NUST JOURNAL OF SOCIAL SCIENCES AND HUMANITIES
Vol.5 No.2 (July-December 2019) pp. 129-152

Poverty-Reducing or Poverty-Inducing? A CGE-based Analysis of Foreign Capital Inflows in Pakistan

Rizwana Siddiqui[*] and A. R. Kemal[†]

Abstract

Foreign capital inflows (FKI) help an economy by financing the imbalance between income and expenditure. However, their impact on poverty in the recipient economy is a controversial issue. In this study, a static computable general equilibrium (CGE) model for Pakistan has been used to assess the impact of foreign capital on poverty. Several interesting results emerged from the study. FKI increase demand for goods for investment purposes that lead to the expansion of import-competing- sector machinery to fulfil domestic demand. However, the contraction of the majority of trading sectors combined with expansion of non-trading sectors of the economy have generated 'Dutch disease effect'. The results show that FKI have a positive impact on poverty in Pakistan. Trade liberalization of import of machinery reduces the negative effect of the decline in FKI. Rise in poverty in Pakistan may be attributed to the decline in foreign capital.

1. INTRODUCTION

Pakistan is a capital-scarce country and heavily relies on foreign capital inflows (FKI) to finance the saving-investment gap. With a view to constraining the imports to the available foreign exchange, the government opted for import-restricting policies such as licensing, quota, tariffs, etc[1]. These interventions-created-distortions resulted in the inefficient use of resources—encouraging sectors producing import substitutes where the country did not have a comparative advantage. The sectors where the country has a comparative advantage and employs the most abundant factor of the economy, labour, have been neglected. The inefficient use of resources inflow expected to aggravate

[*] Rizwana Siddiqui <rizwana_s99@yahoo.com> was Research Economist at the Pakistan Institute of Development Economics, Islamabad at the time when the research was conducted.

[†] A. R. Kemal (late) was the Director at Pakistan Institute of Development Economics, Islamabad when the research was conducted.

This paper is a part of the project entitled "Linkages of Globalization and Poverty in South Asian Countries. CGE based analysis" DFID-project, University of Warwick, UK". We are also thankful to Prof John Whalley University of Warwick, Prof. Jeff Round , University of Warwick, UK, Dr. Howard White, Senior Evaluation Officer, World Bank, Washington D. C., USA and Dr. Rehana Siddiqui, Chief of Research, PIDE, Islamabad for their comments on the earlier version of this paper.

[1] Haque and Siddiqui (2017) and Kemal, *et al.* (1994) have analysed the structure of protection by industries.

the poverty problem of the country. The main objective of this study is to analyse the impact of foreign capital inflows on poverty incidence in Pakistan.

Carvalho and White (1996) show that FKIs have contributed to poverty reduction by two channels: a) directly, when it is given to the poor and b) indirectly through the trickle-down effects from income-generating activities. However, White (1996) evaluating the impact of *project aid* argued that aid may not affect the poor because official aid goes to their rulers who formulate the spending priorities by their own personal and political interest. Some studies show that FKIs increase poverty by increasing wage gap between skill and unskilled labour [Siddiqui (1997); Wood (1998)].

Foreign capital inflow can take many forms and their relationship with poverty varies depending upon the type of foreign capital included in the analysis, countries focussed, variables included, base year, and the methodologies used. This paper tracks the impact of FKI on poverty focusing on the indirect channels in two different scenarios: In the first scenario, we have made use of change in current account balance (CAB) the excess of investment over domestic savings equal in magnitude to foreign savings and is reflected in the CAB [Baldwin (1971) and Oniki and Uzawa (1995)]. In the second scenario, FKI has been formulated in terms of free imports of capital goods [Borts (1960)]. Using this framework, we test the hypotheses that;

Ho: FKIs reduce poverty in Pakistan
H1: FKIs do not reduce poverty in Pakistan

We trace the impact of these FKIs on poverty through the changes in factor rewards (wage and returns to capital) and prices using a static computable general equilibrium (CGE) model for Pakistan.[1]

The organization of the study is as follows. The next section reviews the results of existing empirical studies with reference to FKI and poverty. In the subsequent two sections, data and major characteristics of the model have been discussed, respectively. Section five presents simulation results. The final section concludes the paper.

2. FOREIGN CAPITAL INFLOW AND POVERTY: EMPIRICAL EVIDENCE

Foreign capital inflow can take many forms and their relationship with poverty varies depending on the type of foreign capital included in the analysis, countries focused, variables included, base year, and the methodologies used.

[1] CGE Model developed for Trade Policy Analysis for the project 'Micro Impact of Macro Adjustment Policies on Poverty in Pakistan'. For details, see Siddiqui and Iqbal (1999), Siddiqui, *et al*. (1999) and Siddiqui, *et al*. (2006).

The analysis in the majority of studies reviewed here is based on econometric techniques. White (1992), Carvalho and White (1996), and White (1996) have analysed the impact of aid. White (1996) found that aid finance imports and debt servicing. Carvalho and White (1996) argue that FKI may contribute to poverty reduction directly and indirectly. Directly when it is given to the poor and indirectly through the trickle-down effects of income-generating activities. While evaluating the impact of *project aid* based on sixty-seven projects White (1996) found that the projects succeeded in a range of physical benefits and economic services. In these studies, he argues that aid may not affect the poor because official aid does not go to the poor people directly. It goes to their rulers who formulate the spending policies by their own personal and political interest, among which the position of the poor has very low priority. These studies show that the impact of foreign capital inflow (aid) on poverty depends on the sectors that receive these inflows [White (1996)]. The evidence provided by Siddiqui (1997) for Pakistan suggests that multinational companies (MNCs) are biased towards the adoption of technologies that were highly capital-intensive and employ skilled labour. Hence, the potential for employment generation especially for unskilled labour is limited. She found that MNCs led to increase wage gap between skilled and unskilled labour and promote poverty. Tamirisa (1998) reported that capital controls reduced bilateral trade of developing and transition economies. Gwin (2002) by reviewing the performance of International Development Assistance (IDA) in developing countries concluded that even though IDA provides a small share of the resources that countries use to pursue their development priorities, it was the main contributor to poverty reduction and social development. Contrary to the expectation that globalisation narrows the differential in the wage rate of skilled and unskilled workers, Wood (1998) reported that globalisation is an important contributory factor to deteriorating position of unskilled labour in developed countries. All these studies have analysed effects of FKI in partial equilibrium setting and focused on some sectors of the economy.

