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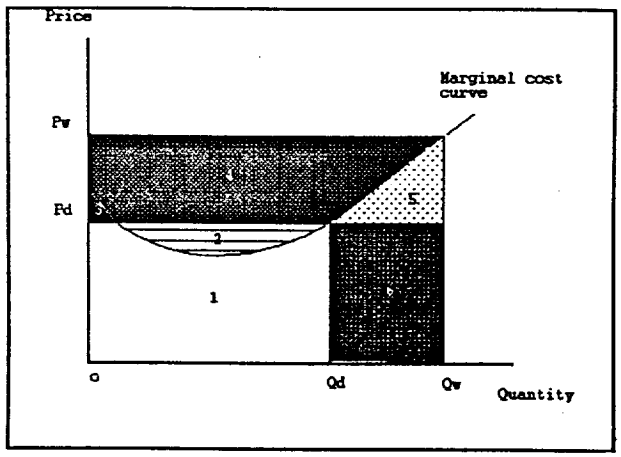

TRAINING MODULE ON AGRICULTURE PRICE POLICY

POLICY ANALYSIS MATRIX THE CASE OF PAKISTAN

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I: POLICY ANALYSIS MATRIX: THE CASE OF PAKISTAN

A. OBJECTIVE OF THE STUDY

Agriculture policy forms the cornerstone of development policy in agricultural economies. Governments often intervene in the agriculture markets to further development policy objectives. These objectives range from a desire to achieve self-sufficiency, provide raw material for industry, generate employment, earn foreign exchange and promote a balanced distribution of income. Among other, agriculture price policies are employed by governments as a mechanism to further these, often conflicting, objectives.

Price policy interventions by the governments affect the agriculture sector by altering the relative prices faced by the individual, household and the sector as a whole. Where policies create distortions in the free functioning of the markets, they lead to economic inefficiency, missallocation of resources and welfare loss.

This case study has been developed as a practitioners tool for policy analysis training. Using the 1990 base year crop data for Pakistan as an example, it provides a methodology for analysis of the distortions in the agricultural crop production system due to interventions through the medium of agricultural price policies. The focus of the study is on developing a commodity and region specific Policy Analysis Matrix (PAM) which measures the extent of economic distortion and the consequent transfers between various players in the agricultural system resulting from a given set of price policies.

This case study is expected to serve as training material for the policy practitioner evaluating the costs of policy distortions on the economy as well as a useful guide to economists interested in studying the impact of externalities on the economy.

B.OVERVIEW

Pakistan is a country of more than 110 million people and a land area of nearly 80 million hectares. Of this, 20.7 million hectares comprises cultivated area, the rest being not available for cultivation, culturable waste, under forests, or inaccessible due to the mountainous terrain.The hetrogeniety of climate, coupled with one of the world's largest systems of canal irrigation, enables the country

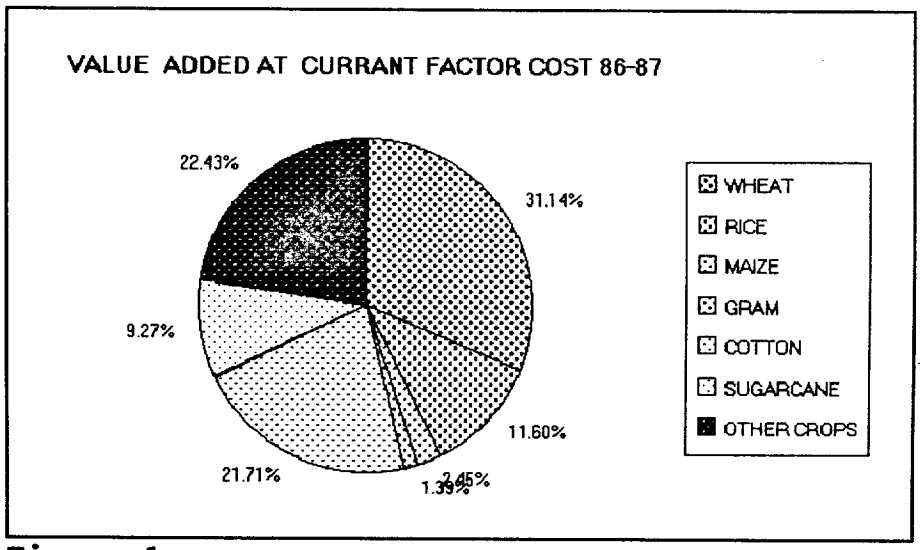

Figure 1

to grow a diverse species of crops, fruits and vegetables.

Among the numerous crops grown in the country four stand out most prominently. Wheat, a staple food in Pakistan, is grown on more than one third (7.8 million hectares during 1989-90) of the total cultivated area; followed by cotton with an area of 2.6 million hectares. Rice, the third major crop accounts for another 2.1 million hectares and sugarcane about 0.9 million hectares. Whereas cotton and rice are the main export crops, sugar cane is an important cash crop and is grown mainly for domestic needs. The total area under these four major crops represented nearly 70 percent of the total cropped area of Pakistan in 1989-90.

C. THE CROP SYSTEM IN PAKISTAN

The data regarding the area, yield and the production of cotton, rice and sugarcane from 1947-48 to 1989-90 are presented in Annexure-A.

COTTON

Cotton is the most important cash crop of Pakistan earning the largest export revenues for the country. It accounts for 12 percent of the cropped area, 31 percent of the value added by the major crops and 57 percent of the foreign exchange earnings (raw and cotton products). Cotton-based industry employs about 40 percent of

the industrial labor. Cotton seed is the principal source of edible oil. Cotton sticks provide fuel and contribute towards conserving forest wealth.

The Punjab and Sindh provinces account for 77 and 23 percent of the total cotton area. In view of the differences in yield levels, the share of the Punjab in total production is about 86 percent, while that of Sindh is 14 per cent.

During the eighties, cotton production in the country increased at the average annual rate of 3.4 percent. The entire increase in the production of cotton at the national level was contributed by the Punjab province where the production increased by 13.3 percent per annum, due to 3.6 percent expansion in area and 9.7 percent rise in yield . One the other hand, despite a 2 percent in increase in yield, the production in Sindh declined by 2.6 percent in total primarily because acreage under cotton in Sindh declined by 0.6 percent per annum.

Trends in seed cotton output would have been far better if the policy environment governing the economics of production had been conducive to better returns to the farmer. The expansion in acreage and yield in the Punjab occurred despite a decline of 12-16 per cent in the real procurement and market prices of seed cotton over the last 10 years. Support prices of seed cotton were increased from Rs. 171 per 40 kg. in 1980-81 to Rs. 211 per 40 kg. in 1989-90 (i.e by 23 per cent only) although the general price level in the economy rose by 82-92 per cent during the same time.

RICE

Rice accounts for about 10 percent of cropped area. Its annual production averages around 3 million tones, contributing 13-14 percent of the total value added by major crops. In times of shortage of wheat, rice can partly substitute for it. Rice bran is a potential source of edible oil. Pakistan is famous for aromatic long grain rice and contributes 1.26 million tones to the world trade of around 12 million tones per year. Rice exports earn 7 to 8 percent of total foreign exchange.

Rice production during last 10 years, fluctuated between 2.9 to 3.59 million tones. Despite expansion in area by 0.5 percent per annum, overall production of rice during the decade (1979-80 to 1989-90) declined by 0.2 percent annually due to reductions in yields. Similar reductions in yield occurred in the case of the long grain Basmati rice despite significant expansion in acreage and the adoption of the new 385 variety.

SUGARCANE

Sugarcane is an important cash crop in Pakistan, grown primarily in the Punjab, followed by Sindh and NWFP. Between 1980-81 and 1990-91 the sugarcane yield increased by about 1.0 percent per annum. By 1988-89, the area under sugarcane was 877000 hectares while the average yield was about 42.16 tons/ha.

The average yields in Pakistan are considerably less than obtained in many other countries such as India (53 tons/ha) and Egypt (83 tons/ton). Based on the evidence of yields realized by progressive farmers, the yield gap on the existing varieties in Pakistan is estimated at about 50 percent.

WHEAT

Wheat is the basic staple food in Pakistan . A high percentage (about 79 percent) of the total wheat crop is grown in canal-irrigated areas. Wheat production has increased dramatically since the late sixties mainly as the result of yield increases. However, the increase in yields during the past decade of 1981-1991, at 1.8 per cent per annum, has been lower than that achieved during the previous decades.

D.THE CROPPING PATTERN

In the last decade, whereas the acreage under wheat expanded by almost one million hectare and that under cotton by about half as much, there occurred only modest increases in the acreage under cultivation of rice and sugarcane. This led to the share of area under wheat in total cropped area to increase from 36.0 percent in 1979-80 to 39.6 percent in 1989-90 and that of cotton from 10.0 percent to 13.0 percent. The share of cropped area under sugar cane, however, increased only marginally from 3.7 percent to 4.3 percent while that for rice maintained its share at 10.6 percent.

Cotton a Kharif (summer) crop, competes directly for land and other resources with rice, and indirectly with sugarcane, an annual crop. The resources committed by the farmers for raising sugarcane for example, are not available for cotton. Cotton-wheat is the most important cropping system, covering much of southern Punjab and the Sindh province. Traditionally, wheat and cotton were grown as a single crop in cotton-fallow and fallow-wheat cropping pattern. However, in the last fifteen years, the cropping intensity has increased rapidly from 114 percent in 1971 to over 150 percent in the mid eighties. The reason for this quantum jump is the development of new cotton varieties of shorter duration, increased availability of supplementary ground water, and increasing pressure on land due to urbanization. According to the existing

double cropping pattern, about half of the wheat crop is sown after cotton and 30 percent after fallow[1].

E. CROP YIELDS

Crop yields in Pakistan are low. Its ranking in the world is 38th for wheat, 33rd for rice, 71st for sugarcane, and 35th for cotton. Except for cotton, where a major break through occurred during the last 6 years, crop yields of other major crops have remained stagnant in recent years. Two of the major reasons for low crop yields has been the inefficient extension services and the lack of financial capital to the farmer for the timely application of necessary inputs.

F. CROP OUTPUT

The average annual growth rate of wheat over the last decade 1980 to 1990 was nearly 2.8 percent while cotton production grew at the rate of 3.4 percent from 1979/80 to 1984/85 and a higher 7.6 percent during 1984/85 to 1989/90. While rice production was mostly stagnant or declining during the decade, growth in the output of sugar cane declined from 3.2 during the first half of the decade to 2.0 percent during the second.

While area and yield increases, both, were responsible for production increases in wheat and cotton, in the case of cotton, it was primarily the dramatic increase in the yield for cotton which explains the spurt in growth of output during the latter half of the decade. Whereas the increase in cotton yield was nearly 5.0 percent per annum, in the case of wheat and sugar cane it was only 1.8 and 0.8 percent respectively.

Changing acreage and yields are, among other things, a function of technological change and the pricing policy in agriculture. Why is it that in Pakistan during the last 10 years no commodity witnessed varietal breakthrough except cotton? Why do yields continue to be low? And why, despite a rich natural resource base, agriculture in Pakistan has not reach its full potential?

