

# Methods for Assessing the Impact of Temporary Labour Emigration

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## 1. INTRODUCTION

Over the last three decades temporary emigration<sup>1</sup> of labour force has gained considerable importance for the economic development of many labour-rich and capital-short countries. As most of these countries have little influence on the volume, timing, and structure of their migrating labour force, labour outflow, fluctuating remittances, and remigration often result in external shocks on their vulnerable economies. Given the strong influence which labour emigration bears on key macro-economic aggregates and on the well-being of the population, its integration into the overall development planning is a *sine qua non* for sound economic strategies of the source countries. As a rule, however, migration policy largely consists of trial and error reactions to already on-going developments.

Over the last years, much empirical research effort has been devoted to the impact of labour migration on sending regions. Most of it is based on micro-level surveys, and on descriptions of economic changes which have occurred over a migration boom, without exact specification of causal relationships. The deduction of macro-economic changes from observed household behaviour is difficult and implies much speculation, yet. Therefore, maximizing the economic benefits from labour migration for the source country requires the application of quantitative methods based on macro models which can be used for assessing its impact and for stimulating alternative policy strategies considered for accompanying the process. The paper presents four methods which seem appropriate for that purpose, namely partial sectoral analysis by regression computations, cost-benefit analysis, social accounting matrices, and computable general equilibrium models. It considers their respective advantages for different ends, questions, and policy goals, and explains their data requirements.

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<sup>1</sup>The terms "migration" and "migrants" are defined here in a generic sense to "denote the fact that non-nationals are admitted or present, irrespective of their subjective motivations or the intentions of policy makers as regards the purpose or duration of their stay" (Bohning 184:48). Temporary migrant workers are defined as aliens who perform non-permanent but not always fix-term services of labour.

## 2. COST-BENEFIT ANALYSIS

Cost-benefit analysis (CBA) is generally used for estimating the welfare gains of a project for the entire nation. It may become a useful tool for assessing the net national benefit of marginal emigration of labour force. Each migrant is then treated as a "project". CBA can further be used to judge whether suggested input-requiring measures intended to influence migration or consequences of it will pay off for society. Based on Paretian welfare economics and an individualistic concept of the society, it implies that a project is considered to contribute to social welfare if it makes someone better off without making someone else worse off ("Pareto improvement").<sup>2</sup>

$$W = W(U_i(X_{ij}, F_{ik})) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

with  $dW / dU_i > 0$ ,  $dU_i / dX_{ij} > 0$ ,  $dU_i / dF_{ik} < 0$

where  $W$  = social welfare,  $U_i$  = utility of individual  $i$ ,  $X_{ij}$  = amount of good  $j$  consumed by individual  $i$ ,  $F_{ik}$  = amount of factor service  $k$  provided by individual  $i$ .

Based on the Hicks-Kaldor test [Kaldor (1939)] a project is assumed to imply a Pareto improvement if the winners' monetarily measured willingness-to-pay for the benefits exceeds the amount required to compensate the losers. It is not necessary that such transfer actually take place; the *potential* Pareto improvement is sufficient.

The basic question to be answered when implementing the analysis for purposes of evaluating international labour migration are:

### (a) Whose Benefits Should be Counted?

The question who is considered as a member of "the society" is a widely debated issue in CBA theory. The following issues require particular consideration:

Should emigrants be treated as part of the society? With some reason, temporary migrants should be included in the group of those whose benefits count, while permanent emigrants should be treated as part of the country where they have settled. As a consequence, the real total income which accrues to temporary migrants abroad has to be included in the society's total benefit. In practice, drawing a clear *ex-ante* delimitation between the two groups might become troublesome. Those who have left on the basis of timely limited employment contracts, should be comparatively easy to classify. For others, conceivable criteria may be the average interval of visits home, or their family's permanent residence.

<sup>2</sup>Detailed descriptions of the basic principles of CBA may be found in Irvin (1978), Little and Mirrlees (1974), and UNIDO (1972).

Should future generations have standing? This question touches an outstanding goal of development policy, the long-term economic growth which might be achieved by sacrifices of the present generation. In CBA, future generations usually enter the analysis only as far as present generations express their concern about their well-being [Whittington and MacRae (1986)]. Still, there are other points of view. Trumbull (1990), e.g., is convinced that the potential Pareto principle implies the inclusion of future generations' welfare since it postulates that the benefits of all people affected by a given project must be accounted for. "The implementation of this postulate may pose obvious practical problems, yet, as the number, composition, and preferences of future generations are difficult to predict".

Should foreigners have standing? This would particularly pertain to the population of the host country, sometimes also to the population of countries competing with the own nation on foreign labour markets. According to Mishan's (1982) and most other CBA analysts' opinion, national borders represent a "social constraint", and therefore the benefits of non-nationals across the borders should not be counted. Others, however, disagree with the fact that CBA results may favour projects which shift a large share of the costs to foreigners while the nationals reap all the benefits; or, vice versa, that an internationally highly beneficial project may be rejected just because the net benefit of nationals are negative. In the case of labour export, excluding cross-border implications leads to a "beggar-may-neighbour policy" where domestic unemployment is deliberately exported. In spite of explicit "national egoism" it may be useful to calculate the benefits accruing to other nations, since they may by a certain project, since this might convince them to contribute to the considered project's financing.

Should certain groups have only "partial standing"? The idea to include benefits of certain groups only partly (i.e. with a weighting of less than one) in order to reflect distributional principles, was brought into discussion by Weisbrod (1968), and has been defended by many others, such as Whittington and MacRae (1986). It has not been shared by Mishan. Trumbull (1990) shares the argument that such weighting is inconsistent with the potential Pareto principle: "All that the principle determines is whether the project results in a movement of resources to more highly valued uses. This determination is not possible if some individuals valuations are not given full weight while others are" [Trumbull (1990): 214]. Equity weighting is usually introduced either by defining a social welfare function or by inferring distributional weights directly from the perceived political will expressed by past decisions. Whatever the method applied, if interpersonally different benefit weights are introduced in order to reflect collective distributional

preferences, their use and numerical values have to be determined by those who are supposed to represent the will of that society.

**(b) Which Social and Political Constraints should be Respected?**

Sometimes a project could produce a high social benefit as assessed by CBA, if existing socio-political constraints could be removed. Social constraints which are defined by Buchanan (1962) as those which society imposes on itself, delineate the space of socially accepted and attainable positions. If the analyst does not respect them he might arrive at irrelevant conclusions. It is useful to distinguish between unwritten laws and regulations established by tradition which often are difficult to specify, and therefore not easy to include in a CBA, and written legal restrictions which may be easier to define but nevertheless are sometimes often open to interpretation. The analyst may try to influence the political choice of legal restrictions by pointing out their shadow price if they significantly influence his results and if there is chance that they might be removed. This might be the case for foreign trade restrictions. If a change cannot be expected, he has to observe them, yet, irrespective of their shadow price. Moreover he should be careful not to underestimate the costs of a removal of such restrictions which may be high in terms of their impact on other issues than labour migration.

