Draft:

Issues in Agricultural Pricing Policy in Pakistan

Nadeem Ul Haque

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3. *The author is Research Fellow at the International Food Policy Research Institute, Washington DC.*

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Introduction

The relationship of agriculture to other sectors of the economy has been a matter of considerable debate in Pakistan over the years. On the one hand, following standard growth theories, planning efforts, from time to time, have been based on the notion that surpluses from the agricultural sectors should be generated for needed investment into higher value added industrial and agro-processing sectors. On the other hand, political pressures have protected the agricultural sector from direct taxation. Through the history of the country, agricultural producers have been exempt from income tax--and this situation is likely to persist in the coming years. As a result, any attempt on the part of policy to direct resources between sectors had to be based on indirect taxation of agriculture only.

The principal form that this indirect taxation has taken is the manipulation of prices by policy. Administrative controls on prices have served to tax agricultural producers while subsidizing directly industrial raw material and indirectly the food costs of

labor and the urban areas. Historically, the containment of food costs in a country where poverty is widespread has been an important rationale for administrative controls on prices.

Policy has had to balance this form of 'taxation' of agriculture with the need to expand domestic agricultural output to enhance the country's food security needs as well as foreign exchange earnings from agricultural exports. Price policy, therefore had to remain cognizant of the supply responsiveness of farmers. The pace of expansion of agricultural output could also be increased if new technologies were adopted at a rapid rate as they became available. Consequently, agricultural policy has also subsidized key inputs such as fertilizers and new varieties of seed to encourage their rapid diffusion in the agricultural sector.

With both input and output prices being administratively controlled, often for several different, and sometimes even competing objectives, the net effect of government intervention on the agricultural sector is not entirely evident and remains the subject of intense debate, tainted often by self-interest. The result is that issues of agricultural pricing and taxation, and

intersectoral transfers is fairly well researched, though quite often ideologically affected.

The issue of agricultural pricing is therefore quite complex involving many aspects of public policy and political and economic factors.[4] It has, therefore, excited considerable research and debate in the country. The purpose of this paper is to take an overview of the area reviewing some of the research, and identifying issues where further work may be required.

The paper is divided into sections. The section following this introduction reviews the research that has been conducted in intersectoral terms of trade. Section 2 takes up the issue of supply response. Section 3 looks at the issue of the effects of government intervention in agriculture reviewing both intersectoral resource transfers and the possibility of the institution of agricultural income tax. The fourth section studies the issue of leakages, such as smuggling, that could be

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[4] *Research only serves to inform politics and cannot alone solve a political issue. The policymaker continues to point to the possibility of riots and demonstrations in the event of a price rise that would follow the dismantling of the current agricultural system. A similar scenario of doom was used for a long time to justify exchange controls. The claim was that if exchange and trade controls were to be abolished, there would be a rush for luxury goods and a rapid reserve loss would result that would be ruinous for the country's foreign exchange holdings, in terms of its reserves. However, when exchange controls were dropped in Spring 1991, quite the opposite happened-- money flowed into the country.*

directly a result of price policy. This is an important issue in small open economies that unfortunately has received little attention. The fifth section examines the important question of the incidence of the subsidy on wheat. The sixth section looks at the storage which is a byproduct of price policy. The issue of the cost of such a policy is also taken up. The paper ends with a conclusion.

1. Evolution of the terms of trade for agriculture.

Numerous studies have been conducted in this area [1]. These studies basically attempt to estimate the price of agricultural goods relative to other goods. Thus the terms of trade of agriculture relative to other sectors attempt to determine in a broad sense the profitability of agriculture or the purchasing power of agricultural income. Since the terms of trade attempts to estimate the price of agricultural products relative to other goods, the estimated terms of trade represent the joint effect of all factors that affect the domestic supply and demand of agricultural and other products. Thus macroeconomic and international trade policy as well as developments in international markets are all factors that determine the intersectoral terms of trade.

In Table 1, findings of various studies on the terms of trade have been collected. Although the methodologies and the time periods of the various studies have differed, I have, in order to get a complete historical picture, combined the various series on the terms of trade in the

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[1] *See Lewis and Hussain (1966), Lewis (1970), Cheong and D'Silva (1984), Kazi (1987), Qureshi (1985, 1987) and Salam (1992).*

Table 1:

Inter-Sectoral Terms of Trade

YEAR	Lewis & Husain	Lewis	Quarishi	Salam	Terms of Trade
1952	104.1	-	-	-	101.83
1953	102.3	-	-	-	100.07
1954	85.8	-	-	-	83.929
1955	85.3	-	-	-	83.440
1956	90.9	-	-	-	88.918
1957	98.0	-	-	-	95.863
1958	99.2	-	-	-	97.037
1959	99.1	-	-	-	96.939
1960	100.0	-	-	-	97.820
1961	110.3	-	-	-	107.89
1962	109.9	-	-	-	107.50
1963	105.7	-	-	-	103.40
1964	109.0	-	-	-	106.62
1965	-	114.8	-	-	112.30
1966	-	108.2	-	-	105.84
1967	-	113.3	-	-	110.83
1968	-	103.9	-	-	101.63
1969	-	102.5	-	-	100.27
1970	-	-	107.10	-	100.00
1971	-	-	107.30	-	107.10
1972	-	-	113.70	-	107.30
1973	-	-	134.70	-	113.70
1974	-	-	125.70	-	134.70
1975	-	-	135.80	-	125.70
1976	-	-	153.60	-	135.80
1977	-	-	149.20	-	153.60
1978	-	-	212.70	-	149.20
1979	-	-	206.90	-	212.70
1980	-	-	191.70	-	206.90
1981	-	-	181.20	100.00	191.70
1982	-	-	162.10	111.08	181.20
1983	-	-	181.20	108.05	162.10
1984	-	-	158.40	107.10	181.20
1985	-	-	153.60	108.18	158.40
1986	-	-	148.40	103.88	153.60
1987	-	-	-	100.45	148.40
1988	-	-	-	105.73	156.20
1989	-	-	-	107.63	159.01
1990	-	-	-	101.20	149.51
1991	-	-	-	102.73	151.77

last column of the table 1 [6]. This historical series is also plotted in Figure 1.[7] The estimates show that in the early fifties, Pakistan's agriculture faced a declining terms of trade perhaps because a disruption of traditional trade patterns as a result of partition caused a glut of agricultural products and a relative scarcity of manufactured products. In the second half of the fifties, terms of trade for agriculture improved largely as a result of the introduction of subsidies on certain inputs and support prices on some products. Although there is some oscillation in the sixties in the data shows no clear trend and perhaps reflects only the political upheavals within the country given the system of trade controls that was insulating the domestic economy from the international economy for most of this period. For most of this period, an overvalued exchange rate and a system of quantitative controls in international trade were maintained, which served to depress the price of traded goods such as agricultural products.[8]

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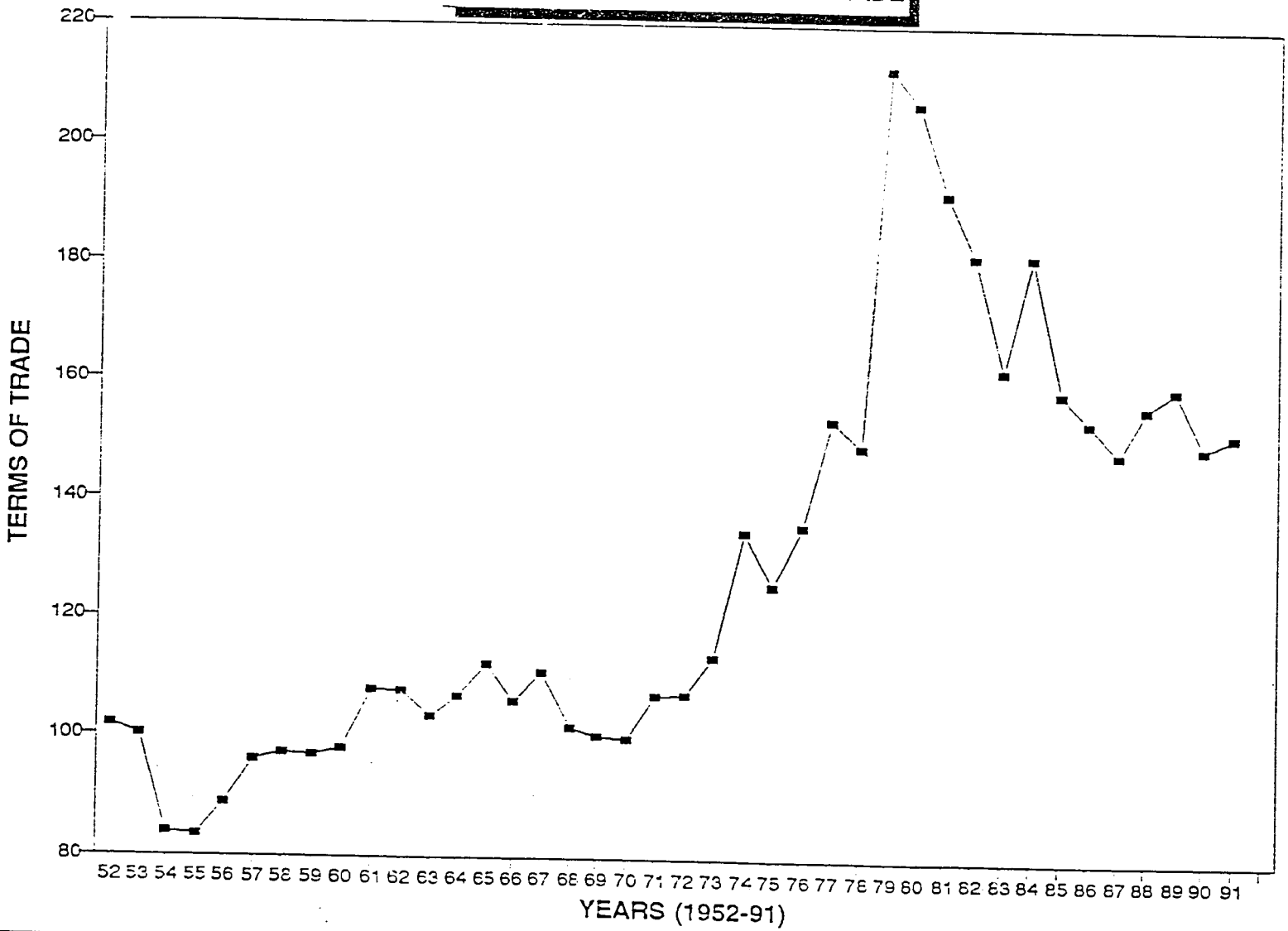
[6] *For a review of the methodologies used in the terms of trade calculations, see Qureshi (1987).*