In the past, the mix of polices adopted for growth and development in Pakistan have combined to create a bias against the agricultural sector by altering key prices faced by the farmer. Despite subsidization of inputs such as fertilizer, water, and others, regulated producer prices at a level below the international price; mandatory sale of output to government para-statals for export; and over-valuation of the exchange rate, have

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[1] Farming system Of Pakistan: Derek Byerlee and Tariq Husain, 1992

all combined to effectively impose a tax on the production of major crops in Pakistan. Although producer prices for these crops were periodically raised, farm profitability consistently declined during the early eighties as is evident by decline of the commodity-input price ratio. For example, whereas output prices rose by 28 percent for wheat, and 58 percent for cotton and sugarcane between 1980 and 1983, fertilizer prices doubled during the same time, and the price of insecticides increased by 100-500 percent. As a result, there was a steep reduction in fertilizer and insecticide use per hectare. Against 1044 thousand nutrient tones during the period 1972 to 1980, fertilizer consumption declined to 989 in 1983-84, whereas most commonly used insecticides in 1983-84 dropped to one-third of the level attained in 1979-80. A recent study on agriculture price policy in Pakistan [2] indicated that a combination of direct (price controls) and indirect (over valued exchange rate) interventions may have resulted in reduced output of wheat by 12 percent, irri rice by 25 percent, basmati rice by 32 percent and cotton by 44 percent.

II. THE POLICY ENVIRONMENT

Policies provide the basic framework through which governments affect change in the markets according to a desired set of objectives. Of these, three major sets of policies employed by the governments have a direct bearing on agricultural sector output.

i) Agricultural Price Policies which could take the form of a direct regulation of commodity prices, tariffs, quotas or subsidies. The most often used mechanism involves regulating the producer price of the crop by setting it lower than the international price. Whereas this results in a loss to the producer, it serves governments objectives of keeping domestic consumer prices low, providing cheap raw material for the industrial sector and generating revenue surplus for the state if institutional regulations dictate mandatory sale of produce to the public sector.

Price policy interventions also take the form of subsidies on inputs. One objective is to defray part of the cost of keeping producer prices down. Other reasons for input subsidies could be promotion of new technology (e.g. a new high yield seed, mechanized farming). Interventions in input prices serve to create distortions in the production process, are an economically inefficient method of compensating the farmers and a drain on the budget.

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[2]. Trade, Exchange Rate, and Agriculture Pricing Policy in Pakistan, Naved, Ijaz, Anjam, World Bank Comparative Studies,1990.

ii) Fiscal, Monetary and Exchange Rate Policies which indirectly affect the prices of various commodities in the economy. A common occurrence in many developing countries is the over valuation of the official exchange rate which results in the producer of export crops receiving far less than if the exchange rate reflected its equilibrium price. This acts as a tax on the producer.

iii) Public Investment Policies such as allocation of government expenditures in agricultural research, agricultural extension, credit schemes. Each of these will bring about a change in the net profitability of agricultural crop production and farm income.

Most agricultural commodities in the developing countries are subject to these forms of direct or indirect taxation or subsidization.

A. AGRICULTURE POLICY IN PAKISTAN

POLICY OBJECTIVES

The stated objectives of the agricultural sector policy in Pakistan have been to: (i) increase agricultural production to attain self-sufficiency for domestic consumption; (ii) assure a reasonable level of income to the farmer; (iii) stabilize market prices and commodity supplies to protect the interest of both producers and consumers; and (iv) maximize foreign exchange earnings from export crops.

Many developing countries, including Pakistan, recognize the importance of the agriculture sector. Yet an analysis of the impact of their agricultural and other macro-economic policies reflect a strong bias against the agriculture sector. This bias is effected through the pricing of inputs and outputs by the governments which are, often, also the key players in the marketing and export of agricultural products.

Stated policy objectives should be evaluated against the backdrop of some of the unstated objectives which, nevertheless, may be equally important because of their politically sensitive nature. Policy makers are often called upon to make trade-offs between competing objectives (such as keeping producer prices low to keep domestic cost of food down or raising output prices to enhance crop profitability), or they may simply adhere to a model of growth which necessarily allocates resources to one sector at the expense of the other (such as promoting industry at the expense of agriculture).

The following are the major reasons for government intervention in the agricultural sector through the price mechanism:

i) Providing Cheap Raw Material to Industry: Often governments keep prices of agricultural raw materials for industry low in a bid to protect the domestic industrial sector considered to be the engine of growth. This model of growth was followed by many developing countries and was a preferred argument in the case of infant industries specially during the sixties.

ii) Earning Foreign Exchange: Generating foreign exchange for the government by export of agricultural commodities by government parastatals equal to the difference between the higher international price and the producer price. Sometimes the budgetary costs of consumer subsidies on food are paid for through the additional foreign exchange revenues. In Pakistan, the subsidy on agriculture inputs and consumer food subsidy (rationed flour) were financed by this method.

iii) Protecting the Poor: Low income households spend the bulk of their income on food. A low producer price of food is forwarded as a low consumer price of food with a minimal impact on the budget.

iv) Promoting Agricultural Production: Subsidies, which reduce the cost of production to the farmer, are provided by governments on inputs as an incentive to promote one crop over the other.

v) Protecting the Urban Consumer: Governments in many developing countries keep agricultural prices low to keep the cost of food down for the urban consumer. Often this is dictated by political considerations.

In the presence of these often competing objectives, governments find themselves employing interventionist measures in agricultural systems. Often policies are made without appropriate deliberation of their impact on farm profitability, economic efficiency of the agricultural system and sometimes even the objectives themselves.

B. The policy instruments

Specifically, governments intervene in the market using a variety of instruments. These are:

1. Regulation of procurement prices and government control of the marketing and storage of agricultural commodities;

2.Regulation of cropping pattern by assigning certain regions to grow certain crops;

3.Indirect tax and subsidies on both agricultural inputs and outputs (for example, indirect taxes are levied on oil, machinery, and most consumption goods purchased by farmers, while subsidies , either implicit or explicit, are paid on fertilizer, pesticides, and irrigation water).

4.Over-valuation of exchange rate;

5.Provision of subsidized credit for certain crops; and

Price interventions - whether direct or indirect - essentially imply that the net profitability of the farmer is affected. Developing country experiences with price interventionist policies in the agricultural sector indicate that traditionally agriculture has suffered relative to other sectors in the economy leading to loss in output and foreign exchange and defeating the policy makers own national objectives.

Let us see what has been the case in Pakistan - our illustrative example.

C. Self Sufficiency

Whereas the stated government policy has been to achieve self- sufficiency in the production of wheat and other import crops, and promote expansion of high quality rice export, past trends in production indicate that self-sufficiency has not been attained fully. The major reason for this lack of self-sufficiency is that the net return per acre on wheat production to the farmer has been very low. A study conducted by the Government of Punjab in May 1991 indicates that the support prices of wheat and basmati rice during the past five years have been 44-54 percent and 57-63 percent of the international prices respectively. [3]

The failure of this objective has been most glaring in the case of oilseeds where Pakistan moved from being self-sufficient to a net importer in the eighties. The main reason was once again the government price policy which kept the price of edible oil depressed to benefit of the urban consumer.

D. Maintaining Farm Income Level

Apart from in a few years, the prices of agricultural commodities have indicated a declining trend in real terms in the past decades. In addition to the declining terms of trade, , the farm sector in Pakistan has been taxed through regulated support prices of major crops which have been lower than international

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[3] Government of Punjab. Report of the Agricultural Inputs and Outputs Prices Review Committee. May 1991. p 8.

prices. Crop support prices faced by the farmer in the Punjab have been below his cost of production leading to a net loss to the farmer. According to a study undertaken by the World Bank, total price interventions in Pakistan resulted in a net loss of 50 percent to the farmer in irrigated areas and over 35 percent in un-irrigated areas in 1980. [4] It is estimated that in 1984-85 the loss to a farmer in Pakistan producing wheat and Irri-rice was Rs. 3.1 per acre and Rs 160.3 respectively.[5] Since 1981 the government has sought to increase crop support prices to improve total farm profitability. However, since subsidies on inputs were also being phased out the net impact on farm incomes has not been substantial. According to the Government of Punjab study mentioned above, 27.1 percent of the farmers in the Punjab registered negative farm incomes in 1988-89 while another 7.9 percent had a net annual farm income of Rs 2000 (or US $ 80 per annum !).[6]

E. Stabilizing Market Prices

One objective of price policy interventions is to stabilize farm commodity prices with the objective of protecting consumer welfare, and producer income. Consumer welfare looks at the distributional aspect of real income of the household groups in both urban and rural areas. The Government of Pakistan has been fairly successful in stabilizing market prices - specially since 1981 when the Agricultural Price Commission was established. The divergence in border prices has been 33 percent higher than domestic prices in the case of Basmati rice and 76 percent in the case of sugar cane. [7]

F. Maximizing Foreign Exchange Earnings

An important objective of many governments in developing countries is to earn foreign exchange from export crops. Between 1961-87, due to direct price interventions, production losses for the major agricultural crops led to a loss in foreign exchange earnings to the government in the short term equal to 17 percent of the total exports. The effect of both direct and indirect interventions is far more damaging. During the same period, the foreign exchange loss to the Government of Pakistan from total

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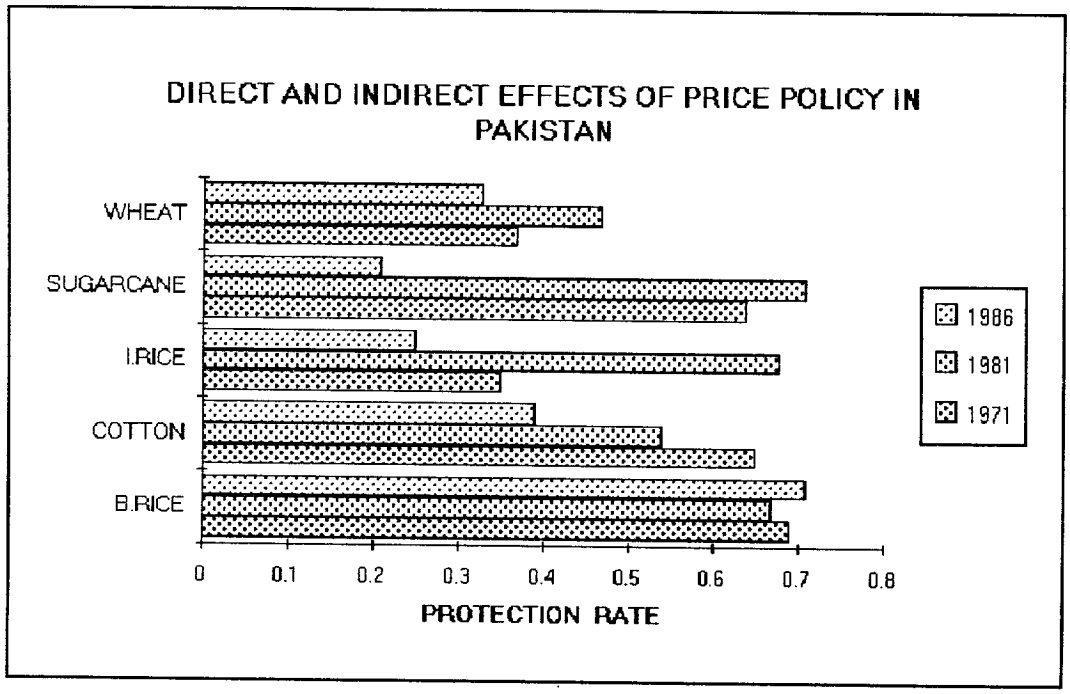
[4]Naved, Hamid, Ijaz Nabi and Anjum Nasim. Trade, Exchange Rate, and Agricultural Pricing Policies in Pakistan. World Bank Comparative Studies. The World Bank, Washington DC. 1990. p 127.

[5] Ibid. p 9.

[6] Ibid. p ii.

[7] Naved Hamid, Ijaz Nabi and Anjum Nasim. Trade, Exchange Rate, and Agricultural Pricing Policies in Pakistan. World Bank Comparative Studies. The World Bank, Washington DC. p 125.

price intervention was 1 and a half times the total foreign exchange earned![8]



III. INTRODUCTION TO POLICY ANALYSIS MATRIX:

If policy interventions frequently result in net economic loss to the producer, the government and the society as a whole, why do many governments still adopt these policies?