**(c) Physical Costs of Migration and Migration Policies**

For assessing the opportunity costs which arise by the transfer of resources to a project, their alternative use should be known. Opportunity costs of migrant labour are mainly output forgone, costs of transportation and organisation of the emigration, and training for employment abroad. For that purpose four categories of migrants should be distinguished:

- (a) Those who were unemployed before migration. Their departure entails no loss of output. Those staying behind may consume more than before because they do not have to share with the migrants anymore;
- (b) Those who were employed at home but can costlessly be replaced by other persons from the pool of unemployed, implying negligible opportunity costs;
- (c) Those who were employed before their departure, and who can be substituted by previously unemployed persons who, however, need to be trained and to acquire some experience. In this case, costs of training and transitory production losses will occur; and

- (d) Those who cannot be replaced in the foreseeable future. The opportunity costs increase with the domestic scarceness of the migrant's skill. Under the conditions of perfect competition in the labour market they may be measured by the migrant's domestic salary.

The dynamics of this categorization have to be observed when the flow of emigrants grows. Migrating skills which had been in surplus previously might later on involve important opportunity costs implying their transition into an other category.

Costs of migration may furthermore arise because migrants undergo special training courses in order to find employment abroad.<sup>3</sup> If they acquire skills which are useful for the domestic economy later on their benefits are to be included in the analysis. Other physical costs of the migration process may be those of transportation, of intermediation, and of public authorities like the issuing of visa and passports. Possible losses of consumer surplus and negative externalities also may have to be taken into account.

#### **(d) Physical Benefits**

Physical benefits arise in form of private and/or public goods. Remittances from abroad are generally considered as the most important benefit of labour migration for the sending country. A large share of it takes the form increased consumption by the migrants' families.<sup>4</sup> If the migrant is treated as part of the domestic economy, his consumption abroad must also be included. Social benefits may occur, moreover, in form of human capital if the migrant acquires additional skills abroad which he can employ later on in his home country.<sup>5</sup>

#### **(e) Aggregation by Prices**

The listed physical costs and benefits have to be weighted by prices reflecting their social value in order to allow their aggregation. The amount of money an individual is prepared to pay for a good or service is supposed to reflect the utility it provides to him. When measuring this willingness-to-pay, the first approach is to look for free market prices, which are not always available, yet. While the border prices can generally be used as the appropriate value measures for the

<sup>3</sup>In the Philippines, for example, thousands of young women receive housemaid training each year in order to become eligible for employment in households in Hongkong.

<sup>4</sup>For the following it is assumed that the exchange of the foreign for domestic currency does not by itself contribute to expanding the volume of money in the economy.

<sup>5</sup>However, those with increased experience and on-the-job training acquired in the host country often enjoy rising wages and better employment opportunities abroad which increases their propensity of settling there for longer. Such persons are also more likely to take their family with them, and therefore to refrain from sending remittances.

traded goods, the prices for non-traded goods often are more complicated to assess, as imperfect markets may contribute to considerable distortions.

Measuring benefits by the willingness-to-pay as a proxy for the utility gain is sometimes criticised for ignoring differences in the ability to pay. "Willingness to pay reflects not only utility but also ability to pay. The wealthy could be willing to pay more for small gains than it would take to compensate the poor for large utility losses" [Trumbull (1990) : 203 ]. This reservation might, e.g., become relevant in the context of brain drain, and its importance increases with the inequality of the income distribution. In such cases, the emigrant often derives considerable financial advantages while those suffering the most by his departure may not be in position to compensate him for the losses he would have to incur if he stayed.

The foreign exchange remitted by those working abroad should in principle be valued like any other foreign exchange earnings of the country considered. If the official exchange rate does not correspond to the free market rate, a shadow rate has to be calculated. It corresponds to the marginal value of a unit of foreign exchange which is the domestic value of what such a unit could buy, expressed in terms of domestic currency, according to the UNIDO method.<sup>6</sup> The black market rate often reflects this value quite well.

External effects and public goods pose considerable problems of monetary expression. Intangible costs and benefits, such as national independence, food security, or social peace and harmony, can even less be quantified in monetary terms. Proper CBA requires to include them quantitatively although this requires a considerable subjective assessment.

#### **(f) Aggregation Over Time**

To make costs and benefits which arise at different times comparable, requires to select the appropriate rate of discount. It is generally advocated that for CBA it should be based on the market interest rate unless, due to market failure, this does not efficiently reflect society's time preferences and calls for adjustments.<sup>7</sup> Politicians who have a saying in this matter may nevertheless decide on the basis of the short-sighted goal of their political survival, although they are expected to maximise the long-term benefit of the population. This may lead to the use of an inappropriately high rate of discount which implies that short-term benefits such as the consumption gains of emigrants become more relevant for policy decisions than long-term costs.

<sup>6</sup>Alternatively, the Shadow exchange rate may be calculated according to the method suggested by Little/Mirrlees and Squire/van der Tak, with foreign exchange as the numeraire. Both methods arrive at equivalent results [for a more detailed comparison see, e.g., Irvin (1978)].

### **(g) Interpretation and Application of the Results**

CBA can help the policy maker to direct the country's resources to their most highly valued use, and it forces the planner to take the broader view of the whole society instead of focusing on those who are directly affected. If the CBA outcome is that migration is profitable for the individual but socially harmful then a most challenging policy task is to make the private and the public interests coincide by appropriate measures.

Helpful as it may be, CBA cannot stand on its own in the political decision process. Moving resources to uses more highly valued by individuals' willingness-to-pay is only one of many goals of society. Therefore, CBA results eventually have to be matched with other national objectives. One major issue often discussed on the ultimate decision level is whether the distributional implications of the finalised CBA are acceptable. If its results, e.g., suggest higher returns from a training centre for potential migrants who are expected to belong to the middle class, than from a primary school for the children of poor families, politicians nevertheless may favour the last option for reasons of social justice. Other considerations which may enter the policy-makers decision are destabilisation of the social structure, potential political unrest caused by frustrated returnees, or hardship and stress for families left behind.

CBA seems particularly suited for evaluating marginal migration. For theoretical and practical reasons, it is not appropriate for evaluating the impact of large-scale labour emigration with inflows of remittances amounting to a significant share of the country's GDP. In this case a migration boom results in important changes in the country's price system which makes CBA extremely difficult and sometimes impossible [see Little and Mirrlees (1976); UNIDO (1972); Ray (1984)]. The method is very demanding regarding the data base, requires much theoretical thinking, and implies important normative judgements. Specifications of political and social goals, and numerical distributional weights are difficult to obtain from politicians if desired since they might not be prepared to state such goals explicitly because they wish to avoid open conflicts.

Some authors have tried to apply elements of CBA for evaluating the impact of labour migration on the sending country. CBA as an instrument for assessing the impact of labour emigration has been reviewed very generally by Swami [see, Swami (1985)]. Mahmud (1989) uses elements and expressions of CBA in his investigation on Bangladesh but instead of providing a full-fledged analysis supplies mainly qualitative descriptions. He concludes that labour migration as a whole is beneficial for the population of Bangladesh but does not substantiate this result

<sup>7</sup>An interesting discussion of the issue of interest rates in CBA is supplied by Lind (1982)

by concrete figures. Others who have applied elements of CBA for evaluating labour migration are Ali *et al.* (1981) for Bangladesh, and Gilani *et al.* (1981) for Pakistan.

