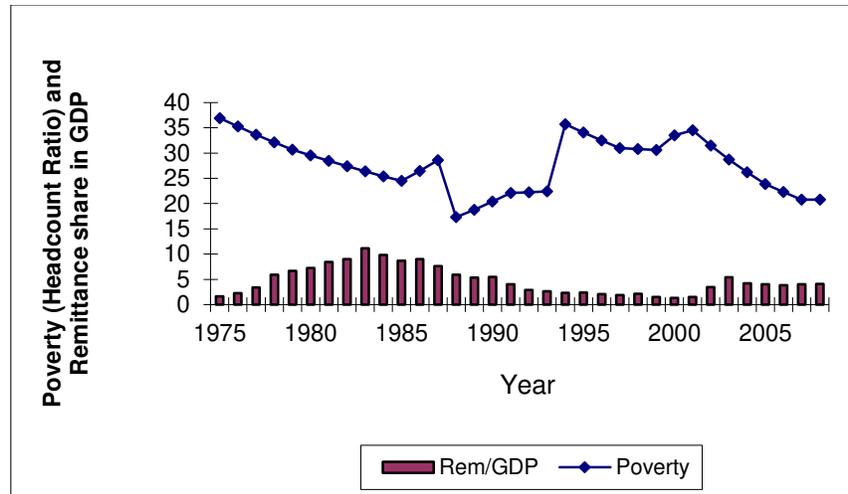
Earlier studies show that remittances serve multiple purposes. Therefore, they are expected to have multi-dimension impacts. They are also expected to bring growth and distributional effects and hence poverty and welfare.

Figure 3.1: GDP Growth and Remittance Share in GDP



Source: Author's construction using data from Pakistan (Various issues)

Figure 3.2: Poverty and Remittance Share in GDP



Source: Author's construction using data from Economic Survey (Pakistan, Various issues)

Figure 3.1 shows that growth and remittances share in GDP move together. Since 2000, remittances inflows sharply increase. Figure 3.2 shows that during 1975 to 1985, with increasing remittance inflow, poverty reduces continuously. Since then, remittance decline and poverty shows a rising trend. Since 2000, the pattern again changes – rising remittances and lower poverty. However, this needs to be explored in a comprehensive framework that takes into account all dimensions of the economy which are expected to be affected through remittances inflows.

Realizing the importance of migration,⁶ the Government of Pakistan (GOP) has rectified the policies several times to expedite the process of migration and solve the problems of migrated labour and their families left behind. A brief overview of policies is given below.

The first time GOP has revised the Emigration Act of 1922 (before independence) was in 1959, and it continued to work under these rules for a very long time period. In 1971, the Bureau of Migration and Overseas Employment was established to handle migration in a legal and systematic manner. During 1971–77, the process of issuing visas to labour to take the advantage of the boom in the Middle East has been expedited on the order of then Prime Minister, which works very well and during this period labour migration has substantially increased from 3.7 thousand in 1971 to 80.3 thousands in 1977 and approaches to 100 thousand in 1984 (Pakistan, various issues).⁷

In 1979, emigration policy was revised again and the private sector was also allowed to take part in the migration process and a formal institutional framework was established. The Worker Foundation was

⁶ A large number of studies [Amjad (1986, 1988), Kazi (1988), Burney (1988, 1987), Maqsood and Sirageldin (1994), Irfan (1986), Malik and Sawar (1995), Iqbal and Sattar (2005), Siddiqui and Kemal (2006)] have analyzed the impact of remittances on the domestic economy using available information and reveal their significance at country level and at the household level.

⁷ This number includes only formal migrated workers.

established for the welfare of Pakistani workers abroad to facilitate: 1) the rehabilitation of migrants on their return; 2) to solve the problems facing migrants in country of work and of their families within the country. Their children are given the entitlement for stipends and scholarships for higher education in the institutions within the country, housing projects have been started to facilitate overseas Pakistanis' residential needs, a transport service has been provided to the labour from the airport to their home on their return, and in case of death of any worker abroad, the Foundation expedites the process of payments. In the case of delay they make payments to families and bear expenses of transferring the dead body back to the country.

In the following years, the institutional framework was further developed to deal with emigration from Pakistan. The Overseas Employment Promoters (OEP) and National Manpower Commission (NMC) were established, which provide full support to Pakistanis seeking employment opportunities abroad and provide assistance in re-absorption of returning migrants. People's program was initiated in 1989 with Rs. 2 billion, which includes exploration of employment opportunities in Iraq, Iran and Middle East. In 2001, the Overseas Employment Corporation (OEC) has launched the CV online Scheme. This helps to reduce unemployment among educated labour. This program has expedited the migration of highly qualified professionals, a 42 per cent increase during 2002 to 2007 (see Table 3.2). In 2002-03, OEC explored new opportunities and paved avenues for employment in - South Korea for General workers, USA for employment for nurses, and Europe employment for Doctors and Nurses. However, there is a need to develop expertise according to the standard of recipient countries' needs to work effectively.

Since 2006-07, the major focus is to increase the number of overseas workers with proper skill taking full advantage of opportunities being offered by the demographic change taking place in industrialized countries, protecting the right of migrant workers, facilitating workers in sending remittances through formal channels, effective utilization of remittances, and developing investment facilities for the expatriates to use their acquired expertise. Recently, the Ministry of Labour, Manpower, and Overseas Pakistanis (MOLMOP) has established a policy planning cell. In this regard, four MoUs with Kuwait, Malaysia, Korea and UAE have been signed while MOUs with several other countries are under process. Currently, National migration policy is under revision, which will provide further guidelines for safer and greater emigration from Pakistan. However, there is plenty of room to improve the institutional framework to handle the migration process effectively. For instance, there is an urgent need to protect the migrants' rights in destination countries.

Pakistan is not only a labour sending country, but she has also been receiving labour in the form of refugees, mainly from Afghanistan. Being a recipient country, Pakistan faces problems posed by these refugee inflows. The civil war that was begun about three decades ago in Afghanistan displaced a large

number of people who migrated to other countries including Pakistan. Pakistan hosted the largest number of Afghan refugee population in the world for three decades. In 1992, the Afghan refugee population – both registered and unregistered – are about 3.7 million. About 2 million of them were in Khyber Pakhtoonkhawa⁸ (Pakistan, 1992). About half of the Afghan refugees, who are still staying in Pakistan arrived in the early years of the tragedy - 1979-90, while 1.6 percent of the Afghan refugees arrived Pakistan after the year 2000 (IPS). Despite repatriation programme, 2.1 million registered refugees still present in Pakistan in 2007 (IPS). The challenges posed by Afghan refugees to Pakistan economy include financial constraints to provide them food, health and education facilities. In sum, they have inflicted considerable economic losses and ecological change in the country. With the passage of time, international humanitarian assistance has been drastically curtailed and government of Pakistan has to bear the entire cost by herself. The reduction in food and other financial aid for Afghan refugees forced them to move from camps to urban centres to earn their living. They exert pressure on labour market. About 55 percent of Afghan refugees are daily wage earner, which generally affect relatively poor population. About 20 percent of them are employed while self-employed, dependent, and others are 24 percent (8 percent each) (IPS). Pakistan needs to formulate a strategy to make smooth repatriation process.

The Structure of the Model and Data Base

Basic Structure of Computable General Equilibrium Model

The neo-classical CGE model consists of six blocks, *i.e.*, production, consumption, income and saving, prices, trade, and equilibrium. The building blocks of the model are equations representing the behaviour of consumers, producers, government, enterprises etc. Each of these agents demand and supply both goods and services and factors of production as a function of their prices. Market forces adjust prices and bring equilibrium between demand and supply. The equations of the model and variables definition are given in Table 3 and Table 4 in Appendix. The neoclassical models and their assumptions are discussed in detail in Gunter et al (2005), and Gunter et al (2005a).

