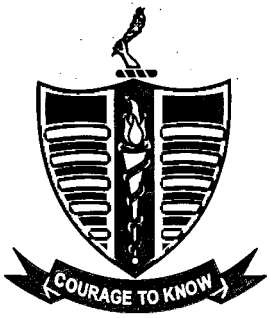
Volume XXXIV *2001* *N0 . 1 & 2*

GOVERNMENT COLLEGE

ECONOMIC JOURNAL



Department of Economics
Government College
Lahore - Pakistan

ISSN 0242-2815

GOVERNMENT COLLEGE

ECONOMIC JOURNAL

CONTENTS

Volume XXXIV ***2001*** ***No. 1 & 2***

OIL AND WATER DO MIX: THE CASE OF SAUDI ARABIA

Masudul Alam Choudhury* and Mohammad A. Al-Sahlawi**

ABSTRACT

The goals of attaining economic development and social wellbeing must go together in national socio-economic planning. The two are to be linked together by means of appropriate relations. Among the many items of life fulfilling needs in such a complementary perspective of socio-economic development is water resource. Because of its critical importance, appropriate water resource policies are to be implemented for sustaining an affordable water rate for all levels of use. Yet this should not put undue burden of government expenditure on the public purse. The balance between the provisioning of water resource as a basic need and sustainable government expenditure on it can be attained through a general equilibrium model of production in relation to water subsidy. Such a problem is examined in this paper for the case of Saudi Arabia, where petroleum production model, revenue and water rate are interlinked through appropriate subsidy policies.

INTRODUCTION

The study of economic development cannot be complete without addressing the deep social issues of life fulfilling needs (streeten, 1981). Among the many issues in this area is the central one of social well being. Such a well being objective is realized through distribution, security and entitlement of the basic needs of life. Various instruments of economic development are directed in attaining economic security to ensure that the citizens have sufficient means of fulfilling their essential needs (Levine, 1988). Such kinds of economic security should be guaranteed intergenerationally.

* Professor of Economics, school of Business. University College of Cape Breton. Sydney, Nova Scotia, Canada.

** Professor of Finance and Economics, Department of Finance and Economics, College of Industrial Management, King Fahd University of Petroleum and Minerals.

Water resource plays a central role within the context of socio-economic development and well being. A nation that guarantees this basic need adopts an important moral command with respect to preserving life and progeny within a healthy environment. Thus there appear linkages between economic development, in which water resource plays so central a role as a factor of production and the role of water-resource as a basic need for human wellbeing is recognized (Hussain, 1971).

The Sixth Development Plan of Saudi Arabia gives special emphasis on water resource development and management so as "to provide sufficient quantities of good quality water to meet the needs of the population, the producing sectors and other public services in a more efficient manner." (Govt. of Saudi Arabia, 1995). On the side of maintaining efficiency and productivity of production and use of water resources, the Sixth Development Plan aims at conserving water resources, particularly of non-renewable water resources and to sustain supply to meet future demand of water. In meeting these objectives the Saudi Government aims at increasing its extensive desalination efforts (Al-Sahlawi, 1999).

In a modern society the provision of water for all purposes—consumption and industrial use—must appear as a sustained input in the aggregate production function. (Coucri, 1998). In a general equilibrium perspective of the relationship between water resource and socio-economic development, water must establish a critical linkage in the production process across sectors, including the household as the important sector for studying well being.

In this paper we will show that the provision of water resource when guaranteed by subsidy derived from petroleum revenue in subsidizing a sustained fair price for water has contributed to the social well being component of economic development. This is why we claim that in the context of social and developmental relationship, oil and water *do mix* in the case of Saudi Arabia.

In the first part of this paper, we will conceptualize the interactive model involving an aggregate petroleum production function, revenue equation and water subsidy linkage with production. The formal model is thereby of the general equilibrium type. Such a model will explain the pricing policy of water resource as a critical factor in economic development and social wellbeing. In the second part of the paper we will explain the

nature of demand and supply curves of water in the presence of targeted subsidy rates arising from petroleum revenue. We argue that such a sustainable flow of subsidy would be required for maintaining the water rate for end user. In the third part of the paper we will provide limited empirical perspectives pertaining to some of the general equilibrium relations taken up in the conceptual part of the paper. The fourth section is a conclusion summarizing the results pertaining to our limited empirical observations in the light of Saudi Arabia's pricing policy on water in view of the general equilibrium model.

THE GENERAL EQUILIBRIUM MODEL: OIL PRODUCTION, OIL REVENUE AND SUBSIDIZING WATER RESOURCE

1. Oil Production Sector

The general equilibrium framework of the formal model comprises a two-sector model with linkages between them. In sector 1 crude oil production generates revenues. In sector 2 the petroleum revenue is injected into a pricing model for water input. The general equilibrium model comprising oil production and revenue, water subsidy and water rate is then closed up by linking the reverse flow of subsidized water resource into the petroleum production and revenue generation capability in sector 1.

The general equilibrium model with three equations explains in a simple way the sectoral linkage that should be encouraged for a balanced functioning of economy in the light of sustaining both its socio-economic development and social wellbeing objectives. In the absence of such a balance, subsidizing water resource by sheer government expenditure can put pressure on government spending to the detriment of price stability and economic efficiency. Cost inefficiency can then be caused by such an unsustainable provisioning of water resource, albeit that water would still be a basic need but a costly one to provision. Now sustainability of social wellbeing under subsidy inefficiency in the absence of balanced sectoral linkage between the petroleum production and revenue model and the derived input of water in this production specification is lost.

The Formal Model

Let, $Q = F(K,L,W)$ .....(1)
be the aggregate petroleum production function
The cost and revenue equations respectively are,

$C(Q) = r.K + w.L + Pw.\ W;$ .....(2)

$R(Q) = p_{oil}\ .\ F(K,L,W).$ .....(3)

The following symbols are defined in the above equations.
Q denotes aggregate output of crude oil
R(Q) denotes oil revenue.
C(Q) denotes cost of crude oil production as a function of output level.
K denotes the capital stock required in petroleum production.
L denotes the stock of labour required in petroleum production.
W denotes the volume of water resource required in petroleum production.
r denotes the price of capital.
w denotes the wage rate.
p_w denotes the water rate in the demand and supply.
p_{oil} denotes spot price of oil (e.g. Arabian Light).

In the above equations, p_w and p_{oil} are set exogenously. Thus through the revenue and subsidy relationship to be shown below, the price variables act as policies and play important role in socio-economic development. Consequently the ratio, (p_w / p_{oil}) is a policy parameter.

Since the profit function is not usual to consider in the case of petroleum production because of its public ownership in Saudi Arabia, therefore, we will treat the alternative ratio,

$$[R(Q)/C(Q)] = p_{oil}\ .\ F(K,L,W)/[r.K + w.L + p_w.\ W] = a. \quad ....(4)$$

'a' is a sustainability ratio for petroleum function in view of the need to sustain the levels of socio-economic development and social wellbeing. The 'a'-ratio must therefore be importantly maintained at a stable level. Several forms of the aggregate production function can be specified. In our case of treating complementarity between the goals of socio-economic development and social wellbeing, it is important to consider such complementarity among the factors of production. Contrarily the existence of marginal substitution among the factors, K,W,L, adversely affects one or other factors by making them compete with each other.

The result then is an inequitable utilization of factors, resources and distribution of factor incomes.

In our complementary type production function the objective is to attain economic efficiency and profitability simultaneously along with distributive equity. Underlying this perspective of socio-economic planning is an appropriate kind of technological change. In this technological choice productive factors interrelate in establishing equitable distribution of resources among all of them. A sharing of resources for attaining overall economic efficiency and distributive equity is thus put into effect by appropriate choices and policy variables.

To address the above kinds of conditions we choose the Cobb-Douglas Production Function with increasing returns to scale (Henderson & Quandt, 1958).

In reference to the Cobb-Douglas Production Function with increasing returns to scale we re-write expression (5) as,

$K^{\alpha}L^{\beta}W^{\gamma} = a.\ [(r/p_{oil}).\ K + (w/p_{oil}).\ L + (p_w/p_{oil}).\ W]$.

Here, $\alpha > 0$, $\beta > 0$, $\gamma > 0$, are the factor elasticity coefficients of output, with $\alpha + \beta + \gamma + > 1$, indicating increasing returns to scale in oil production.

We interpret this equation as follows: The value of total petroleum output is proportionately distributed in a sustainable way among factor inputs according to their real prices measured relative to petroleum price. Thus, petroleum price plays an important exogenous role in determining payments. For complementarity among factors to exist their respective prices must move in the same direction together. Hence the real factor prices, including importantly the price of water as shown, must remain fairly stable and monotonic in the same direction among the factors at given oil prices.

The coefficient "a" must be stable or be increasing on a time trend because it plays an important role in the measurement of revenue impact relative to cost of production. Stability of the coefficient 'a' will imply that revenue impact among factors remains sustainable and equitable in the given production function.

For factor complementarity and sustainability property of "a"-ratio to exist the coefficients of the Cobb-Douglas production function must satisfy the relationship,

$$\alpha + \beta + \gamma > 1,\ \alpha > 0, \beta > 0,\ \gamma > 0.$$

2. Water Subsidy and Oil Revenue

A portion of the oil revenue, say "b" is directed as subsidy, S, for maintaining a stable water price (warter rate) , p_w. That is,

$$S = b.R(Q) \qquad \ldots\ldots\ldots(7)$$

$$p_w = f(S) = f(b.R(Q)) = f(b.p_{oil} \,.\, F(K,L,W)) \ldots(8)$$

It is noted from expression (8) that petroleum output, Q, and price. p_{oil} should move in a way that maintains a healthy flow of oil revenue, $R(Q) = p_{oil} \,.\, F(K,L,W)$.

Consequently, S remains a sustainable amount of subsidy. Furthermore, let,

$$p_w = f(S),$$

be in the linear form with a negative coefficient for S in relation to p_w. The following results are obtained:

1. $dpw/dS < 0$, but if S itself remains steady, then $dP_w \approx 0$.....(9)

2. After logarithmic differentiation of the expression,

$$S = b.\ p_{oil} \,.\, F(K,L,W) = b.p_{oil} \,.\, K^{\alpha} L^{\beta} W^{\gamma},$$

We obtain, $g(S) = g(p_{oil}) + \alpha.g(K) + \beta.g(L) + \gamma.g(W)$. ...(10)
g (.) denotes the percentage rate of change of the variables inside(.). Expression (10) points out that a given amount of subsidy would be needed to sustain the complementary use of productive factors in the aggregate oil production function. This is attainable by a stable flow of oil revenue relative to the cost of oil production, as shown above.

Consequently, in expression(10) it is $g(p_{oil})$ that would determine the critical relationship for this revenue-subsidy sustainable relationship in reference to socio-economic development.

3. Furthermore. on writing, $p_{w'} = p_w - A = B.p_{oil}.\ K^{\alpha}L^{\beta}W^{\gamma}$, where A and B are coefficients, we obtain,

$$g(P_{w'}) + \alpha.g(K)+\beta.g(L)+\gamma.g(w)$$

Clearly then, $g(p_{w'})= g(S)$. This means that the water rate and subsidy are inversely related up to a given amount of the subsidy. That is, such a subsidy level sustains a stable water rate. This result points out that stability of the subsidy level must be sustained in order to maintain a given scheme of water rate.

3. Closing up the Petroleum Production, Revenue and Water Subsidy Model: Revenue Flow of Subsidized Water as a Factor input in the Aggregate Oil Production Function

Expression (8), $p_w=f(S)=f(b.R(Q)) =f(b.p_{oil}.F(K,L,W))$, helps to close the model between water pricing, the subsidy on it, oil revenue and oil production. From the stability of $R(Q)/C(Q)=$ 'a', it is clear that $p_w=f(s)=f(b.a.C(Q))$. That is, $S=a'.\ C(Q)$, where, $a'=a.b>0$. Thus, $S=a'[r.K+w.L+p_w.W]$. This means that a proportion of the payments to factor payments in the oil production function is maintained by the use of water subsidy. This is due to the fact that since subsidy in water returns the stabilizing effect of water rate to the aggregate oil production function, therefore, by the effect of complementarity among the productive factors, all the factor payments benefit from this reverse input of water resource in production. The resulting cost stabilization now contributes to the stable 'a'-ratio, for $R(Q)/C(Q) =a$.

We now have a circular interrelationship among oil production, oil revenue, water subsidy and water rate. Into this interrelationship is introduced the socio-economic developmental effect of complementarity among the productive factors, including the reverse flow of subsidized water resource as a factor of production. The social wellbeing aspect of this developmental impact is reflected in the stable water rate that is made possible by a steady flow of oil revenue relative to the cost of oil production and by the channeling of some of this revenue into water subsidy. Finally, complemtarity among productive factors contributes to

cost stabilization by maintaining stable complementary factor prices for given levels of cost of production. This in truth sustains R(Q)/C(Q) =a.

DIAGRAMATIC EXPLANATION OF THE CIRCULAR MODEL

The closed model of aggregate oil production and revenue water pricing and subsidy is required to establish the feedback relations that exist between the social and developmental consequences of water subsidy and its sustainability in the Saudi case. This means that the revenue generating capability relative to cost of crude oil production must be sustained in order to sustain the subsidy derived from oil revenue. The circularly closed general equilibrium model is explained by means of figure 1.

The systemic feedback loops show in figure 1 are self-explanatory. One notes that the stable levels of oil production and revenue flow in relation to the cost of crude oil production make the sustained water subsidy possible. This supports steady water rates. Thus we have the pair, (S,P),as shown.

Next these parameters enter the goals of economic development by supporting the complementary relations among K,L,W in the increasing returns to scale Cobb-Douglas production function. The stable water prices caused by water subsidy adds to social wellbeing, water being a basic need in all aspects of life. The developmental and social wellbeing effects thus become interactive in the general equilibrium feedback.

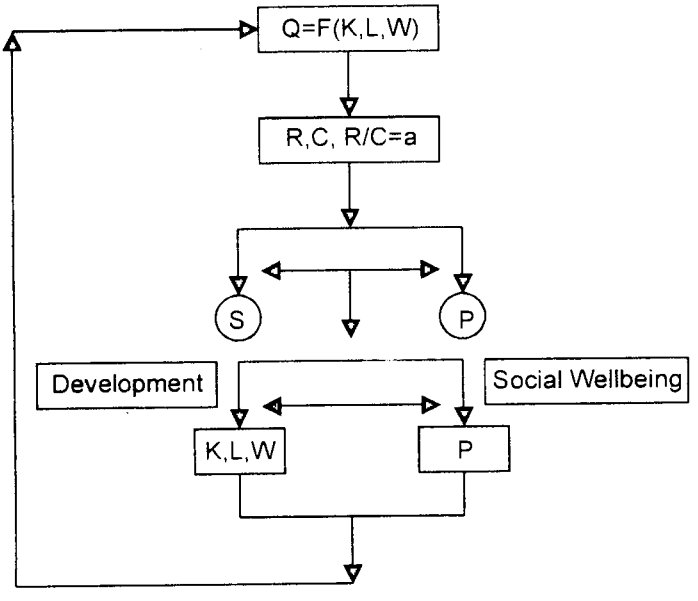
Finally, the reappearance of water, and hence its subsidized price in the petroleum production function, regenerates the system of feedback loops. This closes the model in a circular fashion between production and subsidized water resource with complementarity among the factors of production, including subsidized water resource.

The circular use of water resource in boosting up the productivity of economic production in Saudi Arabia has been emphasized in the Sixth Development (1995). The aim is "to raise labour productivity in the water sector and to train Saudi manpower to adapt to the continuous development in water technologies". In our conceptual framework of the general equilibrium model we have shown that water resource when appropriately subsidized to maintain its price level supports a stable cost of production in the petroleum sector. This in turn favours other factors of production, leading to stability in the revenue/cost-ratio.

The most critical parameters for such sustainability in the closed and circular feedback are the stability of the revenue-cost ratio, 'a' and the complementary nature of the production function, Q =F(K,L,W) among the productive factors. For policy variables we must also examine the relative movements in water and oil prices, (p_w/p_{oil}). These effects in principle provide first, the effect of sustainable oil in maintaining water subsidy. Secondly, by establishing factors complementarity, water subsidy becomes an important element of social wellbeing. Thirdly, they provide policy directions by using the policy parameters, (p_w/p_{oil}).

The developmental and social wellbeing effects are thereby realized by the complementary nature of factors in the production function. In this case, increasing returns to scale in oil production are indicated by the case of $\alpha + \beta + \gamma > 1$, with $\alpha > 0$, $\beta > 0$, $\gamma > 0$. Increasing returns in turn are reinforced by the stabilization of production Cost through Complementarity among factors. These effects cause the revenue cost ratio to remain stable. Cycles of circular causation are thus established in such a development-wellbeing interrelationship between oil production, revenue and water subsidy.

Figure 1: Circularly closed feedback in petroleum production, revenue generation and water subsidy model in the light of development and social wellbeing impact.



DETERMINING SUBSIDIZED WATER RATE IN THE GENERAL EQUILIBRIUM MODEL

From the negative relationship of water rate to subsidy as a matter of social policy, we note that there is a limit to the extent that water rates can be subsidized. This follows the need in our oil production model to maintain the revenue/cost ratio and stabilize the cost of oil production. The pricing schedule for water under different impacts of subsidy in the overall production and revenue system, as shown in figure 1, now becomes a critical element. This is explained by means of figure 2.

In the case of water demand shown by p_w, W)-relations, we contend that there will be shifting kinked demand curves, such as D_1 D_1 to D_2 D_2, with kinks a_1 shifting to a_2. This is the result of injecting subsidy in support of a socially acceptable water pricing policy (MacDonald et al, 1999). These kinks convey social decisions that must be taken up periodically to set appropriate subsidy and water rates. By our result in the case of Saudi Arabia the water subsidy must have remained constant over periods of time, since water prices have remained unchanged for the periods 1986-1994, when the water rate was on average SR3 per cubic meter, and for the period 1994-2000, when the water rate was SR5 per cubic meter.

The subsidy effect in the shifting kinked demand curves for water impacts upon the petroleum productivity curves, Q_1 and Q_2. This causes the productivity curves to shift upwards, as shown, by R_1 and R_2 under the petroleum demand curves in the (p_{oil}, Q)-quadrant.

Since the revenue cost ratio must be stable in our model, therefore, the petroleum demand curves must shift outwards, as shown, along with the shifts in the petroleum productivity curve of water.