[7] *For further evidence on trends in terms of trade see Kazi (1987) and Qureshi (1987).*

[8] *Although this is an issue that will be taken up later in the paper, for a good discussion on the issue of agriculture as a traded good, and the impact of exchange and trade policies on the agricultural sector, see Dorosh and Valdes (1990).*

FIGURE 1:
INTER-SECTORAL TERMS OF TRADE



The seventies saw a sharp improvement in the relative price of agriculture. A major reform of the exchange and trade system including a major devaluation that corrected for the overvaluation that had prevailed, improved the outlook for traded goods. Moreover, this was a period where commodity prices worldwide had enjoyed a boom. The more favorable international environment as well as a more auspicious domestic policy stance, therefore, contributed to improving the terms of trade for agriculture over the seventies.

In the eighties we see a decline in the terms of trade for agriculture perhaps because a) the international commodity boom had subsided and b) forced by its own budgetary pressures, the government reduced the subsidy to agriculture, hence putting pressure on agricultural input and output prices.

While it is useful to know how intersectoral terms of trade are evolving especially with a view to identifying, and perhaps alleviating the hardship faced by, exceptionally hard-hit sectors. However, since the terms of trade are determined by a number of factors including several exogenous as well as external factors, it is not always easy to determine the factors that caused changes in the terms of trade. Certainly, all declines in the

terms of trade cannot be attributed only to policy. Moreover, there are periods when the terms of trade decline purely because the relative price of agriculture in international markets is declining. There is little work that has been done to look at a) the causes of terms of trade changes as they happened b) the reaction of policymakers to external terms of trade changes, and c) farmers reactions to terms of trade changes.[9]

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[9] *Testing for example for the Harberger-Laursen-Metzler effect. See Svensson and Razin (198).*

2. Supply response.

For the period as a whole the terms of trade for agriculture improves at approximately a compound annual rate of .02% per annum.[10] Thus, for the period as a whole, the terms of trade for agriculture have improved. Has this terms of trade improvement induced a higher output or productivity from agriculture? Gotsch and Brown (1977) and Kazi (1987) have both attempted to look at the relationship between terms of trade and agricultural output and concluded that "the growth in farm output was determined primarily by non-price factors"[11], and that "the productivity of improved technology was sufficient to provide the incentive necessary for a respectable rate of growth"[12] It seems that the failure to sustain

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[10] *This is based on the least squares estimation of a logarithmic trend the results of which are as follows:*

$$\log(TOT) = \underset{(30.1)}{4.399} + \underset{(3.7)}{.02}\ TREND + \underset{(7.2)}{.77}\ AR(1)$$

$$R^2 = .9 \qquad D.WStat. = 2.0$$

Where TOT stands for the terms of trade of the agricultural sector relative to the other sectors, and AR stands for the autoregessive error structure.

Other studies had a slightly higher estimate of the trend growth rate. However, their estimate was biased because of the presence of serial correlation which those studies did not correct for. The Durbin-Watson for the estimated equation without the serial correlation term was close to .5 pointing to the presence of positive serial correlation which our estimate above confirms.

[11] *Kazi (987).*

[12] *See Gotsch sand Brown (1977).*

productivity growth in agriculture in the agricultural sector cannot be attributed to an unfavorable change in the price environment. The terms of trade though marked by fluctuations did not shift to the advantage of the farm sector. The inability to raise the level of agricultural production points to the structural impediments in the path of the expansion of agricultural production.

Numerous authors have tried to estimate the effect of aggregate terms of trade on agricultural output.[11] The more recent of these results are presented in Table 2. As the table shows, none of these authors have found the effect of terms of trade changes to significantly affect output. My own investigations which are presented in Table 3 suggest that perhaps the lack of significance in the previous studies was because of the lack of adequate attention to time series properties of the series.