Assuming labour is mobile and capital is sector specific, they are combined with CES technology in production function. The income from sale of goods and services in domestic and foreign markets is allocated to purchase intermediate inputs and payments to factors of production. The factor supply is fixed. The incomes of factors of production are distributed among institutions [households, government,

⁸ Old name N.W.F.P

enterprises *etc.*]. Households receive all labour income. The distribution of factor income among the households depends on the quantity and quality of factors of production they own. They also receive transfer payments from government, remittances from rest of the world and dividends from firms. Household saving is defined as a fixed share of income. Households pay taxes to the government and spend on goods and services to satisfy their needs. Household consumption is specified by linear expenditure system (LES). The government collects taxes and use them for consumption (of fixed commodity quantities), transfers to households (indexed to the domestic price level), and savings. Government savings is defined as the difference between government revenues and expenditures. Enterprises income originates from capital and they allocate it to savings and transfers to households in the form of dividends.

The aggregate demand for goods and services is determined by investment demand, household consumption, government consumption, and intermediate input demands. The aggregate supply consists of domestic production and imports. They are combined with CES function assuming they are imperfect substitute (Armington, 1969). The allocation of outputs between domestic and foreign markets takes place through CET [constant elasticity of transformation] function. Import supply and export demand are function of the ratio of world prices and domestic prices (fob). Pakistan is assumed to be a price-taker on the import side. Exports supply and export demand equilibrate with price adjustment.

Rest of the world's income includes income from sales of imports and its outlay includes expenditure on exports and payment to labour working abroad who remit this income to their home country. The difference between the two measures is current account balance (CAB) or foreign capital inflow. To the extent that Pakistan's spending exceeds its earnings, foreign savings (the current account deficit) is positive or vice versa.

The three blocks, *viz.*, savings-investment, government, and the rest of the world, are associated with the macro constraints of the model. Walras' law holds. The coefficients such as share and shift parameters are calculated from SAM data. Elasticities are taken from earlier studies conducted for Pakistan in CGE-framework. Welfare is measured by equivalent variations (EV) using base year price and consumption for each household. FGT indices of Poverty are used for poverty analysis (for detail discussion on poverty analysis in CGE framework see Siddiqui, 2009a). Government consumption and total demand for investment goods are fixed to make sure that households' welfare is not at the cost of government consumption or investment.

The poverty analysis is conducted using micro data from household income and expenditure survey for 1990 and 2002. The change in income and poverty line are taken from simulation results (for detail see Decaluwe *et al.*, 1999; Siddiqui, 2009; Siddiqui and Kemal, 2006). The national poverty lines for 1990 and

2002 are Rs. 274, and Rs. 748 per capita per month respectively those are used to estimate poverty in the rural and the urban area in the base year through FGT indices- headcount, poverty gap and severity indices.⁹

Dynamic Features of the Model

Siddiqui (2009a) has developed a simple dynamic CGE for Pakistan for long run analysis. This study uses the model to explore growth impact of remittance inflow in 2002. For the long run analysis the model is run for twelve years. Within a year, the module remains unchanged. The capital stock is defined on the basis of an average capital output ratio (ACOR). One of the channels, suggested by new growth theory, by which trade enhances growth, is that a country can obtain advanced technology from its trading partners through trade. The same can be applied to migration. The model incorporates it through change in factor productivity through parameters. All exogenous variables also grow with exogenous growth rate. The investment demand equation determines the pattern of reallocation of new investment among different sectors of the economy after the shock.

Data

The models use data from social accounting matrix (SAM) for the year 1990 and 2002 developed by Siddiqui and Iqbal (1999) and Dorosh *et al.* (2006). It is an instrument to depict the initial structure of an economy on the basis of systematic and consistent data organisation in accounts that shows the relationship between the variables in these accounts. Both models classify production in three major categories: agriculture, industry and services. But disaggregation in each group differs, *i.e.*, SAM for 1990 contains four agriculture sectors and in 2002 there are seven agriculture sectors (for further detail see Siddiqui *et al.* (2009) and Siddiqui 2009). The discussion in the chapter focuses on aggregates to compare the results of 1990 and 2002. Here it discusses income distribution by source and households' poverty level.

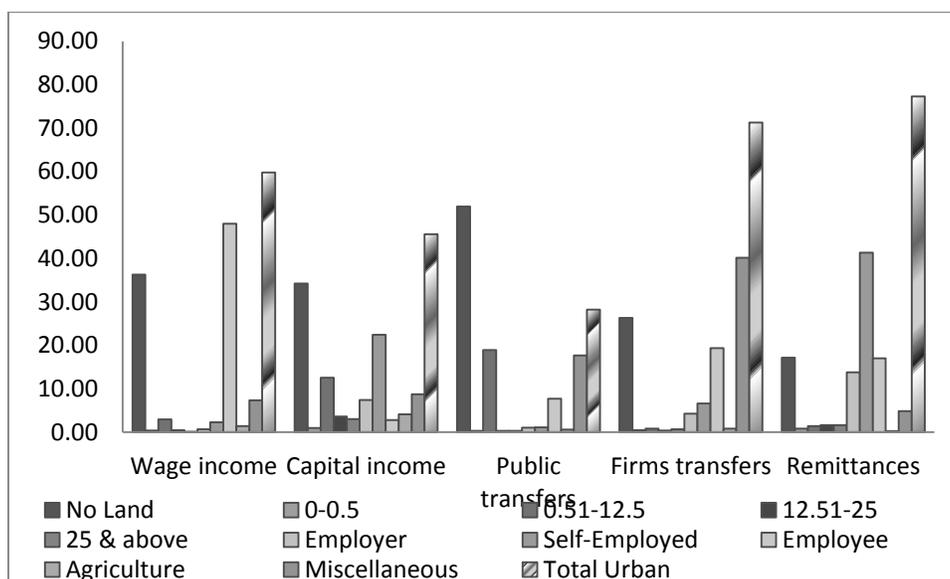
Households are identified by region – rural and urban. Within each region classification of households is different in 1990 and 2002. In 1990, households are identified by land holdings and employment status in rural and urban areas, respectively. Whereas SAM 2002 show more groups – seventeen rural households identified by land holdings by region – Punjab, Sindh, NWFP, and ROP (Rest of Pakistan), and two urban households identified as rich and poor on the basis of the national poverty line *i.e.*, Rs. 748 per capita per annum. Therefore, results are compared at the aggregate level only – rural, urban and Pakistan.

Income Distribution and Remittances

⁹ The poverty gap measures distance between the average poor household income per capita and the poverty line. Whereas severity index, which is squared of poverty gap gives a measure of the distribution of income among poor households (Robiillard and Robinson, 2005).

The Figures 3.3 and 3.4 present distribution of income by source in 1990 and 2002. In 1990, employees and self-employed receive larger share from wage income, and hence they are expected to benefit from migration due to wage increase. Remittances income is largely received by self-employed in urban area and households with no land in rural area. Both types of households belong to the relatively poor population (Figure 3.3). It can be concluded from this that migration of labour in 1990, who largely belong to relatively low skill labour, is expected to benefit the poor population.