Some studies investigated the impact of FKI in economy-wide framework—computable general equilibrium model. Dervis, *et al.* (1982) explained how multi-sector models such as CGE models can be used to analyse the contributory factors to a specific outcome. Vos (1993) investigated the impact of different forms of foreign capital inflow to Pakistan using CGE framework. He found that the effects differed with the type of capital flows. The results showed that foreign assistance would generate 'Dutch Disease' effects and would not support the export sectors and traded goods production. However, the loans from banks led to the expansion of the traded goods production. Numerical simulations in the CGE framework by Abrego (1999) showed that partial trade liberalisation in the presence of taxation on free

mobility of capital reduced gains. Removal of tariffs led to an outflow of capital and a loss of tax revenue. Buffie (1985) found that direct foreign investment (DFI) has immiserizing effects in a small tariff-distorted economy where capital is mobile and exports are labour-intensive. In light of Buffie's argument, DFIs have a welfare worsening impact in presence of restricted imports and labour intensive exports.

From the previous discussion, it can be concluded that the effects vary with the type of foreign capital inflow, depend on the structure of the economy and the tool of analysis. This study incorporates two types of foreign capital inflows; foreign saving and imports of capital goods in CGE framework to analyse the impact of FKI on the socio-economic outcome.

3. DATA

Data have been arranged in the form of social accounting matrix[2] to operationalize CGE model for Pakistan. It reflects the structure of the Pakistani economy in the year 1989-90. The production sectors aggregated into eleven activities -- agriculture [crop-non crop], mining, manufacturing [consumer goods (food), textile, chemicals, machinery, and other miscellaneous manufactured goods], and services [two traded sectors and one non-traded sector]. These sectors employ primary factors of production, labour and capital (a mixed factor which includes tools, land, and all other primary factors other than labour). Labour is assumed to be homogeneous and can move freely in the economy, but capital is sector specific. Table 1 shows the main characteristics of the production sectors in 1990. It shows that machinery (capital goods) has the largest share in total imports and textile has the largest share in total exports, 37.5 percent and 67.7 percent, respectively. More than 55.6 percent expenditure on machinery is on imported machinery and 44.6 percent of textiles production goes to the external market. Among manufactured goods, the largest share of labour and capital income comes from the textile sector.

For poverty analyses, households have been classified by the occupation of head of the households in both the urban and the rural areas using data from the Household Integrated Economic Survey (HIES) [Pakistan (1993)]. Households receive income from five sources, labour, and capital, dividends from firms, government transfers, and remittances. It shows that professional households in urban areas receive 59 percent of their annual income from labour and production workers receive 51.5 percent of their income from labour. All other households in the urban area receive a larger share of their income from capital (tools, land, and all other inputs other than labour and intermediate

[2] For detail data sources see Siddiqui and Iqbal(1999) and Siddiqui and Kemal (2oo6a)

goods). Among the rural households, production workers receive 56.8 percent from labour. All other groups in the rural areas receive a relatively larger share of their income from capital. The professional group receives 80 percent of their income from capital.

FGT[3] indices of poverty based on the adult-equivalent basic need poverty line of per capita per month of Rs. 318 for the urban and Rs.264 for the rural households have been estimated using data from Household Integrated Economic Survey for 1990-91[Pakistan (1993)] using DAD[4] programme [Duclos, *et al.* (2001)][5]. Table 2 shows that poverty incidence is relatively low among professional and miscellaneous group of households, 19.9 percent and 23.4 percent, respectively.

Table 1. Structure of Base Year Economy (Percentage**)**

Sector	Imports Share	Exports Share	Imports Share in Domestic Demand	Exports Share in Domestic Production	Labour	Capital
Crop	6.11	1.70	3.57	0.67	20.14	27.67
Non-Crop	0.23	1.31	1.44	5.14	1.65	3.66
Mining	7.84	0.77	35.99	3.52	2.99	2.60
Food	8.52	6.91	9.98	5.59	2.58	3.78
Textile	1.91	67.66	3.34	44.60	6.84	5.19
Chemicals	18.35	1.21	30.88	1.90	1.10	1.07
Machinery	37.51	0.35	55.63	0.77	2.45	1.86
Other Manufacturing	11.23	2.66	17.97	3.30	5.60	4.12
Other Trade Sector 1	2.94	17.42	1.53	5.70	19.91	36.72
Other Trade Sector 2	5.35	0.01	18.67	0.03	11.71	2.18
Non-traded Sector	–	–	–	–	25.03	–
Total*	100	100	13.11	9.04	100	100

Source: Authors' calculations using data from Social Accounting Matrix -1989-90.

The incidence of poverty, in the urban areas, amongst production workers, agriculture worker and clerks are quite high, 40.1 percent, 35.3 percent, and 31.5 percent, respectively. In the rural area the higher percentage of households, who are below the poverty line belong to the production worker, 36.3

[3] Foster, Greer, Thoerbecke. FGT (Foster, Greer, Thoerbecke) indices have been developed in Foster, Greer, and Thorbecke (1984) to measure the level, depth, and severity of poverty.

[4] DAD—A Software for Distributional Analysis/Analyse Distributive developed by Duclos *et al* (2001).

[5] For detail see Siddiqui and Kemal (2006).

percent of households consume less than Rs 264 per capita per month. However, 25.2 percent and 23.2 percent of households are below the poverty line in the professional group of households and a miscellaneous group of households, respectively, in the rural area.

Table 2. Sources of Households Income and Labour (Percentage)

Household	Wages	Capital	Dividends	Others	Households Below Poverty Line
Urban Household					32.44
Professional	59.46	24.23	14.81	1.51	19.92
Clerks	28.53	38.41	18.86	14.19	31.52
Agriculture Worker	13.01	76.42	0.00	10.57	35.33
Production Worker	51.52	34.38	5.15	8.96	40.08
Miscellaneous	23.52	63.58	1.72	11.19	23.44
Rural Households					30.47
Professional	19.18	80.48	0.00	0.34	25.20
Clerks	38.95	56.53	0.01	4.51	34.25
Agriculture Worker	13.82	81.56	0.43	4.20	28.30
Production Worker	56.77	31.22	3.75	8.27	36.30
Miscellaneous	16.98	54.37	19.22	9.44	23.19

Source: Authors' calculations using data from Social Accounting Matrix - 1989-90.