Recent econometric advances have shown that the use of tended data, which most time series data is, can often lead to spurious correlations. The results in table 3 show, that the simple regressions have a very low Durbin-Watson statistic indicating the presence of serial correlation. Further investigation identified the error

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[11] *See for Example Gotsch and Brown (1980), Kazi (1987) and Qureshi (1987).*

Table 2:

Output Response of Terms of trade changes.1/ 2/

Dependant Variable: Index of agricultural output.

	Qazi S.	Qureshi
Q(t-1)	-	.75 (6.05)
TOT(-1)	0.46 (0.04)	.28 (1.55)
Trend	289.85 (14.23)	1.12 (1.40)
IRRI	14554.69 (5.08)	0.07 (2.80)
Constant	- -	-13.72 (-0.63)
R-Square	0.98	0.92

Q(t-1)= Lagged output.
TOT = Terms of trade change.
Trend = Trend variable.
IRRI = Irrigated area as percent of cultivated area.
1/ = From 1952 - 91.
2/ = t-statistics in parenthesis.

structure evolving according to a moving average process. Correcting for the moving average error process, improves the significance and the fit of the equation. Consequently, a careful analysis of the error structure obtained an improvement on the estimates of earlier studies.[14] In this estimation we get an elasticity of about .6 with respect to terms of trade changes which is on the high side and perhaps comparable to some estimates of long run supply elasticities[15].[16] [17]

It is hard to define in any meaningful theoretical manner a relationship estimating aggregate supply response of the sector as a whole based on changes in the terms of trade of the sector. More meaningful supply response relationships are those that relate individual crop productions to changes in relative prices. Table 4 which presents some supply response elasticities shows a fair response to expected price changes

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[14] *The Durbin-Watson for the specification before an exploration of the error structure was .5.*

[15] *See Tweeten (1987) for some consensus estimates. See also Ashiq (1992) who also gets a long run supply response elasticity of "one" for wheat and rice.*

[16] *The whole area of agricultural time-series analysis needs to be careful reviewed in the light of recent developments in econometrics. The problem of a spurious correlation when regressors and the dependent variable are heavily tended has been carefully treated and understood (Granger ( ). Unfortunately, much of the econometric work in Pakistan's agriculture has not been re-examined in the light of these developments.*

[17] *This means that a 10 percent improvement in the terms of trade will increase agricultural output by about percent.*

Table 3:

Output Response to Terms of trade changes.1/ 2/

Dependent Variable: Log of Agricultural Output

VARIAVLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LTOT	1.12 (6.83)	- -	1.12 (9.1)	- -	0.64 (2.05)	- -	- -
LTOT(-1)	- -	1.1 (6.7)	- -	1.1 (8.6)	- -	.66 (2.1)	0.66 (2.6)
TREND	- -	- -	- -	- -	0.02 (2.21)	0.02 (2.41)	0.02 (2.9)
IRRI	- -	- -	- -	- -	-.01 (-1.06)	-.02 (-1.26)	-0.02 (-1.57)
CONSTANT	-.31 (-.42)	-.27 (-.34)	-.3 (-.51)	-.28 (-.44)	2.4 (1.68)	2.48 (1.78)	2.48 (2.22)
MA(1)	- -	- -	0.81 (5.04)	0.73 (4.41)	- -	- -	0.74 (4.25)
R-SQUARE D-W	0.56 0.6	0.56 0.48	0.76 1.95	0.74 1.85	0.62 0.61	0.62 0.6	0.8 2

LTOT = Log of terms of trade change.
Trend = Trend variable.
IRRI = Irrigated area as percent of cultivated area.
1/ = From 1952 - 91.
2/ = t-statistics in parenthesis.

especially in the long run. It seems that farmers are responsive to price incentives. Thus policy that keeps agricultural prices low may result in a loss of output.

Figure 2 shows that agriculture has a trend growth that is substantially lower that the growth in GDP. Agricultural output has grown at about 3% per annum (almost the same as the rate of growth of population) whereas the economy has grown at the rate of 5% per annum. There are very few studies that explain this differential in sectoral growth rates. What is missing in agricultural research is an understanding of the sources of growth in agriculture. Such a study would help answer the question of a slower pace of agricultural growth.