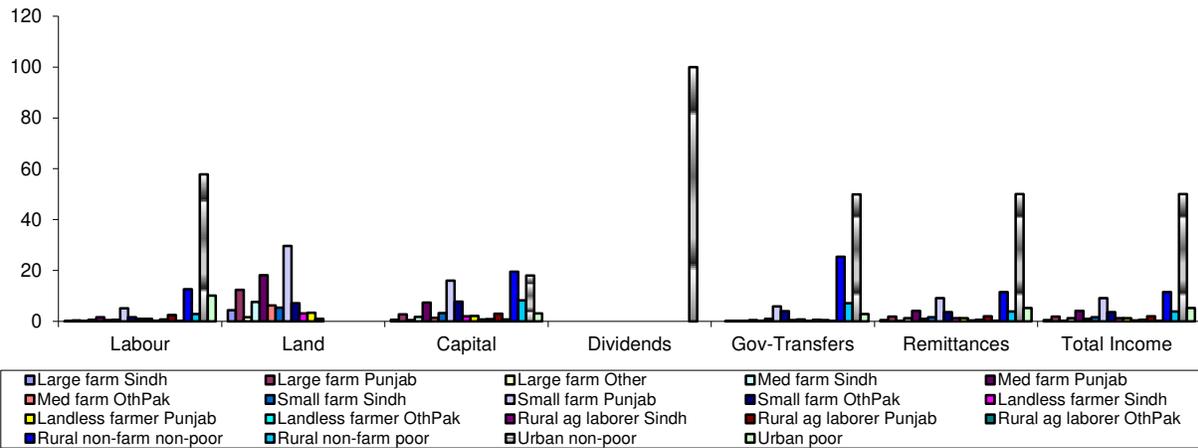
Figure 3.3: Household Receipts by Source-1990



Source: Author’s construction using data from Social Accounting Matrix-1990.

The Figure 3.4 shows that the urban rich households receive the larger share of income from all sources. The urban rich households – 20 per cent of the whole population – receive 50 per cent of the total income. They receive 60 per cent of labour income, dividends (100 per cent), while government transfers and remittances are more than 50 per cent of the total. The shaded bars in Figure 3.4 show the share of urban non-poor households in each source of income, which reveal larger inequality between urban rich and all other types of households. Contrary to 1990, rich households receive about 50 per cent of remittances which lead us to conclude that migrated labour in 2002 can largely be classified as qualified professionals. Therefore, the impact of remittances may differ over time.

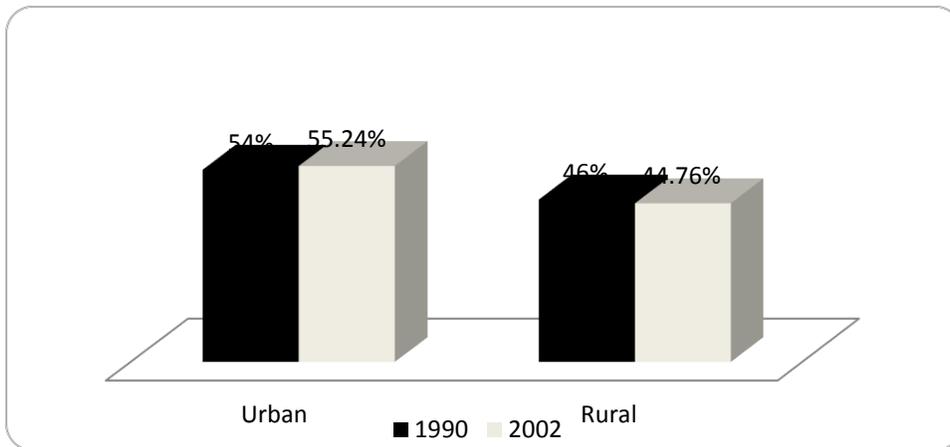
Figure 3.4: Household Receipts by Source-2002



Source: Author’s construction using data from Social Accounting Matrix-2002.

Figure 3.5 shows that the shares of remittances of rural and urban area have changed during 1990 - 2002. In 1990 urban share of remittances was 54 per cent which has slightly increased to 55 and rural share has declined from 46 to 45 per cent (Figure 3.5).

Figure 3.5: Distribution of Remittances between Rural and Urban Area



Source: Author’s construction using data from Social Accounting Matrix-1990.

Table 3.4: Remittance per capita by Region (Rs.)

	1990	2002	Price Adjusted
Rural	4.2	1772.4	733.9
Urban	33.6	1982.7	821.0
Total	13.1	699.3	289.6

Source: Author's calculations from SAM 1990 and SAM 2002.

Table 3.4 shows that remittance per capita has increased in real terms in both rural and urban areas between 1990 [a year of low remittance inflow] to 2002 [a period of high remittance inflow].

Household Expenditure Pattern

A large disparity exists between rural and urban households' consumption pattern as consumption of 30 per cent population living in urban area is larger than the consumption of 70 per cent population living in rural area in both 1990 and 2002 (Siddiqui, 2008 and Siddiqui *et al.*, 2009). Table 3.5 shows that urban and rural households spend a relatively larger share of their food budget on goods from industry in 1990. Over time the pattern has changed. Rural households reduce consumption of commodities from agriculture and industry and demand more for services in 2002, twice that of in 1990. Urban household consumption shifts from industry to services. This indicates that the consumption pattern has changed toward services with a marginal decline in consumption of agriculture goods. This change may be attributed to change in remittances income.

Table 3.5: Consumption Pattern of Households (%)

	1990		2002	
	Rural	Urban	Rural	Urban
Agriculture	35.49	26.74	28.67	26.60
Industry	46.15	41.55	35.71	34.55
Services	18.36	31.71	35.62	38.85
Total	100	100	100	100

Source: Calculated from SAM 1990 and SAM 2002.

Poverty

The primary objective of this chapter is to evaluate the impact of increase in remittances inflow on poverty and welfare in 1990 and 2002. The simulation identifies the impacts on different socio-economic groups. Poverty comparison over 1990-2002 shows that despite a larger flow of remittances, poverty has risen in Pakistan from 40 per cent in 1990 to 44 per cent in 2002 (Table 3.6). In 2002, poverty has increased in rural area by 10 percentage points and reduced in urban area by 10 percentage points over 1990 (Table 3.6). The reason may be embodied in remittance inflows which largely flow to urban households (50 per cent of remittances in 2002). This change in poverty may be explained by change in type of labour migrated. This

is because, 5 per cent increase in remittances in 2002 is associated with 0.02 million of labour migration, while five per cent of remittances in 1990 comes from 0.04 million of labour.¹⁰

Table 3.6: Poverty in Pakistan (%)

Region	1990	2002
Rural	40	52
Urban	40	26
Pakistan	40	44

Source: Siddiqui *et al.* (2009) and Siddiqui (2008).

Impact Evaluation of Migration and Remittances

Labour migration serves two purposes. It reduces unemployment and earns foreign exchange, which have important implications for Pakistan in terms of production, consumption, trade, households' welfare and poverty. As discussed above, as the structure of skill of out migrants has changed over time (Table 3.2), the impact of migration and remittances inflow in 1990s is expected to be different from the impact in 2002. Here, the analysis is conducted in static framework for 1990 and 2002 to see the change in impact of migration and remittance over time.

Increased migration and remittance inflows have three immediate effects: (1) reduce labour supply in the country, (2) relax current account deficit (CAD) position, (3) relax household financial constraints. All these channels have important socio-economic implications for Pakistan through direct and indirect channels. Increase in remittances of 5 per cent over the base year and reduction in labour supply associated with migration of labour of 0.04 million (0.06 per cent increase in migration of labour) in 1990 and 0.02 million (0.13 per cent) in 2002 are introduced in 1990 and 2002 economies.¹¹ The difference in migrated labour associated with five per cent increase in remittances is because of two reasons. First, Pakistan labour that migrated in 2002 is more skilled labour than that in 1990, therefore earning higher and remitting more income to their home country. Second, all increase in remittances in 2002 may not be associated with increase in labour migration. In post 9/11, existing migrated labour in the world started to remit more

¹⁰ In absolute terms five per cent remittance of the total remittances in 1990 is also less than that of 2002.