The circular feedback model is completed by recycling the effect of oil prices (i.e. revenues) on the setting of water rates in terms of water subsidy. The effect of sustained oil prices on stable water rates is shown in the p_w'p_{oil} –quadrant by the points d_1 moving to d_2. The near flat relationship between p_w and p_{oil} indicates a fairly stable water rate on a time trend related with increasing oil prices.

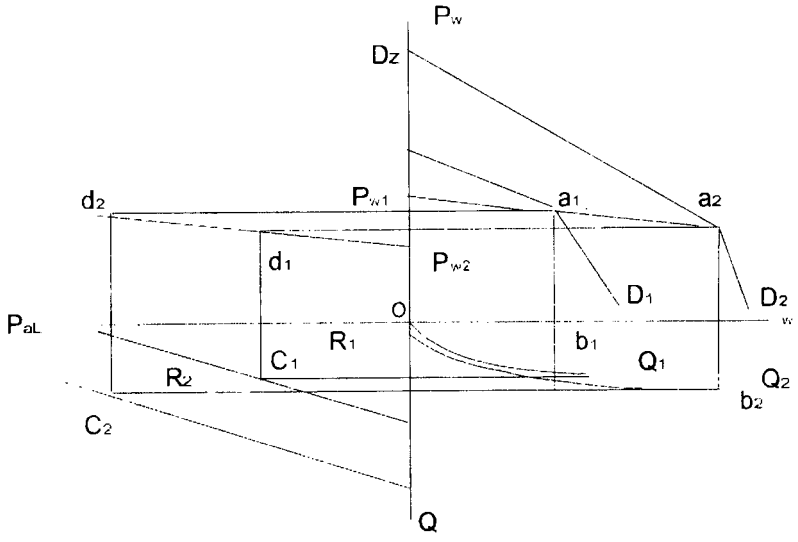
The points in the respective quardrant, (a_1, a_2),(b_1, b_2), (c_1, c_2),(d_1, d_2), are interrelated, as shown. Such points are policy-induced on the basis of three important effects. These are namely, maintaining revenue/cost stability, the effect of this in sustaining water pricing

subsidy and water rate, the resulting complementarity among the productive factors (K,L,W), and the stability in the policy parameter, (p_w/p_{oil}). These effects in turn stabilize production costs and the revenue/cost ratio. Thus once again the circularly closed relationship of the petroleum production, revenue and water subsidy model of economic development and social wellbeing is established.

It is precisely because of this nature of policy-induction of the mentioned geometrical points that methodologically we cannot consider an output-maximization objective criterion function for the oil production model. Instead, we find that a simulation model was inherently present in our general equilibrium model. In this regard, expressions (6) and (8) show that assigned values of p_w relative to p_{oil} must be continuously fed into these equations to generate petroleum output, and thereby, revenue/cost stability, level of subsidy and water pricing. The simulative nature of the General Equilibrium Model was brought out in figure 1.

We now infer from the almost fixed nature of the points (a_1, a_2) in figure 2, that water rates administered by social policy under a subsidy derived from oil revenue becomes an elastic supply curve. Thus water can be seen as an economic necessity in the supply function. This function is shown by the curves SS in (p_w, W)-quadrant. Its elastic but slightly negative slope indicates the existence of increasing returns to scale in the aggregate oil production function. This is also a condition required to maintain sustainability between production, revenue/cost ratio, subsidy and water pricing.

Figure 2: Subsidized water in the petroleum production, revenue and water subsidy model of development and social wellbeing.



EMPIRICAL SUPPORT FOR THE OIL REVENUE AND WATER PRICING-SUBSIDY RELATIONS.

In order to support our conceptual formalism on the relationship among oil production, revenue and water pricing model vis a vis subsidy, we need to study the following critical conditions by means of data in table 1. The principal indicators to observe for stability are the R(Q)/C(Q)=a-ratio. If this ratio remains fairly constant on a time trend then our inferences on stable crude oil output and revenue, stabilized cost and sustained oil prices will follow, and vice versa, in view of circular causation in the general equilibrium model. The level of water subsidy as percentage of oil revenue is an inferred result from estimates the stability of the 'a'-ratio, water rate and oil price will be used to infer the social and development effects of subsidy derived from sustained flows of oil revenue. The analysis is explained in figure 2.

Empirical results on stability relations in oil production and water pricing in Saudi Arabia

Table 1 gives the secondary data on the basis of which table 2 is calculated and estimation results are interpreted.

Table 1: Petroleum and pricing data: water and oil

Time	Petroleum Output[1] Q ('000b/d)	Spot Price Arabian Light[2] p_{oil} ($/SR)	Petroleum Revenue, R(Q) (Millions SR)	Cost of production (Gross Capital Formation[3]) C(Q) (Millions SR)	Avg. Water Rate, p_w/cub.meter (200-300+Cub. metr) (SR)
1990	5674	20.82	118,142	--	3.00
1991	6670	17.43	116,266	--	3.00
1992	7083	17.94	127,077	--	3.00
1993	6758	15.68	105,976	--	3.00
1994	8045	15.39	95,505	8,084	5.00
1995	8023	16.73	105,728	14,768	5.00
1996	8102	19.85	135,982	8,536	5.00
1997	8329	18.80	159,985	9,088	5.00
1998	8033	12.24	79,998	9,231	5.00

Sources: various issues of OPEC Bulletin and Annual Report of Saudi Arabia Monetary Agency, 1999. water rates are obtained from the Department of Water and Sewage, Ministry of Agriculture, Riyadh.

1. Output is measured in thousands of barrels of crude oil.
2. We denote spot prices of Arabian Light.
3. Gross caption formation is treated as a proxy for cost of crude oil production.
4. The values of oil production for the period 1990-94 have been estimated by Revenue/Price of Arabian Light.
5. The water rate for 1994 is kept at 1995 level of SR 5.00 per cubic meters of water.
6. Revenue for 1991 is estimated from a linear estimated equation (Rev = 116,395-64.2882t).

Table 2: Computed revenue/cost and price ratios

Year	1994	1995	1996	1997	1998
A=R(Q)/C(Q)	11.81	7.16	15.93	17.60	8.67

Average a= 12.23

Year	1990	1991	1992	1993	1994	1995	1996
P_w/p_{oil}	0.1441	0.1721	0.1768	0.1913	0.1949	0.2989	0.2519

Year	1997	1998					
P_w/p_{oil}	0.2660	0.4098					

Average = 0.3
Computed from Table 1
Estimated time-trend equation for 'a'-ratio (Y):

Y= 10.9860 + 0.4160.t
(2.367) (0.2558)
Level of significance 81.5%
R^2= 0.0213; DW = 2.323

Estimated time-trend equation for (p_w/p_{oil})-ratio (Y):

Y= 0.100453 + 0.267050.xt
(3.31073) (4.95286)

Significance Level (%) 97.7 99.8
R^2= 0.7780; DW=2.16588

Some interesting results can be read off table 2 with respect to our theoretical inferences. In both cases we note that there is a fair degree of stability of the estimated ratios ('a'-ratio and price-ratio, (p_w/p_{oil})). Our theoretical inferences on the stability of revenue flows in support of maintaining a regular flow of subsidy for water and its linkage in the general equilibrium production model, is established. The short time period of available data on the required variables, particularly for the cost of production series (gross capital formation) makes the corresponding results only illustrative in our study.

The estimated time-trend equation for 'a'-ratio shows that about 41.60 percent of the change in 'a'-ratio is explained by time trend. This is reliable at the 81.50 percentage level of significance according to t-statistic. Hence, the estimated value of the 'a'-ratio is close to 11.00 on a

trend. Because of the short period of time, 1994-1998, the estimated equation shows low goodness of fit by the R^2 value. The value of DW – statistic shows no serious autocorrelation in this estimated equation.

With regards to the time-trend on water price relative to oil price we note that only 2.67 percent is estimated to be due to change in this ratio over time. Thus the relative price policy parameter, (p_w/p_{oil}), is found to be stable around 0.100453 in the long-run (between 1990-1998). The time-trend estimate is reliable at the 99.8 percentage significance level according to t-statistic. There appears to be no time-series errors due to autocorrelation of the error terms. The R^2 value of 0.7786 indicates a fairly good linear fit for the estimated equation over the long-run.

In summary, the empirical results for the period 1994-98 for which consistent data are available indicate a fairly stable trend for the a-ratio (=R(Q)/C(Q). The (p_w/p_{oil}) policy parameter is also stable and low. Thus increasing oil prices on a trend subsidize water rate to a stable level, while the stable 'a'-ratio is casually related with factor complementarity and reverse flow of water resource in the aggregate oil production function.

Policy Conclusion The formulation and theoretical analysis of a General Equilibrium Model in oil production and revenue and the sustained effect on water subsidy and rates establishes a complementary framework among factors. One of these factors is the reverse flow of subsidized water. This along with factor complementarity stabilizes the cost of production. Such a stabilization of cost versus revenue is both theoretically and empirically proven in our General Equilibrium Model. The circular flow of resources among factors in the aggregate production function of oil establishes the innovative specification model of a type that is not of the neoclassical genre. Here extensive complementarity prevails causing cost reduction through factor price stabilization (Choudhury, 1996)

The empirical section of the paper establishes many of the complementary, sustainable and wellbeing implications of our General Equilibrium Model. Of particular importance to note here is the nature of kinked demand curves for water resource. This phenomenon was explained by means of the policy nature of water rate based on oil price movements. In actual case for Saudi Arabia we find that between the years 1986 and 2000, there were two major re-setting of water rates. Between 1986 and 1993 water rate remained at the average of SR 3.00

per cubic meters between 200-300 cubic meters of usage. Between 1994 and 2000 then new water rate was set at SR 5.00 per cubic meter for the same usage level. The policy effects of such rate setting are explained by the kinks on the oligopoly type demand curves for water and by the slightly positive shape of the (p_w/p_{oil})-curve in quadrant 2 of figure 2 (Mansfield, 1985). In this way, both p_{oil} and p_w can be considered as policy variables and their ratio, p_w/p_{oil}, can be seen as a policy parameter.

The last point mentioned above accords strongly with the aim of the Sixth Development Plan of Saudi Arabia with respect to the use of water resource for the sustenance of wellbeing in all sectors of the economy. This aim is a long-term sustained goal of the Saudi Arabia Government. The Sixth Development Plan mentions the following directions along which the water resource policy will be pursued (1995):

In the area of general wellbeing while treating water as a basic need the plan says, "water should be considered as the most basic and valuable resource, and as an important factor in measuring the economic efficiency of public and private sector projects."

To keep up with the supply of water resource to all end-users the Saudi Government aims at attaining the following measures (Sixth Development Plan, 1995 p. 191): "the water studies program will be resumed to update the hydrological information on water aquifers, and the water potential studies for some areas. Rules will be established for the operation and maintenance of existing water resources in order to preserve their productive efficiency." The implementation of water projects will be continued, while giving priority to the population's need for potable water. "Expanded use will be made of reclaimed waste for agricultural and recreational purposes, and its potential use for industrial purposes will be studied.

One the issue of productivity and efficiency of productive factors being utilized in the water resource development sector the Sixth Development Plan points out the following direction: "Suitable training programs will be prepared for the manpower working in this sector. "In terms of the closure of the General Equilibrium Model by reverse flow of subsidization water we note here the expected effectiveness on stabilization of cost of production and stable supply of water that can be generated by the implementation of such a program. Consequently, the cost stabilization effect of the resulting sustained supply of water and of factor productivity on cost control can be transmitted to the petroleum

aggregate production function. Thereby, the R(Q)/C(Q)= 'a'-ratio can be maintained at long-term stable level.

On the matter of a step-wise need to re-set water rates periodically so as to contain unwanted excessive pressure on Governmental expenditure in water resources, the Sixth Development Plan points out the following measure : "Regulations and legislation with respect to the organization of water consumption for all purposes and on an economic basis will continue to be issued, in order to promote the conservation of water resources." "A revenue collection program will be developed according to a system of water consumption tariffs for various consumer categories to provide financial resources that are sufficient to cover the operating expenses of water production and distribution." These points are consistent with the inferences derived from our General Equilibrium Model.

The social wellbeing connection between water and oil in Saudi Arabia is thus found to be a sustainable relationship over time albeit periodic re-setting of water rate in relation to the movement of oil prices and revenues. Subsidy on water in Saudi Arabia is thus closely related with the flow of oil revenue, *ceteris paribus*, within the bounds of economic efficiency, productivity and social wellbeing, jointly required next to the back water supply at adequate levels. Thus we claim that *water does mix with oil* in Saudi Arabia in the General Equilibrium Model of causality among productive relations, economic productivity and social wellbeing, as formalized in this paper.

REFERENCES

Al-Sahlawi, M.A. 1999. "Seawater desalination in Saudi Arabia: and demand projections", Desalination, 123,pp. 143-147.

Choudhury, M.A. 1996. "Why cannot neoclassicism explain resource allocation and development in the Islamic political economy?" in E. Ahmad ed. Role of Private and Public Sectors in Economic Development in an Islamic Perspective, Herndon, VA: International Institute of Islamic Thought and the Association of Islamic Social Scientists.

Henderson, J.M. & Quandt, R.E. 1958, Microeconomic Theory: A Mathematical Approach, New York, NY: McGraw-Hill.

Hussaini, S.W.A. 1971, Principles of Environmental Engineering System Planning in Islamic Culture: Law, Politics, Economics, Education and Sociology of Science and Culture, Ph.D. Dissertation, Stanford University.

Levine, D. 1998. Needs, Rights, and the Market, Boulder, CO: Lynne.

Macdonald. K. 1999, Systems Economic Analysis of Water Conservation in Sydney, Nova Scotia, memo. Sydney, Nova Scotia: Atlantic Canada Actions Program.

Mansfield, E. 1985. Microeconomics, New York, NY: W.W. Norton.

Streeten, P. 1981. Development Perspective. New York, NY: St. Martin's Press.

Government of Saudi Arabia, Ministry of Planning, 1995. Kingdom of Saudi Arabia Sixth Development Plan, 1415-1420AH/1995-2000AD.

ESTIMATION OF DISTRIBUTION OF INCOME AMONG VARIOUS FORMAL AND NON-FORMAL EDUCATIONAL GROUPS

MEHBOOB AHMAD*

The relationship between education and income inequality is well established. It is seen that inequality decreases with the increase in the level of education. Using HIES data it has been shown that in Pakistan, there is more equality among high education groups compared with low educational groups. This negative relationship between education and inequality is shown both for formal as well as for non-formal education.

INTRODUCTION

There have been numerous studies related to distribution of income in Pakistan. But most of these are confined to calculation of various measures of inequalities including Coefficient of Variation, Logarithmic Variance. Theil L, Gini Coefficient, Lorenz Curve etc. for all Pakistan as well as for the provinces of Pakistan including refinement at rural/urban level. These types of study include Khadija Haq (1964), Bergen (1967), Mehmood (1984), Ercelawn (1988), Ahmed and Ludlow (1989), etc. For example, Khadija Haq (1964) measured inequality in personal income of tax payers in the urban areas of Pakistan. Bergen (1967) and Mehmood (1984) utilized Household Integrated Economic Survey (HIES) data to calculate income inequalities in Pakistan. Apart from quantifying degree of income inequalities, Mehmood (1984) analyzed the consequences of economic changes on income distribution at different points in time. Main purpose of Ercelawn's (1988) paper was to evaluate inferences of changes in rural inequality. Ahmed and Ludlow (1989), like Ercelawn, used HIES data to estimate inequality of income and expenditure of household by using Coefficient of Variation, Logarithmic Variance, Gini Coefficient, Atkinson Index, and Lorenz Curve.

Jeetun (1978) was more concerned about the consequences of economic growth on level of inequality. He also estimated trends in inequalities in over all Pakistan as well as in rural and urban areas of Pakistan. Chaudhary (1982) tried to find out impacts of Green Revolution on income inequalities in the West Pakistan. Main objective of the study by

* Assistant Professor, Department of Economics, Allama Iqbal Open University, Islamabad.

Cheema and Malik (1984) was to find effects of different income policies, that increase the relative income share of the poor, on the composition and level of employment in Pakistan. Kruijk and Leewan (1985) examined the incidence of poverty and inequality in Pakistan in the 1970s and also decomposed inequality into various components in order to identify the location, the magnitude and the change of various inequalities. Kruijk (1986) while utilizing HIES 1989, analyzed the incidence of inequality between and within urban and rural, between and within occupational groups in the four provinces of Pakistan.

Kemal (1994) examined the impacts of adjustment period of Pakistan since the late 1970s, on efficiency and equity. Jaffrey and Khattak, while utilizing HIES 1990/91, measured and analyzed inequality and poverty in Pakistan together with their historical trends. They also analyzed the phenomenon of income inequality and poverty and their relation to the distribution of assets and employment. Chaudhary (1995) computed and analyzed income inequality in Pakistan as well as in its provinces broken down to rural urban level. He not only studied the extent of inequality in Pakistan but also its change over time measured on the basis of per capita income distribution involving households.

In spite of the existence of a large number of studies related to distribution of income in Pakistan, very little attempt has been made to decompose income inequalities to inequalities due to occupation, education etc. This study attempts to explain level of inequality due to different level of education. In this connection two types of education is considered viz. formal and non-formal or vocational. In other words this paper considers level and extent of inequality among various educational formal as well as non-formal groups. Apart from this we also calculate measures of inequality using household as well as persons as frame of reference details of which are presented below.

DATA BASE

The main feature of this study is that it is based on individual household data of the Household Integrated Economic Survey (HIES) 1992-93 being conducted by the Federal Bureau of Statistics. At the time of this study Household Integrated Economic Survey 1992-93 was the latest data available on tapes. The universe of this survey consists of all urban and rural areas of the four provinces of Pakistan defined as such by 1981 Population Census excluding FATA, military restricted areas, districts of Kohistan, Chitral, Malakand (Protected Area) and PATA of NWFP. The population of excluded areas constitutes about 4% of the total population.

SAMPLE COVERED

Due to various reasons, out of 14,976 households, 382 households could not be numerated for various reasons such as non-contact, locked etc., thus the results of this survey are based on 14,594 households.

PACKAGE USED

The package used to calculate measures of inequality are Statistical Package for Social Sciences (SPSS).