Table: 4

Short-run own and cross price Elasticities Estimated/
Calculated By other Studies

SOURC	SPECIFI CATION	WHEAT	COTTO	RICE	S.CAN	MAIZ	INPUT
FALCO 1964)	ACREA						
	Wheat(i)	0.1-0.2					
	Wheat(b)	-	-	-	-	-	-
	Cotton	-	0.4	-	-	-	
Hamid et. al. (1987)	Acrage						
	WheatY	0.09					-0.09
	Wheat	0.34	-.03				
Tweeten (1986)	OUTPU						
	Wheat	0.15	-0.02	-0.004	-0.007		-0.119
	Cotton	0	0.3	-0.01	-0.015		-0.275
	Rice	0	-0.028	0.2	-0.009		-0.163
	S.Can	0	-0.043	-0.009	0.3		-0.248
Ch. and Bashir (1986)	ACRAG						
	Wheat	-	-	-	-	-	-
	Cotton	-	0.055	-	-	-	-
	Rice	-	-	0.342	-	-	-
	S.Can	-	-	-	0.242	-	-
	Maize	-	-	-	-	0.148	-
Average own Price Elasticity		0.17	0.28	0.21	0.41	0.15	

(I) = Irrigated, (b) Barani

* Mean of the significant coefficients for different regions of Punjab

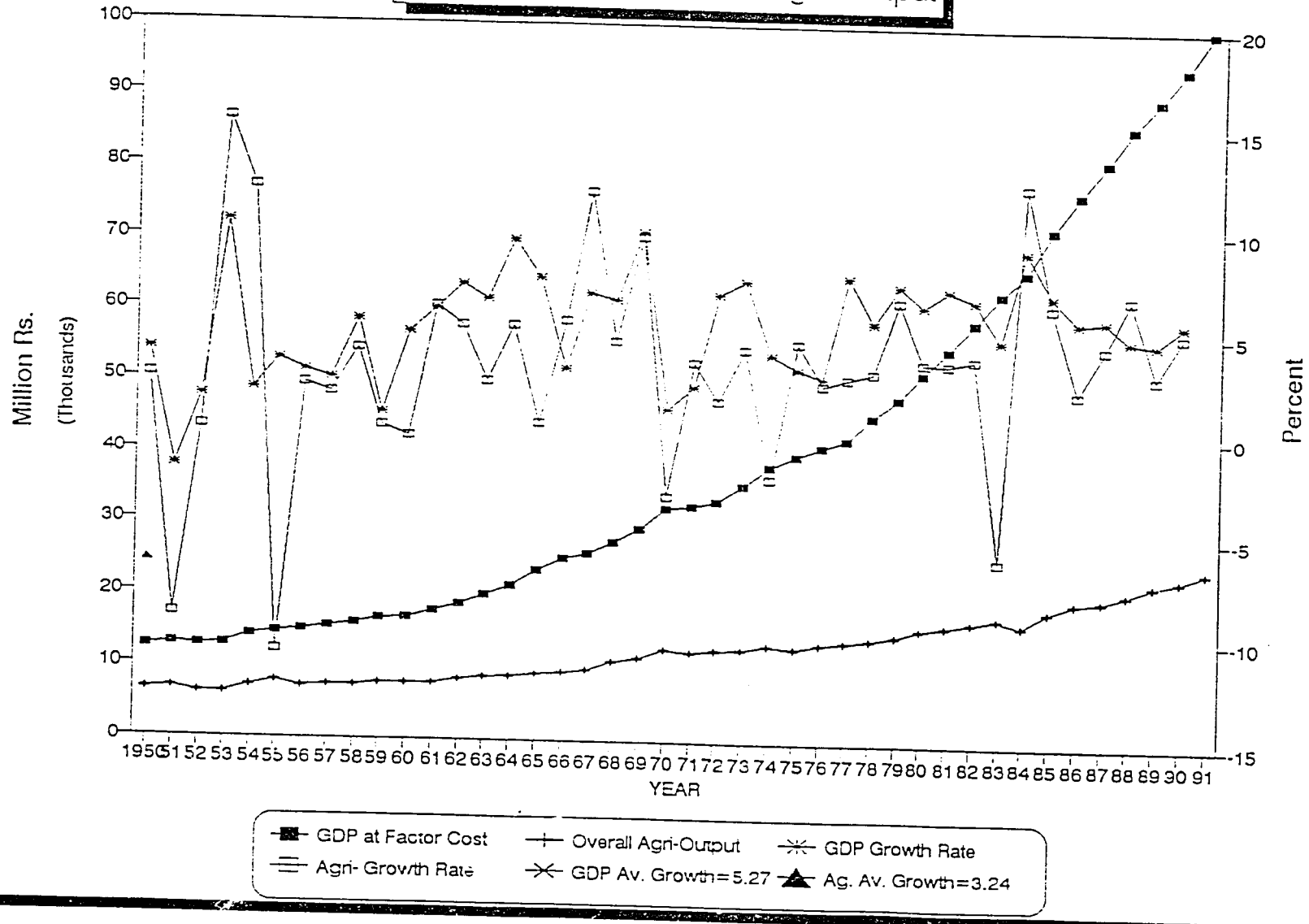
Table: 4 Contd.