### 3. PARTIAL SECTORAL ANALYSIS

Partial sectoral analysis by regression calculations can be used as a rough approach to quantitatively assess the macro-economic impact of labour outflow and remittance inflow. It may be applied when labour export takes place on a large scale, displays significant fluctuations, and the emigrating labour force is comparatively homogenous. Information about the reaction of macro-economic aggregates on a percentage elasticity basis is supplied by double-log regression based on empirical data series. In such an analysis it may be particularly interesting to regress real GDP, sectoral output, price indices, exports, or imports against the number of migrating workers and/or volume of remittances. Such data usually are available from official statistics and do not call for additional inquiries if the analyst is satisfied with rough indicators such as sectoral development or reactions of the inflation rate. For many countries time series which are long enough to permit a regression analysis are available from international institutions like the IMF, the World Bank, or UN organisations although mostly on very aggregated levels. In order to separate price from volume effects, specific data for both would be needed but are not always available in the required quality.

However, the available information about the volume of remitted foreign exchange is often sketchy and unreliable, as part of it is always carried back by hand and exchanged on informal markets instead of being sent through official channels. This applies in particular when the official exchange rate is fixed below the market rate. The data problems are generally still greater regarding the number of migrants, be it stock or flow. Unregistered, repeated, and illegal migration, and an insufficient statistical recording make the available information insecure and often contradictory [for an in-depth description see, e.g., Saith (1989)].

Fig. 1 displays the regression output for Pakistan with workers' remittances, emigrants, net official transfers, and long term debts as the independent, and GDP, imports, consumer prices index, agricultural, industrial, manufacture, and services output as the dependent variables. External debts and official transfers have been included as independent variables because it is assumed that these inflows, too, decisively determine the development of the dependent aggregates. The results of the analysis suggest that the number of migrants has a significantly negative influence on Pakistan's GDP. This may be explained by labour shortages which have emerged over the migration boom [Knerr (1990)]. Workers' remit-



tances, in contrast, display a significantly positive influence on GDP, as additional demand stimulates the domestic production. The reaction of total output is the most pronounced after a time lag of two years (with an elasticity coefficient of 0.3), and afterwards slowly crowds out. The regression output reveals a negative elasticity of agricultural output in reaction to remittances inflow in the very short run (i.e. without time lag), and a moderately positive (0.15) reaction later on. This reaction may be attributed to the fact that the loss of labour force in Pakistan was followed by large-scale mechanisation in the agricultural sector which might have contributed to an important increase of productivity. There seems to be no significant impact of remittances inflow on the industrial sector and a very moderate and short-term influence of the number of migrants which might also be explained by productivity-increasing mechanisation. The service sector reacts slightly positive to the outflow of labour force which could be caused by migrants' demand for travelling, banking, and agents' services. No relationship could be established between inflow of remittances and imports, an outcome which surprises and might need further investigations. A simple explanation for this result could be weaknesses of the data base.

Regression analyses carried out for a number of other labour exporting countries (Pakistan, India, Bangladesh, the Philippines, Sri Lanka, Lesotho, Jamaica, and Egypt)<sup>8</sup> all came to the result that the inflow of remittances stimulates GDP growth [Knerr (1988, 1989a, 1990)]. Disaggregation reveals booming and lagging sectors and often symptoms of Dutch Disease behind these general trends. Sectoral output reactions are governed by elasticities of supply and demand and by the tradeability of the products. If productive resources are in abundant supply, domestic output may rise without major price increases. Otherwise, the additional demand for tradeables products is satisfied by imports, while that for non-tradeable results in inflation. In most cases, construction and services derive the highest growth rates from remittance spending while the agricultural sector typically displays comparatively low elasticities due to the fact that income elasticities of demand for agricultural products usually decline with growing income ('Engel's Law'). The industrial sector, too, generally displays moderate reactions which may be explained by the tradeability of its products and the stiff competition by imports from industrialised countries. In all countries, imports show a comparatively high elasticity with respect to the inflow of remitted foreign exchange. Trading and banking activities usually become increasingly important over a remittance

<sup>8</sup>Detailed results about the different country analyses are available from the author upon request. For a single regression analysis for Pakistan, India, Bangladesh, and Sri Lanka see Knerr (1989a and 1990).

boom which explain much of the high elasticity of the service sector with regard to the inflow of remittances. These branches, however, shrink very fast as soon as the boom is over.

The simple regression analyses displayed here suggests that some of the countries which have experienced a migration boom suffer from symptoms of the 'Dutch Disease', as the inflow of remittances causes a decline of their real exchange rate which makes sectors producing internationally traded goods lose their competitiveness on the world market.<sup>9</sup> This applies particularly in those countries where labour shortages have been felt. Under such circumstances, a high demand for tradeables combined with open borders depresses the real exchange rate, while effective import barriers would promote inflation, particularly if elasticities of supply are low.

Partial sectoral analysis does not provide any information about the way the remittances proceed through the economy or about distributional effects; it only describes what is coming out of a 'black box'. The hints it gives the policy-maker about the measures to take in order to come closer to desired outcomes, are therefore very limited and general. The results of a simple analysis as described above supply a first basis for approaching questions of sectoral direction of capital investment; of import restrictions as measures against Dutch Disease; or of interventions into factor intensities in production for preventing large-scale substitution of labour by capital. The method has the advantage of not being too demanding with regard to the required data base. Rough results can already be obtained from easily available publications of international institutions. They are, moreover, easy to calculate.

#### 4. SOCIAL ACCOUNTING MATRICES

Governments of labour exporting countries often put much emphasis on other goals than to maximise the economy's material output. Distributional objectives play a prominent role in this context. Whenever policy planning has to take care of such issues, the data system and the method used for evaluating the consequences of appropriate policy measures must include distributional variables. For approaching questions of that kind, the "Social Accounting Matrix" (SAM) has been developed as a tool for analysis, simulation, and planning.<sup>10</sup> In its basic form it is an instrument for diagnosing the initial situation of an economy on the

<sup>9</sup>'Dutch Disease' has been observed in many countries as result of an export boom in a primary product sector. See, e.g. Szekely (1989), Davis (1983), Auti and Gelb (1986).

basis of systematic data organisation in accounts, and for clarifying inter-relationships between the variables appearing in these accounts. For transferring it into a useful planning instrument, the variables and sets of accounts have to be inter-linked by behavioural and technical coefficients. For that purpose, a model of causal relationships is necessary. In addition, the basic framework must contain controllable policy instruments able to influence the development into the desired direction.

Table 1 displays the simplified structure of a SAM which may serve as a framework for evaluating the impact of a labour emigration and remittance boom on the source country. It depicts an open labour surplus economy with three sectors (agriculture, industry and services), two production factors (labour and capital), three household groups (lower, middle, and upper income), and an economically active government sector. It is assumed that neither labour nor capital shortages set limits to the expansion of production. The columns indicate the structure of expenditures, while the rows show the composition of revenues. The figures in each box indicate the amount which has been paid by the "column sector" to the "row sector" over the period considered. In the diagnostic period 0, the agricultural sector (sector A) buys inputs of US\$ 100 mio from the industrial sector (sector I), and of US\$ 50 mio from the services sector (sector S). The labour force receives US\$ 180 mio, and capital US\$ 20 mio. The government obtained taxes of US\$ 25 mio, US\$ 25 mio are spent on imports and factor services from abroad. The sum of expenditures of sector A thus amounts to US\$ 400 mio. The sector's total value added is US\$ 225 mio ( $180 + 20 + 25$ ), US\$ 150 are spent on domestic, and US\$ 25 mio on imported inputs. Parallel interpretations apply to the receipts and expenditures of sectors I and S. The described activities over period  $T_0$  create a labour income of US\$ 385 mio, and a capital income of US\$ 155 mio. The treasury receives US \$ 43 mio, and foreign producers and factor owners US \$ 167 mio.