As mentioned above, often governments are forced to make trade-offs between competing objectives which may give rise to interventionist policies. But more often, governments are not fully aware of the extent of the loss to the economy as a result of the policy distortions brought about by the myriad of adhoc decisions about pricing, tariffs, quotas, and taxes adopted over a period of time. Although financial and budget analysis of farm crops may be

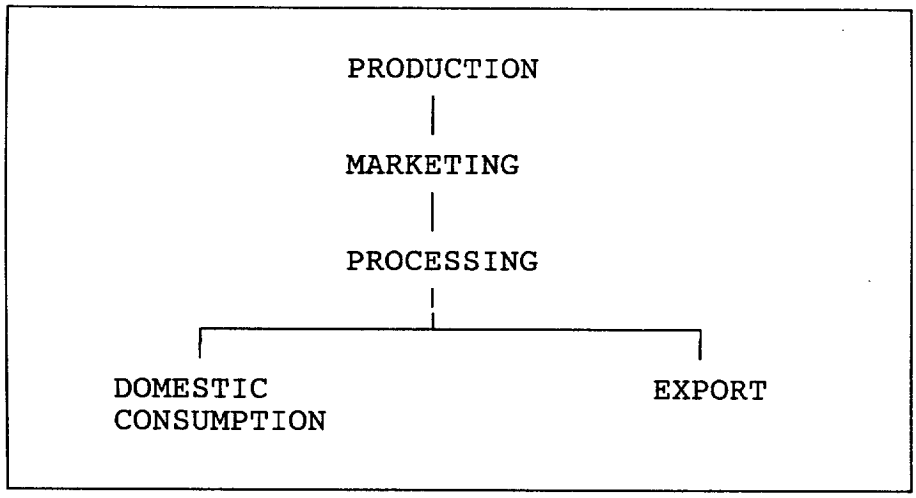
[8] Ibid. p 195

employed as a tool for evaluating the impact of sector policies, these models may not fully capture the impact of all the distortions in the economy.

The Policy Analysis Matrix (PAM) provides the policy practitioner a handy tool for evaluating the impact of price distortions in the commodity markets.

Pearson and Monk in their manual for practioners of agriculture policy analysis describe PAM as " a product of two accounting identities-- one defining profitability as the difference between revenues and costs, and the other measuring the effects of divergence (distorting policies and market failure) as the difference between observed parameters and parameters levels that might exist if divergence is removed. By completing a PAM for the agricultural system, an analyst can simultaneously measure both the extent of the transfer occasioned by the entire set of policy acting on the system, and the degree of economic efficiency of the system."

A simple commodity system is presented below. At each stage, as one moves through the system, the raw product is altered by some combination of tradeable and non-tradeable inputs into a product of greater value.



The PAM for the commodity system is derived from an aggregation of revenues and costs across the representative activities indicated above. A typical PAM for a commodity has the following elements.

	REVENUES	TRADABLE INPUTS	DOMESTIC FACTORS	PROFITS
PRIVATE PRICES	A	B	C	D (A-B-C)
SOCIAL PRICES	E	F	G	H (E-F-G)
EFFECTS OF DIVERGENCE	I (A-E)	J (B-F)	K (C-G)	L (D-H)

The Policy Analysis Matrix is generally employed to calculate the following indicators.

A. Private profitability: (D = A-B-C)

Private profitability (D) is defined as the difference between the revenues of the commodity under study (A) and the production costs of the tradable inputs (B)[9] and the domestic factors (C)[10]. It is calculated using is calculated private prices or the market prices. This is equivalent to estimation of private budgets in project analysis.

B. Social profitability : (H = E-F-G)

The second row in the PAM estimates the social profitability of commodity (H) which is the difference between the revenue (E) less tradeable inputs (F) and domestic factors (G) valued at their opportunity cost or at social prices.

C. Transfer:

This row estimates the difference between the elements of the private profitability row and the social profitability row and is the result of government intervention policy or market failure.

D. Policy Analysis Indicators:

The following indicators for the analysis of commodity

[9] Traded commodities are defined as one which are actually traded or imported or internationally available or are import substitute for the country.

[10] domestic resource cost include non traded items like labor, land , electricity, and transport ete.

systems can be derived from the above table.

1. **Private cost ratio (PCR) = C/(A-B)**

2. **Domestic resource cost (DRC) = G/(E-F)**

3. **Nominal protection coefficients outputs (NPCO) = A/E**

4. **Nominal protection coefficients inputs (NPCI) = B/F**

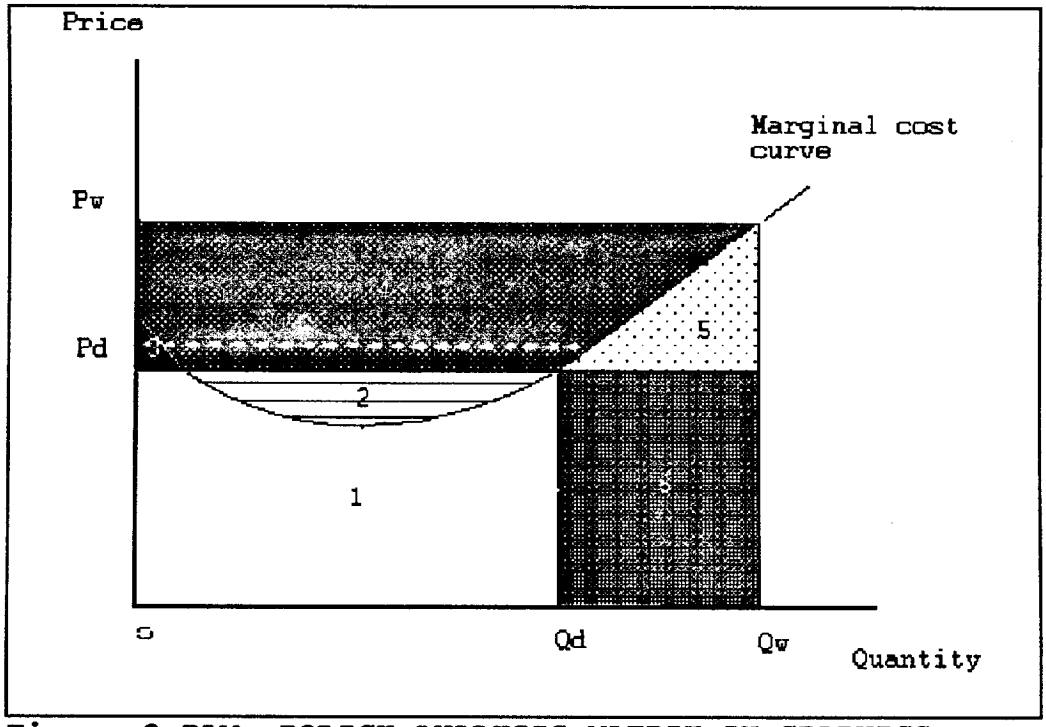


Figure 3 PAM- POLICY ANALYSIS MATRIX IN GRAPHICS:

5. **Effective protection coefficients (EPC) = (A-B)/(E-F)**

On the basis of above the indicators, the policy practitioner can measure the extent of transfer of resources that has taken place due to the distortions brought about by a given set of policy interventions in the commodities system.

	REVENUES	COSTS	PROFIT
PRIVATE PRICES	1+2	1+3	2-3
SOCIAL PRICES	1+2+3+4+5+6	1+3+5+6	2+4
TRANSFER	-(3+4+5+6)	-(5+6)	-(3+4)

Figure 3 depicts the PAM for an exportable crop such as cotton in Pakistan. Pd represents the domestic price of cotton at which quantity Qd is produced. This price embodies an implicit tax on cotton. Pw represents the world price of cotton at which quantity Qw would be produced.

The total cost of production is represented by the marginal cost curve. Private revenue and cost is depicted in area (1+2) and (1+2+3). and the profit in area covered by (2-3). In the row for social the revenues and costs shown under area (1+2+3+4+5+6) and (1+3+5+6), and the profits by area (2+4). The transfer is the difference between revenues (3+5+6) costs, (5+6) and profits (3+4) calculated at private and social prices.

To further clarify some of concepts a simple example of policy analysis matrix is developed.

E. PAM: THE CASE WITHOUT ANY POLICY INTERVENTION

In an ideal world, the simplest PAM would be the case without any policy intervention. In this case, markets are cleared by the forces of supply and demand. The private profitability is equal to social profitability and all indicators reflect a unity value. However, in practice, distortions or market failures exist, in one form or the other, in both the developed and developing countries, making this case mostly theoretical. The closest that the case without intervention comes to is the one with the least market intervention for both traded and non-traded goods.

CHARACTERISTICS:

- No controls on the productions and consumption of agricultural commodities exist.
- Imports and export restrictions on agricultural commodities do not exist

- There are no subsidies on either inputs or outputs.

-The exchange rate is free and agricultural commodities are valued at the free market exchange rate

- Investments in agriculture are undertaken on the basis of comparative advantage enjoyed by a crop, a region or a country.

Table 1. PAM a case without intervention in commodity prices

Rs per acre				
		TRADABLE	DOMESTIC	
	REVENUES	INPUTS	RESOURCE	PROFITS
VALUATION AT:				
PRIVATE PRICES	600	400	200	0
SOCIAL PRICES	600	400	200	0
POLICY EFFECTS	0	0	0	0
INDICATORS				
Nominal Protection Co-efficient:			1.00	
Nominal Protection on Inputs:			1.00	
Effective Protection Co-efficient:			1.00	
Domestic Resource Cost:			1.00	

F. PAM: THE CASE OF TAXATION OF AGRICULTURE

The objective behind such a strategy, generally, is to provide protection to the industrial import substitutes relative to the agricultural import substitutes and exports. This has been the classic 'infant industry argument' which considers the industrial sector as the 'engine of growth'. In addition, agricultural commodities may suffer implicit taxation due to distortions brought about by an overvalued exchange rate which undervalues export crop production.

CHARACTERISTICS

An interventionist regime is generally characterized by the following:

- Sectoral terms of trade are against agriculture as evident from a faster rise in prices for goods from the non- agricultural sector rise compared to the prices the farmer receives from his farming activities;

- Output prices of agricultural commodities are regulated with the objective of providing cheap raw material for the industrial sector;

- Revenues for the state exchequer are extracted by government owned parastatals which buy agricultural commodities at the low regulated price and sell them at a much higher price in the international market.

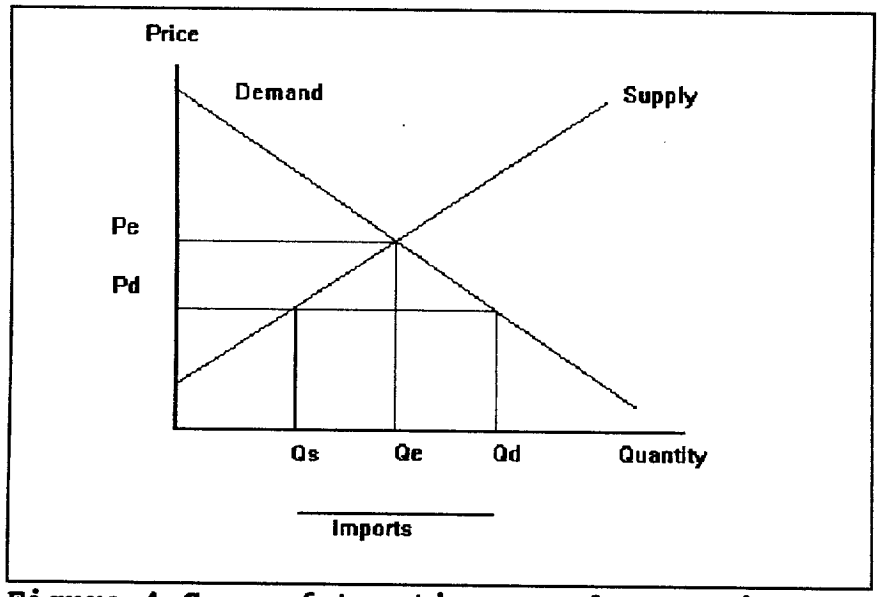


Figure 4 Case of taxation: producer price below the world or equilibrium price

G. POLICY INSTRUMENTS:

One or more of the following instruments may be used in support of interventionist policies:

1) Guaranteed floor, Government procurement and distribution, no monopoly.
2) Fixed price, government monopoly over the procurement and trade.
3) Buffer stocks and funds
4) Export duties,taxes
5) Export subsidies
6) Import tariffs
7) Import subsidies
8) Quotas and quantitative import restrictions
9) Food aid
10) Consumer price fixation
11) Consumer subsidies
12) Food rationing
13) Exchange rate distortions

A simple graph would highlight the commodity specific price strategy.