Supply Elsticities of Five Major Crops in Pakistan

	Supply Elasticity with Respect to					
	Price					
Crop	Wheat	Cotton	Rice	Sugarcan	Maize	Fertiliz
			SHORT-RUN			
Wheat	0.228	-0.151	0.173	0	0	0.25
	(0.139)	(0.149)	(0.189)			(0.272)
Cotton	0	0.715	-0.329	0	0	-0.386
		(0.302)	(0.36)			(0.446)
Rice	0.136	-0.098	0.407	0	-0.084	-0.361
	(0.112)	(0.103)	(0.151)		(0.077)	(0.228)
Sugarcan	0	-0.149	0	0.524	0	-0.361
		(0.153)		(0.131)		(0.201)
Maize	0	-0.207	0	0.095	0.395	0
		(0.099)		(0.08)	(0.147)	
			LONG-RUN			
Wheat	0.327	-0.217	0.245	0	0	-0.359
Cotton	0	1.34	-0.62	0	0	-0.722
Rice	0.641	-0.46	1.92	0	-0.396	-1.7
Sugarcan	0	-0.23	0	0.81	0	-0.579
Maize	0	-0.207	0	-0.95	0.359	0

Source: Mubarik Ali

Table 2:
Comparison of GDP and Agri. Output



3. Effects of Government Intervention in agriculture:

a. Intersectoral Transfers

As mentioned above, agricultural incomes are not subjected to any direct taxation, but the control of both input and output prices reacting to the agricultural sector has resulted in a combination of subsidies and taxes. The net result is a resource transfer from agriculture. However, the magnitude of this transfer is perhaps the most widely and hotly debated topics from academic journals to the popular media. Proponents of direct taxation of agricultural incomes claim that the sector is already bearing an inordinate share of the tax burden whereas the opponents show estimates to the contrary.

Because of this intense debate, a large number of estimates of resource transfer from agriculture are available. Some of the better known of these estimates are presented in Table 5. The estimates which presumably use the same data are quite disparate, reflecting the degree of disagreement between the protagonists. On the high side are the estimates of Chaudhry and Mann (1991), who are strong opponents of agricultural income tax. Their claim is that the indirect taxation on agriculture is already leading to the sector

Table 5

Transfers from Agriculture.

Year	Chaudhry and Kayani (1991)	Qureshi (1987)	Nasim 3/ (1991)				Ender (1992)	Chaudhry and Mann (1991)		
	Net taxes as % of value added in agriculture	Ratio of total taxes to Agricultural GDP	Net taxes as % of value added in agriculture (a)	Net taxes + exchange rate appreciation effect as % of value added in agriculture (b)	Price and non-price transfers as % of value added in agriculture (c)	Price and non-price transfers + exchange rate appreciation effect as % of value added in agriculture (d)	Total policy transfers as % of value added in agriculture	Total direct and indirect taxes as a % of value added in agriculture	Overall tax rate in Pakistan 1/	Direct taxes as a % of non-agri. GDP 2/
1972-73	4.07	9.48	7.20	6.39	-0.11	-0.93	–		12.37	
1973-74	14.89	8.46	19.61	32.49	10.94	23.79	–		13.47	
1974-75	13.64	9.23	17.85	32.43	6.76	21.37	–		12.8	
1975-76	7.39	7.93	5.68	19.64	-1.16	11.37	–		13.28	
1976-77	5.57	3.31	7.02	18.68	-3.10	6.53	–		13.28	
1977-78	2.22	0.98	4.43	14.64	-3.64	6.57	–		14.05	
1978-79	2.62	4.09	5.23	14.59	-2.55	6.80	–		14.66	
1979-80	4.40	5.44	10.08	21.61	2.94	15.15	–		15.25	3.72
1980-81	7.79	11.19	14.23	27.84	7.11	20.73	–	43.92	15.66	
1981-82	5.75	3.52	5.01	18.73	0.09	10.81	4	39.26	14.96	
1982-83	4.44	4.69	5.77	12.77	-2.84	4.16	13	40.65	14.67	
1983-84	7.63	3.45	7.62	16.32	0.11	8.81	5	45.42	15.69	3.43
1984-85	4.09	–	6.89	13.92	-0.04	7.03	4	36.26	14.87	3.15
1985-86	1.94	–	2.55	8.40	-4.45	1.14	1	35.14	15.27	3.01
1986-87	3.96	–	3.87	9.52	-3.63	2.02	5	45.51	16.11	2.98
1987-88	3.46	–	–	–	–	–	–	43.36	16.32	3.08
1988-89	3.66	–	–	–	–	–	–	41.13	17.46	3.36
1989-90	12.59	–	–	–	–	–	–	46.59	17.38	3.16
1990-91										3.64
Mean	5.46	5.98	8.08	14.89	0.25	6.08	5.33	41.72	14.86	3.25

1/ Chaudhry (1991) Tax revenue as percentage of GDP.

2/ Pakistan Economic Survey.

bearing an excessive burden. Their estimate of the incidence of taxation on agriculture has averaged annually about 42 percent of agricultural value added over the ten years of the study. The principal source of this rather a high estimate of taxation of the sector is the fact that the authors include an estimate of the sector's contribution to indirect taxes -- attributing about 38% of all indirect taxes to agriculture. Though this allows the authors to present data that is convincing, but indirect taxes are not agriculture specific and therefore should not be used as a source of taxation of agriculture. Since indirect taxes constitute the bulk of tax revenues in Pakistan, it is not surprising that including these taxes serves to dramatically increase the estimate of agricultural income.