HOUSEHOLD VS PERSONS AS FRAME OF REFERENCE

The utility and soundness of any exercise relating to estimating and analysis of income inequalities not only depends on the choice of the package of inequality indices but also on the choice of some appropriate income receiving/consuming unit(s). It is well established and highly recognized fact that household is the most appropriate and most commonly used frame of reference for a meaningful analysis of income distribution. That is why it is almost exclusively used as basic unit of measurement in surveys etc. Moreover, in any given society/sector there is a normal household size and most of the households (in terms of their size) fall around this 'normal' household. For example, in a country like ours the normal household size is six and most of the households (size) fall within close range of this figure. Apart from this it must be remembered that in almost all societies in general and Muslim in particular, inequality among households is more important than inequality among individual persons within or between households.

There is no doubt that household is the most commonly used frame of reference. But according to Kuznets (1976) "it makes little sense to talk about inequality in the distribution of income among families or households by income per family or household when underlying units differ so much in size. A large income for a large family may turn out to be small on a per person or per consumer equivalent basis, and a small income for a small family may turn out to be large with allowance for the size of the family" (Kuznets,1976,87).

The point is that there is no sense in assigning equal weight to a single person household and a household consisting of say ten or more members. The traditional framework which treats households as equal units regardless of their size and composition grossly distorts the true image of

the distribution of income and makes the level of inequality look like what it really is not.

In view of the above arguments, an attempt is made to calculate Gini Coefficient as a measure of inequality using both households and individuals as frame of references. Ours is not the first attempt in this direction. Number of other writers have calculated various measures of inequalities for countries of their choice using both households and individuals as frame of reference. These include Kuznets (1963,1976), Ranadive (1965), Ojha (1971), Kumar (1974), Henry (1975), Hsia and Chou (1978), Visaria (1980), Data and Meerman (1980), Choudhry (1982,1984,1995) and many others.

INEQUALITIES AMONG VARIOUS EDUCATIONAL (FORMAL) GROUPS

It is highly recognized and well established fact that education plays very important role in the reduction of poverty and inequality in any society. By simply looking at statistics being published by various international organizations, we can observe a very close relationship between equality and level of education. Many countries could be quoted which have high level of literacy and also equality. Good example is newly developed countries of the Far-East including S. Korea, Singapore, Taiwan and Hong Kong. These are some of the countries, which have almost 100% literacy with highly educated and skilled manpower, but at the same time there is very high degree of equality in these countries.

It is not only the comparisons of different countries that have shown a close relationship between level of education and degree of equality but this relationship has also been observed within individual countries. In other words it has been observed that within an individual country, more equality is observed among the educated households/persons compared with uneducated households/persons. This relationship could also be seen, in case of Pakistan, by looking at table No 1 below. In the table 1 (a) Gini coefficients are calculated on the basis of distribution of household by household income. The table shows a perfect negative relationship, with minor exception at matriculation, between levels of education and values of Gini coefficients. As we move from no education to higher and higher level of education, values of Gini coefficients fall smoothly until college education and then falls by full one point as we move from college level to university level education.

While examining the table in detail, we can see that degree of inequality at zero level of education (Gini=0.379) is very close to the national level of inequality. But as we move to the group of people with primary level of education the inequality falls as shown by the values of Gini coefficient, which falls from 0.379 to 0.353. A minor exception to the falling trend is shown at matric level of education where Gini coefficient shows a small rise (to 0.362 from 0.353) from primary level of education. Movement from matriculation to college level of education leads to fall in the value of Gini coefficient from 0.362 to 0.322. This shows that compared with all other groups the people with college education have better distribution of income among themselves. But the group of people with university degrees show a very high degree of equality. Among this group of people there is very little income inequality as shown by the very small value of Gini coefficient of 0.224. In fact even to compare with college education group, university education group shows a very high degree of equality among its folks. The fall of Gini coefficient by full one point from 0.322 to 0.224 shows two things (1) the importance of education in reducing income inequality and (2) that high educated group in Pakistan is much more uniform and homogenous in terms of income, compared with any other group in our country.

The Gini coefficients presented in table 1(b) are based on distribution of persons by household income. The table 1(b) is no more different from table 1(a). Falling trend in Gini coefficients is observed as we move from low level of education to higher and higher level of education. Apart from this when we move from household based data to persons based data the values of Gini coefficients fall throughout. This happens in accordance with our expectations but this fall is more profound in some cases than the others. This can be seen from table 1(c). Highest fall in Gini coefficient is recorded, as expected, by the no education group. It means that their incomes are more human labor based than any other group's income. The next is primary level education group and so on. A perfectly smooth falling values of Gini coefficient is seen as we move up the higher education level groups. In other words higher the education level group lesser the human labor based income. In this case inequality between the two households does not reflect the number of people living in those households rather it reflects the difference in the level of earnings of the heads of households. For example inequality found (which is very small) between the two households, in university education group, reflects the difference in the level of earnings of the heads of the respective households.

Table 1 (a)
Measures of Gini Coefficients (Education) Based on Distribution of Household by Household Income. HIES 1992/93

Level of Education	Gini Coefficient
No education	0.379
Primary	0.353
Matric	0.362
College	0.322
University	0.224

Table 1(b)
Measures of Gini Coefficients (Education) Based on Distribution of Persons by Household Income. HIES 1992/93

Level of Education	Gini Coefficient
No education	0.242
Primary	0.236
Matric	0.262
College	0.274
University	0.200

Table 1(c)

Level of Education	Difference in Gini Coefficients
No education	0.137
Primary	0.117
Matric	0.100
College	0.048
University	0.024

INEQUALITIES AMONG VARIOUS EDUCATIONAL (vocational) GROUPS

It is not only the formal education but vocational education also plays important role in the improvement of distribution of income in a society. This can be seen from table 2(a) where Gini coefficients presented are based on distribution of household by household income. The table shows higher level of inequality among the group with no vocational education as shown by Gini coefficient of 0.389 whereas lowest level of inequality is observed among one to two years vocational education group with Gini coefficient of 0.289. Even though there is general trend of declining Gini coefficients as we move towards higher and higher level of vocational education, but this trend is not very smooth. As we move from no vocational education to less than one and then one to two years of vocational education, Gini coefficient falls from 0.398 to 0.361 and then to 0.289. However, it rises again to 0.339 with two to three years of vocational education and then still rises to 0.345 with level of vocational education amounting to three to four years. At the highest level of vocational education (four years plus) Gini coefficient falls to second lowest in the table i.e. it falls to 0.298. The four plus vocational education group is more in line with the university education group in table 1(a). When we move from household based data to persons based data in table 2(b), Gini coefficients fall without exception. This fall, however is not as smooth as we observed in case of formal education in table 1. Here highest level of fall in

Gini coefficient is recorded by no vocational education group (fall of 0.110) followed by one to two years vocational education (fall of 0.095) and two to three years vocational education group (fall of 0.088). The lowest fall in Gini coefficient is recorded by three to four years vocational education group (fall of 0.030) followed by four plus vocational education group (fall of 0.049). This means that even though there is no smooth fall in Gini coefficient as we move from household data to persons based data, but still it could be safely said that the group with lowest vocational education have incomes which are more human labor based compared with high vocational education groups. This could be seen from table 2(c). For example, in table 2(a), the four plus years group shows the lowest level of inequality (Gini=0.298). But when moved to persons based data, in table 2(b), the Gini coefficient fell by only 0.049 points. This means the difference of income between the household in this group reflects the difference in the incomes of heads of the households and that their incomes are not human labor based as is in the case of non-vocational education group.

Table 2(a)
Measures of Gini Coefficient (Vocational Education) Based on Distribution of Household by Household Income. HIES 1992/93

Level of Education	Gini Coefficient
No vocational education	0.398
Less than one year	0.361
One to two years	0.289
Two to three years	0.339
Three to four years	0.345
Four plus years	0.298

Table 2(b)

Measures of Gini Coefficients (Vocational Education) Based on Distribution of Persons by Household Income. HIES 1992/93

Level of Education	Gini Coefficient
No Vocational education	0.288
Less than one year	0.308
One to two years	0.194
Two to three years	0.251
Three to four years	0.315
Four plus years	0.249

Table 2(c)

Level of Education	Difference in Gini Coefficients
No Vocational education	0.110
Less than one year	0.053
One to two years	0.095
Two to three years	0.088
Three to four years	0.030
Four plus years	0.049

CONCLUSION

In this paper an attempt is made to calculate the relationship between education and income inequality. This relationship is well known to exist within and across countries. Countries with higher level of education tend to have better distribution of income than the countries with lower level of education. Similarly, within a country people with higher education tend to show better distribution of income within its own group compared with other less educated groups. For this purpose, while utilizing HIES 1992/1993 and making use of SPSS, we have calculated Gini coefficients for various educational groups starting from zero level of education to Masters level. Similarly, we have also calculated Gini coefficients for various levels of vocational educational groups including zero level of vocational education to four plus level of vocational education. Our calculations show a very smooth negative relationship between education level and level of inequality. In other words higher the level of education lower will be the level of inequality. This means our calculations confirm to the generally observed phenomenon that higher education groups tend to have lower level of inequality among its folks compared with the groups with lower level of education.

BIBLIOGRAPHY

Ahmad, Ehtisham and Ludlow, Stephen (1989), Poverty, Inequality and Growth in Pakistan. *The Pakistan Development Review,* Vol.28, No.4.PP.831-850.

Akmal, Hussain, Ahmed (1992), Poverty and Poverty Alleviation, Paper presented to Pakistan Institutte of Development Economics and Planning Commission of Pakistan, as an input into 8th five year plan 1993-98.

Ayub, M.A. (1984), Sources and Structure of Income Inequality in Pakistan paper presented at the second annual general meeting of *Pakistan Society of Development Economics,* Islamabad.

Bergan, Asbjorn (1967), Personal Income Distribution and Personal Savings in Pakistan, 1963/64. *The Pakistan Development Review,* Vol.7 No.2.

Cheema A.A. (1986), Poverty in Pakistan: Some New Dimensions, unpublished paper, PIDE,Islamabad.

Cheema, A.A. and Malik, M.H. (1984), Consumption and Employment Effects of Income Redistribution in Pakistan. *The Pakistan Development Review*. 23(2 & 3), P.P. 347-360.

Choudhary, M.K. (1995), National and Provincial Size Distribution of Income in Pakistan, *Journal of Economics* Vol. 2 Sep. 1995.

Choudhary, M.K. (1982), *Foreign Aid and Economic Development: A Case Study of Pakistan with Special Reference to Poverty and Income Distribution*, Unpublished Ph.D. Thesis, submitted to the University of Salford.

Choudhry M. Ghaffar (1982), Green Revolution and Redistribution of Rural Income: Pakistan Experience. *The Pakistan Development Review* Vol.21, No.3.

Choudhry, M.K. (1984), Income Inequality in Pakistan-Some Estimates Based on Household Income Per Capita *The Kashmir Economic Review*, Vol.1, No.2.

Choudhry, M.K. (1984), The Statistical Evidence on Income Inequality in Pakistan - Some Observations, *The Kashmir Economic Review,* Vol. 1 No.1.

Datta, G. and Meerman, J. (1980), Household Income or Household Income Per Capita in Welfare Comparisons, *Review of Income and Wealth, Series* No.26.

Ercelawn, A. (1988), Income Inequality in Pakistan During the 70s: Issues in Estimation. Discussion Paper No.92. Karachi, *Applied Economic Research Center*, Karachi.

HIES 1992/93, Federal Bureaus of Statistics, Statistic Division, Govt. of Pakistan.

Henry, R.M. (1975), A Note on Income Distribution and Poverty in Trinidad and Tobago, Research Wroking Paper WEP 2-23/WP 29 Geneva, ILO.

HIES 1992/93, Federal Bureaus of Statistics, Statistic Division, Govt. of Pakistan.

Hsia, R. and Chau, L. (1978), *Industrialisation, Employment and Income Distribution: A Case Study of Hong Kong* . A study prepared for ILO London Croom Helm.

Iqbal, M. Qamar (1988), Use of Inequality Measures in Calculating Income Elasticity, *The Pakistan Journal of Applied Economics,* Vol. 7, No.1.

Jafari, S. Y. and Khattak Azizullah (1995), Income Inequality and Poverty in Pakistan, *Pakistan Economic and Social Review* Vol. XXXIII No 1 and 2.

Jeetun, A. (1981), Trends in Inequality of Income Distribution in Pakistan. Discussion Paper No.29. *Applied Economic Research Center*, University of Karachi.

Kakwani, N. (1980), *Income Inequality and Poverty: Method of Estimation and Policy Application*, N. Y. Oxford University Press.

Kakwani, N. (1980), *Income Inequality and Poverty: Method of Estimation and Policy Application*, N. Y. Oxford University Press.

Kemal, A.R. (1981), Income Distribution in Pakistan: A Review. Research Reports Series No.123. *Pakistan Institute of Development Economics,* Islamabad.

Kemal, A.R. (1994), Structural Adjustment, Employment, Income Distribution and Poverty. *The Pakistan Development* q *Review* 33(4), 901-911

Khadija Haq (1969), A Measurement of Inequality in Urban Personal Income Distribution in Pakistan, *The Pakistan Development Review,* 4(4), Winter 1964.

Khan, M.F. (1990), Factors of Production and Factor Markets in Islamic Framework, *Journal of King Abdul Aziz University: Islamic Economics,* vol.2, 1410/1990.

Kondor Yaakov (1975), The Gini Coefficients of Concentration and the Kuznets Measure of Inequality. A note *Review of Income and Wealth* series 21 No.3 Sept 1975.

Koutsoyiannis, A. - Theory of Econometrics. 2nd ed.

Kruijk de Hans (1986) Inequality in the Four Provinces of Pakistan. *The Pakistan Development Review* Vol.25 No.4.

Kruijk de Hans and Myrna,Van Leeuwen (1985), Changes in Poverty and Income Inequality in Pakistan During 1970s *The Pakistan Development Review* No. 3 and 4.

Kumar, D. (1974), Changes in Income Distribution and Poverty in India: A Review of the Literature. *World Development*, Vol.2 No.1.

Kuznets, S. (1955), Economic Growth and Income Inequality, *American Economic Review,* March.

Kuznets, S. (1963), Quantitative Aspects of Economic Growth of Nations: Distribution of Income by Size, *Economic Development and Cultural Change* Vol.II , 1963.

Kuznets, S. (1976), Demographic Aspects of the Size Distribution of Income: An Exploratory Essay, *Economic Development and Cultural Change.* Vol. 25, No.1, October.

Mahmood, Zafar (1984), Income Inequality in Pakistan: An Analysis of Existing Evidence. *The Pakistan Development Review*, Vol.XXIII, Nos. 2&3 (Summer Autumn 1984).

Morgan, James (1962), The Analogy of Income Distribution *Review of Income & Statistics* vol.XLIO No.3 Aug. 1962.

Mujahid, G. B .S. (1978), A Note on Measurement of Poverty and Income Inequalities in Pakistan: S ome Observations on Methodology. *The Pakistan Development Review 17(3).*

Ojha. P.D. (1971), Pattern of Income Distribution in India, 1953-55 to 1961-64, (Mimeographed).
Pakistan Economic Survey 1999.

Yotopoulos, Pan A. (1987),. The'World Distribution of Income and Real Poverty and Affluence *Pakistan Development Review,* Vol. XXVI, No. 3, Autumn 1987.

ESTIMATING THE EFFECT OF TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING ON EARNINGS OF PASS OUTS IN PUNJAB (PAKISTAN)

Haq Nawaz Shah[1]

Abstract

In this paper regression analysis has been used to estimate earnings functions in order to determine the effects of a number of human capital and state variables for a sample of 635 pass-outs of public and private sector technical and vocational institutions located in the Punjab, surveyed in 1996. The results of the study suggest that duration of education and training have positive effects on earnings. Experience of pass outs has a J-shape earnings profile. Average earnings of male pass outs are higher than those of female pass outs. Earnings in jobs matching with training skills are higher than those in non-matching jobs. Earnings of self-employed workers are higher than those of employees. Programmes run by different government departments have different effects. Results of the study are useful for theoretical findings as well as economic development and poverty alleviation policies in developing countries.

Significance of technical and vocational education and training (TVET) for economic development

The importance of TVET for an economy can hardly be exaggerated. Skilled workers are indispensable for operation, repair, and maintainence of every production process, equipment and facility. ". The Holy Prophet Mohammad (PBUH) also recognized that skilled people had better knowledge of the world (than unskilled people). Once he allowed grafting of fruit trees to increase their yield (Hadith No. 3 in Sahih Muslim).

Middleton et al (1993, p. 1) state that skilled workers and technicians, who occupy the middle of the work force between the unskilled and professional manpower, "facilitate the adaptation and use of new technologies, enhance the efficiency and quality of production and maintenance, and supervise and train workers with lesser skills".

In the modern world, developed and fast growing economies ensure sufficient investment in human capital, including education and training of manpower. In Israel over 50% of secondary school pupils are enrolled in

[1] The author, who is a retired employee of Punjab Economic Research Institute, Planning and Development Department, Government Of Punjab, is obliged to the Director of the Institute for financing the collection of this data.

vocational schools and this trend has been increasing over time relative to general education (Neuman and Ziderman, 1991, p. 3). In Japan, enrollment in vocational courses in the upper secondary schools was 29.5% in 1983 (Inoue, 1985, P.27). The author states that human resources have played a crucial role in Japan's economic development (op cit, p.1). Min found that in a Chinese factory, workers with vocational schooling were 6 to 11 percent more productive than those with academic schooling (Quoted in Middleton et al, 1993, p.41). TVET reduces income inequality, because workers pursuing vocational and technical institutions generally have lower socio-economic background but earn higher income than their counterparts passing out from academic institutions (Neuman and Ziderman, 1991, p.16). It must be recognized, however, that the impact of vocational education and training on employment and earnings of TVET pass outs is highly dependent on growth of the demand for skilled labor which, in turn, is dependent on the rate of growth of the economy, particularly that of the modern sector (Middleton et al, 1993, p.55). In Punjab, Bashir and Achtel (1996) found that the decline in employment rates for the technically trained manpower during the 8th Five Year Plan was "most likely the consequence of some serious social and economic developments such as population growth, inflation, lower rate of education and interruption in industrial progress" rather than low quality and irrelevance of training to job specifications.

The concepts of technical and vocational education and training (TVET)

According to Middleton et al (1993, p.30), vocational training consists of imparting training in job-specific skills with or without theory. Allocation of course content among general education, vocational theory and vocational practice varies substantially among countries, but the content of advanced theory is invariably negligible in vocational training. Fresh vocational graduates start jobs as skilled workers rather than supervisors. On the other hand, technical education has larger theoretical content than its workshops time. In Pakistan, technical education is provided at the college level. Study of science subjects at secondary school level is a pre-requisite for admission to technical colleges. In terms of instruction time, theory and workshop instruction in technical colleges is combined in the ratio of 60:40. Technical education institutions are managed by Directorates of Technical Education working under the Ministries of Education in different provinces. Terminal examinations are conducted by provincial Boards of Technical Education.