Table 2: Case of policy intervention at output level

Rs per acre				
		TRADABLE	DOMESTIC	
		REVENUES	INPUTS	RESOURCE	PROFITS
VALUATION AT:				
PRIVATE PRICES	500	400	200	-100
SOCIAL PRICES	700	400	200	100
POLICY EFFECTS	-200	0	0	-200
INDICATORS				
Nominal Protection Co-efficient:			0.71	
Nominal Protection on Inputs:			1.00	
Effective Protection Co-efficient:			0.33	
Domestic Resource Cost:			0.67	

Table 3: Policy intervention at output and input levels- a typical case:

Rs per acre				
		TRADABLE	DOMESTIC	
		REVENUES	INPUTS	RESOURCE	PROFITS
VALUATION AT:				
PRIVATE PRICES		500	400	200	-100
SOCIAL PRICES		850	450	250	150
POLICY EFFECTS		-350	-50	-50	-250
INDICATORS					
Nominal Protection Co-efficient:				0.59	
Nominal Protection on Inputs:				0.89	
Effective Protection Co-efficient:				0.25	
Domestic Resource Cost:				0.63	

The PAM given above represents a typical situation. What do these numbers and coefficients mean? Negative profits under private prices indicate the profits the farmer actually receives for his output after deducting his expenditure (including his normal profits). If this is negative, he incurs a loss i.e is paying from his normal profits. Such a situation is a disincentive for the farmer to continue or expand the production. If we value his output and inputs at social prices he could have earned a profit of 150.

The policy effects are traced in the row below. In the output column, the negative figure of 350 gives the extent of explicit or implicit tax on the commodity. If the amount were positive, it would represent a subsidy. The negative figure of 50 under tradeable inputs has the opposite meaning and indicates a subsidy - a policy often formulated by the government to introduce new technology in the form of subsidized fertilizer, seed or insecticides.

Similarly, for domestic factors, a positive figure in these two columns would represent a tax on inputs and would represent a clear case of protecting the domestic industry with the institution of high tax or tariff barriers. A negative figure of 250 depicts the overall incentive structure for the commodity, in this case a clear policy of taxation (protectionist) strategy to transfer resources to consumers (government). It means that the current policies are driving the system away from an efficient resource allocation according to the market mechanism.

The NPC or nominal protection coefficient for output indicates that farmer is receiving the market price equivalent to 59 percent of the world market price as result of the intervention policy (a tax of 41 percent). The nominal protection coefficient for inputs of 0.89 indicates that farmer is only paying 89 percent of the world prices of inputs (a subsidy of 11 percent). The effective protection coefficient reflects the ratio of value added at private prices to the value added at the social prices.

The value of 0.25 indicates that even after taking the input subsidy into account the overall policies result in a net tax of 25 percent on the farmer.

I. PAM: THE CASE OF SUBSIDIZATION

The case for subsidization that we will now consider, is essentially based on providing incentives to increase the relative profitability of crop output in the agricultural sector. Its justification is on usually on three grounds:

1) The countries may attach some strategic value to the increased production of the import-substitute commodity or to domestic consumption crops for attaining self-sufficiency;

2) The objective is to promote export crops as a means to earning more foreign exchange;

3) To facilitate the adoption of new technology by making it profitable enough to overcome the uncertainty attached to prototype; and

4) In the initial stages of developments, where resources are underemployed, specially labor, additional production could be brought about by a by making the returns attractive to the farmer.

The Tools:

The central instrument used to institute a policy of subsidization is, usually, to set the support prices above the world prices i.e a generally favorably or protected export climate for the export crops. A simple graphic presents a typical

scenario.

As long the country is not self sufficient in food and has a comparative advantage in producing the particular crop, such an incentive strategy is not economically inconsistent. Under such a scenario additional resources are likely to be diverted to the production of traded commodities.

TABLE : A CASE OF INCENTIVE POLICY

Rs per acre				
		TRADABLE	DOMESTIC	
	REVENUES	INPUTS	RESOURCE	PROFITS
VALUATION AT:				
PRIVATE PRICES	650	200	400	50
SOCIAL PRICES	500	250	450	-200
POLICY EFFECTS	150	-50	-50	250
INDICATORS				
Nominal Protection Co-efficient:			1.30	
Nominal Protection on Inputs:			0.80	
Effective Protection Co-efficient:			1.80	
Domestic Resource Cost:			1.80	

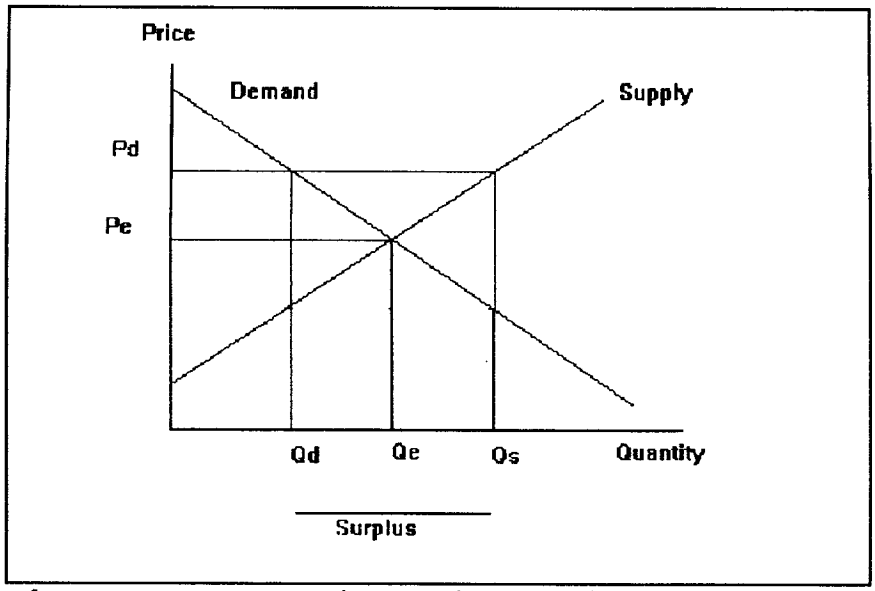


Figure 5 Case of incentive policy: The producer price is above the international.

IV. POLICY ANALYSIS MATRIX- THE CASE OF PUNJAB

A. TASKS IN CONSTRUCTING A PAM:

We will use data from an average farm in Punjab province of Pakistan to demonstrate the steps required in building a commodity PAM at the production level.

The PAM is constructed on a spreadsheet according to the following steps:

1. Identify major farming activity or system:

2. Describe physical input-output table

3. Obtain private and social prices for traded commodities.

4. Obtain private and social prices for non- traded inputs

5. Obtain private and social prices for non- traded factors.

6. Construct private and social crop budgets

7. Construct the commodity PAM

B. Identify major farming activities or systems:

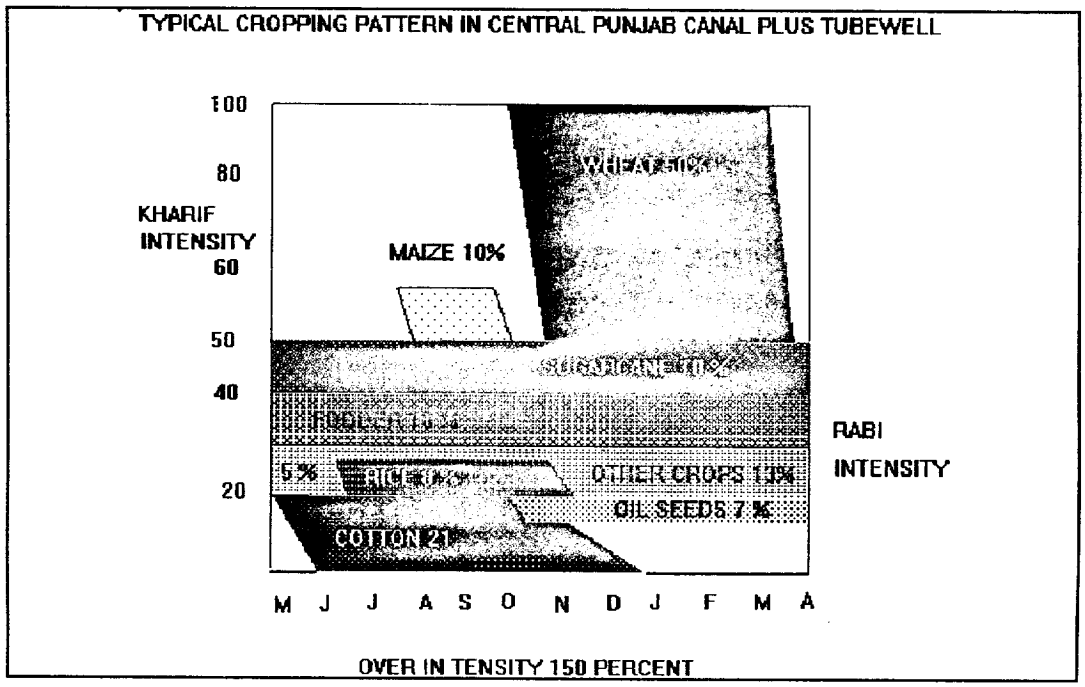
Based on the data from a typical farm in Punjab, the following four commodities are being studied:

- wheat (Multan, Gujrawala)
- rice (Gujrawala)
- cotton(Multan)

The case study will construct PAM's for rice, wheat and cotton and leave the construction of PAM's for sugarcane for the trainees.

A typical farming model selected for our analysis represents

a 12.5 acre farm in the cotton-wheat (shown in figure) cropping rotation in Multan area of Punjab and wheat-rice in the Gujrawala areas . The farming intensity is more than 150 percent due to the availability of irrigated water from canals and tubewells.



We assume wheat competes for cotton in Multan area and wheat for rice in Gujrawala area.

C. Farm capital Budgets

Table 1 and 2 (in the Annex) presents the farm capital budgets at private and social prices. They include data on fixed inputs such as the tractor and tubewells used in the production process. The costs are divided into fixed and variable costs. The fixed costs is made up of the CIF price plus the cost of port handling (or the purchase price). To this we add a 10 percent of surcharge. According to a study conducted by the National Development Finance Corporation (NDFC) in 1986, there exits a markup and a surcharge (of 10 percent) on the domestic sale of tractors to the tune of 20 percent . Annual depreciation is based on the estimated life of ten years and a salvage value of 10 percent of the purchase price. The calculations are as follows

Annul Depreciation cost = (Purchase price - Salvage value)/Years of Life

The calculations of annual capital cost is based on

Annul Capital cost = ((Purchase price + Salvage value)/2)*Interest rate

Hourly rates are estimated dividing the above figures by the numbers of hours used by each machine in a year .