Labour and capital income are distributed among the households according to their factor services. While the households of the lowest income group (group 1) receive US\$ 80 mio for their labour input, those of the middle income group (group 2) get US\$ 80 mio and of the upper group (group 3) US\$ 20 mio. Household group 1 receives US\$ 5 mio, group 2 US\$ 20 mio, group 3 US\$ 80 mio, and foreign capital owners US\$ 10 mio of capital income.

Columns 6 to 8 display the households' spending pattern. Group 1 spends US\$ 180 mio on agricultural products, US\$ 30 mio on industrial products, and

<sup>10</sup>For more detailed explanations of SAM construction see, e.g., Cohen (1987) and Pyatt (1985).

Table 1

*Macro-economic Distribution of the Social Product in to*

		Expenses in mio. US											
		Agr 1	Ind 2	Ser 3	Lab 4	Cap 5	Hol 6	Hom 7	Hou 8	Gov 9	Caf 10	For 11	Sum
	1	0	25	15	0	0	180	50	20	15	10	85	400
	2	100	0	20	0	0	30	25	15	20	115	5	330
	3	50	5	0	0	0	40	30	30	20	18	2	195
Rev.	4	180	75	130	0	0	0	0	0	0	0	0	385
in	5	20	75	20	0	0	0	0	0	0	0	0	115
mio.	6	0	0	0	250	5	0	0	0	10	3	0	268
US\$	7	0	0	0	100	20	0	0	0	5	50	45	220
	8	0	0	0	35	80	0	0	0	0	0	335	450
	9	25	10	8	0	0	8	50	85	0	14	50	250
	10	0	0	0	0	0	0	45	160	100	0	0	305
	11	25	140	2	0	10	10	20	140	80	95	0	522
		400	330	195	385	115	268	220	450	250	305	522	3440

US\$ 40 mio on services. In addition, it pays US\$ 8 mio to the treasury and US\$10 mio for imports. A dynamic component is introduced by unexpected households' savings which occur as unpredicted end period income from the production sectors. They are disbursed over the next round according the usual spending pattern. The profit (net capital formation) of sector A is allocated to household groups 1, 2, and 3 in the relation 2:7:1, that of sector I as 0:2:8, and that of sector S as 3:3:4.

The government sector (row 9), the aggregate of accumulated capital (row 10), and the foreign sector (row 11) are exogenous, i.e. they are able to accumulate financial surpluses, and injecting them into the economy requires explicit decisions.

In order to simulate the consequences of a remittance boom, a US\$ 50 mio injection is introduced in period 1. Household group 1 receive 40 percent of it, group 2 gets 40 percent, and group 3 20 percent. The household spend the additional income according to their usual pattern. First, a temporary one-period emigration movement is simulated, which results in a once-and-for-all remittance inflow. The coefficients of production and distribution determining the running of the simulations as calculated from Table 1, are displayed in Table 2. The outcome for household income, sectoral revenues, government revenues, domestic capital formation, and the foreign balance of payments over the next eight periods are depicted in Fig. 3.

In the first period, the poorer households experience the highest income gain with almost US\$ 35 mio. Group 2 gets an additional US\$ mio 25, and group 3 US\$ 15 mio. After two periods, the economic development driven by elasticities of demand, coefficients of production, the structure of factor ownership, and government spending patterns, has redistributed the largest additional gains to income group 3. (which receives more than US\$ 15 mio) while group 1 gets less than half of this. After 18 periods household group 1 has gained a total of US\$ 48.925 mio (31 percent of the total additional income), group 2 US\$ 49.054 mio (32 percent of the total) and group 3 which has received the lowest amount of remittances US\$ 54.095 (37 percent of the total) (since from period 9 onwards, only marginal changes take place, only the periods 0 to 8 are shown in Fig. 4). Most of the additional demand was spent on agricultural products (over the 18 periods considered an additional US\$ 54.850 mio). By far the largest share of the additional revenue of sector A occurred over the first two periods.

If labour export is sustained and remittances of US\$ 50 mio per period flow in permanently they induce the changes depicted in Fig. 5. Although over the first few periods, the poorest households enjoy the largest income gains, group 3 again profits most when a new macro-economic equilibrium is approached.



After four periods the additional income of household groups 1 and 2 stabilises at less than US\$ 49 mio, while that of group 3 reaches almost US\$ 55 mio.

The largest amount of additional sectoral revenues accrues to agriculture whose additional receipts stabilise at US\$ 54 mio. The government receives an additional US\$ 25 mio after a four periods's adaption; capital formation increases by over US\$ 60 mio, and the deficit of the foreign balance of payments increases by US\$ 9 mio.

The consequences of changes in households' propensities to save and to import are displayed in Fig. 6 and 7. If the savings rate of groups 2 and 3 increases by 10 percent of the initial rate, and that of group 1 by one percentage point, the total capital formation over 18 periods increases by US\$ 14.945 against the initial scenario, while additional sectoral and government revenue remain almost unchanged. The extra income of group 3 is US\$ 3.2 mio higher than at the initial scenario, that of group 2 rises by US\$ 1.3 mio, and that of group 1 by US\$ 0.5 mio.

If the overall propensity to import drops by 10 percent of the initial rate, the results shown in Fig. 6 are obtained. Within 18 periods capital formation increases by US\$ 6.6 mio, and government revenues decrease by US\$ 1.2 mio. The upper household group loses US\$ 2.2 mio, group 2 US\$ 1 mio, and group 1 US\$ 1.1 mio.

This simple example demonstrates that the long-term consequences of a remittance boom for sectoral growth and income distribution might be very different from the short-term outcome. Under quite plausible assumptions those households who receive the lowest amount of remittances may fast reap the most important benefits of the remittance inflow. Refinements of a SAM for assessing the impact of labour migration and policy interventions should include further subdivisions of the production accounts into tradeable and non-tradeable categories in order to make emerging symptoms of Dutch Disease more transparent, labour constraints, and a subdivision of households into migrants' and non-migrants' categories.

## 6. COMPUTABLE GENERAL EQUILIBRIUM MODELS

Of the methods presented, computable general equilibrium (CGE) models are the most demanding regarding the volume and quality of the required data. With their theoretical foundation in the Walrus model of the competitive economy, they are suited for macro-economic analysis and policy simulations in economies where policy makers use to rely on market forces and incentives rather than centrally planned allocation procedures [Decaluwe and Martens (1988)]<sup>11</sup>. A CGE

<sup>11</sup>Examples for CGE model applications are described in DeJanvry and Subbarao (1986), Narayana and Feldstein (1983), Decaluwe *et al.* (1986), and Taylor *et al.* (1984).

model, therefore, may be used for evaluating the impact of large scale labour export, and simulating considered policies in decentralised economies.

The standard model assumptions are that only relative prices matter, producers are profit maximisers facing non-increasing returns to scale, consumers are insatiable utility maximisers, and factors of production are paid their marginal-revenue product. The analysis usually is comparative static, and the solution output is a set of prices at which all markets are cleared simultaneously.