In Pakistan, many departments provide vocational training. Secondary school education with or without science subjects is a pre-requisite for two years, but not for shorter vocational programs. For the latter, minimum educational qualification is not prescribed. Respective departments conduct examinations for vocational students. Syllabi for similar vocational skills imparted by various government departments are not uniform. The theoretical content for vocational courses varies from 0 to 20 percent in total instruction time. Technical and vocational training in the country is also imparted in private sector institutions.

Hypotheses to be tested

Hypotheses to be tested in this study relate to measuring the effect of human capital and other variables on earnings of pass outs from TVET institutions working under different conditions. There are seven different departments of Government of Punjab as well as the private sector, which are producing TVET pass-outs every year with different durations, and course contents of training and education. Examination systems are also different. From theoretical point of view, it is interesting to test if the hypothesis of human capital formation holds under different circumstances. So the main hypothesis to test is whether investment in human beings increases their income. Because of formidable difficulties in collecting reliable and adequate cost data on TVET, duration of training will be used as a proxy variable for the cost of TVET. Auxiliary hypotheses relate to test the effect of different conditions on earnings of pass outs.

Sampling procedures and their limitations

Some of the limitations of data collection for this analysis may be noted at the outset. Sampling is not perfectly random. Home addresses of pass outs were selected as randomly as possible from records of vocational and technical institutions or their regional executive offices in all eight administrative Divisions of the Punjab province. The sampled passed outs were visited at their home addresses or, if possible, at their work places. Many of them were not accessible due to errors or changes in home addresses, or due to their jobs away from homes in or out of Pakistan. In case of female respondents, some of them could not be interviewed for cultural restrictions. Sometimes interviewers were not permitted by employers to enter work places of pass outs. The sampling design also does not include control groups of unskilled manpower with similar educational qualifications as our sample TVET respondents, and the

manpower with technical and vocational skills learnt from the informal system. The proportion of the size of the sample relative to population is indeterminate because this would require pass outs data since establishment of every sample and non-sample institute and would involve tremendous cost and time. However, the sample size is very large relative to the number of explanatory variables used in the regression analysis. Size and distribution of sample with respect to regions, sex, and departments is given in Appendix Tables 1 and 2.

We aimed at interviewing 500 male and 500 female pass outs. We could reach 893 of them (522 males and 371 females). A large number of female respondents told us that they had learnt skills for domestic use only. Twenty one percent of male respondents reported having lost their skills and were not looking for jobs any more. They were engaged in their family occupations. As the focus of this study is not the measurement of cost-effectiveness of the TVET programs, only 635 respondents who were working at the time of the survey were used for data analysis, of which sixty five percent were males and 35 percent females; 93 percent of them passed out from public sector institutions; only 4 males and 5 females had zero or less than 5 years of schooling; 18.3 percent of male and 26 percent of female respondents had less than 10 years of schooling; 23 percent of males and 37 percent of females were self-employed; only 4 percent of working respondents were mismatches in their jobs of which 17 percent were females.

Specification of the earnings function and variables

As substantial aspects of human resource development are of qualitative nature and involve externalities in costs and benefits, exact measurement of costs and benefits of TVET is not possible. Confining our analysis to quantitative variables, the effect of investment in the TVET can be measured in terms of earnings of pass outs, their employment rates and rates of return to cost of training.

Earnings functions are a necessary ingredient in the two main methods utilized for estimating rates of returns to education (Khan and Irfan, 1985, p. 674). The direct method due to Becker (1975) is based on setting the future returns from a given level of education equal to the value of opportunity foregone for attaining that education and computing the internal rates of returns.[2] This method requires data on both cost of training and earnings of pass outs. The indirect method due to Mincer (1974) relies

2 For application of this method to education data in Pakistan see Hamdani (1975)

on deriving the rates of returns from the earnings functions.[3]This method gives gross returns to resources used in training because, while estimating earnings functions, costs of training are not taken into account. Thus, if P and S represent education variables for the primary and secondary education levels respectively, the returns to secondary education would be equal to the difference between their econometrically estimated coefficients divided by the time period it takes to increase education level of an individual from P to S (which is 5 years in Pakistan). An earnings function shows the effect of personal characteristics and human capital embodied in individuals, and environmental factors on their earnings. A general earning function may be specified as follows:

$$(1) \qquad Y = f(S, A, T, EX, DV)$$

where, Y = observed monthly earnings, S = years of formal schooling, A = a measure of ability of respondent, T = technical and vocational education (and/or training), EX = work experience after completion of education / training program, and DV is a vector of dummy variables generally representing variables of qualitative nature. Specification of the full set of variables employed in estimating the earnings functions in this study is discussed in the following:

(a) Earnings of Sample TVET

Y = Individual monthly earnings of respondents in the survey year (in rupees).

If the respondent is a paid employee, this is monthly wages; if he/she is self-employed, this is average monthly income during the survey year as roughly estimated by the respondent. Self-employed workers have to incur much more capital and variable cost in conducting their business than their employee counterparts. But the data is inadequate in this respect. Y will be used as the dependent variable in logarithmic form for the sake of achieving convenience in interpreting results.

(b) Human Capital Variables

AGE = age of respondent in years.

3 For application of this method to manpower data in Pakistan see Khan and Irfan (1985) and for application of both methods to the same data sets see Neuman and Ziderman (1991).

For technical workers age affects productivity in two ways. Firstly, the worker becomes more experienced as he/she advances in age. Secondly, skilled work involves the use of much more physical strength to work than a white-collar job. This may decrease productivity of a worker, as he/she gets older. Hence it is common to use the AGE variable in quadratic form in earnings functions.

S = years of formal education.

Effect of education on earnings was measured in terms of both a continuous and categorical variables. Since the variable S as defined above cannot distinguish among returns to different levels of education, a dummy variable S10 was defined to determine differential effects of education on earnings: S10 = 1, if the respondent had 10 or more years of schooling, 0 otherwise. Dummy variables representing education levels zero, 1 to5 years, 6 to 9 years, 10 years, 11 to 12 years, and 13 years and above were also defined and tried in different regressions, but their differential effects were not significant. Hence, only two levels of education have been differentiated i.e. less than 10 years and 10 years or more.

The coefficients of schooling dummies would represent the percentage difference in the gross monthly earnings of an included category to the category excluded from the regression. As already noted, coefficients on schooling dummies can be used to calculate average rate of return to education between any two levels.

T = level of technical and vocational education (and/or training).

Length of training programs varies substantially both within and between training modes. According to Ziderman (1988, p.10) "Lengthier courses, in augmenting individual human capital stocks, should lead to higher earnings". For determining the effect of different levels of technical training on earnings differentials, dummy variables T_{00}, T_1, T_2, and T_3 were defined.

Training duration of less than one year was assigned to the dummy variable (T_{00}), 12-18 months to (T_1), 19-24 months to (T_2) and 25-36 months to (T_3). The category T_{00} was used as the base category. EX= work experience (measured in years), gained after completion of training program. The experience variable EX is frequently entered in the quadratic form in estimating earnings functions because it is expected that the wage-experience profile can take J-shaped form as the experience of the worker increases.[4]

4 For instance, Beyer and Knight (1989).

(c) Institutional Variables

Institutional variables are associated with institutions from where our sample respondents passed out.

Average Cost= salary budgets of respective institutions in the survey year divided by number of enrolled students in that year. Data on other variables costs, particularly workshop costs, was hard to collect. This variable is not adequately specified because these costs do not relate to the year in which our sample respondents had passed their programs. Past data was not available.

TVACANT=proportion of vacant positions of teachers in the institution at the time of study of our respondents.

(d) Departmental Effects: There are seven departments/semi autonomous agencies involved in providing TVET included in this sample (names of departments are given in Tables in the appendix). For the purpose of this analysis, dummy variables were defined to represent different departments.

(e) Family Background Variables

During the survey it was pointed out by many heads of institutions that most of the students seeking admissions to vocational and technical institutions belonged to poorer sections of the society. Competition for jobs is hard. Economic opportunities of pass outs may be influenced by the socio-economic status of parents[5]. The following family background variables were included in regressions: father's general education level in years, father's technical education level in years, father's monthly income in rupees.

---

5 See Khan and Irfan (1985), P. 678, and Neuman and Ziderman (1991), P. 15. The former found that parental income and education levels affected economic opportunities and earning of their children when they
entered the labor market. The latter found that in Israel, vocational students came from lower socio-economic classes and had lower ability than their academic school counterparts. Mental retardation can also be attributed largely to poverty.

(f) Other Determinants of Earning Differentials

Other factors, which may influence earnings of individuals, were also considered. In this respect the following dummy variables were used: URBAN=1 if pass out from an institution located at the district or the divisional headquarter, 0 otherwise. This variable was included because it is hoped that quality of education and training may deteriorate as location of institutions gets farther from the administrative offices, which are invariably located in district and divisional cities. MALE =1, if the pass out male, 0 otherwise. This variable is included to test the hypothesis of sex discrimination in job and market opportunities. Self-employed =1 if the pass out self-employed, 0 otherwise. This variable is intended to test the hypothesis that self-employed workers have to invest more in their businesses; they have to work harder, and may be more motivated than their employee counter parts. Job match=1 if the pass out working in an occupation which matches his/her TVET skill, 0 otherwise. SECTOR=1 if the respondent from a public sector institution, 0 otherwise. It is expected that private sector trainees may have better quality, which may raise their earnings. Beyer and Knight (1989) emphasized the role of occupation in determining wage rates. They state that, since additional pay is needed to compensate for training costs incurred by workers, occupational wages differ according to the amount of vocational skill involved in the job. Neuman and Ziderman (1991, p.9) found that "matched workers achieve higher earnings than their non-matched counterparts".

Estimation of the Model and Discussion of Results

Basic Regression Model: To begin with, it is assumed that education, skill level, work experience and age are the basic human capital determinants of earnings. In this regression skill level is measured by duration of training. Therefore, the following equation was estimated[6]:

$$(2)\ \ln(Y) = a + bAGE + c(AGE)2 + dS + eT + f(EX) + g(EX)^2 + u$$

New variables were added to this model to test their contributions to total variation in the dependent variable until a final model was selected. Results are presented in the following Table.

6 Similar model was estimated by Burki and Abbas (1991).

Regression Output Table

(Dependent Variable) = Log of Yearly Earning)

Variable	Unit	Regression 1		Regression 2		Regression 3	
		Estimated Coefficient	t-stat.	Regression 2	t-stat.	Estimated Coefficient	t-stat.
Constant	--	5.3223	12.2467	5.5069	12.6774	5.4471	12.7061
Age	Years	0.0953	2.6729	0.0993	2.8258	0.0953	2.7189
$(Age)^2$	Years	-0.0136	-1.9878	-0.01453	-2.1498	-0.1320	-1.9576
Education	Years	0.0423	3.4923	--	Excluded	0.0429	3.6199
Duration training	Years	0.0254	9.5645	0.0232	8.2327	--	--
Experience	Years	0.0731	0.2166	0.0108	0.3241	0.0891	0.2683
$(Experience)^2$	Years	0.0371	1.1910	0.0341	1.0968	0.0372	1.2109
S_{10}	Dummy	--	--	0.2775	4.1583	E-	--
T_{00}	Dummy	--	--	--	--	--	Excluded
T_1	Dummy	--	--	--	--	0.7255	3.4220
T_2	Dummy	--	--	--	--	0.5210	9.7331
T_3	Dummy	--	--	--	--	0.6445	7.9413
No Of Observation		635	--	--	635	635	--
Adjusted R^2		0.2498	--	--	0.2557	0.2761	--

(Continued)

Regression Output Table (Continued)
(Dependent Variables) = Log of Yearly Earning)

Variable	Unit	Regression 4		Regression 5	
		Estimated Coefficient	t-stat.	Value of Estimated Coefficient	Value of t-statistic
Constant	--	6.3288	15.9814	5.43820	13.4670
Age	Years	0.0619	1.9650	.091729	3.04507
$(Age)^2$	Years	-0.0069	-1.1437	-.0117246	-2.03826
Education	Years	0.0251	2.2579	-	Excluded
Duration of Training	Months	0.0148	4.0011	-	Excluded
Experience	Years	0.0432	1.4336	.010701	.361559
$(Experience)^2$	Years	0.0261	0.9516	.04464941	1.74234
S_{10} (=1 of educ 10 years or higher)	Dummy	-	-	.147624	2.50375
T_{00} (less than 12 months)	Dummy	-	-	-	Excluded
T_1 (12-18 months)	Dummy	-	-	.431979	2.32021
T_2 (19-24 months)	Dummy	-	-	.221966	3.21984
T_3 (25 months or higher)	Dummy	-	-	.271795	2.59523
College of technology or higher	Dummy	-0.1993	-2.5001	.403417	3.63758
MP&L Deptt.	Dummy	-0.2147	-2.9566	.180856	1.82822

PSIC	Dummy	-0.1992	-1.9253	.413352	3.51008
Social Welfare Deptt.	Dummy	-0.9224	-8.4846	-.341908	-2.66122
ABAD Centers	Dummy	-1.1958	-8.7957	-.549053	-3.75811
Agric. Mach. Deptt.	Dummy	0.2952	2.0570	.679305	4.66434
Industries Deptt.	Dummy	0.7314	1.3989	1.52546	3.03932
Comm. Institutes	Dummy	-	-	.359985	3.17026
Private Institutions	Dummy	-0.6525	-6.0544	-	Excluded
Father's Gen. Educ.	Years	-	-	-.0176387	-.360634
Father's Tech. Education	Years	-	-	.00832383	.521613
Father's Income	(Rs.)	-	-	.00022	1.57677
Teachers' Positions Vacant.	%	-	-	.0117846	.728726
Average cost Per student	(Rs.)	-	-	.00000279	-.408597
Location of Institution (=1 if urban)	Dummy			.307733	5.04409
Job Matches (=1 if matches)	Dummy			.325740	6.00537
Self-Employed (=1 if self-empl.)	Dummy			.234747	4.26832
Gender (Male=1)	Dummy	-	-	.283688	4.03845

Number of Observations		-	635	635	-
Adjusted R^2		-	0.4402	.499410	-

Regression 1 shows that age, education level and duration of training of workers positively and significantly affect their earnings. The square term on age is negative and significant implying that as the worker advances in age, his/her productivity falls resulting in lower earnings in the older age. The experience variable is not significant in this regression. Signs of all significant coefficients are right, but the R^2 is low.

In Regression 2, education as a continuous variable is excluded and its differential effects are measured and tested. The base category is the education level up to 9 years of schooling including zero. There were 53 observations in this category. The coefficient on the dummy variable S10 is positive and significant meaning that average earnings of pass outs with 10 or more years of schooling are 27.75 percent higher than those of their under-Matric counter parts. Other results are similar to that of preceding regression. Quadratic terms on the age and experience variables and the adj. R^2 have improved further.

In Regression 3 differential effects of duration of training are measured. In this regression all variables of Regression 1 are combined with dummies representing different levels of training periods. The excluded category is 'less than one year'. We notice that earnings of workers with training of 12 months or more categories rise relative to the excluded category. Other results are qualitatively similar to that of Regression 1. Adjusted R^2 has improved but it is still very low.

In Regression 4 the differential effects of departments are measured. The excluded category is the pass outs of commercial Institutes of Technical Education Department. From regression results we note that commercially trained pass outs earn much more income than pass outs of all other skills, except agricultural machinery training institute (Multan). The adjusted R-square has improved to .4402, which is a significant improvement. It means that the administrative departments significantly affect earnings of TVET pass outs. Results on variables included in Regression 1 are qualitatively similar in Regression 4.

In Regression 5 all variables of interest have been included. Results obtained in this regression are highly plausible from analytical, theoretical, and policy points of view. From analytical point of view, the explanatory power of the model has increased substantially (from R^2 = .2498 in Regression 1 to R^2 = .499 in Regression 5) and most of the variables are significant with expected signs. Starting from the first variable AGE, we see that both the linear and the quadratic terms are significant, the former positive while the latter negative. This implies that earnings increase in earlier age, but finally taper off. For TVET workers these results are specifically valid because their work requires the use of much more physical strength than the white-collar jobs. The linear term on the experience variable is not significant, but its quadratic term is positive and significant implying that as the experience increases beyond a certain point, earnings of pass outs accelerate. Thus earnings profile is J-shaped. This is very interesting and relevant observation. More experienced workers are paid higher wage rates if they work as employees. If they are self-employed, they gradually become master craftsmen and attract pupils who handle the simpler operations in their workshops while the master craftsman performs managerial and more complicated technical operations. Scale of operations of their firms increases which brings larger earnings. The variable S_{10} shows that secondary school and higher education increases earnings by 14.76% compared to under-Matric pass outs. Coefficients of 'duration of training' dummy variables T_1, T_2 and T_3 are also positive and significant. Raising the training period from, say, less than one year to 12 to 18 months increases earnings by 43.20%, raising it by one more year increases earnings by 22.20% and raising it further by more than a year increases earnings by 27.18%. Our results conform with Bashir and Achtel (1996, p.6)] who found that "the employability rate of pass outs seemed to increase along with the duration of respective training period Pass outs with 3 years of training had better employment opportunities than the trainees with shorter duration had".

Results on department dummies are also interesting. In this regression the excluded category is the private sector institutions. We notice that pass outs from technical and vocational institutions of Technical Education Department earn 40.34% higher income than their private sector counterparts, Manpower and Labor Department pass outs earn 18.09% higher Punjab Small Industries Corporation pass outs earn 41.34% higher, Social Welfare pass outs earn 34.19% lower, ABAD pass outs earn 54.90% lower, Agri. Machinery pass outs earn 67.93% higher, Industries Department pass outs earn 152.54% higher, and commercial institutes (of Technical Education Department) pass outs earn 36% higher. Therefore,

this study finds that performance of most of the government departments is better than that of the private sector. Performance of Social Welfare and ABAD is, however, much worse than that of the private sector. On the whole Government departments conducting various training programs are making a difference in productivity of their trainees. This analysis, however, cannot determine cost effectiveness of government programs due to lack of their cost and budgetary data for many past years.