The variable costs constitute the repair , the fuel, the oil and payment made as taxes and insurance. The break down of these costs into traded and non-traded components is taken up in the section on deriving social prices.

C. Describe a physical input-output table:

Table 3 presents the basic input-output data to be used in constructing the PAM. It describes the technical coefficients for raising wheat, rice and cotton on one acre of land on an average farm in Punjab. The original data is taken from Agricultural Prices Commission (APCOM) reports and is fairly disaggregated. The data can be obtained from number of other sources such as field surveys carried out by a number of organizations such as the Punjab Economic Research Institute (PERI) or from an extension agents having a fair degree of knowledge of the parameters. The analyst has to be careful in disaggregating the data to the point where he can draw meaningful results and perform sensitivity analyses. He has to incorporate whatever detail is necessary to capture the competition among crops for fixed resources.

The items in this table are divided into five categories which are (1) Cropping calendar or areas devoted to winter(wheat), summer (cotton and rice)and perennial crops (sugarcane) (2) for each crop per acre labor requirements under each farming operation (3) fixed inputs that include hourly per acre use of tractors and tubewells (4) purchased inputs such as seeds, fertilizer, pesticides and canal water and (5) the per yield of the main and by products.

D. Obtain private and social prices for traded commodities.

The most difficult part in constructing PAM is the estimation of social prices for the inputs and outputs. First we divide the commodities into traded and non-traded. Non-traded items are further divided into domestic factors and capital. Social prices for traded commodities are derived based on the international prices

A series of sub-tables (6 to 13) are required to organize the data for the calculation of export and import parity prices for commodities that have international market. The tables contain both the private and social prices. We will illustrate the steps required in calculating the export parity price for traded outputs (cotton), estimating other traded inputs (fertilizers, pesticides)

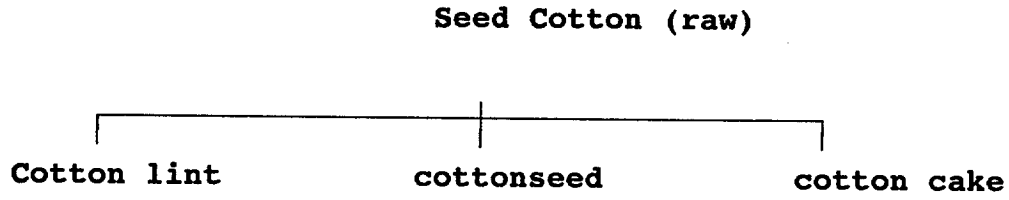
and nontraded inputs (irrigation, transportation) and domestic factors (land labor and capital). Detailed estimates are in the appendix tables.

E. Deriving the Social Price for Cotton:

1) Export Parity Price :

Since cotton is an export crop in Pakistan, one needs to calculate the export parity prices. The estimation begin at an international market such as Liverpool in England. The price received by the farmer is for the raw cotton while the CIF price reflects the processed cotton or lint. To compare prices on an equal basis we have to work back from the world price performing certain deductions and, in some cases, additions to arrive at the comparable farmgate price for an average cotton grower in the Multan District of Punjab.

Seed Cotton (raw cotton) reflects three important outputs.



The following are the steps in the calculating the export parity price:

Cotton lint

cif price Middling
multiply (*)
factor for quality difference
deduct (-)
unloading
freight
insurance
fob port price (foreign currency)
multiply (*)
official exchange rate (private prices)
multiply (*)
equilibrium exchange rate (social prices)
fob port price (local currency)

deduct (-)
tariffs
add (+)
subsidies
fob port price net of transfers(local currency)
deduct (-)
following cost between port and ginnery in Multan
handling
transportation
insurance
interest
price of lint per ton at ginnery
multiply (*)
by ginnery recovery factor of 33%
to derive seed cotton equivalent price .....(1)

COTTON SEED

FOB Soybean proxy price, Dutch crude

multiply (*)
factor for quality difference
deduct (-)
unloading
freight
insurance
CIF port price (foreign currency)
multiply (*)
official exchange rate (private prices)
multiply (*)
equilibrium exchange rate (social prices)
CIF port price (local currency)
deduct (-)
tariffs
add (+)
subsidies
CIF port price net of transfers(local currency)
deduct (-)
following cost between port and ginnery in Multan
handling
transportation
insurance
interest
Extraction cost per ton of oil
multiply (*)
by mill recovery factor of 7%

to derive seed cotton equivalent price .....(2)

COTTON CAKE

FOB Soybean meal proxy price,

multiply (*)
factor for quality difference
deduct (-)
unloading
freight
insurance
CIF port price (foreign currency)
multiply (*)
official exchange rate (private prices)
multiply (*)
equilibrium exchange rate (social prices)
CIF port price (local currency)
deduct (-)
tariffs
add (+)
subsidies
CIF port price net of transfers(local currency)
deduct (-)
following cost between port and ginnery in Multan
handling
transportation
insurance
interest
Extraction cost per ton of soybean
multiply (*)
by mill recovery factor of 55%

to derive seed cotton equivalent price .....(3)

DERIVING FARMGATE PRICE FOR SEED COTTON (RAW)

add
cotton lint equivalent seed cotton price (1)
cotton seed equivalent seed cotton price (2)
cotton cake equivalent seed cotton price (3)

price of seed cotton at ginnery
deduct
ginning cost
deduct
handling & transportation cost

Border farm gate price of cotton seed

Calculation for social prices of cotton is presented on the next page, in this the taxes and subsidies are excluded and the

fob price is converted at the official exchange rate. The estimation of private and social prices for other traded commodities is presented in the annex table 7 to 12

E.Traded Inputs:

1. Tractor cost

As mentioned before the tractor cost in Pakistan can be divided into a fixed cost, which includes the investment, depreciation and capital cost and the variable one, which includes the repair, fuel, oil and insurance costs. These are further broken into the tradeable and the non-tradeable item costs, such as the capital and labor cost. The table below numerically presents the methodology of actual cost break down for the tractor cost in Pakistan.[11]

2. Cost decomposition:

The f.o.b price of fertilizer faced by the farmer includes the price of transportation, marketing, storage and processing (table 13). In addition, the services used to deliver the commodity to the farmer may entail a cost which may, again, have a traded and a non-traded component e.g the truck transporting the fertilizer may have a traded components such as spares and fuel, the machinery can be a capital cost, and driver wages as labor cost. One needs to break these costs into their components to correctly estimate the ultimate transfer of resources.

The table below presents the breakdown of costs for the tractor , and tubewell into various components of fixed and variables costs i.e. traded, capital and labor categories. To determine the actual proportion of these costs to be ascribed to each category, usually one has to rely on surveys and studies conducted for this purpose. In our example the breakdown is on the basis of past studies (e.g. Amir 1989 and Jim Longmire, 1993) along with the information provided by PERI.

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[11] Amir Mahmood. Assessing the Comparative Advantage of Pakistan's Oilseed and Edible Oil Industry. Ph.D Dissertation. University of Manitoba. Winnipeg, Manitoba. 1991.

Table 4: Cost breakdown- Traded and non-traded (percentage)

	Traded	**Capital**	**Labor**
Fixed Costs			
Depreciation	50	50	0
Capital	0	100	0
Variables Costs			
Repairs	50	25	25
Fuel	100	0	0
Oil	100	0	0
Insurance	0	0	100

3. The social price for fuel:

To calculate the social price of fuel one has to deduct custom duties and the distributional charges from the private prices. Again, the distributional cost, which is Rs.37 per liter or Rs 0.67 per hour of operation, includes the traded and non-traded components. According to the information provided in the studies cited above, out of this 49 percent of the distributional cost is tradeable and 51 percent is non-tradeable. The non-tradeable part is further divided into 42 percent of labor cost and 9 percent of domestic costs. The tradeable portion of the distributional cost, Rs.18 per liter, is added to the per liter c.i.f price of the fuel to arrive at the social price, which comes to be Rs 4.10 per liter.

Table 5: Social price of fuel

1	COST ITEM	UNIT	AMOUNT
2	Market Price	Rs/liter	5
3	Duties	Rs/liter	1.08
4	Distributional services (DS)	Rs/liter	.37
5	Tradeable DS	Rs/liter	0.18
6	Non-tradeable	Rs/liter	0.19
7	Labor	Rs/Hr	0.16
9	Capital	Rs/Hr	0.03
10	Social price (2-3+5)	Rs/liter	4.10

4. Fertilizer

Pakistan Fertilizer Statistics provide a breakdown of distribution costs of various types of fertilizers in Pakistan. However this source includes the administrative cost, organizational charges, and interest payments, which may overstate the opportunity cost of imported fertilizer in Pakistan. We use the following figures provided in the table below to approximate the distributional cost of fertilizers in Pakistan.

Table 6: Fertilizer: cost of nontraded services: (Rs/kg)

	TRADED	DOMESTIC CAPITAL	DOMESTIC LABOR
Transportation.	.54	.33	.20
Marketing	.181	.11	.3
Storage	.294	.104	.20
TOTAL	1.25	.556	.7

To arrive at the social price of fertilizer we add the traded part of distributional cost to the cif prices. The nontraded portion forms part of the costs of the domestic factors.

To arrive at the social prices of seed cotton and rice, we use the cif prices and deduct the tradeable part of the domestic distributional costs. The non-tradeable part of the distributional cost is deducted from the domestic cost component. The distributional cost of seed is assumed to be the same as the cost of fertilizer.

7. Insecticides

In the absence of any data on the distributional costs of insecticides we assume that the domestic distributional cost in terms of traded, capital and labor costs is divided in the same proportion as in the case of fertilizer. The distributional cost of insecticides is assumed to be the same as the cost of fertilizer.

F. Obtain private and social prices for non- traded inputs

1. Irrigation

Chaudry and Ashraf (1981), have calculated the breakdown of the costs of irrigation in terms of operation and maintenance cost, labor cost and capital cost for the major crops over a period of eleven years. According to their estimate, 76 percent of the irrigation costs form the capital cost, which is treated as tradeable and 26 percent - which is the operation-maintenance cost - as non-tradeable (mainly domestic labor). We will use these estimates to decompose our canal and tubewell cost estimates.

Table 7: Private and social prices of Irrigation (Rs per hour)

	Cotton	Wheat	Rice
Private	33	21.66	64
Social	99	64.98	192

2. Transport

Manzoor and Saeed (1988), give the percentage breakdown of transport costs according to the following : 75 percent tradeable (fuel, oil, tire and depreciation and maintenance costs), 14 percent capital (interest cost), and 11 percent as domestic labor.

G. Social Prices of domestic (non-traded) resources

The next important step is to determine social prices for nontraded factors such as capital, labor and land.

1.Capital

For the cost of capital, the prevailing interest rate in the local credit market and (public sector) financial institutions can provide useful indicators of the private cost of capital. The private cost of capital may contain a considerable amount of subsidy/transfer if credit from financial institutions (as happens in many countries) is available at lower than market interest rates for certain sectors. This has been the case in Pakistan. However, since this is the actual capital cost to the private borrowers it should be taken as the private price for capital.

To calculate the social price of capital, one needs to remove the subsidy - an exercise that can be quite complex. Pearson and Monke note that if the policy distortion involves quantitative restrictions on the supply of capital or control of interest rate it is difficult to associate the private rate of return and the observed interest rate to arrive at the social rate of return on capital. Instead, they suggest looking for alternative sources (both national and international) which may give the rate of return on investment. For detailed calculation of the shadow price of capital, see table 14.