A simple CGE model of a labour export economy should consist of:

- (a) A production block. It specifies the available factors of production, sectoral production functions, and assumptions about the mobility and supply elasticity of each factor of production. Cobb-Douglas, CES, and Leontieff production functions are the most commonly used. For finding a model solution it is assumed that for each given set of prices the producers adjust their production until prices equal input costs (zero-profit condition);
- (b) A private consumption block. Usually it is assumed that all consumers' preferences are identical and homothetic, and that demand is a function of income and of the price vector. Often a certain basic autonomous consumption for each good is postulated. The inflow of remittances into migrants' households increase their demand for various goods according to prevailing income elasticities. This starts a multiplier effect, whose outcome depends on the elasticities of demand of those who receive additional income, and on the elasticities of supply;
- (c) A foreign trade block. The assumptions made here stretch from the completely closed economy to completely open borders;
- (d) A modelling of the public sector. This element introduces some imperfect competition into the model since a government inevitably intervenes into the markets by taxation, price fixing, foreign trade regulation etc.; and
- (e) A market clearing block. The market adjustment is regulated by prices. The model's equilibrium solution makes the individual optimisations mutually consistent and feasible, and supplies a set of equilibrium prices. A static equilibrium is reached when all product and factor markets are (almost) cleared. While the prices of tradeable commodities use to the given by the world market, those of non-tradeables are determined by domestic supply and demand. There are different ways to close the model. Very often, the model solution looks for an equilibrium wage



rate on the domestic market, where the search process proceeds according to the cobweb rule.

The economy is disaggregated into the three broad sectors agriculture, industry and services, each of which should be further sub-divided into tradeable and non-tradeable categories to provide for their different price formation. Further disaggregation is determined by the special problems to be analysed and by data availability.

For analysing the impact of labour emigration the assumption of a "small economy" usually comes close to reality as most of the labour exporting countries have no decisive influence on the wages paid in the host countries, and on the prices of their major export and import commodities.

A simple CGE model, devised with the final aim to simulate the effects of alternative strategies of migration policy, based on standard CGE model assumptions, is presented in the following paragraphs. Its framework is the "small open economy". The analysis is comparative static. The model assumes five production sectors: (a) internationally traded agricultural products (sector 1); (b) non-traded agricultural products (sector 2); (c) internationally traded industrial products (sector 3); (d) non-tradeable industrial products (sector 4); and (e) services (sector 5).

The typical sector 1 product is grain while milk and vegetables regularly belong to the sector 2 category. The industrial sector produces mostly traded goods, with the exception of construction which usually becomes particularly important over a labour migration boom, as a large share of the remittances regularly is invested in housing. Services constitute the typical non-tradeable category.

The economy uses two homogeneous inputs, labour ( $L$ ) and capital ( $K$ ). Both are in completely inelastic supply in the short run.  $K$  is inter-sectoral immobile in the short term, while  $L$  is completely mobile, with the exception of a certain amount of labour force in agriculture, who are not prepared to move to another occupation. Sectors 1, 2, and 5 produce with labour and capital while sectors 3 and 4 use only labour. The production functions are of the Cobb-Douglas type for sectors 1, 2, and 5; and of the Leontieff type for sectors 3 and 4. In the equilibrium, all factors are fully employed. Then equations

$$X_i^s = a_i L_i^{m_i} K_i^{(1-m_i)}, \text{ for } i = 1, 2, 5 \quad \dots \quad (2)-(4)$$

$$X_i^s = a_j L_j, \text{ for } j = 3, 5 \quad \dots \quad (5)-(6)$$

$$\sum L_i = L, i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (7)$$

$$\sum K_i = K, i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (8)$$

hold, where  $X_i$  is the sectoral output, and  $m_i$  is the elasticity of production. The total demand for each good ( $X_i^D$ ) consists of a certain autonomous consumption ( $C_i$ ), and of additional demand which is a function of income ( $Y$ ) and of the price vector ( $p$ ). Then

$$X_i^D = C_i + f(Y, p), i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (9)-(13)$$

$$GDP = \sum (p_i * Y_i), i = 1, \dots, 5. \quad \dots \quad \dots \quad \dots \quad \dots \quad (14)$$

The population's total consumption ( $C$ ) after the inflow of remittances ( $R$ ) is

$$C = GDP + e_r * R \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (15)$$

where  $e_r$  is the consumption share in remittances. Sectoral equilibrium output is expressed as a share ( $s_i$ ) of total income where

$$\sum (s_i) = 1, i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (16)-(20)$$

Static equilibrium is reached when

$$\sum (L_i) = L, i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (21)$$

$$\sum (K_i) = K, i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (22)$$

$$X_i^D = X_i^S, \text{ for all } i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (23)-(27)$$

Market adjustment is regulated by prices. While the prices of the tradeable are given by the world market

$$p_i = p_i, i = 2, 3 \quad \dots \quad \dots \quad \dots \quad \dots \quad (28)-(29)$$

those of non-tradeables are endogenously determined by domestic supply and demand. The steps of the model solution are as follows. Output prices and wage rate are initially normalised on one. A certain level of initial demand is assumed for sectors 1 and 4.

Demand in the initial equilibrium is assumed as

$$X_i^D = s_i * C / p_i, \text{ for } i = 1, 4, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (30)-(32)$$

$$X_i^D = s_i * C \text{ for } i = 2, 3. \quad \dots \quad \dots \quad \dots \quad \dots \quad (33)-(34)$$

The equilibrium wage rate is calculated on the basis of current prices. The initial  $X_i^D$  and the  $P_i$  are used as the starting set of an "equilibrium wage finding subroutine" which looks for a labour market clearing wage rate. The production functions (2)–(6) are used to calculate, the labour demand. In sectors 1,2, and 5 it is a function of the wage rate ( $w$ ) while in sectors 3 and 4 it is a fixed proportion of demand.  $W$  is then used to determine labour allocation, structure and level of output, and price relations. The sectoral output of each sector is calculated by using the production functions after labour has been allocated.  $P_4$  and  $P_5$  are determined by a wage and a material component.

Demand of each sector at time  $t$  ( $X_i^{Dt}$ ) is adjusted such as to reflect the changes in relative prices

$$X_i^{Dt} = X_i^{D(t-1)} + e_i^D (r_i - r) X_i^{Dt}, \quad i = 1,5 \quad \dots \quad \dots \quad \dots \quad (35)-(39)$$

where  $e_i^D$  is the price elasticity of demand,  $r_i$  the change in relative price ( $r_i = p_i/r$ ,  $i = 1, \dots, 5$ ), and  $r$  is the weighted index of all nominal prices ( $r = \sum(p_i * s_i)$ ).

Excess demand ( $X_i^E$ ) is calculated as

$$X_i^E = X_i^D - X_i^S, \quad i = 1, \dots, 5 \quad \dots \quad \dots \quad \dots \quad \dots \quad (40-44)$$

$X_i^E > 0$  initiates further adaptive routines until the approximation to zero is considered as sufficient.

The migration boom is introduced step wise into the basic model over five periods:

1. The pre-boom equilibrium ( $T_0$ ) is characterised by fixed amounts of capital and labour, and inter-sectoral immobility of capital. The model simulation looks for equilibrium prices of the non-tradeable goods, the allocation of labour, and the sectoral output. For testing the validity of the constructed model, the results are compared with the real country data. If the results are not consistent with the real pre-boom situation the model is not suitable;
2. With the start of labour emigration ( $T_1$ ) a certain amount of labour force is assumed to leave the country. For the following periods net migration may be assumed to be zero, equal to that of  $T_1$  or changing with a certain annual rate;
3. In period  $T_2$  the emigrated workers start to send remittances. This flow is assumed to follow the net labour outflow with a one-period time-lag.