4. THEORETICAL FRAMEWORK—CGE MODEL

The basic framework of the computable general equilibrium model has been taken from the model developed for MIMAP-Pakistan [Siddiqui and Iqbal (1999) and Siddiqui and Kemal (2006)][6]. The model is static in nature. For the model-equations [Siddiqui and Kemal (2006)]. Its major characteristics have been discussed below.

Production sectors employ labour and capital combined with CES (Constant Elasticity of Substitution) technology for Value-Added. Labour is assumed to be mobile and capital is sector specific. Supply of each factor of production is fixed. Assuming perfect competition and market clearing conditions, labour demand function for each sector is derived from production function by first order condition. Returns to labour are determined through equilibrium in the labour market, while returns to capital are determined in each sector with zero profit condition. Gross output has separable production

[6] MIMAP-Micro Impact of Macro Adjustment Policies--project funded by IDRC, Canada.

function of value added and intermediate inputs. Leontief technology has been assumed between intermediate good and final output and within intermediates.

The economy is differentiated into traded and non-traded sectors. Goods for the domestic market and for the external market with the same sector classification are of different qualities and domestically produced goods sold in the domestic market are imperfect substitutes of imported goods (Armington assumption). Profit maximisation gives export supply and import demand equations as a function of relative prices. The Constant Elasticity of Transformation (CET) function describes the possible shift of domestic production of goods for domestic and external markets. Import aggregation function presents the demand for composite goods (imported and domestically produced goods). The non-traded sector is as important as the traded sector. The level of each activity in the traded sector is constrained by activity in the non-traded sector. The supply of non-traded goods is equal to the domestic demand.

The model has four types of institutions: households, firms, government and the rest of the world. The households receive income from labour, capital, dividends from firms, remittances, and transfers from government. The effects on income of households after increased foreign capital inflow has been determined through changes in the endogenous sources of income; wage income, capital income, and dividends. After subtracting income taxes from the households total income, we get disposable income of households. Saving is defined as a fixed share of the disposable income and the rest is consumed. Firms receive income from capital and transfers from the government. Transfers from the government to firms are given exogenously. Its expenditure includes tax payments to the government, dividends to the households, and transfers to the rest of the world. The residual is saving of the firms. The government receives revenue from direct and indirect taxes; taxes on imports, exports, production, households' income and capital income of the firms. They are determined endogenously. The Government also receive transfers from the rest of the world which is fixed exogenously. Its expenditure includes current expenditure on goods and services, transfer payments to households, and transfers to firms. Transfers from the government are fixed. After subtracting expenditure from income, rest is saved. The rest of the world receives income from the sales of imports and fixed transfers from firms. Its expenditure includes exports, remittance income to households and transfers to the government.

There are four types of domestic demand for goods and services: (1) household demand for the i^{th} commodity is defined by a Linear Expenditure

System (LES)[7]; (2) government expenditure on the i^{th} commodity is derived by the Cobb Douglas utility function; (3) intermediate demand is defined by the Leontief technology between output and intermediate consumption and within the intermediate consumption; and (4) demand for goods for investment purposes is determined by the fixed value share. Total household consumption is defined as residual after subtracting saving from disposable income. The aggregate demand for goods of the country is the sum of households' consumption; government consumption, intermediate consumption, and investment goods. We assume that the country is a price taker for exports as well as for imports. Domestic price of exports and imports are defined after including domestic taxes. Producer price is the weighted average of domestic price of goods for the domestic market before taxes and price of goods for the external market, export. Value-added price is determined by factor prices. Domestic price is determined after including taxes in producer prices. Consumer prices are the weighted average of domestic prices and import prices of a commodity for traded goods. The GDP deflator is a weighted price index of all goods.

All markets are in equilibrium. Labour supply is equal to aggregate labour demand. Total demand for investment goods is equal to the supply of domestic saving plus foreign savings (FKI). Foreign capital inflow (foreign savings) fills the gap between expenditure and earnings, defined as expenditure of rest of the world (exports + transfers to households and transfers to Government) and foreign exchange earnings (imports + transfers from firms). The nominal exchange rate acts as the numeraire. Its value is set equal to one. The real exchange rate adjusts to bring equilibrium.

In the absence of the financial sector, focusing on the real sector of the economy, the current account balance determines the amount of foreign saving in the country. Starting with a simple macro identity we get the following equation identifying the need of foreign capital inflows in the country[8].

$$M - X + TR_H + TR_H - TR_F = CAB \qquad \ldots (1)$$

where,

M	=	Imports,
X	=	Exports,
TR_H	=	Remittances to the household from abroad,
TR_G	=	Transfers to the government from abroad,
TR_F	=	Transfers from firms to rest of the world,
CAB	=	Current Account Balance (foreign saving)

[7] Maximising $u(X) = \sum fi\ (Xi) = \sum \alpha_i\ log\ (X_i - \gamma_i)$ *subject to constraint* $\sum P_i X_i = Y$.

[8] For derivation see Siddiqui and Kemal (2006).

In this paper, poverty orientation of foreign capital inflow has been analysed through the impact of two shocks: (1) increased inflow of foreign saving and (2) increase inflow of capital goods (imports), which traces the impact on rich and the poor through changes in the demand for factors of production and change in their factor rewards and prices. The main thrust of the argument is how FKI affect traded and non-traded sectors, which ultimately determine factor income and prices. Given fixed factor supplies, the shift in demand changes factor prices until zero profit condition is restored.

Capital movement in equilibrium is the excess of investment over domestic savings, equal in magnitude to the current account balance of payments [Baldwin (1971) and Oniki and Uzawa (1995)] Or the movement of capital also takes place through a transfer of goods across the countries,[9] [Borts (1960)]. In the first case, the main thrust of the argument is that the increased current account deficit increases the demand for goods for investment purposes. This can be seen from the following equation,

$$SH + SF + SG + CAB = TI \qquad \ldots (2)$$

where,

SH	=	Household Saving,
SF	=	Firms Saving,
SG	=	Government Saving,
CAB	=	Current Account Balance (foreign saving)
TI	=	Total Investment

In the second case, imports of capital goods increase the supply of investment goods, which ultimately changes factor remuneration and prices. As a result, households' real income, and consumption change leading to change the poverty level in the country. In the model tariff elimination on capital goods increases the inflow of imports of capital goods and reduces the price of capital goods, which expected to benefit more to rich households.