Lower performance of the private institutions relative to public institutions is a myth. In general, it is believed that the quality of education in government institutions is low due to non-market oriented teaching service. However, private institutions, which apparently look ostentatious, may not be delivering quality product commensurate with their service charges. They may not be adequately equipped. The visiting faculty may be lower paid relative to teaching work. Private institutions may be more easily subjected to use unfair means to get good results than public institutions. Private institutions offer mostly courses of short duration for which average earnings are lower. Finally, best students are mostly attracted to public institutions for better recognition of their diplomas and lower tuition fees. Hence, the private institutions may end up with lower ability students. In general, lower quality students are also less productive when they enter the labor market (Beyer and Knight 1989).

Coefficients on family and institutional characteristics variables are all non-significant. Technical manpower finds job mostly on the basis of quality of training rather than family connections. The coefficient of the average teaching cost per student is not significant in determining earnings. From the male dummy variable MALE we see that earnings of pass outs are influenced by their gender. The male pass outs have significantly (28.37%) higher earnings than female pass outs. Lower average earnings of female TVET workers are attributed to many factors. Most of them don't work for the market. In this sample, the unemployment rate equaled 40% among females compared to 21% among males. Middleton et al (1993, p.64) state that women are mostly channeled into "female" areas of study due to societal prejudices and labor market realities. The skills offered to females in the TVET institutions have limited market. It is mostly useful for home production functions. In Pakistan female skilled workers face hard competition from male skilled workers trained in the informal sector in even those skills which are traditionally female oriented like dress making, embroidery, jewelry, cooking and secretarial jobs. Poorer female TVET pass outs who work for the market may be exploited by the contractors who provide them with piece order work.

The job matching variable (work relevant to training) is positive and significant with a coefficient of 0.3257 implying that pass outs working in matching jobs earn 32.57% higher income than those working in jobs irrelevant to their training. In this sample 66.2% of pass outs were already doing matching jobs. No female self-employed or female government employee in the sample was mismatch. In the private sector, only 12 percent of females were mismatch. As regards male respondents, only 3 percent of self-employed, 10.5 percent of government employed, and 5 percent of private sector employed were mismatches. Thus, most of the pass outs were utilizing their TVET for productive purposes. This implies a flow of returns to investment in human capital.

The self-employment variable is also positive and significant with a coefficient of 0.2347. In other words, self-employed workers earn 23.47% higher income than their employee counterparts. In this sample 23% of pass outs were self-employed. Hence, TVET makes a valuable contribution to increasing employment of young people. Currently, courses for entrepreneurial training and small business support services are lacking for TVET. Policy support may be increased. Bashir and Achtel (1996) suggest that technical and vocational training programs must include training for applying for loans, preparing accounts, understanding and observing labor rules and regulations, establishing business contacts and imparting training to apprentices (shagirds).

Finally, the location dummy has a coefficient of 0.3077 and it is highly significant implying that pass outs of TVET institutions located in Divisional and District head quarters earn 31% higher income than their counterparts trained at smaller towns or rural areas. Technical colleges and technical training centers are not found in rural areas. So the rural pass outs were mainly trained in vocational and commercial skills. Better off students may have moved on to Divisional and District headquarter institutions, while poorer students may have been trained in Tehsil and rural institutions. The laggards may also be academically poor. The equipment and repair and maintenance of equipment may not be adequate at the rural institutions. More teachers' positions may be vacant in rural than urban areas. The management control in far-flung areas may also be lower than in district and divisional head quarters. Wage rates in rural areas are generally lower than those in bigger cities. Finally, ABAD training centers are all located in rural areas.

Conclusions and Recommendations

This study examined earnings functions of 635 pass outs (592 from the public and 43 from the private institutions) of technical, vocational and commercial institutions in the public and the private sectors, which were located in the Punjab. The objective of the study was to determine the factors, which affect earnings of technically trained manpower. The study finds that:

1. Levels of education and training have positive differential effects on earnings.

2. Earnings are not only determined by human capital variables of education, training, experience and age, but there are many other factors.

3. Experience of TVET has a J-shape earning profile implying that earnings increase faster as experience increases.

4. As predicted by theory, earnings rise with age, but taper off as workers get older.

5. Average earnings of male pass outs are higher than those of female pass outs. Females may have cultural problems in utilizing market potential for their skills.

6. There is high rate of unemployment among technically and vocationally trained male workers, basically due to slow growth of the economy rather than low quality of training or irrelevance of skills to market needs.

7. About 40 percent of females get vocational training for domestic use only, or they are not allowed to work for the market.

8. Earnings of ABAD and Social Welfare department pass outs are lower than even that of the private sector, but earnings of pass outs of all

other government departments are higher than those of the private sector.

9. Earnings of pass outs working in jobs matching with their training skills are higher than those working in non-matching jobs.

10. Only 4 percent of working respondents were mismatches in their jobs, of which 17 percent were females. So trained pass outs are utilizing the public and private cost incurred in their training. So, although this study has not calculated cost and benefit ratio of training cost, it has provided an indicative measure of the utility of training for pass outs.

11. Earnings of self-employed workers are higher than those of employees.

12. On the whole, this study supports investment in technical and vocational education and training for economic development and poverty alleviation.

13. Further research is needed in the following areas: cost effectiveness of different training programs, how to improve training and employment of females, how to improve training and employment opportunities in rural areas, causes and remedies of low productivity of pass outs from private institutions, and how to support services for the self-employed pass outs.

References

Alam, Bashir, and Achtel, Klaus. *Information and Recommendations on How to Improve the Quality of Vocational Training in Selected Areas Related to the Needs of the Industry*, Condensed Report, Pak-German Technical Cooperation, Advisory Service to DM&T- Monitoring & Evaluation, Labor and Manpower Department, Government of the Punjab, Lahore, 1996.

Becker, G.S. *Human Capital* (2nd ed.), New York: National Bureau of Economic Research, 1975.

Beyer, J.De and Knight, J.B. "The Role of Occupation in the Determination of Wages", Oxford Economic Papers, Vol. 41 (3), 1989: 595-618.

Burki, Abid Aman and Abbas, Qaisar, "Earnings Functions in Pakistan's Urban Informal Sector: A Case Study", The Pakistan Development Review, Vol. 30 (4), 1991: 695-706.

Dougherty, Christopher. *The Cost-Effectiveness of National Training Systems in Developing Countries*, Population and Human Resources Department Report No.WPS 171, Washington, D.C.: World Bank, 1989.

Hamdani, K.A. "Education and Income Differential: An Estimation for Rawalpindi City". Pakistan Development Review, Vol.26 (2): 1975.

Harbison, R.W., and Hanushek, E. A., *Educational Performance of the Poor: Lessons from the North Brazil,* Oxford University Press, 1992.

Inoue, Ken. *The Education and Training of Industrial Manpower in Japan*, World Bank Staff Working Papers, No. 729, the World Bank, Washington, D.C., U. S. A., 1985.

Khan, Shahrukh Rafi and Irfan, Mohammad. "Rates of Return to Education and the Determinants of Earnings in Pakistan", The Pakistan Development Review, Vol. 24 (3&4), 1985: 671-680.

Middleton, J., Ziderman, A., and Adams, A. V. *Skill for Productivity: Vocational Education and Training in Developing Countries*, Oxfor University Press, 1993.

Mincer, J. Schooling. *Experience and Earnings*. New York: National Bureau of Economic Research, 1974.

Neuman, S., and Ziderman, A. *Vocational Schooling, Occupational Matching, and Labor Market Earnings in Israel*, Population and Human Resources Department Report No.WPS 683, Washington, D.C.: World Bank, 1991.

Ziderman, Adrian. *Israel's Vocational Training*, Population and Human Resources Department, World Bank, WPS 25, 1988

Appendix Table 1

Distribution of Sample Male Pass out Trainees by Divisions and Departments in Punjab

Division	Tech. Training Department		M. P&L	PSIC	Social Welfare	ABAD	Agri. Deptt.	Indus. Deptt.	Private Inst	Overall
	Voct.& Other	Comm. Trg Inst								
Lahore		14	17	14					17	57 (13.9)
Gujranwala		12	34	18					5	69 (16.8)
Faisalabad		4	20	5					1	35 (8.5)
Rawalpindi	19	9	9	13		16	8		2	76 (18.5)
Sargodha	6		29	8			7			50 (12.2)
Multan		5	32	6						43 (10.4)
Bahawalpur	7	10	26	7			2		2	54 (13.1)
D.G. Khan	3		15	9						27 (6.6)
Overall	35 (8.5)	54 (13.1)	182 (44.3)	80 (19.5)	(-)	16 (3.9)	22 (5.4)	1 (0.2)	21 (5.1)	411 (64.7)

Figures in parentheses indicate percentage of total.

Distribution of Sample Female pass out Trainees by Divisions and Departments in Punjab

Division	Tech.Training Department		M. P&L	PSIC	Social Welfare	ABAD	Agri. Deptt.	Indus. Deptt.	Priv ate Inst	Overall
	Voct.& Other	Comm. Trg. Int								
Lahore	16	-	11	-	12	-	-	-	8	**47 (21.0)**
Gujranwala	5	2	-	-	15	-	-	-	-	**22 (9.8)**
Faisalabad	17	-	-	-	11	-	-	-	5	**33 (14.7)**
Rawalpindi	9	8	-	-	6	-	-	-	-	**23 (10.3)**
Sargodha	6	13	-	-	15	-	-	-	-	**34 (15.2)**
Multan	13	-	-	-	4	-	-	-	9	**26 (11.6)**
Bahawalpur	14	5	-	-	6	-	-	-	-	**25 (11.2)**
D.G. Khan	4	-	-	-	4	6	-	-	-	**14 (6.2)**
Overall	**84 (37.5)**	**28 (12.5)**	**11 (4.9)**	**- (-)**	**73 (32.6)**	**6 (2.7)**	**- (-)**	**- (-)**	**22 (9.8)**	**224 (35.3)**

Note: Figures in parentheses indicate percentage of total.

EXPORTS IN A SIMULTANEOUS MODEL -----THE CASE OF PAKISTAN

Muhammad Afzal[1]

1. INTRODUCTION

Empirical studies of international trade have concentrated on single-equation models to analyse the demand relationship for imports and exports [Houthakar and Magee (1969), Naqvi et al (1973), Gafer (1981), Bahmani-Oskeooee (1984,1986)]. These studies have assumed that the imports and exports price elasticity may be acceptable for the world supply of imports to a single country. The same assumption cannot be applied to the supply of exports of an individual country.

This assumption is based on the argument that when firms are operating at less than full capacity, changes in output can occur without changes in prices. When demand falls firms will not reduce production for the fear of reaction of their competitors, and consequently the industry supply curve will be horizontal up to the full capacity level of production, changes in exports do not substantially change total output and thus prices [Murray and Ginman (1976)].

But if the firms are already operating at full capacity level of output and there is an increase in the demand for exports, Goldstein and Khan (1978) argue that it is most likely that export production cannot be increased to meet the growing world demand without increasing the price of export. To overcome the problem, Khan (1974) and goldstein and Khan (1978) have investigated the price responsiveness of both export demand and export supply of eight industrial countries for the period 1955-70.

To study the link from income to trade, Khan and Ross (1975), Dunlevy (1980), and Haynes and Stone (1983) have emphasized the decomposition of income into trend and deviation from trend to separate secular and business cycle components. Magee [(1975), pp. 188-93, 211-214] has provided an influential motivation for this decomposition, arguing that trade flows respond differently to secular and business cycle income changes and that regression estimates with income in level form combined these effects. Haynes and stone (1983) have pointed out some problems for the said decomposition and have suggested the use of spectral analysis. The Spectral analysis also suffers from problems [Arize (1991].

[1] Department of Economics, Gomal University. D.I.Khan – Pakistan

PIDE Macro-econometric model of Pakistan's Economy [Naqvi et al)1983)] has specified 13 equations for foreign trade sector. According to export equations (p.51) agricultural, manufacturing and total output are the determinants of primary goods, manufacturing goods and services. Theoretically, world income or income of the important trade partners should also determine Pakistan's exports to the rest of the world. Exports are produced domestically, bt they are not determined by domestic factor alone. Therefore, demand factors should also be taken into account and and this can be captured in a simultaneous equation context.

Export demand and supply functions have heen estimated in a simultaneous equation framework [African countries by Arize(1986). Greek and Korea by Balassa et al (1989), Pakistan by [Anwar (1985), Khan and Saqib (1993)]. Naqvi et al (1983) has assumed Pakistan exports demand to be exogenous, Anwar (1985)has studied export performance of Pakistan and estimated elasticities of export demand and supply for primary and manufactured exports for the period 1959-80. Khan and Saqib (1993) have estimated export (total, primary and manufactured) demand and supply function simultaneously for the period 1972-88 and have concluded positive and significant relationship between GDP and exports and have suggested export orientation towards manufactured goods.

Therefore, export performance of Pakistan can be better understood and analysed adequately if both export demand and supply are taken into account. Moreover, no study has investigated; first, the impact of trade liberalization on Pakistan's exports, which Pakistan has been pursuing vigorously since the beginning of 1990s. Secondly, the performance and contribution of semi-manufactured exports whose importance has increased in recent years. This study differs from other studies particularly those done on Pakistan experience in the following aspects. (a) This study covers a longer period than the previous studies and is expected to provide better estimates as well as policy prescriptions for export performance of Pakistan, (b) To capture the impact of liberalization on exports, a dummy variable has been used, (c) This study uses the decomposition of total exports into primary, manufactured and semi-manufactured exports in order to get a better guide for policy formulation keeping in view the liberalization attempts of the country.

Using annual data, export performance of Pakistan will be investigated for the period 1960-99. The rest of the paper is set as follows. Section II contains a simultaneous equation model of total, Primary, Manufactured, and Semi- manufactured exports of Pakistan and

data sources. Results and discussions are given in Section III and section IV is devoted to conclusions.

II. MODEL AND DATA SOURCES

The demand for exports depends on the world or important trade partners, income and also on the competition of domestic export prices with the world or important trade partners, export prices. Similarly, supply of exports is determined by the domestic price of exports, domestic price level and domestic income. A dummy variable has been added to capture the impact of trade liberalization on exports. Equation 1 and 3 are the traditional forms of the export demand and supply, which have been estimated by other studies mentioned above though not exactly have been used by the current study. Therefore, in log – linear form following are the demand (Xd) and supply (Xs) equations for exports. It is assumed that Xd=Xs. The same equations also apply to decomposition of exports into Primary, Manufactured, and Semi-manufactured exports.

Export Demand Equations

$LnXd = a_0+a_1LnPU+a_3LnZW$.....(1)

$LnXd = \gamma_0+\gamma_1LnPU+\gamma_2LnZW+\gamma_3D_0$.....(2)

Since the equations are specified in logarithm, the coefficients are elasticities. The expected signs of the coefficients are $a_1<0, a_3>0, \gamma_1<0, \gamma_2>0$. Nothing can be said a priori about γ_3 because trade liberalization may have positive or negative effects on exports.

Export Supply Equations

$LnXs = \beta_0+\beta_1LnZZ+\beta_2LnYpak$

$LnXs = \kappa_0+\kappa_1LnZZ+\kappa_2LnYpak+\kappa_3D_0$

The expected signs of the coefficients are:

$\beta_1>0$, $\beta_2>o, \kappa_1>0, \kappa_2>0$.

The sign of κ_3 is uncertain.

Where

Xd = real value of exports demanded, X_s= real value of export supply, X=total exports, X_p= Primary exports, X_m= manufactured exports, X_s =semi- manufactured exports PXd =Unit value of exports of Pakistan in US dollars XW = Unit value of exports of world in US dollars, PU = PXd/SW, ZW = world real income, PXpak= Unit value of exports of Pakistan in domestic currency rupees [Rs.], Pd = Wholesale Price Index [WPI] of Pakistan , ZZ =PXpak/Pd, Ypak =real GDP of Pakistan, Do=0 for 1959-60 to 1988-89 and D=1 for 1989-90 to 1999.

All the data on GDP1 total, primary, semi-manufactured and manufactured exports have been taken from Pakistan Economic Survey (PES) [various issues]. The data regarding export unit value index for both Pakistan and the world in US$, world Whole Sale Price Index [WPI], unit value of exports and imports in domestic currency have been taken from International Financial Statistics (IFS) yearbooks [various years]. The total as well as Xp, Xm, and Xs were deflated by unit value indices of exports [1990=100].

III. RESULTS AND DISCUSSION

Table 1 shows the results of both OLS and TSLS estimation for the total exports demand. The signs of the relative price variable and the world income are correct and significant [Equation 1]. This is in agreement with Khan (1974) results that also got significant price (-1.84) and world income (0.92) coefficients. In equation 2 when dummy is included both variables are still significant but the significance of the relative price variable is slightly reduced in TSLS, Dummy is positive but not significant in OLS and negative and significant in TSLS. Though the two results contradict each other, the obvious fact is that liberalization has not too bad effect on demand for exports. Table -2 shows the results for the export supply function . Total export supply function (Equation 3) is positively sloped though relative price is not significant.

Tabel:1 Total Exports Demand

Equations	Equation 1		Equation 2	
Variables	OLS	TSLS	OLS	TSLS
Constant	-29.30 (-4.74)*	-15.15 (-1.25)	-26.31 (-3.59)*	-24.24 (1.63)
PU	-0.43 (-2.35)*	-1.32 (-1.88)**	-0.42 (-2.33)*	-1.46 (-1.77)**
ZW	2.28 (6.13)*	1.44 (1.99)**	2.10 (4.74)*	2.01 (2.24)*
Do	-	-	0.15 (1.55)	-0.62 (-2.26)*
$\overline{R^2}$	0.97	0.95	0.96	0.92
D.W	1.40	1.54	1.41	1.54

Note: The number in parentheses in all the Tables are t-statistics unless otherwise mentioned where * stands for 5 % and ** for 10 % levels of significance respectively in all Tables.

Khan and Saqib (1993) also got positive but not significant coefficient (0.10). The positive and not significant coefficient implies that supply price is not important that is Pakistan is a price taker. This is in accordance with the economic theory that tells us that small countries are price takers. Their actions cannot influence the rest of the world [Dun and Ingram (1996)]. Equation 4 shows that liberalization though not significant has positive influence on export supply while relative price variable is significant at 10% level of significance.