¹¹ Migration of labour associated with 5 per cent increase in remittances is calculated on the basis of increase in remittance and increase in labour migration in 1990 and 2002. Figures for labour migration and remittance inflow have been taken from economic surveys (various issues) to calculate the migration associated with five per cent increase in remittances inflow.

income than prior to it. This is especially true for diaspora communities in US. Introduction of migration enables us to see the change in output after taking into account the output loss (if any) due to migration of labour. For each year, the study conducted two simulations:

1. Increase in remittances inflow along with reducing labour supply (Remit_M)
2. Increase in remittances inflow without reducing labour supply (Remit_NM)

Increase in Migration and Remittance Inflow

An exogenous shock of five per cent increase in remittances over the base year along with reduction in labour supply equal to the amount of migrated labour is introduced in 1990 and 2002 economies. The detailed results of simulations for the year 1990 and 2002 are reported in Tables 3.1 and 3.2 in Appendix I. The results reported at the aggregate level in Tables 3.7 and 3.8 in the text are discussed here with reference to the variation over the base year values after the shock. A comparison is also made between the outcome of 1990 and 2002 after the shock. It is assumed that labour in the country is fully employed.¹² The results show that in the absence of labour migration, effects on imports, exports, demand and supply are over-estimated. Therefore, the study discusses the results in detail of the experiment – Remit_M for both years – 1990 and 2002, and compares the outcome.

**Table 3.7: Effects of Remittances Inflow during 1990-2002
(Percentage variation over base values)**

	1990	2002	Difference
Macro aggregates			
Production (Total)	-0.09	0.04	0.13
Agriculture	-0.004	0.004	0.008
Industry	-0.233	-0.289	-0.056
Services	0.001	0.317	0.318
Imports (Total)	0.27	0.82	0.56
Agriculture	0.558	1.775	1.217
Industry	0.247	0.715	0.468
Services	0.281	2.189	1.908
Demand for composite good	0.01	0.24	0.24
Agriculture	0.02	0.066	0.046
Industry	-0.007	0.162	0.169
Services	0.02	0.404	0.384
Demand for Domestic Good	-0.031	0.14	0.17
Agriculture	-0.001	0.02	0.021

¹² Even if the country has unemployed labour, they may not fill the gap immediately due to lack of information and differences in skill level.

Industry	-0.106	-0.144	-0.038
Services	0.013	0.372	0.359
Exports	-0.8	-0.83	-0.03
Agriculture	-0.326	-0.819	-0.493
Industry	-0.887	-0.785	0.102
Services	-0.347	-1.051	-0.704
Prices			
Value Added Price	0.49	1.6	1.11
Export Price	0.004	0.73	0.73
Domestic Price	0.48	1.32	0.84
Consumer Price	0.42		0.68
Wages	0.6	2.1	1.50
Returns to capital	0.42	1.2	0.78

Source: Simulation Results

In the labour sending country it is considered as an advantage that international migrants send foreign exchange in the country. At the same time, the country loses human resources – called brain drain – which may result in loss of output. The effects of labour migration and remittance inflow travel in the economy from both supply and demand sides. A direct impact of international migration in labour market, works through reduction in labour force that lead to upward pressure on wages, 0.6 per cent in 1990. In 2002, migrated labour is half of that in 1990, but the effect on wages was very high, 2.1 per cent. This additional increase in wages may come from the production side of the economy. Despite decline in labour supply, production increases in 2002 contrary to the decline in production in 1990. This has upward pressure on labour and capital both. Given fixed supply, increase in demand translates into higher returns to factors of production. Demand for capital increases due to substitution effect in 1990. But in 2002, both substitution and increase in demand for labour and capital works due to increased production. Returns to capital increases by 0.42 and 1.2 per cent over base year of 1990 and 2002, respectively.

International prices do not change despite increase in import inflow, but prices of domestically produced goods rise in response to change in domestic market conditions. Increase in production cost due to rise in factor prices (labour and capital) are major contributory factors. Value added price increases by 0.5 per cent and 1.6 per cent in 1990 and 2002, respectively. This leads to increase in domestic prices of exports also. The exports become expensive and fall in both years. Another factor responsible for decline in exports is appreciation of real exchange rate due to larger inflow of imports and remittances. Increase in remittance improves the current account position and thus financing of imports that increase by 0.27 and 0.82 per cent in 1990 and 2002, respectively.

Domestic production bears a negative impact in 1990 but it turns out to be positive in 2002. The stimulus to production in 2002 may have come from the demand side [income effect of remittances], as demand for domestic goods rises in 2002 by 0.14 percentage (Table 3.7), whereas demand for domestic goods decline in 1990. Although GDP marginally declines and rises in both years, a relatively large variation in macro aggregates can be observed at the sectoral level. The impact of the shock depends on type of sectors – import competing, export oriented or non- traded sector. The results show that the industrial sector contracts in both years, because of high import penetration in consumption. This is also an indication that with higher income, households’ consumption shifts towards imported goods and they increase demand for imports. The agriculture sector bears marginal negative and positive effects in 1990 and 2002, respectively. The positive impact may be attributed to higher income change in 2002, because agriculture being a food and a basic necessity, the sector is less responsive to income and price changes. The services sector shows a marginal expansion in 1990 but substantial increase in 2002, 0.001, and 0.32 per cent, respectively, over the base year. On the production side, the tradable sectors which bear a negative effect may be a consequence of the ‘Dutch Disease’ effect (Bussolo and Medvedev, 2007). This is due to reduction in labour supply which makes capital relatively more abundant and thus less costly relative to labour, *i.e.*, returns to capital increase less than increase in wages in both time periods (Table 3.7). The services sector expands in both years despite higher labour cost. It contains least import and export contents, and majority of its production is consumed domestically, have little competition from imports and less substitution between domestic and imported goods. Therefore, rise in demand due to increase in income is satisfied by the domestic supply despite increase in prices.

Table 3.8: Simulation: Increase in Remittances by 5 per cent and Reduction in Labour Supply

Income	1990	2002	Difference
Rural Households	0.6	1.75	1.15
Urban Households	0.89	2.02	1.13
Total	0.76	1.9	1.14
Consumption			
Rural Households Consumption	0.58	1.77	1.19
Urban Households Consumption	0.82	2.07	1.26
Total Households Consumption	0.70	1.92	1.23
CPI for Rural Households	0.50	1.43	0.93
CPI for Urban Households	0.48	1.1	0.62
CPI for all Households	0.49	1.25	0.76
Equivalent Variation			

Rural Households	0.08	0.3	0.24
Urban Households	0.28	0.8	0.52
Total	0.19	0.58	0.39
Poverty-Headcount Ratio			
Rural Households	-13	-2.41	10.59
Urban Households	-17	-3.51	13.49

Source: Simulations Results

The results in Table 3.8 show that all households gain in rural and urban areas in both years. The increase in income is less than 5 per cent because remittance is one of the five sources of households' income. In addition to increase in remittances income, gains in income come from their labour and capital income due to increase in returns to labour and capital. The results show that urban households gain more than rural households in both years. This implies that remittances income increase the gap between rural and urban areas. Remittances have a strong impact on households income in 2002; more than twice the impact in 1990. Difference in impact by rural and urban households is due to difference in their sources of income--ownership of factors of production and their share in remittances. In 1990, remittances constitute around 3.4 per cent of income of rural households and 10 percent of urban households. In 2002, remittance share is five per cent of the total income for both rural and urban households.

Higher income generates more demand for consumption of goods and services, which is fulfilled by import inflow in 1990 and by a combination of increased production and import inflows in 2002. A marginal difference in impact on income and consumption is found. Consumption increases less than income in 1990 but more than the income in 2002. This difference in impact can be attributed to difference in receipt of remittances due to difference in skill of migrated labour because the effect depends on who is receiving remittances in larger amount.