The change in income of households and the monetary value of the poverty line after the shock determines the percentage change in households below the poverty line. In the present analysis, government consumption and tax rate on production are kept fixed to be sure that an increase in investment is not at the expense of government consumption. Price indices for government consumption adjust. Households' savings and government savings adjust endogenously with the change in income and consumption. With the equilibrium

[9] Thus a country that is importing capital has a surplus in its balance on the capital account and a deficit in its balance on the current account that is, the level of investment in the country exceeds the level of savings.

between saving and investment, increased foreign savings directly lead to an increase in investment demand.

The model has been calibrated to data of Pakistan economy for the year 1989-90. Elasticities of substitution for industrial production functions are taken from Kemal (1981) and Malik, *et al*. (1989). We estimated households' specific income elasticities for each commodity using data from 'Household Integrated Economic Survey' for 1990 [Pakistan (1993)]. In addition, a value for the Frisch parameter is set equal to (–2) to derive the remaining parameters of the linear expenditure system (LES). We assume reasonable values for parameters, which are not available from the existing studies, to complete the calibration process. Policy parameters, like tax rates, are calculated from the Social Accounting Matrix (SAM) data. Shift and share parameters in demand and supply equations have been calculated using data from SAM data. The GAMS[10] software package is used to solve the model. The impacts of the following three shocks to the economy are evaluated.

(1) Increase in Foreign capital by 70 percent.
(2) Increase in Foreign capital by 70 percent and tariff elimination on imports of capital goods (free mobility of capital goods).
(3) Reduce Foreign Capital Inflow by 60 percent - Real life scenario.

5. SIMULATION RESULTS

The results of the exercises corresponding to shocks reported above have been presented in Tables 3 to 5. They show the percentage change in the demand for goods for investment purposes, employment, wages, output, prices, welfare and poverty level in Pakistan.

Simulation 1: Increase in FKI by 70 Percent

We assume that capital stock is fixed. Model is static in nature. This is a saving-driven model and increased foreign savings (foreign capital flows) lead to increased demand for investable goods. The increased foreign capital (foreign savings) leads to a larger inflow of imports[11] as foreign transfers have been fixed in the model. This leads to a change in consumer prices. Prices increase by small amount where the share of imports is larger in total consumption as well as in total imports. The larger inflow of imports increase prices less in the sheltered /import-competing sectors relative to prices in

[10] General Algebraic Modelling System.

[11] This has the same effect as trade liberalisation as far as the inflow of imports is concerned.

export-oriented sectors. Consequently, demand for investment goods increases by a higher percentage in the sheltered sectors.

Due to an increase in domestic prices relative to world prices, exports become expensive. Exports from all sectors decline. Consumer prices of 'Machinery' increases by 2 percent while the consumer price of the 'Textiles' increase by 4.2 percent. As a result, exports of textiles decline by higher percentage of 8 percent and export of machinery decline by 1.1 percent.

Increased foreign saving raises the demand for labour. Resultantly, wages increase by 2.5 percent, which reduces the competitiveness of both the import-competing sectors as well as exporting sectors. However, production in import-competing sector; machinery rises due to increasing demand for investment goods. The results show that increased factor demand mostly in 'sheltered' sectors dominates the decline in factor demand in less sheltered sectors. In the import-competing sector 'machinery', demand for labour increases by 13 percent that leads to increase in overall returns to labour by 2.5 percent (Table 3). Similarly, the demand for capital goods increases in this sector, which result in the increase in returns to capital by 17.3 percent in this sector. Capital index (average returns to capital) in the economy increases by 3.9 percent. Contrarily, demand for labour fell in 'Textiles' by 15.2 percent and demand for capital also declined which led to the decline in return to capital in this sector by 4.4 percent over the base run (Table 3). The output of 'Machinery' increase by 4.2 percent and the output of 'textile' decline by 5.3 percent. It leads us to conclude that foreign capital inflow leads to inefficient use of resources. In the majority of traded sectors, output has declined. On average, output in the traded sector fell and output in non -traded sector increase. This is called *Dutch Disease effects* [Vos (1993)].[12] This confirms the results obtained by Vos (1993) for Pakistan.

The change in factor returns in production activities affects households' nominal income. Returns to capital increase more than wages. Thus, the income of households who receive a larger share of their income

[12] Vos (1993), analysing the impact of different forms of foreign capital inflow in Pakistan in the CGE framework found that foreign assistance would not support the export sectors and traded goods production.

Table 3. Simulation Results: Percentage Change Over Base Year Values

Variable Defined Over *i*	Crop	Non-crop	Mining	Food	Textile	Chemical	Machinery	Other Manufacturing	Other Traded 1	Other Traded 2	Non-traded	Total
Simulation 1. Increase in the FKI by 70% in Absence of Trade Liberalisation												
Output	–0.2	0.01	–0.51	–0.2	–5.28	–0.96	4.21	0.46	0.78	–0.01	0.23	–0.43
Rate of Return to Capital	1.41	2.49	0.59	1.27	–4.45	–1.77	17.33	4.44	7.65	2.43	2.95	3.94
Labour Demand	–0.92	0.06	–1.64	–0.93	–15.24	–3.31	12.97	1.35	4.55	–0.02	0.34	–
Wage Rate	2.46	2.46	2.46	2.46	2.46	2.46	2.46	2.46	2.46	2.46	2.46	2.46
Imports Share (Base)	6.11	0.23	7.84	8.52	1.91	18.35	37.51	11.23	2.94	5.35	–	100
Exports Share (Base)	1.70	1.31	0.77	6.91	67.66	1.21	0.35	2.66	17.42	0.01	–	100
Consumer Price	2.35	3	1.28	2.91	4.16	1.59	1.99	2.67	5.37	2.81	2.26	3.14
Imports	2.28	4.86	1.97	4.08	2.34	2.35	9.88	5.17	6.7	2.45	–	5.74
Domestic Demand	–0.18	0.2	–0.46	0.07	–3.16	–0.89	4.25	0.63	1.07	0.23	–	0.19
Exports	–3.04	–3.66	–2.04	–4.73	–7.97	–4.5	–1.09	–4.37	–4.26	–2.21	–	6.75
Investment Demand	13.26	12.55	14.46	12.64	11.3	14.11	13.66	12.9	10.02	12.75	13.37	15.92
Simulation 2. Increase in FKI by 70 Percent in the Presence of Tariff Elimination on Import of Capital Goods												
Output	0.17	0.16	–0.27	0.29	–1.83	–0.05	–1.26	0.04	0.15	0.2	–0.09	–0.19
Rate of Return to Capital	2.49	2.32	0.63	3.34	–0.74	1.37	–2.54	1.78	2.59	2.13	1.39	2.14
Labour Demand	0.79	1.07	–0.86	1.37	–5.37	–0.18	–3.67	0.12	0.88	0.42	–0.14	–
Wage Rate	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Consumer Price	1.64	1.75	0.49	1.48	1.71	0.51	–16.36	0.8	1.34	–1.24	0.88	–0.52
Import Price	0	0	0	0	0	0	–22.42	0	0	0	0	–8.58
Imports	1.91	2.98	0.68	2.47	1.4	1.01	20.56	1.44	1.63	0.77	–	8.56
	0.19	0.28	–0.24	0.42	–0.91	–0.03	–1.31	0.09	0.23	–0.09	–	0.03
Exports	–1.82	–2.01	–0.86	–2.08	–2.99	–1.21	4.64	–1.44	–1.15	–1.06	–	–2.47
Investment Demand	0.47	0.36	1.62	0.62	0.4	1.6	22.1	1.3	0.76	3.4	1.23	2.12
Simulation 3. Reduce in FKI by 60 Percent-real life scenario												