Tabel:2 Total Export-Supply

Equations	Equation 3		Equation 4	
Variables	OLS	TSLS	OLS	TSLS
Constant	-2.40 (-3.02)*	-8.39 (-5.60)*	-1.36 (-1.26)	-5.85 (-2.42)*
ZZ	0.29 (1.58)	0.26 (1.18)	0.39 (2.06)*	0.48 (1.78)**
Ypak	1.25 (11.97)*	1.27 (11.37)*	1.13 (9.04)*	1.08 (5.87)*
Do	-	-	0.17 (1.48)	0.21 (1.32)
$\overline{R^2}$	0.97	0.96	0.97	0.96
D.W.	1.40	1.40	1.36	1.37

The domestic income elasticity (1.27) in total exports supply [Equation 3] is less than world income elasticity (1.44) for export demand [Equation 1] implying that Pakistan's exports are more dependent and influenced by foreign conditions than by domestic economic situation. This result supports Kavoussi (1985) conclusion that free trade enhances trade only when external demand is favorable. When external demand is weak, remarkable export performance is difficult to achieve even in countries which pursue export-oriented policies. That is foreign demand conditions are the principal determinant of the export demand.

Table 3 and 4 show the primary exports demand and supply. For the demand equation [Equation 1] relative price variable is significant and has the expected sign. World income is significant but negative, supporting LDCs complaint of very low-income elasticity for' their exports. Arize (1986) has reported negative world income for Mauritius.

Tabel:3 Primary Exports Demand

Variables	Equation 1		Equation 2	
	OLS	TSLS	OLS	TSLS
Constant	10.08 (1.27)	36.74 (2.70)*	5.78 (0.78)	10.25 (1.13)
PU	-0.87 (-1.78)**	-2.75 (-3.45)*	-1.37 (-3.84)	-1.56 (-3.12)
ZW	-0.28 (-0.59)*	-1.87 (-2.30)*	-0.01 (-0.03)	-0.28 (-0.52)
Do	-	-	-0.34 (-2.46)*	-0.31 (-2.12)*
R^2	0.50	0.29	0.58	0.48
D.W	1.86	1.82	1.84	1.93

Liberalisation is negative and significant in equation 2. Thus liberalization has negative impact on Xp demand. World export prices are also significant in both forms and estimation implying that Xp faces tremendous competition abroad. Xp Supply function is negatively sloped but not siginificant (equation 3). The negative and not significant coefficient implies that Pakistan being a small country is a price taker. Liberalization has negative effect on Xp supply. Because of low world demand and more price competition, Xp supply is adversely affected. Anwar [(1985),p.32] also got negative coefficient for primary exports supply. His argument that the negative sign is correct is contrary to the fundamental economic theory which tells that prices and supply are positively related. Arize (1986) got positively sloped export supply functions in seven out of eight African countries. Khan and Saqib (1993) have reported positive but not significant coefficient for Xp supply. Moreover, domestic economic conditions represented by GDP have dominant influence on Xp supply.

Tabel:4 Primary Exports: Supply

Variables	Equation 3		Equation 4	
	OLS	TSLS	OLS	TSLS
Constant	2.0 (0.71)	-5.55 (-1.36)	1.78 (0.96)	1.87 (1.0)
ZZ	-0.43 -1.18	-0.31 (-0.52)	0.009 (0.03)	0.37 (0.42)
Ypak	0.37 (1.13)	0.82 (2.65)*	0.09 (0.70)	0.07 (0.49)
Do	-0.17 (-0.67)	-0.63 (-2.17)*	-	-
$\overline{R^2}$	0.39	0.29	0.37	0.33
D.W	1.92	1.78	1.82	1.81

Tables 5 and 6 show the results for Xm demand and supply. Relative price coefficient and world income have correct and expected signs for Xm demand (Equation 1). Moreover, unlike X and Xp relative price variable is not significant for Xm. Anwar (1983) also got negative and not significant coefficient (-1.38) for relative price variable for Xm demand for the period 1960-80. While, Khan and Saqib (1983) reported a significant relative price coefficient (-0.38) for the period 1972-88 for Xm demand.

For many developing countries relative prices do not seem to have significant effect on the export of these countries [Houthakker and Magee (1969). Khan (1974), Arize (1986)Bahmani-Oskeeoo (1984)]. However, in sharp contrast to X and Xp, Do is positive and significant for Xm demand implying that liberalization helps promote manufactured exports but discourages X and Xp. Another aspect is that inclusion of the liberalization dummy makes world income variable less significant. It may be construed that when trade is liberalized world income assumes secondary importance.

Tabel:5 Manufactured Exports Demand

Variables	Equation 1		Equation 2	
	OLS	TSLS	OLS	TSLS
C	-33.25 (-2.32)*	-36.70 (-1.77)**	-15.02 (-1.0)	-3.35 (-0.11)
PU	-0.88 (-1.11)	-0.68 (-0.56)	-0.96 (-1.32)	-1.72 (-0.91)
ZW	2.37 (2.77)*	2.58 (2.09)*	1.25 (1.39)	0.56 (0.29)
DO	-	-	0.69 (2.50)*	0.69 (2.34)*
R^2	0.71	0.71	0.75	0.73
D.W	1.75	1.74	2.21	2.24

Table 6 shows the results of Xm supply equations. Traditional form of the Xm supply [Equation 3] shows that relative price coefficient is positive but not significant whereas domestic income coefficient is positive and significant. Khan and Saqib (1993) got positive but not significant value for price variable for Xm supply. While Anwar (1985) got negative but not significant coefficient for Xm supply like this study, Khan and Saqib (1993) different supply result may be due to different relative price form as well as different period. Our estimate of elasticity (1.76) is better than Naqvi [0.93], Anwar [0.96] and Khan and Saqib [1.60]. World income elasticity 2.58 [Equation 1] for Xm is greater than domestic income elasticity 1.76 [Equation 3] for Xm. Thus a comparison of the two income elasticities for Xm [Equation 1 & Equation 3] suggests that manufactured exports are more dependent on world income rather than on GDP, a proxy for domestic economic activities.

Tabel:6 Manufactured Exports- Demand

Variables	Equation 1		Equation 2	
	OLS	TSLS	OLS	TSLS
C	-9.21 (-5.26)*	-17.60 (-5.86)*	-5.36 (-1.92)**	-9.75 (-1.81)**
ZZ	-0.60 (-1.29)	-0.74 -1.00	-0.32 (-0.67)	0.04 (0.05)
Ypak	1.73 (8.63)	1.76 (7.88)*	1.29 (3.84)*	1.16 (2.82)*
DO	-	-	0.53 (1.73)**	0.61 (1.73)**
$\bar{R}^2$	0.73	0.73	0.75	0.74
D.W	1.79	1.78	2.06	2.08

Table 7,8 show that result of estimation for semi-manufactured exports for both demand and supply. Relative price has incorrect and not significant coefficient in equations 1 and 2. Khan [1974] also obtained positive relative price coefficients for Philippines (0.899) and Uruguay (1.038). Bahmani-Oskooee [(1984),p.84] showed positive but not significant demand price elasticity (+0.267) for Korea. Dummy [Equation 2], though not significant like Xm, has positive influence on Xs demand. Thus Unlike X and Xp, liberalization has positive impact on Xm and Xs. Unlike Xp and Xm,Xs supply function [Equation 3] is positively sloped [Table 7]. World income elasticity [2.63] for Xs demand [Equation 1] exceeds Xs supply [Equation 3] elasticity [1.4] suggesting that world demand conditions are more predominant than internal economic conditions. For total and manufactured exports, we got similar results. These findings point towards the most crucial conclusion that in case of Pakistan exports cannot be relied to be an engine of growth.

Tabel:7 Semi-manufactured Exports-Demand

Variables	Equation 1		Equation 2	
	OLS	TSLS	OLS	TSLS
Constant	-35.74 (-2.19)*	-38.89 (-2.17)*	-28.36 (-1.92)**	-32.09 (-1.99)**
PU	-0.25 (-0.68)	0.68 (1.17)	0.30 (0.79)	0.72 (1.23)
ZW	2.45 (2.51)*	2.63 (2.46)*	2.02 (2.25)*	2.22 (2.30)*
Do	-	-	0.75 (1.10)	0.33 (1.19)
$\bar{R}^2$	0.88	0.87	0.88	0.87
D.W	1.86	1.93	1.95	2.03

Tabel:8 Manufactured Exports- Supply

Variables	Equation 1		Equation 2	
	OLS	TSLS	OLS	TSLS
Constant	-4.79 (-0.95)	-12.96 (-1.85)**	-2.63 (-0.67)	-14.63 (-1.53)
ZZ	0.42 (1.02)	1.53 (1.14)	0.44 (1.32)	1.51 (1.02)
Ypak	1.12 (1.98)**	1.34 (2.5)*	0.85 (1.92)**	1.45 (2.08)*
Do	-	-	0.30 (1.06)**	-0.11 (-0.26)
$\bar{R}^2$	0.88	0.82	0.88	0.82
D.W	1.94	1.82	2.01	1.79

Conclusions

The signs of the relative price variable and the world income are correct and significant for total export demand. The estimation of our model provides consistent estimates of the export demand and supply elasticities and is comparable to other studies. World income turns out to be more significant factor than export prices. Liberalization has not too bad effect on demand for total exports. Liberalisation though not significant has positive influence on total exports supply. However, in sharp contrast to primary exports, dummy is positive and significant for manufactured export demand implying that liberalization may help promote manufactured exports.

Moreover, unlike total and primary exports, relative price variable is not significant for manufactured exports. Dummy has positive influence on semi-manufactured exports demand and the supply function is positively sloped. While primary and manufactured exports have negatively sloped supply function. Therefore, study of exports in disaggregated form (primary, semi-manufactured and manufactured exports) throws sufficient light on the true behavior of the primary, semi-manufactured and manufactured exports and can help significantly in the policy formulation about the said categories of exports. Concentration on the examination of total export behavior conceals a number of facts.

Domestic income elasticity of total exports (1.28), manufactured exports (1.76) and semi-manufactured exports (1.34) is much less than the world income elasticities for total (a.99) manufactured (2.6) and semi-manufactured (2.58) exports respectively. For primary exports world income elasticity is even negative (-1.87). Moreover. Negative supply price elasticities for primary and manufactured exports which. account for Pakistan's 80% total exports and marginally positive supply price elasticities for total and semi-manufactured exports, imply that Pakistan is a price taker in the world market.

Keeping in view both demand and supply aspects of Pakistan foreign trade, great care should be exercised in framing export promotion policies as the fragile economy of Pakistan may not sustain the rapid functions in international trade. Another important policy implication is that since primary exports have negative world income elasricity vis-a-vis manufactured and semi-manufactured exports, desirable strategy would be to promote manufactured and semi-manufactured exports.

REFRENCES

Anwar, Sijad [1985], "Export Functions for Pakistan, Pakistan Journal of Applied Economics Vol. 4.No. !,pp.29-34.

Arize , A[1991], "Specification Tests of the Aggregate Import Demand Modèl in Developing Countries," International Economic Journal, Vol5, No. 1,pp.79-89.

_____ [1986],'The supply and Demand for Imports and Exports in a simultaneous Model" Pakistan Economic and Social review, Vol.24 No.2, pp57-76.

Bahmani-Oskooee, Mohsen [1984], "on the Effect of Effective Exchange Rates on Trade Flows," Indian Journal of Development Econonmics, Vol.65,pp.57-67.

_____ [1986]," The determinants of International Trade Flows," Journal of Development Economics,pp. 107-123.

Balassa, B. et al[1989] "Two Determinants of Export Supply and Export demand in Two developing Countries : Greece and Korea." International Economic Journal, Dunn R.M. and J.C.

Ingram [1996], International Economics, 4th Ed John Wiley and Sons. "A Test of the Capacity Pressure Hypothesis Within A Simultaneous Equation Model of export Performance." Review of Economics and Statistics, Vol. 62,pp. 131-135.

Gafer, Jhon [1981] " Devaluations and Balance of Payments Adjustment in a Developing Economy: Analysis Relating to Jamaica: 1954-72" Applied Economics, pp. 151-65.

Godestein. M. and Mohsen s. Khan [1978] "The Supply Demand for Exports: A Simultaneous Approach," Rerview of Economics and Statistics, Vol. 60, No.2 pp. 275-286.

Haynes, S. and J. Stone[1983], "Secular And Cyclycal Response of U.S. Trade to Income: An Evaluation of Traditional Models." Review of Economics and Statistics, Vol. 65, pp. 87-95.

Houthakker, H.S. and Stephen Magee[1969] Income and Price Elasticities in World Trade," Review of Economics and Statistics, Vol. 51, pp. 111-125.

IMF, International Financial Statistics [Various Issues].
Kenen P. B. [1975] International Trade and Finance: Frontiers for Research, Cambridge University Press.

Khan, Ashfaque and Najam Saqib [1993], "Exports and Economic Growth: Pakistan Experience" International Economic Journal, Vol. 7, No.3, pp.53-64.

Khan, Mohsen S. [1974], "Import and Export Demand in Developing Countries," IMF Staff Papers, Vol. 21, pp. 678-693.

Khan, MS and K.Z Ross[1975], " Cyclical and Secular Income Estatistics of the Demands for Imports," Review of Economics and Statistics, Vol. 57, pp.357-361.

Magee, S.P. [1975]," Prices, Income and Foreign Trade: A Survey of Recent Economic Studies," in P.B. Kenen (ed.) International Trade and Financ: Frontiers for Research. Cambridge University Press, pp. 175-252.

Murray Tracy and P. Ginman [1976], "An Empirical Examination of the Traditional Aggregated Import Demand Model" Review of Economic and Statistics. Vol. 58. pp. 75-80.

Pakistan, Government of, Pakistan Economic Survey [Various Issues], Islamabad, Ministry of Finance Economic Advisor Wing.

World Bank, World Tables (various issues)

RE-MPLOYMENT CHOICES OF RETURN MIGRANTS AND INTERNATIONAL TRANSFER OF TECHNOLOGY: A Case of Azad Jammu and Kashmir

M. Aslam Chaudhry and Syed Nisar Hussain Hamdani[1]

1: introduction

Specific socio-economic background and human linkages may play a significant role to encourage migration of people either from rural to urban or from one country to another country. One of the major reasons for migration is search for higher wages/income. There is a rich body of literature focused on the determinants of migration. The role of return migrants in promoting economic growth and socio-economic changes brought by their re-adjustment is well documented in the literature [Stahl, 1986], [ILO/ARTEP, 1984], [Authokorele, 1990], [Hamdani, 1996], Addelton(1992), However, Literature is limited which points out re-employment pattern of return migrants (RMs) and their role in international transfer of new technology from the host to the home countries. The persent study is focused to identify growth prompting role of the RMs in Azad Jammu and Kashmir (AJK) through employment generation by the return migrants, remitted savings, nature of technology transfer and pattern of investment among the RMs. The RMs bring with them not only savings but they also return with better skills and experiences. The quality of human resources usually improves to a notable extent due to the process of migration. Besides, these RMs also bring modern consumption goods, equipment and electric goods etc. with them, which may lead to demonstration effect and the society may turn out either growth Promoting or consumption oriented.[2] Its demonstration effect is promotion of consumption and the society is converted to consumption rather than inclined to savings. Thus, it could create economic problems like discouraging local savings, and increasing unemployment.[3] Moreover, Children of RMs run away from education due to absence of father from home. It creates social and family problems.[4]There is hardly any comprehensive study which may have analyzed the issues concerning socioeconomic status and re-adjustment pattern of workers returning from overseas in Azad Jammu and Kashmir (AJK). The limited literature on the subject- matter too [PERI, 1993: and GOAJK, 1996] does not provide detailed information on these issues. Only Hamdani (1996) has analysed some of these issues, however, its focus

---

[1] the authors are Associate professor of Economics at Quaid-i-Azam University Islamabad and Assistant Professor of Economics University of Azad Jammu and Kashmir, Muzaffarabad, respectively.

also remained limited to socioeconomic factors, transfer of remittances and employment etc, and it also does not provide detailed account of re-employment patterns of return migrants and transfer of modern technology through RMs.

Most important is to analyze re-employment pattern of return migrants and its correlation with different demographic, employment, investment, improvement of human capital, planning of re-employment after returning home and other related variables. The study of these aspects may help to identify specific migration pattern, which could be growth promoting or having demonstration effect to turn the society to high consumption orientation. Given the importance of the issues, as discussed above, the present study is therefore, aimed to pinpoint the specific characteristics of the RMs who bring capital goods and technology in contrast to consumption goods. Most of the studies so far have highlighted that return migrants who bring consumption goods with them and it has negative effect on the society (ILO/ARTEP, 1984). Thus the present study aims at analyzing new aspects of return migrants. Moreover, the present study also aims to identify the issues relating to RMs productive readjustment in the home economy, which may help to accelerate domestic economy and generation of new employment opportunities as well as entrepreneurship culture. There are many reasons for placing importance to identify re-employment pattern and transfer of technology through return migrants. As stated earlier that such analysis will help to identify the relationship between socio-economic characteristics of the RMs who are growth promoting with the transfer of new technology. Their experience of international labor market, the level of skill acquisition abroad and so on could be very important to up lift the developing areas. For example, return migrants who bring savings, technology and skills upon their final return, they may prefer self-employment and therefore they introduce improved and new business culture. The induction of new technology may also improve the quality of local product and it may also turn the country competitive in the international market too. They could also be a source to generate employment for others through establishment of new enterprises. All aspects will be highlighted in this study.

To study the above cited issues, AJK[5] seems to be a very suitable area since substantial number of people migrated from AJK to several destinations like Middle East, Europe, USA and Japan etc. It seems that 36% families in AJK were found having one or more members migrated from the districts of their origin (PERI -1992). In Mirpur district alone about 1.5 members per household had migrated to the places. The overseas

migration in this district was found as high as 24.2%. The above cited study also indicated that among the migrants, 53% were laborer, 28% white collars and over 18% were self-employed. It seems important to look at their readjustment, usage of savings and improvement in managerial skill after returning from overseas. Besides, migrants to a specific region may gain skills and training which may be very useful for uplift of the underdeveloped areas. It has also been stated that the RMs returning from Middle East mostly bring consumption goods where as the RMs from Europe and developed countries are more inclined to bring new technology to home. Such aspects have not been widely analyzed so far except Hamdani(1996). Moreover it will also be looked into whether national planning to establish businesses has played any role in the generation of new businesses by the RMs. To analyze the above-cited issues, the study is organized as follows. Part II, provides socio-economic conditions of the area under study, background of migrants and related existing literature on the subject matter. It also contains details of the new survey and description of data used for the study. Empirical findings are discussed in part III. Part IV provides conclusion and policy prescription.