The main concern in this study is to measure the impact of remittances income on households' welfare and poverty. Households' welfare is measured by equivalent variation (EV). All households gain in terms of income and consumption. Consumer price index (CPI) rises for all households in both years. CPIs rises more for urban households than for rural households due to difference in consumption pattern. Rural households allocate a higher percentage of their budget to goods from agriculture and industry, whereas urban households allocate more resources to services. A comparison of changes in income, consumption and CPI over base years shows that CPI rises less than the rise in income and consumption level. Therefore, all households in rural and urban areas gain in terms of welfare. Households' welfare improves over the base year by 0.19 and 0.58 per cent for Pakistan in 1990 and 2002, respectively. Poverty reduces in both years - 1990 and 2002. The results show that remittances in 1990 have a relatively larger effect on poverty

than in 2002 (Table 3.8). This again confirms to some extent that labour migration in 1990s belong to the relatively poor segment of population compared to migration of labour in 2002.

Long Run Effects of Migration and Remittances Inflow with a Focus on Growth

Two simulations are conducted to measure the growth impact of remittances.

1. Business as usual (BaU) path
2. Increase in Remittances and decline in labour supply

The results are discussed with a focus on remittances effects on production, trade, income and expenditure of households, and welfare.

Simulation 1: BaU Path for Long Run Analysis

A dynamic CGE model¹³ allows the economy to grow in the absence of any policy change. It takes into account efficiency effect as well as accumulation effect. In this exercise, BaU growth path is constructed over the period of 12 years from 2002 to 2014, which is used as the basis for the comparison of the values after shock. In this exercise, capital is assumed to be accumulated with a depreciation rate of 5 per cent for non-agriculture capital and 10 per cent for agriculture capital. Supply of each type of labour increased with a growth rate of 2.5 per cent in the absence of labour migration along with growth of all other exogenous variables with 1.2 per cent. Factor productivity increases by 1 per cent. On average, economy grows with a growth rate of 1.5 per cent. The contribution of agriculture, industry and services to GDP growth is 1.02, 1.8 and 1.5 per cent, respectively. This is the path in the absence of any change in the economy.

Simulation 2: Increase Remittances by 5 per cent in 2002 and Reduction in Labour Supply

Recent rise in remittances inflow in the world including Pakistan has important implications for Pakistan in terms of production, consumption, trade, households' welfare and poverty, which has been discussed in the previous section. This exercise measures the long run impact of remittance increase in 2002.

Increase in remittances of 5 per cent over the base year along with migration of labour of 0.02 million in 2002 are introduced by reducing labour supply. Table 9 shows the impact on volume of goods produced, imported, exported, and consumed.

The results show that in the short run the remittances inflow in 2002 have strong positive impacts on macro aggregates (discussed in previous section). This simulation is conducted to analyze the long run effects of migration and remittance inflow. The results show that in the long run, growth effects of remittance are

¹³ Dynamic CGE model for Pakistan developed in Siddiqui (2007) to measure the long run impact of agriculture trade liberalization.

negative; it reduces production by 0.74 per cent. This shows that productive resources are diverted towards consumption oriented investment as welfare impacts remain positive in the long run.

Table 3.9: Macro Effects of Migration and Remittances Inflow (Percentage Variation over Base)

	Total	Agriculture	Industry	Services
Production	-0.74	1.25	-1.67	-0.76
Labour Demand	-0.06	-0.05	-1.16	0.13
Composite Demand	8.08	0.54	24.16	-0.05
Domestic Goods	6.92	0.73	25.98	-0.13
Imports	17.72	0.64	18.59	4.34
Exports	13.21	23.65	16.85	-2.33
Investment	1.00	-5.00	6.22	-2.08

Source: Simulation Results

Increased migration reduces labour supply that increase wages by 6.8 per cent in agriculture and by 3.7 per cent in industry over BaU path in the long run (Table 3.10), because in 2002 labour market is segmented into agriculture and non-agriculture markets. Demand for capital increases due to substitution effect and lead to increase in returns to capital by 5.8 per cent.

Table 3.10: Macro Effects of Migration and Remittances Inflow (Percentage Variation over Base)

	Total	Agriculture	Industry	Services
Production	-0.74	1.25	-1.67	-0.76
Labour Demand	-0.06	-0.05	-1.16	0.13
Composite Demand	8.08	0.54	24.16	-0.05
Domestic Goods	6.92	0.73	25.98	-0.13
Imports	17.72	0.64	18.59	4.34
Exports	-1.43	23.65	-2.55	-2.33
Investment	1.00	-5.00	6.22	-2.08
Wage Rate in Agriculture	6.82			
Wage Rate in Industry	3.70			
Returns to Capital	5.80			

Source: Simulation Results

Increase in remittance inflow increase foreign exchange inflows which finance imports. Imports increase at 17.7 per cent at the aggregate level. At the sectoral level, larger increase in import of industrial goods [18.6

per cent] and services [4.3 per cent] can be observed from Table 3.10. The local production of very high import intensive sector industry and least protected services sector declines by 1.7 per cent and 0.76 per cent, respectively. Local demand of these goods is fulfilled by imports.

Growth effects of migration and remittances are negative as production falls by 0.74 per cent over BaU path with the increase in agriculture by 1.25 per cent and decrease in production of industrial goods and services by 1.67 and 0.76 per cent, respectively. Agriculture sector expands as demand for agriculture goods by rural and urban households has gone up by 0.25 and 0.36 per cent, respectively, over BaU path. Import contents in composite agriculture goods is low therefore, domestic production increase. On the other hand, consumption of industrial goods increase more than agriculture, but production declines and increased demand is fulfilled by imports.

Table 3.11 presents the impact on income, consumption, consumer price (CPI), general prices level (GDP deflator), and the status of welfare in the representative households- rural and urban. The results show both rural and urban households gains in terms of income by 4.2 and 4 per cent, respectively over BaU path. Aggregate CPI falls by 4.8 per cent. The resulting impacts on welfare are positive on both representative households – rural and urban. In results, welfare level of the country improves. The results show that remittance inflow reduces the gap between rural and urban areas in the long run.

**Table 3.11: Households Income, Expenditure and Welfare
(Percentage Variation over Base)**

Variables	Long Run Effects on Volume
Rural Household Consumption	
Agriculture	0.36
Industry	0.75
Services	0.41
Total	0.50
Urban Household Consumption	
Agriculture	0.25
Industry	0.82
Services	-0.73
Total	-0.04
Rural Household income	4.17
Urban Household Income	3.97
Total Households' Income	4.02
CPI	-4.78

Welfare (EV)	
Rural Household	4.04
Urban Household	0.6
Total	4.64

Source: Simulations Results

A closer look at the short run and long run effects reveals that the changes in income and consumer prices translate into welfare gains, which are higher in the long run for Pakistan. The increase in welfare of rural households is significantly higher than the increase in welfare of households in the urban area.

Regression Analysis of Poverty: Remittances by Region and Poverty

The variation in poverty not only depends on who is sending remittances but also from where. The difference in the impact of remittance from developed and developing countries on poverty cannot be analyzed in the CGE framework with the existing information in SAM. This hypothesis is tested here with time series data using regression analysis to measure the variation in impact of remittance inflow by region on poverty. As indicated in the chapter labour to the Middle East belong to the semi-skilled class where poverty incidence may be higher compared to the households who receive remittances from US and UK, where professionals and skilled labour work. Equation 1 is defined to test this as follows:

$$(1) Lpov = \alpha - \beta LY_{pc} - \gamma L(R/Y) - \delta L(R_ME/TR) - \chi L(R_UKUS/TR) - \xi L(R_row/TR)$$

All variables are in log.

L= Log

Where pov =Poverty measured by headcount ratio-percentage population below poverty line.