Variable Defined Over *i*	Crop	Non-crop	Mining	Food	Textile	Chemical	Machinery	Other Manufacturing	Other Traded 1	Other Traded 2	Non-traded	Total
Output	0.19	0.13	0.33	0.16	4.80	0.80	-4.09	-0.51	-0.76	-0.22	0.01	0.35
Rate of Return to Capital	-0.78	-1.12	-0.54	-0.75	4.06	1.81	-14.20	-3.75	-6.37	-2.15	-	-3.06
Labour Demand	0.84	0.87	1.06	0.77	14.44	2.84	-11.52	-1.47	-4.29	0.02	-0.33	
Wage Rate	-1.69	-1.69	-1.69	-1.69	-1.69	-1.69	-1.69	-1.69	-1.69	-1.69	-1.69	-1.69
Consumer Price	-1.69	-1.84	-1.03	-2.25	-3.23	-1.28	-1.71	-2.20	-4.41	-2.12	-1.65	2.50
Import Price	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imports	-1.60	-2.81	-1.66	-3.12	-1.62	-1.87	-8.45	-4.27	-5.56	-1.84	-	-4.78
Domestic Demand	0.17	0.00	0.28	-0.06	2.86	0.74	-4.12	-0.66	-1.04	-0.22	-	-0.22
Exports	2.32	2.50	1.59	3.89	7.17	3.84	0.40	3.69	3.73	1.63	-	6.00
Investment Demand	-12.05	-11.91	-12.64	-11.55	-10.65	-12.41	-12.02	-11.59	-9.54	-11.66	-12.08	-

Source: Authors' calculations.

from capital (mixed factor) increases by a higher percentage than the households' income who received a larger share from labour (Table 5). In urban areas, the highest increase is in the income of agriculture and miscellaneous group of households who receive, respectively, 76 percent and 64 percent of their income form capital (mixed factor)-3.3 percent and 3.2 percent, respectively. The same pattern is found among rural households. Production workers earn a larger share of their income from labour. They observe 2.8 percent increase in their income. Whereas professional group of household receives 80 percent of their income from capital, the results show a maximum increase in their income--3.65 percent. This implies that foreign capital lets relatively rich households (capital owner) benefit more. Overall income of urban and rural households increases by 3 percent and 3.3 percent, respectively.

On average price level in the country increases, households' specific consumer price indices increase for all households. The rise in household specific consumer price index (CPI) is larger than the increase in nominal income for all households except for agriculture and the miscellaneous group of households in the urban area and for production workers in the rural area. Table 5 shows that poverty declines by all measures in the urban and rural areas except for production workers, who receive a larger share of their income from labour. Overall poverty declines more in the rural areas than in urban areas.

Table 5 presents information on the base year poverty and variation in poverty after the shock. With an increase in consumer price, poverty lines shift for both rural and urban households. The values of poverty line increase more for urban households, while the income of rural household increases more (Table 4). With the change in the poverty line and income, the corresponding poverty level in each group also changes. In the urban area, Poor households (production workers) hurt by the foreign capital inflow. They earn the major share of their income from labour. It benefits agriculture households who receive major share of their income from capital; while poverty remains constant in all other urban households. The other two measures of poverty show that poverty increases among the relatively rich households in the urban area, professional and clerks and it hurts agriculture and production workers in rural areas. In all other households, the population below poverty line decline significantly. However, the poverty gap and severity of poverty indices decline for all rural households. In aggregate, all indicators of poverty (FGT - indices) show an increase in poverty in the urban area and decline in the rural area by 0.72 percent and 1.42, respectively. However, the positive effect on poverty dominates and poverty declines in Pakistan on the whole.

Simulation 2: Increase in FKI by 70 Percent and Tariff Elimination on Import of Machinery

In this simulation, we study the impact of an increase in foreign capital along with cheap availability of imported capital goods. The demand for investment goods increases for two reasons: (1) a decline in the price of machinery and (2) an Increase in the availability of financial resources in terms of foreign saving. Elimination of tariff on imports of capital goods reduces their import price. Consequently, the demand for imported machinery rises, which met by the increase import of machinery. On the other hand, the increase in foreign savings in the country also increase the demand for goods for investment in all sectors of the economy (Table 3). The elimination of tariffs on machinery reduces its domestic import price by 22.4 percent. Consumer substitute imported capital goods for domestically produced goods. Contrary to the results of previous exercise, production of machinery in the domestic market fell by 1.3 percent for two reasons. First, increase in foreign capital inflow increases domestic cost of production, because wages and returns to capital increase by 1.6 percent and 2.1 percent, respectively, which reduce the competitiveness of import-competing sector. Producers reduce production of machinery. Second, due to the availability of cheap imported machinery, consumers shift from domestically produced goods to imported goods. The change in relative prices leads to the reallocation of factors of production. The demand for factors of production fell in machinery. Due to the increase in domestic prices exports become expensive resulting in a reduction in exports from each sector except from 'Machinery' where the domestic price decreases (Table 3).