PART II: ECONOMIC CONDITIONS AND MIGRATION

The AJK is a developing state where neither industry nor agriculture is much developed. As a result migration is a common phenomenon. Return flow of migrants is significant. As pointed out earlier that 36% families in AJK were found having one or more members who migrated from their district of origin. Every fourth person in AJK has migrated from some other area. It means that migration rate in AJK is very high. These migrants belong to labor, white collars, skilled workers, academicians and researchers etc. (see appendix, table 1). There is a continuous flow of out-migration and return migration in the area. The return migrants not only bring with them savings, technology and consumer goods but they also face variety of problems after return i.e. like unemployment and loss of savings in a short period and ending up in poverty (ARTEP/ILO 1984). One of the major social problems is that their children may fail either to obtain skill or education. It happens so due to the absence of the father from home. Besides, the savings may be eaten up in a short period of time by their high consumption pattern and they may again face hardships.

The re-employment choice of return migrants are complex. These choices depend upon their demographic, social and economic background like age, education, skill and duration of stay abroad. The choice of occupation, employment and business among return migrants is

of great importance in the context of their re-absorption in the domestic economy. On return they usually bring savings, technology, skills and equipment with them; which may help to transform the local economy.[7] Specifically, the possibility of technology transfer from their host to home country could play an important role to accelerate economic growth.

The effect of return migration on various aspects of family, business and economy has been widely discussed with reference to various economies [Stahl, 1986], [Gmellch,1986],[ILO/ARTEP,1984], [Authokorele, 1990], However, despite a very high rate of overseas migration and return migration from AJK, research pertaining to the subject matter remained neglected in AJK. ILO/ARTEP (1984) has partially discussed the migration issues. It indicated that there is 25% unemployment among return migrants(RMs). PERI (1992) did analyse migration in AJK, but it ignored important aspects like re-employment pattern and technology transfer. Small Industries Corporation of Azad Kashmir (SICAJK, 1995), conducted a survey and analyzed employment pattern in AJK. However, it also ignored employment pattern of RMs and, particularly, transfer of technology. None of these studies took into account the re-employment practices of RMs. Therefore, the present study is first in analyzing not only re-employment pattern of RMs but also their role in bringing socio-economic changes and transfer of technology in AJK. Besides, the nature of technology transfer and the specific type of migrants who bring technology will also be identified in this study. It has also been argued that RMs prolong their search for re-employment due to specific nature of their education, skill and experience. It may be that reason that IIO/ARTEP(1984) identified high rate of unemployment among return migrants. Besides, cushion of savings keeps their demand high for higher wages, therefore, they keep on waiting for longer time for higher wages, and remain unemployed for a longer time. Moreover, local wages are much lower than what they earned abroad. Therefore, they prefer not to accept prevailing market wages and some of them, later on, may prefer to set up their own businesses.[8]It also appears that at the time of return, education, duration of study abroad, stay abroad in specific country and average savings on return may play important role in re-employment choices of RMs Addelton (1992) stated that self-employment in Pakistan has been promoted by the RMs i.e. from 8% to 22%. Permanent employment has reduced in both rural and urban areas.[9] ILO study (1984) estimated that self-employment among RMs is about one-third of the total numbers. However, the study fails to point out transfer of technology and specific type of return migrants (s) who prefer to establish their own businesses or look for employment. The present study is based upon new survey independently conducted by the qualified surveyors.

The Survey and Data

The study is based upon a fresh survey. Sample was drawn from all the seven districts of AJK. The AJK area was divided into two zones i.e. high and low migration zones. Besides, the stratification was based upon intra-zone similarities and socio-economic set up. The zone-I consists of Muzaffarabad, Bagh, Poonch Sudhnoti, whereas zone-II comprises of Districts of Mirpur, Kotli, and Bhimber, in the South. The sample was drawn in two stages. In stage-I, geographic zones and professional categories of human resources were identified. In stage-II, the areas were selected and respondents were chosen for interviews on random basis. The samples size was determined on the basis of the following widely used formula: $N = K^2V^2/D^2$

Where

N = Required sample size under single stage simple random sample (SSSRS)

K = Standard normal deviate for required confidence.

V = Coefficient of variation of variable under study as proportion of mean.

D = Required precision, as proportion of mean.

The formula is based upon the selection of appropriate sample size (Cochran 1997), Potate and Doplyn, 1993. The method suggested a sample size ranging between 85 – 105. Thus 105 respondents were interviewed. A comprehensive questionnaire was prepared for this purpose which contained questions relating to various aspects of migration, return migration, skills, re-employment, notional plans and other related socio-economic parameters. The questionnaire was pre-tested and necessary adjustments were made. Some case studies were also done, which were based upon vision survey. Besides the principal investigator conducted long interviews (i.e. 33) for verification of the statements made by the return migrants. Such cases were thirty three. Overall, the sample size was 105. After data cleaning, a sample of 94 respondents was utilized for analysis. These were 52 return migrants from zone I and 42 from zone II. The categories of RMs were identified on the basis of their technological environment in which they might have worked abroad, hence they may be expected to have different behaviors regarding skill acquisition, technology transfer, re-adjustment in the home economy. The categories of RMs are given in appendix, table 1.

III: EMPIRICAL FINDINGS

3.1: Reasons of Migration and Linkages

The survey results indicated that one of the major reasons for migration was search for higher income (61%). About 12% MRs migrated abroad due to unfavorable local conditions. Besides, 10.8% persons went abroad for higher education. There were very few persons who migrated abroad because of unemployment at home (3%). There were only 5% migrants who went abroad due to family problems or similar other reasons.

Todaro and Harris model [1960] of rural urban migration of push and pull factors' role in migration seems applicable for overseas migration from AJK too. As stated above, major attraction for migration was higher income opportunities and linkages with friends abroad. The most important is that friends and relatives abroad (42%) helped for migration. Such a link was also stated by the above-cited model. Besides, recruiting agencies helped (22%), self search(22%) and local government helped 14% of the migrants in finding jobs abroad. It is important to note that government helped the minimum to either migrate or to seek jobs abroad. Moreover, majority of migrants were motivated to migrate by their own will (44%). About 37% migrants sought help for their migration. Besides, 19% responded that there was more than one reason (as mentioned above) to convince them for overseas migration.

3.2: Reasons of Return Migration.

There are different reasons for migrants to return home. The major reasons for the same are given in Table 1. As reported in the Table 1 that majority of migrants went abroad for higher income. Thus, as soon as they achieved their target of earnings, they returned home. About 27 % return migrants came back since they achieved their income target and majority of them wanted to establish business at home. The second major reason for returning home was their need at home or events at home country (12.2%). Such need was either their family or relative's need for their presence at home. Similarly, about 13% returned home due to either family problems and the similar percentage of RMs returned due to end of their job contract or their job was abolished abroad. There were 12% RMs who were not satisfied with the work conditions abroad and therefore they returned home. Moreover, 5% RMs retuned earlier than their original planning to return home, because they wanted to establish their

businesses at home. There was a negligible percentage of RMs who came back either because of children education, health reasons or due to insufficient income abroad (7.3%). About 11 % RMs returned due to other several minor reasons. The above-cite empirical evidences indicated that the migrants were successful in achieving their goals for migration like earning higher income, education and business needs etc.

Table 1: REASONS OF RETURN MIGRATION FROM ABROAD

Reason	Nos.	Percentage
Job finished/contract ended	12	13
Family problems	12	13
Health	3	3.2
Children education	2	2.1
Poor work conditions	11	11.7
Event at home/country	11	12.2
Accumulated desired saving/	25	26.6
Expected job/business at home	5	5.3
Insufficient income	2	2.1
Others	11	11.7
Total	**94**	**100**

3.3 Saving Pattern of RMs

One of the major benefits to RMs is cash reserves or savings, which they bring home on their return from abroad. In the case of AJK about 52 % migrants brought less than Rs. 50,000, at the end of migration period. About 20 percent RMs brought between Rs. 50,000 to Rs200,000. However, 28 percent RMs came with more than Rs200,000(up to Rs, 80,000 in case of Mirpur district). Table 2 provides information regarding professional occupation of the RMs and the amount of remittances, which they brought on their final return to home. There were few academicians and researchers who migrated abroad. However, they were successful in bringing significant savings to home. Much importance may not be placed to this category of migrants since they were not large in numbers. However there were 32 % laborers and semi-skilled workers who brought less than Rs. 50, 0000 on their final return to home. However, the same

category was the migrants who brought sufficient remittances to home . More than 52 % of these migrants brought less more than Rs, 50,000. The highest percentage of developers brought more than Rs, 200,000 The unskilled labor and home servants were among the maximum who brought less than Rs. 50,000.

Table: 2 Savings/Remittances by Profession

profession	Less than Rs.50,000 Nos.	%	Between Rs. 50,000-200,000 Nos.	%	Greater than Rs.200,000 Nos.	%
Researchers	1	2.1	1	5.6	2	8.0
Academicians	6	12.7	5	27.7		-
-						
Developers	7	14.9	2	5.6	9	36
(Designers/Engineers)						
Craftsmen/skilled labor	15	32.0	11	27.7	7	28
Promoters(Sales/Traders)	8	17.0	-	16.6	-	-
Facilitators/servants	6	12.7	2	5.6	3	12
(Clerks, Nurses Assistants)						
Learners/students	-	-	-	-	-	-
Others	4	8.5	2	11.2	4	16
Total	**47**	**100**	**22**	**100**	**25**	**100**

Almost half of the total sample size of migrants brought less than Rs. 50,000, on their return to home. It may be noted that it is in addition to their earlier remittances sent to home prior to their return migration.

It is important to note that skilled workers and Craftsmen dominated in all three categories. This class was able to earn more than others too. Besides, businessmen were also were also very successful in all three categories. Academicians were maximum in the middle income category of savers. The maximum amount of savings, i.e. over Rs. 200, 000. Different behavior of savings of different categories of RMs makes it interesting to study the re-employment pattern of the return migrants,

given their amount of savings.

3.4: Re-employment Pattern

It is interesting to note the background and pattern of re-employment of return migrants. Among the self-employed, 36% were those who had planned to establish business before going abroad. However, those who are re-employed with the government had no such planning before going abroad. Among the unemployed, 40% were not clear what to do after returning home and they had no future plan before going abroad. It is also interesting to find that 76% of self-employed were very clear about their future plans, after returning home. Majority of them had business planning even before going abroad. It appears that notional planning of the RMs played an important role in their post-migration adjustment by establishing their own businesses. Thus, notional plans were realized in terms of effective plans.

Table 4. provides age structure of the re-employed RMs . The majority of RMs who were employed with the government were in the age structure of 31-50 years. Among them majority of RMs i.e. 70 % were between the age of 41-50 years. The unskilled manpower inspite of their prime age structure were the maximum who were found unsuccessful in earning high incomes abroad or in readjustment after returning home.
It is generally felt that lack of finance hinders self-employment or such constraint restricts establishment of self-business. It will be interesting to analyze the volume of savings brought by RMs and their choice for re-re-employment.

Table: 4 re-employment Status By Age Group

Age Group Years	Self-employed		Employed With the Government		Unemployed	
	Nos.	%	Nos.	%	Nos.	%
21-30	7	15	-	-	8	40
31-40	30	64	1	5	6	30
41-50	8	17	8	40	1	5
51-60	2	4	11	55	5	25

Table 5, provides empirical evidences regarding re-employment status by the amount of savings. Thus the younger age group of RMs were more interested to start their own business than looking for jobs. Besides, more than 50% of self-employed hired more than two

employees. However, among the unemployed RMs, 40% were in the age group of 21-30 years and these RMs were unskilled. The evidences indicated that technical and skilled manpower, was not only successful in earning more abroad but they were also successful in faster re-employing themselves in gainful businesses and the vice a – versa was also true.

Table: 5 Savings and Re-employment Pattern

Amount of Savings	Self-employed		Employed with Government		Unemployed	
	Nos.	%	Nos.	%	Nos.	%
Less than Rs. 50,000	6	12.7	10	50	12	60
Between Rs,50,000-200,000	31	66	6	30	5	25
More than Rs. 200,000	10	21	4	20	3	15

It appears that about 50% of RMs who got jobs with the government were those who had remittances less than Rs. 50,000.Where as there were only 13% self-employed who had savings less than Rs.50,000. There were 30% RMs employed with government who had remittances between Rs. 51,000 – Rs. 200,000. Only 20% of the Rms employed with the public sector had savings over Rs. 200,000. It is interesting to note that pattern of self-employment with respect to the level of remittances was different than that of employed with the government. Only 13% of self-employed were those who had remittances less than Rs, 50,000 About 69% of self-employed were those who had remittances between Rs 51,000 – Rs 200,000 There were only 13.7% self- employed RMs who had remittances above Rs. 200,000. These figures indicated that job seekers with the government in spite of having substantial savings preferred again to find jobs. This category of RMs had neither business background nor they obtained such skills while abroad. The self-employed had sufficient savings to set up their own businesses. It may be noted that more than 87% self-employed RMs had savings more than Rs.50, 000. It may be said that financial constraints may have been a bottleneck for establishing of businesses. It is also important to note that category of RMs who had minimum savings and they also failed to find a job or to establish a business were also unlucky to re-adjust on their return. The vision survey indicated that more than 60% RMs who established their own businesses had some business background and financial constraint forced them to migrate abroad. Besides, there are also significant percentage of self-employed RMs who established their own businesses on the basis of the skills acquired abroad. Thus, own

professional background, assets, experience abroad and notional planning played an important role for re-adjustment and choice of re-employment.

The re-employment pattern of the return migrants was also different in terms of selecting jobs, given their age group. Appendix table 2 provides information on the selection of employment by age group and the choice between public sector jobs or having own business. It may be noted that up to the age of 40, about 37% preferred to have self-employment. Among this group, as already identified, significant number of unsillked workers remained unemployed. There were 95% of total RMs employed with the public sector who had age over 40 years i.e. out 20 RMs, 19 RMs were in this age group. Thus relatively older RMs preferred to have a job with the public sector. It may also be noted that most of these RMs were academicians and researchers.

Transfer of Technology

Migrants may play multidimensional role in the development of a country on their return to home. They bring durables, savings, professional skills, better working behaviours and most importantly they are also a source of transfer of latest technology. Transfer of technology is a long outstanding debates between developed and developing countries. The RMs helped to bridge this channel. Appendix, Table 1 provides a profile of technology which RMs brought with them on their return to home. Depending on the environment in which the RMs might have worked abroad and their profession of occupation, the RMs are found to bring various types of technological items with them upon their return to home. These items include all types of the four components of Technology[10] like professional equipment, toolkits, computers, plants & Machinery, hi-tech devices, training materials, audio visual equipment, scientific formulae, software, technical specifications & designs, job-techniques, research materials, automobile & electronic items, better improved working habits, and modern styles of organization and management etc. (also see appendix, Table 1). It appears that three types of RMs brought maximum technology and equipments with them. These are researchers/academicians, craftsmen/skilled manpower and facilitators. Although all RMs did bring some type of technology but above cited categories seem to play a major role in the transfer of technology. It may be noted that the same category of RMs also brought higher savings and they were also successful in gainful self-employment[11]. It appears that the technology and equipment which they brought with them may also have helped them in re-employment i.e. establishing their own

businesses. A source of such success was their notional plans to do so, which they prepared before migration abroad. Thus the notional planning played an important role in the transfer of technology. The notional planning for business may also have convinced the RMs to save more to fulfill the goals. As discussed earlier, these were the RMs who were also engaged in business and also created jobs for others. Thus it has an important bearing for the formulation of labor and overseas migration policy, Presently there is no such policy, which may be focused on the migrating of specific type of workers. Thus a policy to encourage specific workers for seeking jobs abroad could also help to bring new technology to home. The government is struggling hard for transfer of technology; for which it has neither sufficient resource nor it succeeded through government channels. Thus a policy for encouraging and facilitating specific workers for oversea's migration can further enhance not only remittances but it can also fill the desired technology gap. Presently this source of technology transfer was neither highlighted nor promoted. It is the very reason that there exists no government policy to channelize such means.

IV. CONCLUSION AND POLICY IMPLICATIONS

The study was focused to highlight the socio-economic background of migrants, with particular reference to transfer of technology from abroad, reasons for migration and their re-employment pattern after returning home. Besides the impact of notional planning on re-employment and promotion of business was also to be analysed. Moreover, readjustment of different categories of workers by their age group was to be identified. Based upon the empirical evidences, guidance for public policy was to be provided.

To analyse the above-cited issues, a fresh survey was conducted in the area of Azad Jammu and Kashmir. The empirical findings indicated that majority of migrants were craftsmen (technical workers/experts, craftsmen and skilled labor) 27%,followed by developers (engineers & designers) 18% Only 16% RMs were promoters (media people, marketing personnel etc.) and 12% RMs were academicians and researchers. Besides the major reason for migration was search for higher income, as also indicated by Todaro & Harris (1960). The objective of gaining higher income was achieved through job seeking abroad, establishment of businesses and also by securing higher education and skill. The decision of returning home was based upon a variety of factors. The major reason for returning home was the achievement of the main goal i.e. accumulation of desired saving. A significant reason for returning home

was also the end of jobs. Other reasons for returning home included, family problems and other events like business ties etc.

The analysis provides interesting results about savings, re-employment pattern and transfer of technology. The top two categories which accumulated the highest savings were skilled workers and professionals (crafters). The unskilled laborers brought minimum savings with them. Academicians were among the middle category of savers. The re-employment pattern of RMs indicated that those who were the highest savers, they were also successful in gainfully re-employing themselves after returning home. These RMs were again technical workers and experts. Academicians and researchers mainly find their re-employment with the public sector inspite of having high savings. Majority of the RMs who find jobs with the public sector were those who were older than 40 years. The lowest savers also either find their re-employment with the public sector or remained unemployed. The RMs who had higher savings also preferred to be self-employed, by establishing their own business, after returning home. Unemployment was not very high among the RMs. Some of them were not interested for re-employment since they had accumulated enough savings for living. It is very interesting to note that those migrants who had their post-migration plan for re-adjustment, towards the end of migration, were successful in managing self-employment in terms of establishing their own business, after returning home. These RMs appear not only successful for themselves but they also appeared to play positive role in the economic uplift of the local areas by bringing new technology and creating jobs for others too. The majority of unemployed were unskilled workers, although they were in their prime age of working position.

The empirical evidences indicated that RMs were a significant source of technology transfer. This has special importance for RMs regarding their post-migration employment. The RMs who brought technology with them, upon their final return to home were not only successful in self-employment but they also created jobs for others. Their re-adjustment process was faster than those who brought technology with them; rather consumption goods. The RMs are also a good source of creating employment opportunities for those in the local economy and as a result they were helpful in promoting economic growth too.