Y_{pc} = Gross domestic product (GDP) per capita

R = Remittances

Y= GDP

R_ME = Remittances from Middle East

R_UKUS = Remittances from United Kingdom and United States of America

R_row = Remittances from rest of the world

TR = Total Remittances

The results for the model are precise and explain the variation in poverty due to remittances inflow from developed and developing countries. All variables have expected negative signs. After controlling for all variables which explains variation in poverty, the results show that the share of remittance from the Middle East (ME) has the highest negative impact on poverty, while remittances from developed countries such as UK and US have no impact on poverty reduction.

$$Lpov = 9.8 - 0.4LY_{pc} - 0.3L(RY) - 0.8L(R_{ME/TR}) - 0.4L(R_{UKUS/TR}) - 0.2L(R_{row/TR})$$

(3.5) (2.6) (4.9) (1.7) (1.4) (1.4)

$\overline{R^2} = 0.5$ F= 6.7 DW=1.2 no of observation = 34

The coefficient of share of remittances in the total from ME is significant at 10 per cent level. The variation in remittance impact on poverty is not very strong. This may highlight the fact that remittances from ME are underestimated due to missing information of informal migration and remittance inflow through informal channels such as 'Hundi'. However, the interesting finding is that remittance from the Middle East, have a poverty reducing impact but remittance from developed countries have no impact on poverty. This result can be explained in the following way that remittance from developed countries generally comes from highly educated professional labour who use formal channels to send money in the country. While labour working in developing countries belongs to low and medium skill level and may be using informal channels to send money. Therefore remittances from ME have a poverty reducing impact.

Conclusions

The effect can be classified into three: First round of effects of migration includes employment situation, wage, CAB position, income of households. Second round, change the structure of demand for goods and services, prices, exports, imports. Third, poverty and welfare change. Unlike earlier studies, this study uses economy-wide CGE model to explore micro and macro effects of migration and remittance and analyses the impact for two periods 1990 and 2002, in comparative static framework to test the change in impact over time.

The results of the study suggest that migration has upward pressure on wages and increase households' income. This flow of remittances increase households' consumption in both urban and rural areas and have a welfare improving and poverty reducing impact. It benefits more the urban households. Hence, it increases the gap between rural and urban areas in both years - 1990 and 2002. The remittance inflows in 2002 have strong positive impact than in 1990 on macro aggregates, but poverty reduces more in 1990. It can be concluded that remittance inflow from developed countries flows to the rich households [assuming that in 2002 more skilled labour migrated and larger remittances inflow was from developed countries such USA]. The results also show that remittances are used to finance imports as imports of all commodities increase.

Simulation results from the dynamic model suggest that supply side effect of reduction in labour supply dominates the stimulus that came from demand side in response to rise in household income. Production has been lower than the BaU path. Therefore, out-flow of labour and inflow of foreign remittances has not

stimulated the growth process. However at the sectoral level, agriculture expands while, industry and services sector contracts. Welfare improves in the long run. Increase in household income and welfare improvement can lead us to conclude that poverty also reduces in the long run.

Econometric evidence also confirms positive impact of remittances on poverty. Interesting findings is that remittances from ME have poverty reducing impact but remittances from developed countries have no impact on poverty. This result can be explained in the following way that remittance from developed countries generally comes from highly educated professional labour, who belong to relatively rich class, so remittances from them do not have a poverty reducing impact. While labour in Middle East belongs to low and medium skill level who generally belong to relatively poor class and affect poverty positively. However, the effect is not very significant. This result may be attributed to missing information of remittance inflow through informal channels. Therefore, there is a need for better documentation of overseas migration and remittances under formal and informal channels that will allow us a more realistic analysis for policy recommendations.

Overall, these results show that a 5 per cent increase in remittance stock affect the external sector, economy-wide wages, returns to capital, poverty and welfare. But remittance inflow generates 'Dutch Disease' effects making capital less costly relative to labour over the base year in both years in static framework. Therefore, remittance reduces the country's competitiveness and reduces export oriented sectors. However, despite its negative effects, remittances are not undesirable. They have a poverty reducing and welfare enhancing impact. If the objective is not maximizing material output, one can achieve the goal of poverty reduction and welfare improvement of individuals. However, some policies can be used to counter the negative impact of remittance inflows. This can be the focus of the next study.

These results are just an indication of direction of change. There is a need to explore the effects with more detailed and refined data sets, which include information on migration and remittances from both formal and informal channels. There is also a need to improve data collection techniques for better policy analysis.

Future Work

This chapter has focused entirely on the impact of migration and remittances on labour sending countries. The analysis does not take into account the problems that migrant labour face in destination countries such as violation of agreement.¹⁴ They are provided substandard boarding and lodging and forced to re-write the agreement. If they refuse they are asked to leave the country without any payments (Jan, 2009). To

¹⁴ Employers do not fulfil all contractual obligations and force them to revise the contract or leave the country without settlement of dues.

reduce the competition with indigenous labour, visa fees and fees of work permits have been increased (Jan, 2009). In addition, illegal migrants are forced to work on lower wages which result in lower remittances that is expected to affect the development process in the country negatively. Apart from these, it is also desirable to look into the problems faced by Pakistan due to Afghan labour inflow (refugees). The number of refugee population in 1992 (3.7 million) is approximately equal to the number of migrants from Pakistan through proper channel- about 4 million (see Table). Therefore, there is a need to develop a comprehensive migration policy which not only facilitates migrants' families in their home country but also protects the rights of migrant workers in the destination countries and help to solve the Afghan refugee's problem. These issues point out to the need for additional research.

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Appendix

Table 1: Simulation Results: Variation in Macro Aggregates over Base year 1990.

Sectors	Simulation Increase in Remittance by 5 per cent					Simulation Increase in Remittances and Reduction in Labour Supply with Migration of Labour				
	Volume change					Volume change				
	Imports	Composite Demand	Domestic Goods	Exports	Production	Imports	Composite Demand	Domestic Goods	Exports	Production
AGRICULTURE	0.875	0.126	0.098	-0.398	0.092	0.558	0.02	-0.001	-0.326	-0.004
Wheat	0.759	0.166	0.054	-0.709	0.054	0.491	0.068	-0.012	-0.558	-0.012
Maj crops	0.61	-0.296	-0.296	-0.52	-0.296	0.398	-0.264	-0.264	-0.401	-0.264
Min crops	1.073	0.199	0.167	-0.487	0.156	0.672	0.068	0.045	-0.408	0.038
Non crops	1.254	0.235	0.226	-0.336	0.218	0.779	0.087	0.081	-0.268	0.076
INDUSTRY	0.465	0.077	-0.075	-1.217	-0.261	0.247	-0.007	-0.106	-0.887	-0.233
Mining	0.275	-0.015	-0.185	-0.491	-0.196	0.125	-0.059	-0.166	-0.36	-0.173
Food consumer	1.158	0.297	0.18	-0.644	0.137	0.695	0.148	0.074	-0.452	0.046
Textile	0.862	-0.447	-0.504	-1.553	-0.934	0.506	-0.383	-0.422	-1.136	-0.714
Petroleum	0.593	0.207	0.058	-0.556	0.056	0.3	0.07	-0.018	-0.383	-0.02
Electric, non electric and tran equipment	0.331	0.162	-0.112	-0.553	-0.115	0.177	0.066	-0.114	-0.404	-0.116
Other manufacturing	0.423	0.074	-0.07	-0.56	-0.14	0.203	-0.013	-0.102	-0.405	-0.145
SERVICES	0.581	0.099	0.087	-0.58	0.064	0.281	0.02	0.013	-0.347	0.001
Other trade sector	0.581	0.059	0.033	-0.58	-0.007	0.281	-0.001	-0.015	-0.347	-0.037
Non trade sector	0	0.143	0.143	0	0.143	0	0.042	0.042	0	0.042
ALL	0.501	0.096	0.033	-1.082	-0.054	0.27	0.009	-0.031	-0.776	-0.09