The increased demand for goods for investment purposes leads to an increased demand for the factors of production. The results show that increased factor demand in the 'protected' sectors dominates the decline in factor demand in the less protected sectors, which is reflected in their rate of returns; wage rate increase by 1.6 percent and returns to capital increase by 2.1 percent. In this exercise, prices did not increase as much as in the previous exercise where tariffs restrict imports of machinery. Due to a decline in the price of machinery the cost of production does not increase as much as in the absence of tariff reduction on machinery. Consequently, returns to capital and labour do not increase as much as in the previous exercise (Table 3). An increased inflow of foreign capital in presence of cheap capital goods benefits the owners of capital more and reduces the 'The Dutch disease effects' as output declines by only 0.19 percent instead of 0.43 percent in the first simulation'.

Nominal income of households increases because of the increase in returns to factors of production. The increase in returns to capital is larger than

the increase in wages. This benefits capital owners more. A comparison of the results from the first simulation with the results from the second simulation shows that maximum increase in income is in the income of agricultural households in the urban area and the minimum increase is in the income of the production workers. In rural areas, professionals Households gain the most who receive 80 percent of their income from capital. The lowest increase is in the income of the production workers, who earn 57 percent from labour. The aggregate income of urban and rural households increases by 1.7 percent and 1.9 percent, respectively Table 4.

In this exercise, increase in consumer price index is lower than the increase in the nominal income for all households in the urban as well as in the rural areas and leads to an increase in households' real income. Poverty falls more irrespective of poverty measure among all households. Table 5 shows that trade liberalization benefits urban households more than rural households. Poverty reduces by 2.4 percent and 2.0 percent among urban and rural households, respectively.

To see the distributive impact of these two shocks, we draw Figures 1 and 2 for variation in density function[13] for the rural and the urban areas separately [For details see Cockburn (2002) and Siddiqui and Kemal (2006)]. All groups of households show the movement of individuals from lower to higher income brackets in the first two simulations. The movement is larger among the lower income groups (200-500) compared to the movement in larger income groups. All graphs suggest that income disparity reduces after the increase of foreign capital in the country, which is also evident from poverty gap ratios.

Simulation 3: Reduction in FKI by 60 percent in Absence of Trade Liberalisation (Real life Scenario)

This simulation depicts the real-life scenario. Over the period of 1990, foreign saving has increased by 21.4 percent, from 3.6 percent of GDP to 4.4 percent of GDP [Pakistan (2005)]. It declines to -0.92 percent of GDP during 2001-05 [Pakistan (2005)]. This is worth investigating how these changes in the economy affected welfare and poverty incidence in Pakistan. In this simulation, we reduce CAB by 60 percent.

We assume that capital stock is fixed and the change in foreign capital inflows do not change existing capital stock (engaged in production). The dec-

[13] The density function shows the percentage of households with a given income [Cockburn (2002)].

Table 4. Simulation Results: Households' Income and CPIs-Variation over Base Year (Percentage)

Household	Share of Households			Increase in FKI by 70%				Reduction in FKI by 60%	
	Base year			Absence of Trade Liberalization		Presence of trade liberalization (Tariff Elimination)		Real Life Scenario	
	Labour	Capital	Dividends	Households' Nominal Income	Households' Consumer Price Index	Households' Nominal Income	Households' Consumer Price Index	Households' Nominal Income	Households' Consumer price index
Professional	59.46	24.23	14.81	3.00	3.05	1.78	0.62	-2.40	-239
Clerks	28.53	38.41	18.86	2.96	3.06	1.68	0.92	-2.20	-2.35
Agriculture Worker	13.01	76.42	0.0	3.33	3.04	1.84	1.09	-2.24	-2.35
Production Worker	51.52	34.38	5.15	2.82	3.05	1.67	1.02	-2.56	-2.32
Miscellaneous	23.52	63.58	1.72	3.15	3.10	1.77	0.63	-2.08	-2.33
Urban	–	–	–	3.02	3.06	1.73	0.85	-2.39	-2.28
Professional	19.18	80.48	0.00	3.65	2.91	2.03	1.16	-2.54	-2.24
Clerks	38.95	56.53	0.01	3.19	2.95	1.83	1.21	-2.79	-2.21
Agriculture Worker	13.82	81.56	0.43	3.57	2.89	1.97	1.33	-2.39	-2.24
Production Worker	56.77	31.22	3.75	2.77	2.94	1.65	1.26	-2.74	-2.18
Miscellaneous	16.98	54.37	19.22	3.32	2.95	1.84	1.25	-2.03	-2.23
Rural	–	–	–	3.33	2.92	1.88	1.27	-2.27	-2.36
Total	–	–	–	3.17	2.99	1.797	1.06	-2.53	-2.21

Table 5. Simulation Results: Variation in FGT Indices of Poverty (Percentage)

Household	Head Count				Poverty Gap				Severity			
	Base	1	2	3	Base	1	2	3	Base	1	2	3
Professional	19.92	0.00	-1.79	0.0	4.68	0.25	-3.92	0.49	1.15	0.26	-4.07	0.52
Clerks	31.52	0.00	-1.53	0.0	3.77	0.31	-2.65	0.27	2.42	0.40	-3.36	-0.35
Agriculture Worker	35.33	-1.90	-13.14	0.0	7.43	-1.41	-5.07	-0.27	1.44	-1.47	-5.38	-0.28
Production Worker	40.08	1.96	-1.91	1.96	5.51	0.77	-2.64	0.93	1.26	0.88	-3.02	1.07
Miscellaneous	23.44	0.00	-2.02	0.0	9.39	-0.35	-3.61	-0.83	3.25	-0.47	-4.82	1.11
Urban	32.44	0.72	-2.42	0.824	7.27	0.37	-2.89	0.22	2.36	0.48	-3.43	0.27
Professional	25.2	-1.57	-1.57	0.53	5.2	-2.80	-2.96	0.77	1.42	-3.71	-3.92	0.85
Clerks	34.25	-1.90	-13.14	0.0	7.38	-1.41	-5.07	1.76	2.33	-1.47	-5.38	2.37
Agriculture Worker	28.3	1.96	-1.91	0.0	6.43	0.77	-2.64	-0.27	2.12	0.88	-3.02	-0.28
Production Worker	36.3	0.10	-1.70	1.83	7.31	0.58	-1.47	0.93	2.22	0.67	-1.70	1.07
Miscellaneous	23.19	-3.81	-3.81	-1.38	4.58	-1.54	-2.21	-1.30	1.41	-1.74	-2.51	-1.50
Rural	30.47	-1.43	-2.01	-0.32	6.49	-1.10	-2.03	0.33	2.05	-1.35	-2.41	0.44
Pakistan	31.3	-0.52	-2.19	0.25	6.8	-0.46	-2.40	0.49	2.2	-0.54	-2.86	0.58