The above cited findings have several policy implications. The general impression of RMs that they only bring consumption goods and face high unemployment after returning home is not supported by our findings of this study. It appeared that the RMs who remained

unemployed, they were either not interested to get a job on the prevailing market wages or they were unskilled workers. There were a significant number of migrants who brought substantial savings with them and they generated businesses, self-employment and job opportunities for others. A substantial number of returning migrants would have been able to set up their own enterprises if they were encouraged and appropriate information was provided to them well in time. The Public sector's guidance and support could have further strengthened such developments process? Such a policy could also enhance flow of remittances. There is a need that information about investment opportunities and related aspects may be provided by electronic and media to overseas workers. Such information may enable the returning workers to plan for their better post-migration may enable the returning workers to plan for their better post-migration business, prior to leaving the host country Hence they may also bring with them more equipment toolkits and cash for their prospective business at home. Hardly any such policy exists at present. Public sector may play its role in providing investment information and adjustments opportunities to the migrants. Such a network is still lacking in AJK and Pakistan. The public sector was found the least helpful in finding jobs abroad. It should play leading role, given the high unemployment at home and limited opportunities to create more jobs. It is very important to note that RMs also played a significant role in bringing technology with them. Thus, it is an important contribution of the present study to further highlight the new channel of transfer of technology[12] The technology, machinery, equipment skill and experience which helped the RMs for sustained self-employment. It also needs to be strengthened. The public sector must change the general education pattern to technical education for successful employment and for increasing migration of technical workers to abroad. Given that the export sector is not flourishing much, the earnings from remittances may be enhanced by improving upon migration policy. The channel can be better utilized if public policies are directed to facilitate the RMs. Such a policy will also help the RMs for productive re-adjustment in the home economy and acceleration of economic growth through productive use of remittances, inflow of latest technology and creation of gainful employment.

End Notes

1. There could be many other reasons for migration like political unrest at home, social conditions, war and education etc. for detail of rural urban migration see Todaro & Harris (1960).

2. The RMs spend their income on consumption goods, they loose saving and investment opportunity too. They not only loose opportunity to enhance their income but it also does not help the country in promoting economic growth. Besides, due to demonstration effect, local community also becomes consumption oriented and therefore saving may be reduced.

3. It is often found that the return migrants, who spend their savings on consumption goods, they eat up these assets. As a result, they loose assets to do any business. Since return migrants hardly adjust to local jobs, therefore, they end up unemployed. [see Chaudhary & Hamdani, 1997].

4. Since children get the assets from parents therefore they neither feel to improve education and skill nor they look for self-employment. Besides, the families left behind and their children suffer from a set of social problems like getting involved in drug, wasteful consumption, running away from school and picking of crimes[Gilani et. Al. 1998;ILO/ARTEP, 1984;PERI 1992].

5. Azad Jammu & Kashmir AJK) is liberated part of the State of Azad Jammu & Kashmir situated in the north East of Pakistan. It is considered to be 5th economic unit of Pakistan (four being the provinces). The total area is about 13,000 sq. Kms. And its population is about 3 million. The area has high rate of migration from their original districts.

6. The most recent unofficial estimates of AJK Chamber of Commerce & Industry show a much higher rate of overseas migration from Mirpur District than that mentioned in this study.

7. Not all return migrants bring technology with them. It is important to find out which types of return migrants play such a role and what is their re-employment pattern.

8. Also see Authukorele (1990) and Brooks (1996).

9. These return migrants may be doing government jobs before going but they prefer not to take up jobs after return.

10. These are; technoware or equipment, humanware or skills, infoware or resource materials and orgaware or organizational styles.

11. A more detailed discussion is available in Hamdani (1996) and Chaudhary & Hamdani (1997) on the type of technology transferred and its effect on re-employment of RMs.

12. Hamdani (1996) and Chaudhary & Hamdani (1979).

Appendix Table 1: Types of Return Migrants and Transfer of Technology

Type of RMs	Type of Technology Transferred*
Researchers & Academicians	Literature, Computers, Software Lab Equipment, Formulae.
Developers & Promoters	Plants, Machinery, Computer, Software, Equipment, Processes, Specifications, Quality Management.
Crafters	Professional Equipment, Toolkits, Hi-tech devices, Processes, Techniques.
Facilitators	Literature, Professional, Equipment Toolkits, Hi-tech devices, Electronic Equipment, Automobile Toolkits, Traffic habits, Environmental Consciousness.
Workers	Miscellaneous Equipment & Techniques, Quality Operations.

Learners	Education, On-job-experience, Specialised Training, Education & Audio-visual Equipment, Research and Lab Equipment, Literature, Specifications, Designs, Formulae, Quality Management, And Information Technology.

*This list is, however not exhaustive to cover all the components of technology transfer.

Appendix Table 2: Re-employment Status by Age Group

Age Group	Self-employed		Government Employment		Unemployed (%)	
	Nos.	%	Nos.	%	Nos.	%
21-30	7	15	-	-	8	40
31-40	30	64	1	5	6	30
41-50	8	17	8	40	1	5
51-60	2	4	11	55	5	25
Total	47	100	20	100	20	100

Appendix Table3: Re-employment Status by Amount of Savings

Age Group	Self-employed		Government Employment		Unemployed(%)	
	Nos.	%	Nos.	%	Nos.	%
Less than Rs. 50,000	6	12.7	10	50	12	60
Between Rs,51,000-200,000	31	66	6	30	5	25
More than Rs. 200,000	10	21.3	4	20	3	15
Total	47	100	20	100	20	100

PREFERENCES

Azad Kashmir Society for scientific and social research, (1995), small & Cottage industries in AJK, Muzaffarabad.

Amjad R. ed, (1989), Technology for the Development, Asia & Pacific Center Technology Transfer, ILO.

Asian Development Bank (ADB, 1995). Technology Development & Technology Transfer, Manila.

Authukorele, P. (1990) "International contract Migration & the Re-integration of Return Migrants: the experience of Sri Lanka IMR, Vol 24, No2.

Azam.F, (1987) "re-integration of Return Migrants in Asia" Working Paper # 2 ILO/ARTEP.

Cochran, W.G. (11979) "Sampling Techniques" 3rd ed., John Wiley, London.

Chaudhary Mohammad Aslam and Hamdani, Syed Nasir (1997) Return Migrants & International transfer of Technology" paper presented at south Asian Regional Conference on Migration & Development, Organized by University of Hohenhiem, Germany/ILO/Quid-e-Azam University, Islamabad.

Daplyn, M.G.(1994) "Sampling size determination for formal Survey" Report No. APR-II (Federal)- 1994-1, Pakistan Agricultural Research Council (PARC).

Fawcett, James T., & Fred Arnold "The role of Survey in the study of international Migration" International Migration Review, Vol.xxi No.4.

Gilani, Ijaz, Fahim Khan and Munawar Iqbal, (1981) "Labor Migration from Pakistan and its Impact on Domestic Economy" PIDE Research Report 126, 127 and 128, Islamabad, Pakistan.

Gmelch G. & Richling B. (1986), The Impact of Return Migrants on Rural Farmland, in Return Migration and Regional Problems, ed., by King R., Croom Helen, London.

Government of Azad Jammu and Kashmir, (GOAJK), Planning & Development, (1984). Azad Kashmir Statistical Year Book.

GOAJK, 9 Government of Azad Jammu and Kashmir), Planning & Development Department. (1995). Muzaffarabad, Azad Kashmir at a Glance.

Government of Pakistan, (1982-83) "Economic Survey" Ministry of Finance, Islamabad.

Govt., AJK, P&D Development, (1995) Azad Kashmir Statistical Year Book, Muzaffarabad AJK.

Hamdani, (1996), Technology Transfer & Re-employment pattern of Return Migrants: a case study of Azad Jammu & Kashmir, M. Phil. Disseration, Quid-e-Azam University Islamabad.

Haq, Anwarul., (1979) "Perspective on Migration Research" A Review of Theory, Evidence, Methodology and research Priorities. Pakistan Economic & Social Review Spring-Summer.

ILO/ARTEP, (1984) Impact of Return Migration on Domestic Employment in Pakistan, A Preliminary Analysis.

Iqbal, Munawar and M.Fahim Khan; (1981) "Economic Implications of Return Flow of Immigrants from the Middle East: A Preliminary Study", Research Report Series No. 123 Pakistan Institute of Development Economics, Islamabad.

Kazi, S (1989) "Domestic Impact of Overseas Migration" Pakistan into Gulf and Back" Studies on the Economic Impact of Asian Labor, ILO

Mir, Anjum Altaf and Obaidullah, (summer 1992) "The Spatial Pattern of International Migration, Flows from and to Pakistan: A Preliminary Analysis", The Pakistan Development Review 31:2.

Monson, Ferry. D. (1975) "Industrial Learning Patterns of Turkish Workers at Home and Abroad, the Journal of Developing Area".

National Manpower Commission (NMC), Govt. of Pakistan (12989), "Overseas Migration", Islamabad.

Smart JE, Jeodosio & CJ Jimenez (1986), Skills and Earnings Issues in Development, Impact on the Philippines Labor Export to the Middle East. Asian, Labor Migration Pipeline to the Middle East. Edited by F.Arnold, NN Shah, London West view.

PERI (Punjab Economic Research Institute), (1992), A Socio-economic Study of AJK, Lahore.

Stahl, C.W. (1986). "Southeast Asian Labor in Middle East" Asian Labor Migration Pipeline to the Middle East.
Edited by F. Arnold. NN Shah, London West view.

Todaro, P. Michael and Harris R. John, (1960), Migration, Unemplyment and Development, A Two Sector Analysis," American Economic Review.

UN, (1982), National Migration Surveys, Guidelines for Analysis, ESCAP.

World Bank, (1991) Shelter for Low Income Communities in Azad Kashmir.

Book Review:

Azhar Hassan Nadeem: Pakistan: The Political Economy of Lawlessness; Oxford University Press, Karachi, 2001, PPs 375, Price Pak Rs. 495

It is reassuring to find a study on the "Political Economy of Lawlessness in Pakistan" which incorporates the institutional and socio-political factors as explanatory variables of Pak economic performance during 1969-96. I believe it would be difficult for anyone to disagree with the broad conclusions of this study that:

i) Economic development includes an improvement in the Quality of Life which can't be achieved in conditions of anarchy and in a crime-ridden society.

ii) Lawlessness and crime in Pakistan have increased tremendously over the last few decades, which started with the abrogation of 1956 constitution.

iii) "Economic development" and "law and order" are interconnected and interdependent.

iv) This relationship exists at macro and micro level. This is evident from the colossal economic losses to the economy and the economic units during times of political and social upheavals in the country.

v) To be more specific, the impact of the variables like sectarian conflict or political upheaval can be further studied by looking at their direct and indirect, as well as weak and strong effects on the economy.

vi) Indeed, the next generation of CGE models should concentrate on giving specific values to a^1, a^2, a^3, etc [i.e. the coefficients of Q^w (phenomenon of war) Q^c (communal and ethic conflicts) and Q^s (phenomena of strikes) and so on].

For a fairly long time some serious Western economists had been advocating the need to incorporate institutional factors in models of underdevelopment, but they were, in minority. The mainstream economists, representing the influential international organizations, could influence economic policies through their positions, leaving the others on the periphery of economic thought. It took a few decades before the influential group of mainstream economists started accepting the importance of institutions and culture as important explanatory variables of development process.

The mainstream economists had worked under the shadow of neoclassical economics and had ignored the general equilibrium analysis (i.e. simultaneous analysis of all markets: capital, product, labour and markets throughout economy). Dr. Azhar Hassan Nadeem used the broader approach which has produced good results. The point is that economic development is a socio-economic phenomena, hence it needs to be studied accordingly. No amount of mathematical sophistication can make up for the limitation of partial analysis. Let us not forget that there is a interrelationship between the political actions and the pure theory of economics.

One may list the following as the main lessons of this study: (a) abundance of certain resources may not ensure rapid economic development of every country; (b) some countries with scarce resources can start growth with relative low income-inequality; and (c) this is possible only in a democratic environment supported by strong institutions.

As I gather, Dr. Nadeem's implicit message to the economists is: "give less attention to measures of economic policy, instead devote more intellectual effort to the problems of institutional and organizational reforms" because the real impact of economic policy can be established only through strong institutions and meaningful organizational reforms.

> I wish the author had gone ahead to explicitly say that given political will, some organizational changes can easily be introduced in the public sector by the ruling elite without making new laws; while changes in the organization of economic units could be left to the entrepreneurs to handle. Institutional changes are, however, possible only by means of "new laws". And such changes should occur through frequent review of existing laws. In this regard, we need to appreciate that changes in the legal framework is of tremendous social importance owing to their general influence on the society.

Another strength of this study is that its observations are based on actual data on Law and Order for the period under review which makes the reasoning convincing and meaningful. This was the appropriate author's analytical plan suited to the subject under study.

Let me mention a few limitations of the study by way of suggestions for improvements in future. I think additional information/details in the section on "Historical Review of Law and Order in Pakistan (PP 70-80)" would have facilitated a better understanding of its impact on the economic conditions. This section appears to be somewhat sketchy keeping in view the volume of the book.

Another suggestion relates to the quality of data on macro economic indicators. It might have been useful to use data in constant prices as this would have made it possible to draw a better picture of the impact of law and order on the Pak economy.

I also express my inability to appreciate the "Impact of Law and Order at Micro level" as recorded in this book. There is no doubt that lawlessness has adverse affects at macro as well as micro level. But the Chapter [9] of the Book entitled: Impact of Lawlessness on Selected Micro Economic Sectors hardly deals with micro issue; instead it focuses on the macro problems such as Stock Market, Government Revenue, Budget Deficit, Bank Loans, Black Economy, National Savings, etc. No doubt this Chapter carries names of 29 sick units, which were planned to be privatized in the mid 1990s, but hardly any firm-level information. At any rate, the title "microeconomic sectors" does not tally with the data included in this section.

This is an academic book and possesses scholarly strengths and weaknesses, but it is thoroughly researched, impressive and in parts fascinating piece of work.

Professor of Economics/
Principal
Government College,
Lahore

Khalid Aftab

Book Review:

Medema & Samuels (ed.): A History of Economic Thought - The LSE Lectures of Lionel Robbins; Oxford University Press, 1998, PPs 359, Price: Not given.

Lionel Robbins gave these lectures at the London School of Economics during 1979-1980 and 1980-1981. He was in his eighties at that time. The lectures taken as such may not be very much clear and detailed, at times, because the text is not that of the masterpiece Robbins might have written himself. But surely one can learn a good deal about economic thought from these lectures. Although they probably are not the best initial readings for someone just getting started in the field, the reader will certainly not be misled in pursuing them. The greatest value in these lectures will be for those interested in Robbins, the teacher, or in the teaching of the subject, as well as in how he handled numerous interpretive complexities. The history of Economics does not write itself. The economy, the development of economic thought and of Economics as a professional discipline, and the historical account of these developments are articrafts, each socially constructed. Accordingly, these lectures are actually Robbins' construction of the history of economic thought. The design and content of the lectures reflect Robbins's conception of what Economics, as well as the economy, is all about.

Robbins wrote many other important and convincing books and articles in the field of economic history. To name a few "The Theory of Economic Development in the History of Economic Thought" [1968] and "The Evolution of Modern Economic Theory" seem to be of much interest.

Robbins also indicates that one function of work in history of economic thought is to correct wrong-headed attributions to and interpretations of past writings. Nowhere was this more important than in the case of the classical economists. And Robbins did it beautifully.

The diction and style is of an authoritative and learned fellow having a good command on his subject.

Sometimes Robbins puts very odd and inquisitive questions that are certainly aimed at inspiring the students to think about the relative emphasis of different thinkers and economists in their politico-economic dimensions. For example consider this statement "Whereas the Greeks had concentrated on discussing incidentally the economic characteristics of a good state, the Christian philosophers concentrated on the obligation of the individual: what ought a Christian man do?" While answering this

question Robbins tried to bring forth the features of thinking of Christian theologians on the subjects of value and distribution—which are found in their works from 13th century until the Reformation. Although Robbins had little exposure to original writings of Christian theologians of middle ages—but he could aptly comment and correlate/compare their theories with other economic philosophers, who pose to be more of moral philosophers. It was all due to his wide reading and understanding of the economic thought.

Readers may find some very good references and citations about 'interest; specially the position of Christian philosophers on this particular issue.

To which School of thought Robbins belonged, in his words: "Don't go away thinking that I am trying to sell you a crude version of monetarism or something of that sort. I am not a true monetarist. I do happen, however, to believe that the quantity of money in relation to gross national product –whether the money be metallic or whether it be paper—has something to do with the purchasing power of money, and that is sometimes forgotten by people who are otherwise high in public esteem".

In his lecturers Robbins doesn't emphasize on dates. Dates aren't history. History is the river of time flowing gradually from past to affect us. I quote, "don't think, any of you, that I attach enormous importance to dates, I just throw them out to give you some sort of general perspective."

The book is equally useful for the students as well as teachers of history of economic thought. While studying this book one should also be aware that the book is not a history of economic theory or method—rather it is more concerned with the gradual development of economic thought. We often find some forceful personalities occupying the economic thinking process.

One quite notable thing is that Robbins delivered four whole lectures out of thirty-three on Adam Smith, whereas he has not spent more than two lectures on any one economist. It might be because of the reason that Adam Smith has a distinction over many other economists to make a system out of scattered thoughts of many thinkers of political economy including his own concepts about labor, capital, taxation and other economic institutions. Readers will certainly find a lot of good information about Smithian system in these lectures.

The book holds in its fold two reading lists. First one is the reading list of Prof. Robbins. It is not for students to read through and through instead it shows the extensive reading of Robbins on the subject. Apart from these books Prof. Robbins suggested to students some other books also while delivering lectures. The second list is that of Robbins's writings on the History of Economic Thought.

An impressive and leading effort in the text of history of economic thought it is!! Students and teachers should have a look on it along side some other books on the subject because it does not describe much about the economic circumstances around which most of the economists build their theories. The book comprises of lectures---text of these lectures cannot be a substitute or alternative to a book. The content of lecture depends, to a large extent on the comprehension level of audience. This challenge is beautifully met by Robbins by not exploring deeply the polemics of moral philosophers but he just introduces the ideas, gives some comprehensive comment and passes on. The text can be rated as a good guide for beginners in the history of economic thought and a pleasure reading for scholars. It alone cannot, like many other books, give you a command on the subject, but the usefulness of this book cannot be denied. It gives us access to the originality of Robbins's style and knowledge on one side and enables us to learn of economic thought on the other.

Uzair Ahson

Research Associate
Department of Economics
Government College
Lahore.