The extra income in the home country is spent according to the existing income elasticities. A certain share may be invested;

4. In the period of remigration ( $T_3$ ) the domestic labour force returns to its pre-boom level. Since many of the emigrants bring back savings, the external income does not return the pre-boom level yet; and
5. In the post-boom equilibrium ( $T_4$ ) labour and remittances are at their pre-boom level.

Public sector activities are introduced subsequently in form of fiscal and regulatory activities at different stages of the migration boom. The simulation of various government parameters, such as taxes, subsidies, import restrictions, etc. can provide a basis for approaching optimal strategies.

The described model has been tested with data of Bangladesh<sup>12</sup> which was chosen for that purpose because of its comparatively uncomplicated economic structure and its good availability of data. 1977 was selected as the base year because it represents the time just before the start of the country's migration boom. Elasticities of demand and production were estimated by double-log regression.<sup>13</sup> The parameters which describe the Bangladesh economy are listed in Table 3. Labour input has been measured in man years, capital input in monetary units, with the exception of agriculture where it has been expressed in acres. In the first programme pass, GDP was set at Taka 75 bio, production of sector 3 at 30 percent, and of sector 5 at 50 percent of GDP. The product price of sector 3 was assumed to consist of a material component of 38 percent and a wage component of 62 percent, that of sector 5 of 10 percent and 90 percent respectively. Eighty-five percent of the demand for each product was assumed to be determined by the initial income shares spent on it, and 15 percent by marginal income elasticities. Then

$$X_i = 0.85 * s_i * C/r + 0.15 * e_i^c * C/r, \quad i = 1, \dots, 5, \quad \dots \quad \dots \quad (45)-(46)$$

Eighty-five percent of the labour force of the agricultural sector is assumed to be immobile.

On that basis the results shown in Table 4 were obtained. They are acceptable when compared with the actual base year data. The developed model therefore is suitable for simulating policy interventions in Bangladesh.

<sup>12</sup>For a detailed description of the economic framework and the impact of labour export on the economy of Bangladesh see Knerr (1989b).

<sup>13</sup>Some income elasticities of demand for agricultural products were available from FAO publications (FAO 1983 and 1986).

Table 3

*Parameters Describing the Bangladesh Economy*

Sector	Consumption Block			Production Block		
	Income Shares %	Marginal Income Elast, %	Price Elastic. of Demand, %	Capital Stocks	Producing Elastic. of Labour	Production Elastic. of Capital
<b>Agriculture</b>						
- Traded(1)	0.126	1.6	-0.667	4.0	0.38	0.62
- Non-traded (2)	0.555	0.9	-0.667	16.0	0.42	0.58
Services (3)	0.073	1.8	-0.315	0	-	-
<b>Manufactures</b>						
- Traded (4)	0.125	1.8	-0.675	5.6	0.45	0.55
- Non-traded (5)	0.121	0.6	-0.790	0	-	-

Table 4

CGE Model Output for Bangladesh<sup>1</sup>

	Sector				
	1	2	3	4	5
GDP (Bio.Taka)	73.052 <sup>2</sup>				
Sectoral Output					
– $X_i^D$	83017	39.198	8.128	10.547	17.663
– $X_i^S$	83548	40.543	8.135	9.131	17.679
Labour Allocation					
– $L_i$	27.324	135.101	5.080	22.867	19.626
Prices <sup>3</sup>					
– $P_i$	1.101	1.000	0.6555	1.000	0.500
Wage Rate	0.444				

<sup>1</sup>The results were obtained with a 1977 data base after 10 iterations.<sup>2</sup>The real GDP was 73.084.<sup>3</sup> $P_2$  was taken as numeraire.

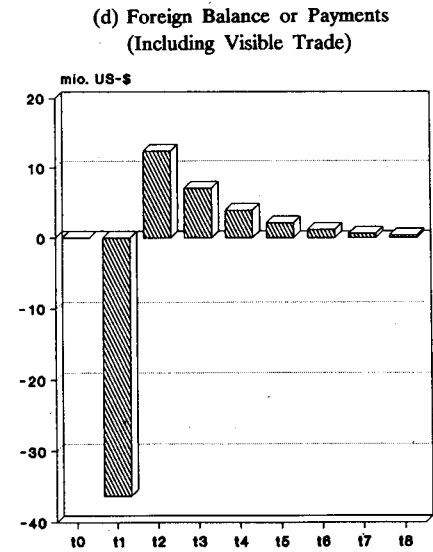
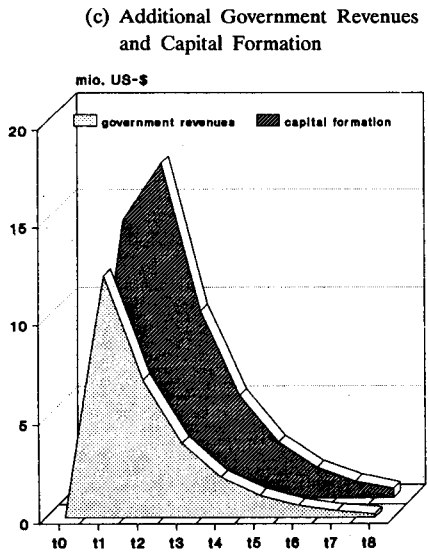
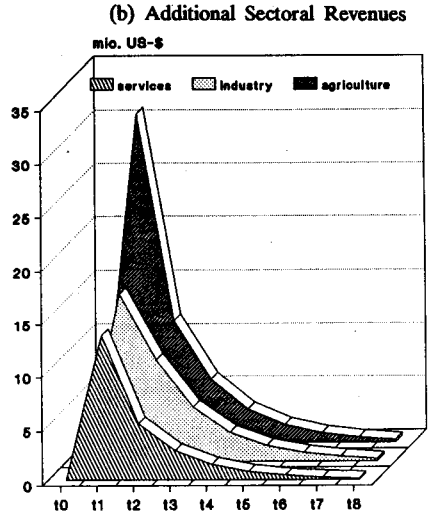
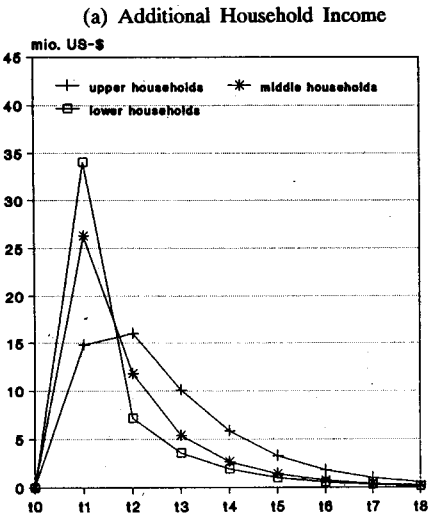
## 7. CONCLUSIONS

Policy measures taken in reaction to labour emigration in source countries mainly consist of trial-and-error strategies and a stop-and-go procedure, usually due to lack of information about possible outcomes of alternative policies. The prevailing insecurity about the right starting-points and the outcomes of policy measures taken most often imply a paralysis of the country's migration policy since the "right medicine" cannot be found without the "right diagnosis". Against this background the paper has presented some methods which may help the policy maker in forecasting the outcome of various forms of labour emigration, simulating and comparing the impact of policy alternatives, and to improve the planning in a "migration and remittances economy". Their application depends on the purpose of the analysis and on the volume and quality of the available data. Cost-benefit analysis is particularly suited for evaluating brain drain and marginal migration. It implies much subjective judgement. Regression analysis is the least demanding of the presented methods, regarding the required skills of the staff as well as the data base. The results provide a very limited and rough basis for designing the right policy instruments. Social accounting matrices should be used where distributional questions are particularly important. They require a data base which is free of contradictions, or very logical and consistent assumptions. Moreover, a sophisticated input-output table of the country considered and detailed information about the income distribution are necessary. CGE models in principle allow a most comprehensive and detailed analysis of changes in the growth and composition of macro-economic aggregates, and of the consequences of policy measures. However, they make great demands on the data base, on the skills and experiences of the programming staff, and on the computer equipment. As a rule they cannot be implemented without many ad hoc assumptions, particularly about the behaviour of economic agents. The results of such simulations often are not satisfactory, however, because the models on which they are built do not sufficiently reflect the reality. Their application requires a thorough preparation and sufficient financial resources. This might not be possible to attain in all countries of emigration within a reasonable span of time.