All the other estimates have a similar figure for estimating the transfer from agriculture except for Nasim (b) and (c).[18] [19] Nasim (a) calculates net taxes on agriculture by evaluating taxes and subsidies arising from price controls. This method results in an average level of taxation on value added in agriculture of about 8 percent annually.

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[18] *See Hamid, Nabi and Nasim (1989).*

[19] *The (a), (b), (c) and (d) refer to columns in table 4.*

In most developing countries, a number of factors have led to trade regimes have discriminated against agriculture. First, trade policy seeks to protect domestic industry in an effort to foster their growth. Second, concerns with food security have also led frequently to restrictions on the movement of food as well as price controls on food items that keep domestic food below international parity prices. Finally, the policy desire to move on to higher value added areas such as agro-processing industries also has led to lower that party price for agriculture. All these factors have led to a pricing, trade and exchange system that implicitly taxes agriculture. While there is general agreement on the direction of the effect of these policies on agriculture and several very good estimates have been obtained, there still remain certain question of how to measure the total impact on agriculture.

Following the methodology of Kreuger, Schiff and Valdes (1988), Nasim estimates the extent of overvaluation of the exchange rate.[20] The exchange rate that is supported by a completely open trading, i.e., where there are no tariffs or export taxes, and a zero or arbitrarily small current account deficit. When viewed from this standpoint Pakistan's exchange rate appears to be quite substantially overvalued. For

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[20] *Dorosh and Valdes (1990)*

example, in 1987, the exchange rate was considered to be overvalued by as much as 19 percent.

According to this approach, the overvaluation of the exchange rate that arises from restrictive trade regimes is a tax on the traded goods. According to the methodology and approach popularized by Kreuger, Schiff and Valdes (1988), since agricultural products are traded goods, the effects of the overvaluation are included in the tax on agriculture. This imputation of the overvaluation of the exchange rate as a tax on agricultural product substantially increases the tax burden of the sector. Apart from indirect taxes, this is the second major factor in the rather large estimate of the transfer from agriculture in Chaudhry and Mann (1991). The inclusion of the exchange rate appreciation in net taxes on agriculture raises the Nasim estimate by 7 percentage points -- from 8 percent of value added in agriculture in (a) to about 15 percent when exchange rate appreciation is added in (b).

Pakistan reformed its exchange regime in 1982 and moved from a fixed exchange rate to a managed float. Most indicators suggest that since then the exchange rate has not been substantially overvalued for any significant length of

time.[21] In addition through much of the eighties, foreign exchange has been freely available in the country in a very liquid and smoothly-functioning open market, at a premium over the official exchange rate that has varied from 5 to 10 percent.[22] In fact for most of the period, the premium has been closer to the lower end of the range. It seems, therefore that the market does not agree with the analysis that suggests that the exchange rate was overvalued during the period. On view of ~~this perhaps~~ this, perhaps the methodology overestimates the resource transfer from agriculture.

The point of many of these estimates is to show that agriculture is being taxed excessively or that agriculture is bearing its share of taxation. The approach is to add in exchange rate overvaluation and then compare it to the average tax rate in Pakistan. If that is the case then we are regarding only agricultural output as a traded good. However, for this calculation to be conducted in a meaningful manner, much of manufacturing output should be regarded as traded.[23] In that case a similar calculation of net taxes needs to be

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[21] *See Haque and Montiel (1991) who show that Pakistan's nominal exchange rate adjusted in line with changes in the equilibrium real exchange rate. When looked at from this standpoint the nominal exchange rate appears to have not been overvalued.*

[22] *See Agenor (1991) and Agenor and Haque (1992).*

[23] *See Haque, Husain and Montiel (1991) for an estimated dependent economy model where manufacturing and agriculture are both regarded as traded goods.*

done for manufacturing add in the exchange rate appreciation for a meaningful comparison.[24]

Whether the equilibrium exchange rate is that exchange rate that is associated with zero tariffs and a zero current account is itself debatable. Most countries, even industrial countries, have some form of tariff protection and export taxes. From this standpoint even industrial country exchange rates then should be regarded as overvalued resulting in a tax on traded goods. For all these reasons therefore, calculations of overvaluation should be used with care as they can be misleading.

Nasim (1991) and Hamid, Nabi and Nasim (1989) also add transfers such as investments in agriculture to transfers from agriculture. As expected this substantially reduces the tax burden on agriculture from 8 percent of value added in agriculture to an annual average of about .25 percent if overvaluation of the exchange rate is not added in and from 15 percent to about 8 percent when the overvaluation of exchange rate is included. The incidence of indirect government transfers is fairly unclear since as is quite likely to happen

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[24] *This point is further substantiated by the fact that cries for devaluation originate mostly from the manufacturing sector. Witness the negotiations of All Pakistan Textile Manufacturers Association (APTMA) with the government where in the most recent round the chairman of APTMa has asked publicly for a evaluation.*

much if this sum could be used in the urban areas on support infrastructure for investment in agriculture.