Table 2: Simulation Results: Variation in Macro Aggregates over Base year 2002

Simulation Increase in Remittance by 5 per cent						Increase in Remittances by 5 per cent and Reduction in Labour Supply with Migration of Labour				
Sectors	Volume change					Volume change				
	Imports	Composite Demand	Domestic Goods	Exports	Production	Imports	Composite Demand	Domestic Goods	Exports	Production
Agriculture	1.758	0.055	0.009	-0.822	-0.007	1.775	0.066	0.02	-0.819	0.004
Wheat RAW	1.556	0.093	0.057	-0.642	0.033	1.558	0.108	0.072	-0.628	0.048
Rice (PADI-I-II)	0	-0.113	-0.113	0	-0.113	0	-0.098	-0.098	0	-0.098
Cotton	0	-0.388	-0.388	0	-0.388	0	-0.364	-0.364	0	-0.364
Other crop	1.145	-0.068	-0.108	-0.553	-0.117	1.154	-0.054	-0.093	-0.542	-0.102
Horticulture	1.931	0.303	0.15	-0.887	0.111	1.942	0.315	0.162	-0.881	0.123
Live Stock and Poultry	2.567	0.071	0.046	-1.188	0.032	2.6	0.079	0.054	-1.196	0.04
Forestry	0.192	-0.093	-0.189	-0.288	-0.22	0.232	-0.068	-0.169	-0.29	-0.207
Industry	0.711	0.145	-0.168	-0.809	-0.314	0.715	0.162	-0.144	-0.785	-0.289
Mining	0.003	-0.119	-0.62	-0.607	-0.618	0.018	-0.099	-0.584	-0.58	-0.583
Food items	1.846	0.221	-0.028	-0.888	-0.202	1.838	0.237	-0.007	-0.865	-0.181
Wheat flour	2.164	0.232	0.146	-0.901	0.127	2.16	0.25	0.164	-0.881	0.145
Rice	0	0.185	0.185	-0.832	-0.162	0	0.202	0.202	-0.813	-0.144
Text	1.36	-0.129	-0.208	-0.847	-0.438	1.353	-0.106	-0.183	-0.821	-0.412
Leather	2.242	0.019	-0.107	-1.225	-0.584	2.251	0.039	-0.087	-1.209	-0.566
Other manufacturing	0.614	0.224	-0.378	-0.612	-0.432	0.611	0.232	-0.355	-0.587	-0.409
Chemicals	0.812	0.496	-0.286	-0.716	-0.355	0.827	0.516	-0.252	-0.691	-0.322
Petroleum and other energy	1.097	0.138	-0.2	0	-0.2	1.116	0.166	-0.168	0	-0.168
Services	2.209	0.41	0.378	-1.096	0.321	2.189	0.404	0.372	-1.051	0.317
Construction	0	0.006	0.006	0	0.006	0	-0.014	-0.014	0	-0.014
Trade and transport	2.285	0.131	0.127	-1.096	0.021	2.268	0.167	0.164	-1.051	0.058
Housing	0	3.771	3.771	0	3.771	0	3.255	3.255	0	3.255
Services private and public	2.206	0.238	0.157	-0.91	0.157	2.186	0.272	0.194	-0.865	0.194
All	0.823	0.239	0.135	-0.86	0.035	0.825	0.245	0.142	-0.832	0.044

Table 3. Computable General Equilibrium Model for Pakistan

1. Income and Saving		
1.1.	$Y_H = \sum_s L_s * (\sum_m LD_{ms} * W_s) + \sum_s \lambda_H * \sum_m K_m * R_m + \Phi_i \sum LAND_{-} * r \ln d + dvr_H * DIV_H + \overline{TR}_H * e + pindex * TGH_H$	Households' Income
1.2	$DIV_H = dvr_H * Y_{FK}$	Dividends
1.3	$YD(H) = (1 - t_{yh}) * Y_H$	Disposable Income
1.4	$S_H = aps_H * sav * YD_H$	Households' Saving
1.5	$Y_{FK} = (1 - \sum \lambda_k) \sum (R_i K_i)$	Firms' Capital Income
1.6	$Y_F = Y_{FK}$	Firms' Total Income
1.7	$S_F = Y_F - \sum DIV_H$	Firms' Saving
1.8	$TXS_i = tx_i * P_i * X_i^S$	Taxes on Production
1.9	$TXM_n = tm_n * \bar{e} * P_n^{WM} M_n$	Taxes on Imports
1.10	$TXE_n = te_n * \bar{e} * P_n^{WM} X_n$	Taxes on Exports
1.11	$Y_G = \sum (t_{yH} * Y_H) + \sum TXS_i + \bar{e} * \overline{TR}_{RG} + \sum TXM_n + \sum TXE_n$	Government Revenue
1.12	$S_G = Y_G - \sum \overline{TR}_{GH} - \sum C_{Gt}$	Government Saving
2. Structure of Production		C
2.1	$X_i^S = IC_i / v_i$	Output
2.2	$IC_i = io(i) * (X_i)$	Intermediate Consumption from ith sector
2.3	$IC_{ij} = a_{ij} * X_i$	Intermediate Demand of ith sector from jth
2.4	$VA_i = B_i [\delta_i K_i^\sigma + (1 - \delta_i) (L_i^D)^{-\sigma}]^{-1/\sigma}$	Production Function (CES)-Non Agriculture
2.5	$L_i^D = [\{\delta_i / (1 - \delta_i)\} \{R_i / wna\}^{1/\rho+1}] * K_i$	Labor Demand-Non Agriculture
2.6	$R_i = (P_i^{VA} * VA_i - wna * L_i^D) / K_i$	Return to Capital
2.7	$LD_i = B_i [\delta_i Lus_i^\sigma + (1 - \delta_i) Ls_i^{-\sigma}]^{-1/\sigma}$	Composite labor of skill and skill -Non Agriculture
2.8	$Lus_i^D = [\{\delta_i / (1 - \delta_i)\} \{ws_i / wus_i\}^{1/\rho+1}] * Ls_i$	Labor Demand derived from 2.7
2.9	$ws = [wnag * L_i^D - wus * L_i^{Dus}] / L_i^{Ds}$	Wages Rate in non agriculture
2.10	$VA_i = B_i [\delta_i (KT_{ag}^D)^\sigma + (1 - \delta_i) (La^D_i)^{-\sigma}]^{-1/\sigma}$	Production Function (CES)-Agriculture
2.11	$L_i a^D = [\{\delta_i / (1 - \delta_i)\} \{rk_{ag} / wag\}^{1/\rho+1}] * Ka_i$	Labor Demand in Agriculture
2.12	$L^D a_i = B_i [\delta_{1i} La_{1i}^{-\rho} + \delta_{2i} La_{2i}^{-\rho} + (1 - \delta_{1i} - \delta_{2i}) La_{3i}^{-\rho}]^{-1/\rho}$	Composite Labour in Agriculture
2.13	$L_i a^D = [\{\delta_i / (1 - \delta_i)\} \{w1 / w2\}^{1/\rho+1}] * Ka_i$	Labor Demand derived from 2.12
2.14	$KT_{ag}^D = A_{ag} * KD_{ag}^\alpha * \overline{LND}_{ag}^{(1-\alpha)}$	CD-Composite Capital in Agriculture
2.15	$KD_{ag} = \alpha_{ag} / (1 - \alpha_{ag}) * r \ln d_{ag} * KT_{ag}^D / r_{ag}$	Demand For Agriculture Capital derived from 2.15