2. Labor

Labor wages in the agriculture sector in Pakistan are not regulated. It would be a fair assumption that the prevailing market wage for skilled workers represents the opportunity cost of skilled labor in the agriculture sector. In other words, the market rate adequately reflects the marginal value product of labor. For unskilled labor, we use the methodology provided in Ballasa (1977), Gotsch and Brown (1981) and M. Z Khan (1979). In this case we divide labor provided during peak and non-peak seasons. During the peak season, the market value of labor represents the opportunity cost of labor and in the non-peak

season, due to the greater availability of labor, we assume the rate to be 1/2 of the rate of the peak season. One can take the weighted average of the two :

$$SWR = \frac{(Wps + a * Wps)}{2}$$

Where

SWA = Shadow wage rate

Wps = Peak season wage rate

a*Wps = Off peak wage rate

a = .5

3. Land

Calculating the opportunity cost of land is one of the most difficult tasks faced in constructing a PAM. Land use and its value, are often determined by such factors as: its possible commercial uses, proximity to the urban centers, the soil type, access to water and its quality. The rental value is usually arrived at by either one of the following:

1) Estimating the return on land by determining its rental value or market price.The problem with this approach is that it does not provide any information on the best alternative use of land within the agriculture sector. For example, the net profitability of growing cotton does not provide a correct measure of the extent of incentives to growing cotton if the per acre returns on rice are higher than cotton; or

2) looking at the alternatives to the commodity being analyzed. In this case, one has to analyze the cropping pattern and determine which are the competing crops. If there is no competing crop the social price of land would be zero (table 14 case 1)

In our case the private prices are determined on the basis of the prevailing market rate of one acre of land in the region. To determine the social price in the absence of data on other competing crops, we present different scenarios using social prices according to four different cases in table 14.

a) The estimates taken from the most recent studies (Longmire

1993) are presented in table 14

b) Social price of land when there is no competing crops (table 14 case 1)
c) Social returns as estimated by this study (table 14 case 2)
d) Social returns based on competing crops (wheat-rice in Gujrawala area) and (wheat-Cotton in Multan area)

The results are based on option (c) should be analyzed accordingly. In the case of social price of land based on competing crops, the net revenues of each crop are adjusted to account for the time each crop affectively occupies the land. Cotton stays nine and rice four months on the field. To calculate rental value of cotton, the net social profit of rice, excluding the rental value is multiplied by 9/4.

H. Construct private and social crop budgets

The next step is to construct commodity budgets. The private budget for cotton, rice and wheat were prepared in table 16. The social budget is based on the social prices calculated above and is represented in table 17.

I. Construction of PAM:

Once the data is in place, it is fairly simple to construct commodity PAMS. The row that evaluates the profit at private prices uses table 5 which describes the private crop budgets for cotton and rice. Table 19 provides similar information based on social prices.

Table 8 : Policy Analysis Matrix- Cotton (Rs per acre)

	Revenues	Traded Inputs	Domestic Factors	Profits
Private prices	5969	1867	1961	2148
Social Prices	13310	1889	3648	7773
Divergence	-7342	-22	-1687	-5632

NPC: .45

NPI: .99

EPC: .36

DRC .32

Table 9: Policy Analysis Matrix- Rice Basmati (Rs per acre)

	Revenues	Traded Inputs	Domestic Factors	Profits
Private prices	3191	1383	3592	-1784
Social Prices	7756	1315	6006	436
Divergence	-4565	67	-2413	-2219

NPC : .41

NPI : 1.05

EPC : .28

DRC : .93

Table 10 : Policy Analysis Matrix- Wheat (Rs per acre)

	Revenues	Traded Inputs	Domestic Factors	Profits
Private prices	4301	819	1570	1913
Social Prices	6225	823	2770	2632
Divergence	-1924	-5	-1200	-719

NPC : .69

NPI : .99

EPC : .64

DRC : .51

The interpretation of the cotton PAM for an average farm in Punjab is as follows. The PAM for rice and wheat has similar interpretations.

The farmer's revenues determined at private prices (or the actual prices he receives) is less at Rs 5969 per acre than what he would have received in the absence of regulated output prices i.e. Rs. 13310 per acre (Table 8). Due to depressed producer prices, the farmer is receiving only 45 % of the border equivalent price of raw cotton. This serves as an effective tax on the producer.

In the case of Pakistan (as in many other countries the farmer is mandated to sell raw cotton to ginners, who in turn sell to the local textile industry or the trader who exports through the government owned Cotton Export Corporation (CEC). Consequently, the output prices the farmer receives are considerably lower than the international prices. In turn, the CEC is buying cotton at a low price and selling it in the international market at higher prices which results in a net transfer of profits to government instead of the farmer.

The results of the PAM also indicate that part of the implicit taxation of the cotton grower on the output side is compensated by subsidies on inputs. The private cost of domestic factors to the farmer is Rs. 1961 per acre include low water charges, depressed land rental value and subsidized credit. Calculation of the same at social prices, when the effect of all distortions are removed, indicates the extent of the subsidy which is Rs. 1687 per acre. (A divergence between private and social prices for tradeable inputs would indicate, similarly, the effect of a subsidy (tax) on the tradeable inputs is Rs 22 per acre.

The point that should be of interest to the policy analyst is that the input subsidy Rs. 1709 per acre is much lower than the implicit tax on the cotton grower due to depressed producer prices i.e. Rs 7342 per acre, which results in a net tax of Rs. 5633 (Rs 7342- Rs. 1709) on the farmer. In other words, the positive transfer to the farmer, in the form of a subsidy, is much lower than the negative transfer from the farmer to the government, in the form of a tax.

As a result, farm profitability per acre for cotton at Rs. 2140 is only 40 % of what it would had been if there were no distortions created by interventions in the agricultural system.

J: Interpretation of ratios:

Additional indicators of relative profitability are determined by calculating the Net Protection Coefficient (NPC), the Effective Rate of Protection (ERP), and the Domestic Resource Cost (DRC). To compare the relative profitability of growing cotton not only within one region (in our case Punjab) but also across regions (say with the Sindh province in Pakistan), these indicators provide an estimate of the extent of distortions in different regions and are useful for policy decisions. (The indicators calculated in the cotton PAM above are in absolute units).

1. Nominal protection coefficient (NPC)

As discussed before, the NPC is a measure of the extent of policy intervention on the output. For the cotton PAM exercise, the NPC of 0.45 which is < 1, indicates that the cotton grower is heavily taxed in Pakistan to the extent of 55 percent. In other words, the producer receives 45 percent of the world price.

A comparison with cotton grown in other areas - and with other crops - is taken up later in the study.

2. Effective protection coefficient (EPC)

The effective protection coefficient (EPC) for cotton in Punjab gives the ratio of value added at the private prices to the value added at the social prices. The difference between the EPC and the NPC is that the protection on inputs (in our case a subsidy) is also taken into account in the calculation of the EPC. The coefficient of 0.36 indicates that with no distortion (coincidentally) on tradeable inputs, the tax on the producer has been increased - the effective price received by the farmer has decreased from 45 percent of the world price (NPC=0.45) to 36 percent of the world price (EPC=0.36).

However, the subsidy on inputs is still not enough to fully compensate for the depressed output prices of cotton.

3. Domestic resource cost (DRC)

The DRC gives the comparative advantage of growing cotton in Pakistan. As mentioned before if the ratio G/(E-F) is < 1, it indicates that the social profits are positive, and the country has a comparative advantage in growing the crop. This is the case of cotton in Pakistan. The coefficient of 0.32 indicates that every 32 cents invested in producing cotton (local currency equivalent) results in earning (or saving foreign exchange) equal to one dollar. Understandably, the crop production should be encouraged.

The PAM for rice and wheat present similar results. For both Basmati rice and wheat, the depressed output prices reduce the profitability of the farmer and acts as an implicit tax on crop production despite subsidies on both tradeable inputs and domestic factors. This is indicated by the negative divergence (in the column for profits) for both crops.

The DRC of 0.32 for cotton and 0.51 for wheat, compared to 0.93 for rice (calculated at social prices) indicates that it is economically most efficient to grow cotton followed by wheat and then rice.

PAM DATA STRUCTURE ON SPREADSHEET

DATA FOR CONVERTING PRIVATE PRICES TO SOCIAL.

Tables 1&2

Capital Budget -Private -Social	**A1**..G50 **A53**..G103

Tables 3&4

-Input-output coefficient -Indicative data	**K110**..Q160 **S162**..Y200

Tables 5&6

Export parity prices cotton -private -social	**Z203**..AG241 **Z244**..AG280

Table 7&8

Parity Prices Rice-export Wheat-Import	**Z285**.. AE323 **Z327**.. AE357

Please note that the table layout on the spreadsheet continues in a down ladder format, in other words table 9 on the next page continue on the right side below table 8.

DATA FOR CONVERTING PRIVATE PRICES TO SOCIAL.

Table 9&10

Import parity Prices Fertil	
- Private	**Z361**..AE403
- Social	**Z407**..AF449

Tables 11&12

Cost nontraded Services	
- Private	**AG452**..AN490
- Social	

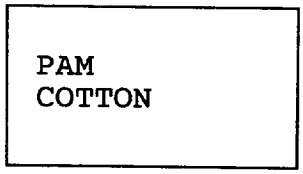
Table 12-13

Private & Social cost	
-Domestic Fact	**AP494**..AT500
-Irrigation	

Table 14&15

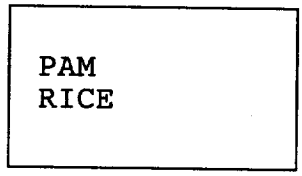
Commodity	**AW565**..
Budgets	BC639
-Private Price	**BD642**..
-Social Prices	BK715

Table 16



BL720..BQ759

Table 18

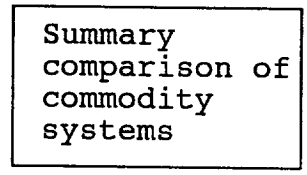


BS741..BX759

Table 19

BZ762..CE780

Table 20



CG787..
CM798

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TABLE (1): PRIVATE CAPITAL BUDGETS

	TRACTOR	TUBEWELL (Diesel)	TUBEWELL (Electric
1. FIXED COSTS:			
CIF PORT KARACHI (US $)	7800	2900	4000
NOMINAL EXCHANGE RATE(Rs/$)	25	25	25
CIF (Rs)	195000	72500	100000
PORT,HNDL & TRNSPRT(10%)	0.10	0.10	0.10
PURCH. PRICE (Rs/Unit)	214500	79750	110000
SURCHARGE (10%)	21450	7975	1100
MARKUP (20%)	42900	15950	22000
TOTAL PURCHASE PRICE	278850	103675	133100
SALV. VALUE (Rs)	27885	15551	19965
HOURS OF USE (HR/YR)	1000	1800	2000
YEARS OF LIFE(YR)	10	10	10
ANN. DEPRECIATION (Rs)	25097	8812	11314
ANN. COST OF CAPITAL (Rs)	12269	4769	6123
HOURL FXD COS S(Rs/HR)	25	5	6
HOURL FXD COS S(Rs/HR)	12	3	3
TOTAL ANN FXD COSTS (Rs)	37	8	9
2. VARIABLE COSTS:			
REPAIRS COST COEFF.	0	0	0
ANN. REPAIRS COST(Rs.)	13943	5184	5324
HRLY REPAIR COSTS (Rs/HR)	14	3	3
HRLY FUEL CONSUM (LITER/HR)	8	4	9
AVGE FUEL PRICE (Rs/LITER)	5	5	1
HRLY FUEL COST (Rs/HR)	40	20	5
HRLY OIL CONS (GAL/HR)	0	0	0
AVGE OIL PRICE (Rs/GAL)	150	150	150
HRLY COST OF OIL(Rs/HR)	2	2	1
HRLY LABOUR (Rs PER HOUR)	6	0	0
ANN INSUR $ TAXSES (Rs /TON)	1000	200	200
HRLY INSUR & TAXES(Rs/HR)	1	0	0
HOURLY VARIABLE COST (Rs/HR)	62	24	8
HOURLY TOTAL COSTS(Rs/HR)	100	32	17
TRADED	61	25	9
CAPITAL	28	6	7
LABOUR	10	1	1