1. Increase in FKI by 70 percent.

2. Increase in FKI by 70 percent in presence of free Import of Capital Goods (Tariff Elimination on Capital Goods).

3. Decline in FKI by 60 percent.

Figure 1. Variation in Density Function (Urban Households)

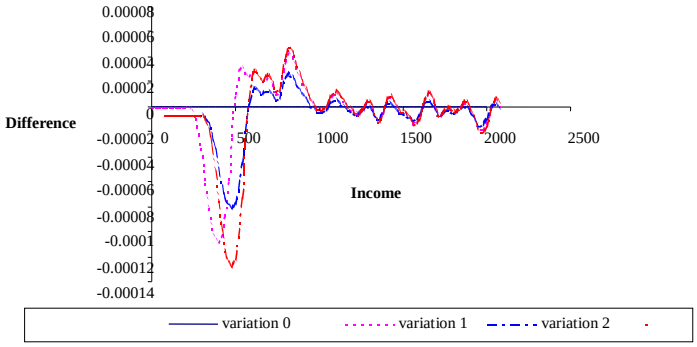
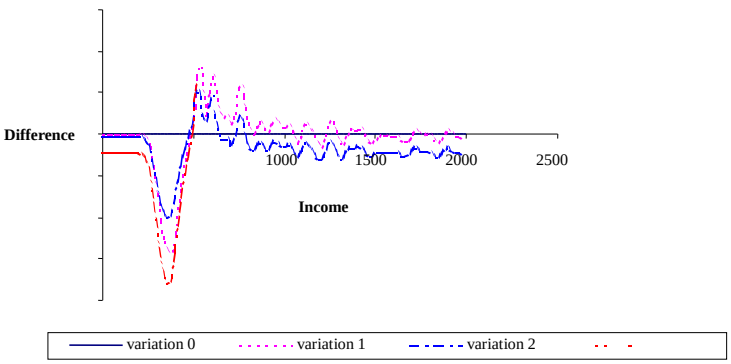


Figure 2. Variation in Density Function (Rural Households)



line in foreign capital (foreign savings) mean lower imports[14] as foreign transfers are fixed in the model. This is a saving-driven model and decline in foreign capital flows lead to reduce demand for investable goods. The decline is bigger in the sheltered sector-Machinery- due to a reduction in demand for investment goods in all sectors of the economy (Table 3). This also reduces the demand for factors of production. Resultantly, wages fell by 1.7 percent and returns to capital by 3.1 percent. The decline in cost of production increases the competitiveness of both the import-competing sectors and exporting sectors. But production in import-competing machinery reduces as demand for

[14] This has the same effect as trade liberalisation as far as the inflow of imports is concerned.

investment goods reduces in all sectors of the economy. On the other hand, production in textile increases as a reduction in the cost of production makes it more competitive. The results show that change in factor demand is significant in the sectors which are producing larger exportable surplus-'Textile'. The demand for labour and capital rise in 'Textiles' by 4.8 percent and 4.1 percent, respectively over the base run (Table 3). The output of textile increases by 4.8 percent. The output of 'Machinery' fell by 4.1 percent. Except for textile and machinery, the change in output in all other sectors is marginal, less than one percent.

Due to a decline in factor prices, domestic prices relative to world prices fell, exports become cheaper. Consequently, exports increase from all the sectors of the economy (Table 3). Prices increase by small amount where the share of exports is larger in total exports. Consumer prices of 'Textiles' declines by 3.2 percent. As a result, exports of textiles rise by 7.2 percent. Import-competing sector 'Machinery' reduces production and export of machinery declines marginally by 0.4 percent.

The decline in factor returns negatively affects households' nominal income. Returns to capital fell more than wages. So the incomes of households who receive a larger share from capital decline by a higher percentage than that of the households' who receive a larger share from labour (Table 4). In urban areas, the highest decline is in the income of professional and production workers' household who receive more than fifty percent of their income from labour. Their income declines by 2.4 percent and 2.6 percent, respectively. The same pattern is found in rural households, production workers earn a larger share of their income from labour. Their income declines by 2.7 percent. This implies that reduction in foreign saving hurt the capital owners more. Overall, this policy shock hurts urban households more than rural households. Their income declines by 2.4 percent and 2.3 percent, respectively. These households experience the change in CPIs depending on their consumption pattern and change in their income. The small variation in the change in income and CPIs across the households have been observed in this exercise. The decline in household specific consumer price index (CPI) is relatively larger for the professional group of households. These changes in income and CPIs translate into the change in poverty incidence. Table 5 shows that poverty remains constant in all urban households but production workers, where headcount ratio increase by 1.96 percent. In the rural area, headcount ratio rises among production workers and professional group of households. However, the population below poverty line declines in the rural area but increases in the urban area. Resultantly, the decline in FKI harms Pakistan on the whole leading to a rise in poverty

incidence. The other two measures of poverty–poverty gap and severity indices- reduces among the relatively poorer group of households; agriculture and production workers households in the urban area and the agriculture and miscellaneous group of households in the rural area. Based on these two measures, poverty rises in rural and urban households and in Pakistan as a whole. This indicates that disparity among the households increases with a decline in FKI. If we compare the results of the first simulation with the results of the third simulation, it becomes clear that poverty increases with the reduction in FKI. We may conclude that the rise in poverty is due to declining FKI in Pakistan in the 1990s.

6. CONCLUSION

In this paper, we have examined the impact of foreign capital inflow and trade liberalization on macro aggregates in general and poverty in particular, using comparative static computable general equilibrium framework. The results suggest that foreign capital inflow generates demand for goods for investment purposes significantly. Resultantly, import-competing sector which produces investment goods (Machinery) expands. Overall, FKI has contractual effects on export-oriented sector and expanding effects on non-trading sectors generating 'Dutch disease effects'. A comparison of the effects on major exportable sector 'Textiles' and major import-competing sector 'Machinery' shows that FKI leads to inefficient use of resources. Whereas, FKI along with liberalization of trade in machinery benefits export-oriented sector, textile, and reduces 'Dutch disease effects'. This leads us to conclude that liberalization of capital goods offset the negative effects of FKI.