The decision about the method of evaluation to be used should not be too much influenced by the availability of data. If a certain method is considered as appropriate for the questions at hand, and if the available data do not prove sufficient – even after thorough examination – additional empirical investigations to fill existing data gaps might be the next step. This could be much cheaper than a policy of trial and error where repeated modifications of the measures taken expose the economy to insecurity and destabilisation.

expose the economy to insecurity and destabilisation.

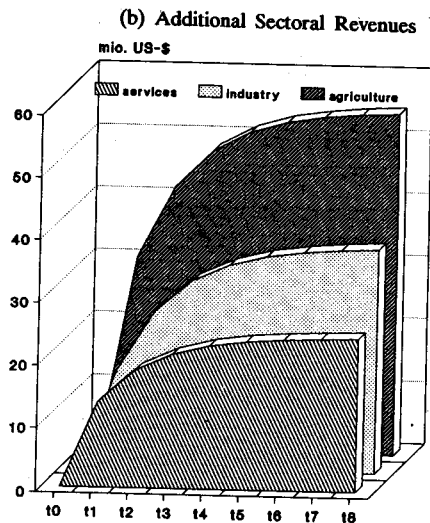
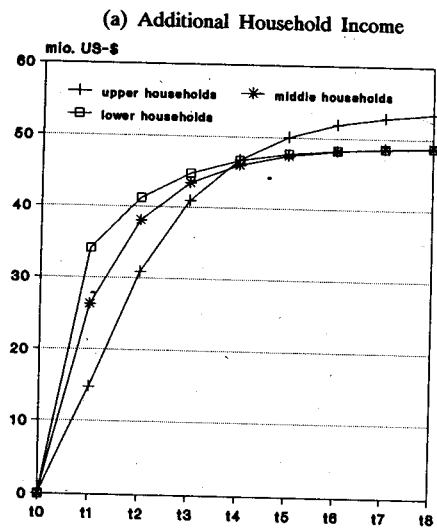
**Fig. 3. SAM Result of a One-period Remittance Boom of US-\$ 50 mio.**



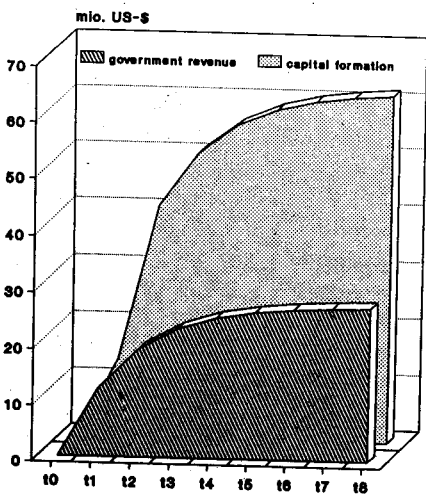
Source: Own calculation



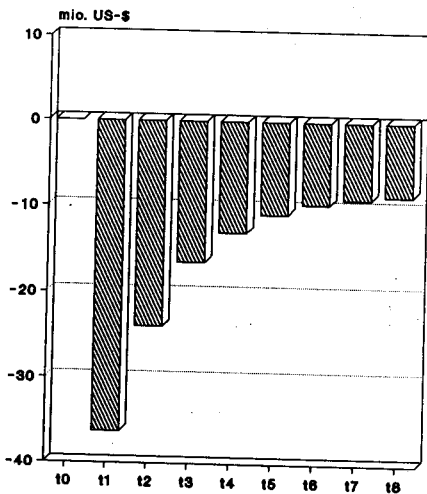
Fig. 4. SAM Result of Sustained Remittance of US-\$ 50 mio.



(c) Additional Government Revenues and Capital Formation

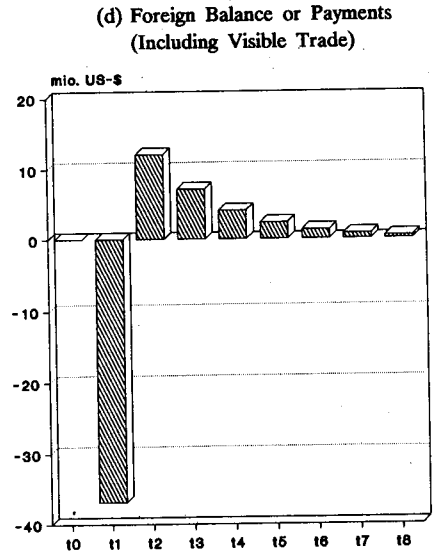
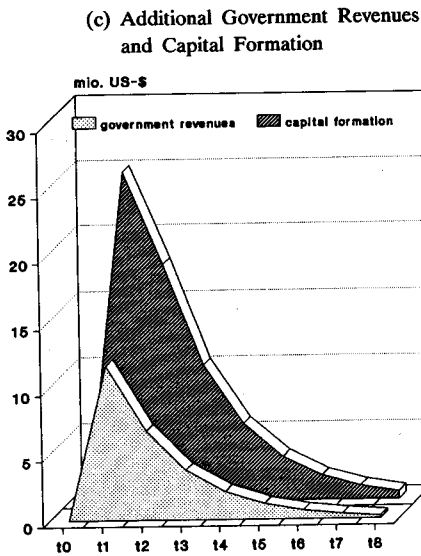
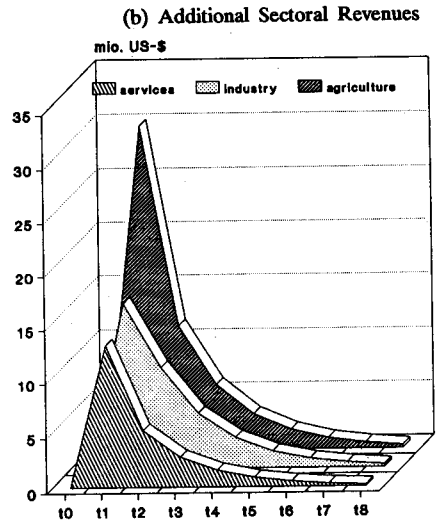
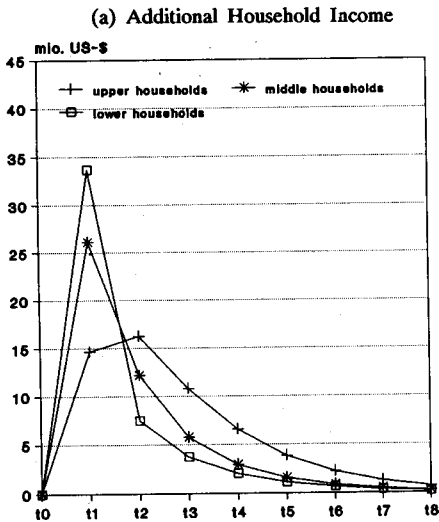