TABLE (2): SOCIAL CAPITAL BUDGETS

	TRACTOR	TUBEWELL (Diesel)	TUBEWELL (Electric
1. FIXED COSTS:			
CIF PORT KARACHI (US $)	7800	2900	4000
NOMINAL EXCHANGE RATE(Rs/$)	28	28	28
CIF (Rs)	218400	81200	112000
PORT,HNDL & TRNSPRT(10%)	0.1	0.1	0.1
PURCH. PRICE (Rs/Unit)	240240	89320	123200
SURCHARGE (10%)	0.00	0.00	0.00
MARKUP (20%)	48048.00	17864.00	24640.00
TOTAL PURCHASE PRICE	288288	107184.0	147840
SALV. VALUE (Rs)	28828.8	16077.6	22176
HOURS OF USE (HR/YR)	1000	1800	2000
YEARS OF LIFE(YR)	10	10	10
ANN. DEPRECIATION (Rs)	25945.92	9110.64	12566.4
ANN. COST OF CAPITAL (Rs)	20612.59	8012.004	11051.04
HOURL FXD COS S(Rs/HR)	25.94592	5.061467	6.2832
HOURL FXD COS S(Rs/HR)	20.61259	4.451113	5.52552
TOTAL ANN FXD COSTS (Rs)	46.55851	9.51258	11.80872
2. VARIABLE COSTS:			
REPAIRS COST COEFF.	0.05	0.05	0.04
ANN. REPAIRS COST(Rs.)	14414.4	5359.2	5913.6
HRLY REPAIR COSTS (Rs/HR)	14.4144	2.977333	2.9568
HRLY FUEL CONSUM (LITER/HR)	8	4.00	8.95
AVGE FUEL PRICE (Rs/LITER)	5	4.10	1.82
HRLY FUEL COST (Rs/HR)	40	16.4	16.289
HRLY OIL CONS (GAL/HR)	0.01	0.01	0.005
AVGE OIL PRICE (Rs/GAL)	150	150	150
HRLY COST OF OIL(Rs/HR)	1.5	1.5	0.75
HRLY LABOUR (Rs PER HOUR)	6.00	0.00	0.00
ANN INSUR $ TAXSES (Rs /TON)	0	0	0
HRLY INSUR & TAXES(Rs/HR)	0	0	0
HOURLY VARIABLE COST (Rs/HR)	61.9144	20.87733	19.9958
HOURLY TOTAL COSTS(Rs/HR)	108.4729	30.38991	31.80452
TRADED	61.68	21.92	21.66
CAPITAL	37.19	7.73	9.41
LABOUR	9.6036	0.744333	0.7392

Table 3 **Input-output Coefficients (Units per A**

Resources		**Units**	**Cotton**	**Rice**	**Wheat**
Land					
Summar			1	1	
Winter			1		1
Perenial					
Labour					
Summar					
	prepartion	md/acre	1.76	1.42	
	Planting	md/acre	0.52	6	
	fertilizer	md/acre	0.17	0.24	
	Weeding	md/acre	2.04	0.5	
	Irrigation	md/acre	1.83	5	
	Harvesting	md/acre	4	8.75	
Total					
Winter					
	prepartion	md/acre			1.02
	Planting	md/acre			0.11
	fertilizer	md/acre			0.23
	Weeding	md/acre			0
	Irrigation	md/acre			1.28
	Harvestin	md/acre			6.09
Total					8.73
Fixed Inputs					
Summar					
	Tractor	hrs/acre	6.83	5.38	
	Tubewell	hrs/acre	4.71	29.1	
	Treshing	hrs/acre	9.43	0	
Total					
Winter					
	Tractor	hrs/acre			3.66
	Tubewell	hrs/acre			5.46
	Treshing	hrs/acre			1.91
Total					
Purchased Inputs					
Seeds		kg/acre	8.5	4	43
Fertilizer					
	urea	kg/acre	52.18	35.43	38.93
	super phosphate	kg/acre	20.26	15.71	20.26
Pesticide		Rs/acre	900.5	28.05	8.18
Irrigation		hrs/acre	8	18	7
Total					
Yield					
Main		tons/acr	0.95	0.78	0.84
By-Product		tons/acr	1	1	1.9

TABLE 4. INDICATIVE DATA REQUIRED:

	Units	Cotton	Rice	Wheat
Official Exchange Rat	(RS/US	25.00	25.00	25
CIFf Main	US$ pe	1521.00	674.44	
By Product cif 1	US$ pe	364.00	0.00	
Freight	US$ pe	125.00	35.12	
Freight Byproduct		0.00	0.00	
Unload Costs at Karac	US$ pe	0.00	0.00	
Insurance for freight	US$ pe	0.00	0.00	
Fixed Handling Charge	Rs/Ton	397.50	170.25	
Fixed Handling Charge	Rs/Ton	0.00	0.00	
Insurance	Rs/Ton	0.00	0.00	
Interest Charges-Mark	Rs/Ton	0.00	0.00	
Processing Charges	Rs/Ton	663.75	885.00	
Value of Bran/	Rs/Ton	0.00	75.00	800

1 Ton = 1000 KG =		
Shadow Exchange rate	28.00	Rs/US$
Nominal interest rate	0.08	%
Real interest rate	0.13	%
Machinery - Spares and Reps	0.20	%
Machinery - Capital	0.80	%

1 Ton = 1000 KG

TRANSPORT
Price per kilometer
Lint: 0.023 RS per 40 KGS/km ,
RICE: 0.023 RS per 40 KGS/km ,

DISTANCES FROM KARACHI:

MULTAN is:	945.00	kilometres
GUJRAWALA	1310.00	kilometres
FAISAL ABAD is:	0.00	kilometres

TABLE 5 : COTTON PRIVATE EXPORT PARITY PRICE

		Units	Lint	Seed	Cake
CIF	($/MT)	$/ton	1521	364	100.16
	Quality Prem	$/ton	1	1	1
	Adjusted price	$/ton	1521	364	100.16
	Unloading	$/ton	3	3	3
	Freight	$/ton	110	110	20.7
	Insurance	$/ton	12	12	2
FOB		$/ton	1396	239	125.86
	Exchange Rate (oer)	Rs/$	25	25	25
	Exchange Pre		0	0	0
	Domstic	Rs/ton	34900	5975	3146.5
	Tarif (-)	Rs/ton	16054	2748.5	1447.4
	Subsidies (+)	Rs/ton	0	0	0
Port Price			18846	3226.5	1699.1
Domestic Handling Port to Multan					
	extraction			90	
	marketing	Rs/ton	313	313	304
	tranport	Rs/ton	255	255	255
	storage	Rs/ton	202	0	202
Mutan market price		Rs/ton	18076	2748.5	2460.1
Price of seed cotton at ginnery processing		Rs/ton	7510.5		
	Ginning cost	Rs/ton	663		
	marketing		187.76		
	transportaion	Rs/ton	175		
	storage	Rs/ton	202		
Seed Cotton Parity Price		Rs/ton	6282.8		

Table 6: Cotton Social Export Parity Price

		Units	Lint	Seed	Cake
CIF	($/MT)	$/ton	1521	364	100.16
	Quality Prem	$/ton	1	1	1
	Adjusted price	$/ton	1521	364	100.16
	Unloading	$/ton	3	3	3
	Freight	$/ton	110	110	20.7
	Insurance	$/ton	12	12	2
FOB		$/ton	1396	**239**	**125.86**
	Exchange Rate (EER)	Rs/$	28	28	28
	Exchange Pre		0	0	0
	Domstic	Rs/ton	39088	6692	3524.1
	Tarif (-)	Rs/ton	0	0	0
	Subsidies (+)	Rs/ton	0	0	0
Port Price			39088	6692	3524.1
Domestic Handling Port to Multan					
	extraction			90	
	marketing	Rs/ton	313	313	304
	tranport	Rs/ton	255	255	255
	storage	Rs/ton	202	0	202
Mutan market price		Rs/ton	38318	6214	4285.1
Price of seed cotton at ginnery processing		Rs/ton	15437		
	Ginning cost	Rs/ton	663		
	marketing		385.92		
	transportaion	Rs/ton	175		
	storage	Rs/ton	202		
Seed Cotton Parity Price		Rs/ton	14011		

Table 7 Rice Private and Social Export Parity Price

		Units	Private	Social
CIF	**($/MT)**	$/ton	674	674
	Unloading	$/ton	9	9
	Freight	$/ton	35	35
	Insurance	**$/ton**	9	9
FOB		$/ton	621	621
	Exchange Rate (OER)	Rs/$	**25**	28
	Exchange Pre		0	0
	Domstic	Rs/ton	15525	17388
	Tarif (-)	Rs/ton	7141.5	0
	Subsidies (+)	Rs/ton	0	0
Port Price			8383.5	17388
Domestic Handling port to Gujrawal				
	marketing	Rs/ton	304	304
	tranport	Rs/ton	348	348
	storage	Rs/ton	202	202
Gugrawala market price		Rs/ton	7529.5	16534
processing				
	milling cost	Rs/ton	885	885
value of bran		Rs/ton	250	250
ex mill price of rice		Rs/ton	6394.5	15399
Equlant price of paddy		Rs/ton	4156.425	10009
Domestic Handling Mill to farm				
	marketing	Rs/ton	25	25
	tranport	Rs/ton	15	15
	storage	Rs/ton	25	25
Farmgate parity price		Rs/ton	4091.425	9944.4

Table 8 Wheat Private Import Parity Price

		Units	Private	Social
FOB	($/MT)	$/ton	131	131
	Unloading	$/ton	5	5
	Freight	$/ton	17	17
	Insurance	$/ton	5	5
CIF		$/ton	**158**	158
	Exchange Rate (OER)	Rs/$	25	28
	Exchange Pre		0	0
	Domstic	Rs/ton	3950	4424
	Tarif (+)	Rs/ton	0	0
	Subsidies (-)	Rs/ton	1817	0
Domestic Price			2133	4424
Domestic Handling				
Port to Multan Market				
	marketing	Rs/ton	436	436
	tranport	Rs/ton	655	655
	storage	Rs/ton	202	202
Multan market price		Rs/ton	3426	5717
Domestic Handling				
Multan market to farm				
	marketing	Rs/ton	100	100
	tranport	Rs/ton	15	15
	storage	Rs/ton	0	0
Farmgate parity price		**Rs/ton**	**3311**	**5602**

Table 9 Private Import Parity Price

		Units	Inputs Urea	Phoshate
FOB	($/MT)	$/ton	155	165
	Unloading	$/ton	5	8
	Freight	$/ton	15	15
	Insurance	$/ton	5	10
CIF		$/ton	180	198
	Exchange Rate (OER)	Rs/$	25	25
	Exchange Pre		0	0
	Domstic	Rs/ton	4500	4950
	Tarif (+)	Rs/ton	0	0
	Subsidies (-)	Rs/ton	0	92
Domestic Price			4500	4858
Domestic Handling port to Gujrawal				
	marketing	Rs/ton	146	146
	tranport	Rs/ton	513	513
	storage	Rs/ton	202	810
Gugrawala market price		Rs/ton	5361	6327
Domestic Handling port to Multan				
	marketing	Rs/ton	146	146
	tranport	Rs/ton	373	373
	storage	Rs/ton	202	810
Multan market price		Rs/ton	5221	6187
Domestic Handling Market to farm				
	marketing	Rs/ton	0.01	0.01
	tranport	Rs/ton	70	70
	storage	Rs/ton	51	51
Farmgate parity price		Rs/ton		
Gujrawala			**5535.61**	**6511.27**
Multan			**5394.21**	**6369.87**