Foreign capital inflow hurts relatively poor households—production workers— and benefits agriculture households as measured by headcount ratio in the urban area. In the rural area, FKI hurts both agriculture and production workers households. The other two measures of poverty show that poverty increases among the relatively rich households in the urban area. However, the poverty gap and severity of poverty indices decline for all rural households. In aggregate, irrespective of poverty indicators, poverty increases in the urban area and decline in the rural area leading to a decline in poverty in Pakistan as a whole.

FKI along with cheap availability of capital goods reduce poverty more for urban households than for rural households. From this, we conclude that trade liberalization benefits urban household more. Poverty reduces more in this exercise in Pakistan as a whole. The decline in foreign savings hurts production workers in

the urban areas. Whereas in the rural areas, it negatively affects the professional group of households and production workers but benefits the miscellaneous group. However, the population below the poverty line still rises in the urban area and reduces in the rural area. Gap and severity of poverty rise in both rural and urban areas. Reduction in FKI increases poverty in Pakistan by all measures. This leads us to conclude that the rise in poverty in the 1990s was due to declining foreign saving in Pakistan. A comparison of the results of the first and the third simulation shows that the despite increase in inefficient use of resources FKI has poverty-reducing impact and reduces income disparity. The following recommendations can be made with reference to FKI and trade liberalization.

Trade liberalization in machinery increases the benefits of FKI. Therefore, the government should reduce tariff on machinery to boost the economy.

- FKI increases inefficient use of resources and produce dutch disease effects. Further analysis with disaggregated labour by skill level will be useful to explore causes of poverty incidence in Pakistan.
- These simulations in a dynamic framework would reveal more insights of the effects of FKI.

REFERENCES

Abrego, L. (1999) Trade Liberalisation and Foreign Direct Investment: An Applied General Equilibrium Model for Costa Rica. Working Paper, CSGR, Warwick, UK, 1-33.

Baldwin, R.E. (1971) Determinants of the Commodity Structure of U.S. Trade. *The American Review*, 61, 126–46.

Borts, G.H. (1960) The Equilisation of Returns and Regional Economic Growth. *American Economic Review*, 50(3), 319–47.

Oniki, H. and H. Uzawa (1965) Patterns of Trade and Investment in a Dynamic Model of International Trade. *Review of Economic Studies*, 32(1), 15–38.

Buffie, E. (1985) Quantitative Restrictions and Welfare Effects of Capital Inflows. *Journal of International Economics*, 19, 291– 312.

Carvalho, S. and H.White (1996) Implementing the Projects for the Poor what has been Learned? Directions in Development. Washington, D.C.: World Bank.

Cockburn, J. (2002) Trade Liberalisation and Poverty in Nepal: A Computable General Equilibrium Micro Simulation Analysis. Presented at MIMAP Meeting in Singapore, 1-38. Dervis.

Duclos, J.Y., A. Araar, and C. Fortin (2001) DAD-4: A Software for Distributional Analysis/Analyse Distributive. MIMAP Programme, International Development Research Centre, Government of Canada and CREFA, University of Laval.

Foster. J., Greer, J. and E. Thorbecke, (1984) A Class of Decomposable Poverty Measures. *Econometrica,* 52:3, 761–766.

Gwin, C. (2002) *IDA's Partnership for Poverty Reduction, An Independent Evaluation of Fiscal Years 1994-2000.* Washington, D. C. World Bank.

Haque, N. and R. Siddiqui (2017) Nominal and Effective Rates of Protection by Industry in Pakistan: A Tariff Based Analysis. *NUST Journal of Social Sciences and Humanities,* 3:1, 1-45.

Kemal, A.R. (1981) Substitution Elasticities in the Large-Scale Manufacturing Industries of Pakistan. *The Pakistan Development Review,* 20:1, 1-36.

Kemal, A. R., Z. Mahmood, and A.M. Ahmed (1994) *Structure of Protection, Efficiency, and Profitability. Pakistan Institute of Development Economics.*

Malik, S.J., M. Muhammad, H. Nazli (1989) An Analysis of Production Relations in the Large Scale Textile Manufacturing Sector in Pakistan. *The Pakistan Development Review 28:1,* 27- 42

Pakistan, Government of (1993) *Household Integrated Economic Survey-1990-1.* Islamabad: Federal Bureau of Statistics.

Melo, K. J. De, and S. Robinson (1982) 'The Anatomy of a Foreign Exchange Crisis: 1973-1977' Chapter 10 in a Book entitled 'General Equilibrium Models for Development Policy: A World Bank Research Publication, Cambridge University Press.

Pakistan, Government of (2005) *Pakistan Economic Survey.* Islamabad: Finance Division, Economic Advisors Wing.

Siddiqui, R. (1997) the Impact of Foreign Resource Inflow, Technology Transfer, and Trade on Poverty. Research Report (Unpublished).

Siddiqui, R., R. Siddiqui and Z. Iqbal (1999) The Impact of Tariff Reforms on Income Distribution in Pakistan: A CGE-Based Analysis. *The Pakistan Development Review,* 38:1,789- 804.

Siddiqui, R. and Z. Iqbal (1999) Social Accounting Matrix of Pakistan for 1989-90. Pakistan Institute of Development Economics, Islamabad. (Research Report No 171).

Siddiqui, R. and Z. Iqbal. (1999) Tariff Reduction and Functional Income Distribution in Pakistan: A CGE Model. PIDE, Islamabad. (MIMAP Technical Paper Series No. 10.)

Siddiqui, R. and A.R. Kemal (2006a) Remittances, Trade Liberalisation, and Poverty in Pakistan: The Role of Excluded Variables, in Poverty Change Analysis. PIDE Working Paper No. 1. Pakistan Institute of Development Economics, Islamabad.

Siddiqui, R. and A.R. Kemal (2006b) 'Poverty-reducing or Poverty-inducing? A CGE Based Analysis of Foreign Capital Inflows in Pakistan' PIDE Working Paper No. 2. Pakistan Institute of Development Economics, Islamabad.

Tamirisa, N.T. (1998) Exchange and Capital Controls as Barriers to Trade. IMF- Working Paper No. 81, 1-19.

Vos, R. (1993) International Capital Flows and Economic Adjustment in Developing Countries. International Policy Workshop, The Hague.

White, H (1992) The Macro Economic Impact of Development Aid: A Critical Survey. *The Journal of Development Studies*, 28:2, 163- 240.

White, H. (1996) How Much Aid is used for Poverty Reduction? *IDS Bulletin*, 27:1, 83-99.

Wood, A. (1998) Globalisation and the Rise in Labour Market Inequalities. *The Economic Journal*, 108, 1463–1482.