2.16	$r \ln d_{ag} = [rkag * KT_{ag}^D - r_a * KD_{ag}] / Lnd_{ag}^D$	Returns for Land
2.17	$Wag = [w1La1 + w2La2 + w3La3] / L^D a$	Average wage in the agriculture Economy
3. Foreign Trade Statistics		
3.1	$X_n^s = B_n^T [\delta_n^T EX_n^{\rho_n T} + (1 - \delta_n^T) D_n^{\rho_n T}]^{1/\rho_n T}$	Export Transformation (CET)
3.2	$Q_n = B_n^s [\delta_n^s M^{-\rho_n^s} + (1 - \delta_n^s) D_n^{\rho_n^s}]^{1/\rho_n^s}$	Constant Elasticity of Substitution between imports and domestic goods
3.3	$Q_{NT} = X_{NT}$	Domestic Demand for non traded goods
3.4	$EX_n = (P_n^E / P_n^D)^{\sigma_n^T} [(1 - \delta_n^T) / \delta_n^T]^{\sigma_n^T} * D_n$	Export Supply Function
3.5	$M_n = (P_n^D / P_n^M)^{\sigma_n^s} [\delta_n / (1 - \delta_n)]^{\sigma_n^s} * D_n$	Import Demand function
3.6	$Exd = (P^{we} / P_{fob}^e)^{\sigma_e} * EXD_o$	Export Demand
3.7	$\sum P_n^{WM} * M_n + (1/e)TR_{FR} - \sum P_n^{WE} * EX_n - TR_{RH} - TR_{RG} = \bar{e} * CAB$	Equilibrium in Foreign Market
4. Demand		
4.1	$CT_H = YD_H - S_H$	Total Households Consumption
4.2	$C_i (h) = \{ P_{ci} \gamma_i + \beta^c_{hi} (CT_h - \sum P_c^i \gamma_i) \} / P_c^i$	Households demand function (LES)
4.3	$CG_i = \beta^G_i CT_G / P_i^c$	Government Consumption
4.4	$C_i = \sum CT_{Hi} + CG_i$	Total Private and Public Consumption
4.5	$INTD_i = \sum a_{ij} IC_j$	Intermediate demand
4.6	$I_i = \beta_i^I * IT / P_i^c$	Investment Demand
4.7	$Cgr_i = CT_G / P_g$	Government Total consumption in Real term
5. Prices		
5.1	$P_n^M = (1 + tm_n) * (1 + tx) * \bar{e} * P_n^{WM}$	Domestic Price of Imports
5.2	$P_e(1 + te) = P_{e_{fob}} * e$	Domestic Price of Exports
5.3	$P_i X_i^S = (Pt_i * D_i^s + EX_i * P_i^E)$	Producer Price
5.4	$P_i^{VA} * VA_i = (P_i * X_i^s) - \sum (P_i^c IC_{ji})$	Value Added Price
5.5	$PD_i = Pt_i * (1 + tx_i)$	Domestic Price after paying taxes
5.6	$P_n^C = (D_n / Q_n) * P_n^D + (M_n / Q_n) * P_n^M$	Composite Price of traded goods (consumer prices)
5.7	$P_{nt}^C = PD_{nt}$	Composite Price of non-traded goods
5.8	$Pindex = \sum (\beta_i^X * P_i^{VA})$	GDP Deflator
5.9	$Pg = \sum (P_i^c * \beta_i^g)$	Price deflator for total Government Consumption
5.9	$P_i = \sum (P_i^c * \beta_i^I)$	Price deflator for total investment
6. Equilibrium		
6.1	$IT = TS_H + S_G + S_F + \bar{e} * CAB$	Saving-Investment Equilibrium

6.2	$Q_i = C_i + INTD_i + I_i$	Commodity Equilibrium	Market
63	$K_{ag}^S = \sum KD_{ag}$	Equilibrium in agriculture Capital	
64	$L_{S_S} = \sum (L_{is}^D)$	Labour Market Equilibrium for each type of Labour	

Table 4. VARIABLES' Definition

Endogenous Variables			Exogenous Variables		
1	C_i	Total Consumption of i th Good	1	CAB	Current Account Balance
2	CG_i	Government final Consumption of Good i	2	CT_{GR}	Government final consumption in real terms
3	CT_G	Total Government Consumption	3	e	Nominal Exchange Rate
4	CH_i	Household Consumption of Good i	4	K_i	i th Branch Capital Stock
5	CT_H	Total Consumption of household	5	L^S	Total Labour Supply
6	D_i	Domestic Demand for domestically produced good	6	P_n^{WE}	World Price of Exports
7	DIV_H	Dividends distributed to Households from firms	7	P_n^{WM}	World Price of Imports
8	EX_n	Exports of nth good (FOB)	8	TR_{FR}	Firms transfers to the rest of world
9	IC_i	Total Intermediate Consumption of Good by ith sector	9	TR_{GF}	Government transfers to Firms
10	IC_{ij}	Intermediate Consumption of Good J by ith sector	10	TR_{GH}	Government Transfers to Households
11	$INTD_I$	Intermediate Demand of Good I	11	TR_{RG}	Foreign transfer payments to the Government
12	I_i	Consumption of Good for investment in sector i th sector	12	TR_{RH}	Foreign transfers to Households
13	IT	Total Investment			b. SYMBOLS.
14	L_i^D	Labour Demand in sector i		Symbols	Variable names
15	Lnd	Land	1	a_{ij}	Input Output Coefficients
16	M_n	Imports of nth good (CAF)	2		
17	P_g	Price deflator for government consumption	3	B_i	CES scale parameter of value added
18	P_i	Producer Price	4	B_e^T	CES scale parameter of export transformation function
19	P_t	Domestic price without taxes	5	B_e^S	CES scale parameter of Import aggregation function
20	P_i^C	Price of Composite good	6	β_{hi}^c	Percentage share of good i in h th household consumption
21	P_n^D	Price of domestically produced and consumed good including taxes	7	β_i^T	Percentage share of good i in Public consumption
22	P_n^E	Domestic price of Exports including all taxes	8	β_i^I	Percentage share of good i consumed for Investment Purposes
23	P_n^M	Domestic Price of Imports including all taxes	9	β_i^A	Percentage share of good i in total Production
24	P_n^{VA}	Value Added Price	10	γ_i	Subsistence expenditure by h th household
25	P_{INDEX}	Producer price Index	11	λ_i	Household Share of Labour Income
26	Q_i	Domestic Demand for Composite Good i	12	λ_k	Household Share of Capital Income
27	R_i	Rate of Return on capital in branch n	13	ι_{oi}	Leontief technical coefficients (Intermediate Consumption of good i)
28	r _{lnd}	Returns to land			
29	S _{av}	Adjustment in saving rate			
30	S _G	Government Saving (Fiscal Deficit)	14	mps_h	Households h marginal propensity to save
31	S _H	Saving of Household h	15	tk	Capital Income tax rate of firms
32	S _F	Firms Savings	16	ν_i	Leontief technical coefficients (value added)
33	TS _H	Total Households Savings	17	σ_i	CES elasticity of substitution of value added
34	TXE _n	Taxes on Exports of nth sector	18	ρ_i	CES Substitution parameter of value added
35	TXM _n	Taxes on Imports of nth sector	19	δ_i	CES Distributive share of value added

36	TXS_i	Indirect taxes on ith sector production	20	σ_e^T	CES elasticity of transformation of export
37	VA_i	Value Added of sector i	21	ρ_e^T	CET Substitution parameter of export transformation
38	W	Wage rate	22	δ_e^T	CES Distributive share of exports and domestic production
39	X_i^s	Production of ith sector	23	σ_c^T	CES elasticity of substitution of imports
40	Y_H	Total Income Household h	24	ρ_c^T	CES Substitution parameter of imports
41	YD_H	Disposable income of h Household h	25	δ_c^T	CES Distributive share of imports and domestically produced goods
42	Y_F	Firms total income	26	σ_{ex}^e	Elasticity of Export Demand
43	Y_G	Government Revenue			
44	Y_{FK}	Firms Capital Income			