Table 10 Social Import Parity Price

		Units	Urea	Inputs Phoshate
FOB	($/MT)	**$/ton**	155	165
	Unloading	$/ton	5	8
	Freight	$/ton	**15**	15
	Insurance	$/ton	5	10
CIF		$/ton	180	198
	Exchange Rate (EER)	Rs/$	28	28
	Exchange Pre		0	0
	Domstic	Rs/ton	5040	5544
	Tarif (+)	Rs/ton	0	0
	Subsidies (-)	Rs/ton	0	0
Domestic Price			5040	5544
Domestic Handling port to Gujrawal				
	marketing	Rs/ton	146	146
	tranport	Rs/ton	513	513
	storage	Rs/ton	202	810
Gugrawala market price		Rs/ton	5901	7013
Domestic Handling port to Multan				
	marketing	Rs/ton	146	146
	tranport	Rs/ton	373	373
	storage	Rs/ton	202	810
Multan market price		Rs/ton	5761	6873
Domestic Handling Market to farm				
	marketing	Rs/ton	57.61	68.73
	tranport	Rs/ton	70	70
	storage	Rs/ton	51	51
Farmgate parity price		Rs/ton		
Gujrawala			**345978.61**	**489137.5**
Multan			**337773.21**	**479375.3**

Table: 11 Private Cost of Non-Traded Services

Commodities		Transpor	Marketin	Storage	Total	Processi
Wheat		662	524	194		
	Traded (Rs/T)	410.44	324.88	139.68	875.00	
	Capital (Rs/T)	251.56	199.12	54.32	505.00	
	Labour (Days/T)	0.20	0.30	0.20	0.70	
	Total	662	524	194	1380	
Cotton		418	488.76	392		717
	Traded (Rs/T)	313.50	283.48	313.60	910.58	537.75
	Capital (Rs/T)	104.50	205.28	78.40	388.18	179.25
	Labour (Days/T)	0.30	0.30	0.30	0.90	0.90
	Total	418.00	488.76	392.00	1298.76	717.00
Rice		355	317	219	891	857
	Traded (Rs/T)	198.8	158.5	109.5	466.8	574.19
	Capital (Rs/T)	156.2	158.5	109.5	424.2	282.81
	Labour (Days/T)	0.2	0.3	0.2	0.7	0.7
	Total	355	317	219	891	857
Fertilizer		443	203.61	253	899.61	
	Traded (Rs/T)	274.66	126.24	184.69	585.5882	
	Capital (Rs/T)	168.34	77.372	68.31	314.0218	
	Labour (Days/T)	0.2	0.3	0.2	0.7	
	Total	443	203.61	253	899.61	
Others (pesticide)		443	203.61	253	899.61	
	Traded (Rs/T)	274.66	126.24	184.69	585.5882	
	Capital (Rs/T)	168.34	77.372	68.31	314.0218	
	Labour (Days/T)	0.2	0.3	0.2	0.7	
		443	203.61	253	899.61	

Fixed Inputs	Wheat	Cotton	Rice	Sugare
Traded (Rs/T)	20	30.7	15.4	29.2
Capital (Rs/T)	20	30.7	15.4	29.2
Labour (Days/Acr	7	10	5	10

TABLE 12. PRIVATE AND SOCIAL COSTS- DOMESTIC FACTORS

	LABOUR	CAPITAL	LAND
PRIVATE	40.00	8.00	3000
SOCIAL	30.00	12.94	5880

TABLE 13: PRIVATE AND SOCIAL PRICE OF IRRIGATION

	WHEAT	RICE	COTTON
PRIVATE	21.66	64.00	33.00
SOCIAL	43.32	128.00	66.00

NOTES ON CALCULATION ON DOMESTIC FACTORS

Shadow Price of Labour

SHADOW WAGE RATE = WP+A*WP/2

WP=PEAK SEASON WAGE RATE	40.00
a	0.50
SWR=	30.00
RATIO	0.75
SWR	30.00

SHADOW PRICE FOR CAPITAL Q=A*Pr+B*Ir

a	PROPORTION OF EQUITY CAPITAL IN TOTAL INVESTMENT
Pr	PROFIT RATE ADJUSTED FOR INFLATION
b	PROPORTION OF DEBT CAPITAL IN TOTAL INVESTMENT
Ir	REAL INTEREST RATE

Shadow Price of Capital

a	0.30	0.30	INFLATION	0.05
Pr (%)	35.00	29.60		
b	0.70	0.70		
Ir	11.20	5.80		
Q	18.34	12.94		

Shadow Price of Land

Case 1. Without a competing crop (land is fallow)

	WHEAT	RICE	COTTON
PRIVATE	978.15	1078.92	1078.9154
SOCIAL	0.00	0.00	0

Case 2. Based on social returns of crop taken from recent studies

	WHEAT	RICE	COTTON
PRIVATE (market)	978.15	1078.92	1078.92
SOCIAL	2515.58	2450.02	2280.858

Case 3. Based on returns from competing crop

	COTTON	RICE	WHEAT
PRIVATE	978.15	1078.92	1078.92
SOCIAL	2516	2450	2280.858

TABLE 14: COMMODITY BUDGETS AT PRIVATE PRICES

GROSS REVENUES	UNITS	COTTON	RICE	WHEAT
Yield	mt/acre	0.95	0.78	0.84
Prices	Rs/ton	6282.772113	4091.425	3311
Yield	mt/acre			1.9
Prices	Rs/ton			800
Total		5968.633507	3191.3115	4301.24
TRADED INPUTS				
Fertilizer				
Traded				
ur Amount	kg/acre	52.18	35.43	38.93
Price	Rs/Kg	4.5		
ph Amount	Kg/acre	20.26	15.71	20.26
Price	Rs/Kg	4.858		
Sub total		256.67	235.75	273.61
N-Traded		42.42	29.95	34.66
Total		299.09	265.70	308.27
Pesticide				
Traded				
Amount	mt/acre	1	1	1
Price	Rs/ton	900.45	28.05	8.18
N-Traded		56.22	1.76	0.59
Total		956.67	29.81	8.77
Seeds				
Traded				
Amount	Kg/acre	8.5	4	43
Price	Rs/Kg	8.79	5	3.35
Total		74.72	20.00	144.05
Fixed Inputs				
tract Amount	Hr/acre	6.83	5.38	3.66
Price	Rs/Hr	61.02		
tubew Amount	Hr/acre	4.71	29.1	5.46
Price	Rs/Hr	25.39		
tubew Amount	Hr/acre			
Price	Rs/Hr			
Total		536.34	1067.07	361.95
DOMESTIC FACTORS				
Labour	days/acre			
Direct production		10.32	21.91	8.73
nontraded inputs				
fertilizer		0.665	0.546	0.588
other		0.665	0.546	0.588
Sub-total		11.65	23.002	9.906
Price	Rs/day	40	40	40
Sub total		466	920.08	396.24
Fixed input		75.53	80.60	42.92
Total		541.53	1000.68	439.16
Capital	Rs/acre			
Direct production				
nontraded inputs				
fertilizer		298.32	244.94	263.78
Others		298.32	244.94	263.78
Sub total		596.64	489.87	527.56
Price	Rs/Rs	0.08	0.08	0.08
Sub total		47.73	39.19	42.20
Fixed cost		220.71	321.56	135.35
Total		268.44	360.75	177.56
Canal water				
Amount	Hr/acre	8	18	7
Price	Rs/Hr	21.66	64	33
Total		173.28	1152	231
Land	Rs/acre	978.1464994	1078.915419	1078.915419
PROFITS WITHOUT LAND		3118.567804	-704.6892003	2630.494395
PROFITS WITH LAND		2140.421304	-1783.604619	1551.578976

TABLE 15: COMMODITY BUDGETS AT SOCIAL PRICES

GROSS REVENUES		**UNITS**	**COTTON**	**RICE**	**WHEAT**
	Yield	mt/acre	0.95	0.78	0.84
	Prices	Rs/ton	14010.79615	9944.35	5602
	Yield	mt/acre			1.9
	Prices	Rs/ton			800
		Total	13310.25634	7756.593	6225.68
TRADED INPUTS					
Fertilizer					
Traded					
urea	Amount	kg/acre	52.18	35.43	38.93
	Price	Rs/Kg	5.04		
phosp	Amount	Kg/acre	20.26	15.71	20.26
	Price	Rs/Kg	5.544		
	Sub total		290.93	265.66	308.53
N-Traded			42.42	29.95	34.66
	Total		333.35	295.61	343.19
Pesticide					
Traded					
	Amount	mt/acre	1	1	1
	Price	Rs/ton	900.45	28.05	8.18
N-Traded			56.22	1.76	0.59
	Total		956.67	29.81	8.77
Seeds					
Traded					
	Amount	Kg/acre	8.5	4	43
	Price	Rs/Kg	8.79	5	3.35
	Total		74.72	20.00	144.05
Fixed Inputs					
tractor	Amount	Hr/acre	6.83	5.38	3.66
	Price	Rs/Hr	61.68		
tubewell	Amount	Hr/acre	4.71	29.1	5.46
	Price	Rs/Hr	21.92		
tubewell	Amount	Hr/acre			
	Price	Rs/Hr			
	Total		524.52	969.69	345.43
DOMESTIC FACTORS					
Labour		days/acre			
Direct production			10.32	21.91	8.73
nontraded inputs					
fertilizer			0.665	0.546	0.588
other			0.665	0.546	0.588
	Sub-total		11.65	23.002	9.906
Price		Rs/day	30	30	30
	Sub total		349.5	690.06	297.18
Fixed input			69.10	73.33	39.21
	Total		418.60	763.39	336.39
Capital		Rs/acre			
Direct production					
nontraded inputs					
fertilizer			298.32	244.94	263.78
Others			298.32	244.94	263.78
	Sub total		596.64	489.87	527.56
Price		Rs/Rs	0.1294	0.1294	0.1294
	Sub total		77.21	63.39	68.27
Fixed cost			290.39	424.91	178.30
	Total		367.60	488.30	246.56
Canal water					
	Amount	Hr/acre	8	18	7
	Price	Rs/Hr	43.32	128	66
	TOTAL		346.56	2304	462
Land		Rs/acre	2515.580737	2450.020235	2280.857952
PROFITS WITHOUT LAND			10288.25403	2885.795374	4339.289194
PROFITS WITH LAND			7772.673289	435.7751389	2058.431242

TABLE 16. COTTON - POLICY ANALYSIS MATRIX
(ALL PER ACRE)

	REVENUES	TRADEABLE INPUTS	DOMESTIC FACTORS	PROFITS
PRIVATE PRICES	5969	1867	1961	2140
SOCIAL PRICES	13310.2563	1889	3648	7773
EFFECTS OF DISTORTIONS	-7342	-22	-1687	-5632

NPC	0.45
NPI	0.99
EPC	0.36
DRC	0.32

TABLE 17. RICE POLICY ANALYSIS MATRIX
(ALL PER ACRE)

	REVENUES	TRADEABLE INPUTS	DOMESTIC FACTORS	PROFITS
PRIVATE PRICES	3191	1383	3592	-1784
SOCIAL PRICES	7756.593	1315	6006	436
EFFECTS OF DISTORTIONS	-4565	67	-2413	-2219

NPC	0.41
NPI	1.05
EPC	0.28
DRC	0.93

TABLE 18 . WHEAT POLICY ANALYSIS MATRIX
(ALL PER ACRE)

	REVENUES	TRADEABLE INPUTS	DOMESTIC FACTORS	PROFITS
PRIVATE PRICES	4301	823	1927	1552
SOCIAL PRICES	6225.68	841.43	3326	2058
EFFECTS OF DISTORTIONS	-1924	-18	-1399	-507

NPC	0.69
NPI	0.98
EPC	0.65
DRC	0.62