(d) Foreign Balance or Payments (Including Visible Trade)



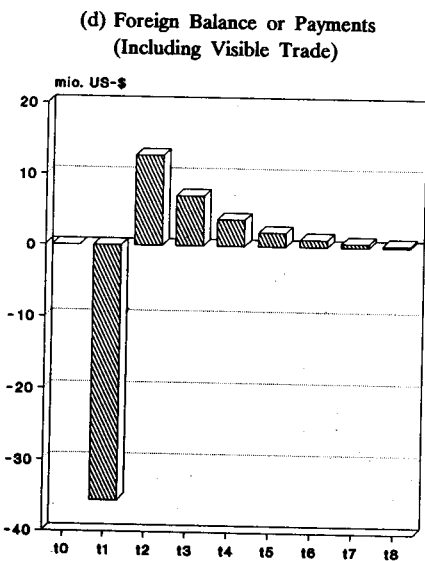
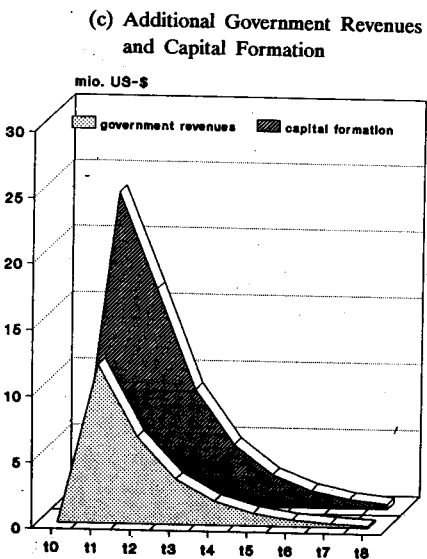
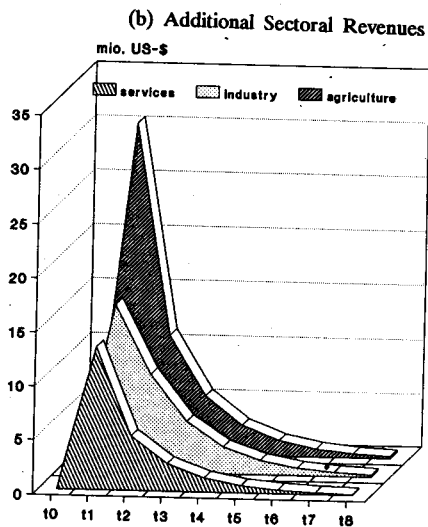
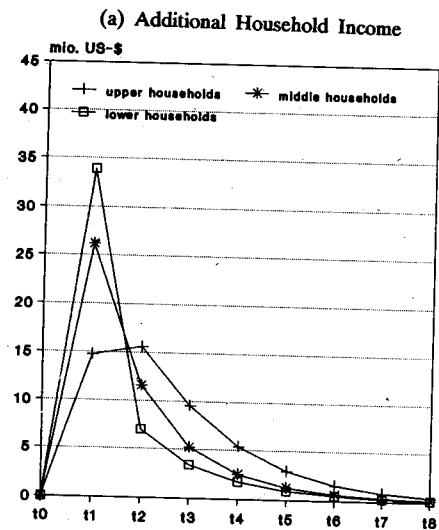
Source: Own calculation

Fig. 5. SAM Result of a Remittance Boom, with Increase Saving Rate.



Source: Own calculation

Fig. 6. SAM Result of a Remittance Boom, with Increase Propensity to Import



Source: Own calculation

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**Comments on**  
**“Methods for Assessing the Impact of**  
**Temporary Labour Emigration”**

Oil revenues that started pouring into the Middle eastern countries following the developments of the 1973 oil embargo, led to the phenomena of large-scale temporary labour emigration to such countries. This phenomena, because of its impact, became an important feature for the labour-exporting countries as well as for the host countries. The issue is important for Pakistan considering its significant outflow of labour to the middle eastern countries and the role which remittances play in its balance of payments financing. In this context the paper by Professor Knerr is very interesting because it deals with some important methodological issues relating to the assessment of benefits from temporary labour emigration from the labour-exporting countries.

The relevance of the paper's is stated objective of providing four methods which may help the policy-maker in forecasting or simulating the economic impact of labour migration under different policy alternatives is therefore obvious.

The four methods discussed by the author, to trace the effects of out-migration and remittances on economic development of labour-exporting countries and alternative policy alternatives are: (a) Partial sectoral analysis by regression computations, (b) Cost-benefit analysis, (c) Social accounting matrices (SAM), and (d) Computable General Equilibrium models (CGE models).

It may be observed that in the event of temporary emigration as against a permanent one, human capital is not permanently lost to the source country. In fact, since many of these migrants return to their home countries after acquiring additional skills, the temporary migration entails human capital formation. The temporary migrants also remit relatively more of their foreign earnings and are significant players in the housing, land and asset market of the source countries. These are important issues both from the theoretical as well as practical point of view.

Professor Knerr argues for macro-level analysis of the effects of temporary labour emigration from the source country's perspective. In her paper she maintains that rather than being merely reactive to exogenous changes, the planners

should endogenise the temporary emigration process.

Although she mentions the merits, questions and policy goals and data requirements of these methods, keeping in view the title of the paper one feels that little mention has been made by the author of the theoretical considerations of the migration process within the context of the stated objectives of the paper. Similarly, some discussion on the form in which data are required, sources of such data, their availability and inadequacies, would have been useful to assess the relative utility and scope of each method. In describing the partial sectoral analysis method there is no specification of the functions for regression analysis. Now some observations about each of these proposed methods.

First, the author rightly characterises the partial sectoral analysis method as a partial equilibrium approach to quantitatively assessing the impact of labour export and remittance inflow on some important macro-economic variables. This, however, should not be any reason to derive it since if the 2nd order and later effects are minimal, such methods are fairly accurate and certainly very cost-effective.

Second, cost-benefit analysis is a classic method for project evaluation but it has well-known difficulties when we consider the social welfare impact of a given project. Amongst there is the determination of 'shadow price' of non-traded goods. It is difficult to agree with the author's view that cost-benefit analysis has to be normative. It is positive as long as all costs and benefits are purely private and market prices are available.

Third, the author has correctly pointed out that the social accounting matrix (SAM) method has extensive data requirements but may be generally comprehensive in capturing interactions.

Finally, the computable general equilibrium models are fancy and elegant but carry unrealistic assumptions which are often not valid.

Let me conclude by making two final observations:

(a) The author's exclusion for discussion of the economy-wide structural models as a method is surprising. (b) Though the author hints at it, she does not provide a clear ranking of the four methods mentioned by her. Moreover, if appropriate and reliable data become available these methods can be used complementarily. However, due to lack or inadequacy of data in most of the developing countries the meaningfulness of more complex methods, specially because they require such large effort, may not really have the advantage for which they are preferred over the other relatively less demanding methods. Surprisingly, partial sectoral analysis method may in fact be the most practical, fairly accurate and



cost-effective way of assessing the results of labour out-migration. Any general equilibrium linkages may be explored using a structural model of appropriate size or perhaps realistic computable general equilibrium (CGE) models.

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