Excluding the effect of the overvaluation of the exchange rate as well as estimates of the share of agriculture in indirect taxation and indirect government transfers, there is considerable agreement among the studies. When these factors are excluded, the share of taxes agricultural output has varied between 5 and 8 percent annually which is higher than the share of direct taxation from non-agricultural output which has been about 3 percent.

b. **Taxation of agricultural incomes.**

Numerous schemes have been suggested for instituting some form of direct taxation on agriculture. Presumptive land taxes, based on some form of land productivity index such as the produce index unit, are easy to administer and have been recommended. Using survey data such as Household Income and Expenditure Survey, the distribution of rural households and their incomes can be determined. Application of the tax schedule to this distribution of income and households can yield the expected tax revenue from taxing agricultural incomes directly.

Some such estimate of a possible direct tax on agriculture is presented in Table 6. The estimates range from Rs. 2.5 billion, about 1 percent of agricultural output for 1991 to about Rs. 6 billion about 2 percent of agricultural output of 1991. Indeed in view of this rather limited expectation of revenue from this source, the case for the institution of such a tax is not immediately evident especially in view of the costs associated with collecting such a tax.

Perhaps an analysis of the effects of a total reform of the system would shed more light on this important political and emotional issue. The envisaged reform might include a move to market-determined prices on outputs as well as inputs eliminating all budgetary subsidies. Presumably, this would initiate price movements in the direction of border prices and therefore induce a higher supply response. The higher rural outputs would improve farm incomes and hence yield higher tax revenues. Consequently, in the case of such a reform, we would expect much needed fiscal savings, increased agricultural output and higher tax revenues. The design of such a policy might also consider meeting the needs of the poor by means of a targeted subsidy which would cut into some of the fiscal savings that resulted from the renunciation of price controls.

Table 6:

Alternative Estimates of Revenue from a Direct Tax on

Agricultural Incomes.

Study	Estimate For 1991 1/ Billion Rs.	Ratio to agri. output
Nasim (1991)	2.99	1.12
Chaudhry (1986)	2.5	0.93
Ahmed and Stern (1990)	6.02	2.25

1/ Using the assumption of a constant tax rate.

4. Leakages or smuggling?

Research has shown that most developing countries, despite erecting legal barriers to trade and capital movements, are quite open in practice. Haque and Montiel (1990 and 1991) have shown that despite capital controls in many developing countries have been unable to impede the free movement of capital. Incidents of smuggling are also known to bypass government controls in the goods market.[25] Although little empirical evidence is available on the extent of smuggling developing economies, it is generally believed that such economies can be characterized as small open economies. Consequently, for such economies to maintain a price that is different from the rest of the world, and in particular from its neighboring countries, is likely to be difficult and at least quite costly. In the extreme, even stabilizing domestic prices may become difficult between bordering countries unless such efforts are coordinated.

Though little evidence has been collected on the possibility of subsidized agricultural commodities finding their way beyond the boundaries of Pakistan, there is

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[25] See Montiel, Agenor and Haque (1992) for a recent survey as well as some analytical approaches to such issues.

considerable talk of it.[26] Some evidence of possible leakages from the system(smuggling or waste etc) can be got from studying the sources and uses of wheat. Basically, supply for the year (fiscal year, July to June), denotes by S, is equal to the sum of last year's production, Q, which has been harvested in May, the opening stocks, X, and the import during the year, Z:

$$S_t = Q_{t-1} + Z_t + X_t \qquad (1)$$

Where the subscript t denotes time at period t.

During the year, wheat is either consumed or used to build up government-held stocks. There is no reason to believe that private sector and on-farm storage would be motivated by interannual considerations. Both private sector and on-farm stocks would be accumulated at harvest time and depleted by next harvest. Alternatively, it is assumed that no private sector stocks are held from year to year. Consequently, only the government holds stocks for interannual

[26] See the daily newspaper Nation of September 2, 1992, where even the Punjab Chief Minister expressed concern for wheat smuggling.

purposes. The uses of wheat, U, can be summed up to be consumption C and The accumulation of stocks (X_{t+1} - Xt):

$$U_t = C_t + X_{t+1} - X_t \qquad (2)$$

Where the subscript t denotes time at period t.

During the year, the government supplements its stocks by both procuring wheat from the farmers and importing wheat from international markets. Thus stocks at the end of the year that are carried over into the next year have to be equal to the difference between the sum of the stocks carried over from last year, imports and procurement (denoted PROC) during the year, and the releases during the year:

$$X_{t+1} = X_t + PROC_t + Z_t - R_t \qquad (3)$$

Combining (1), (2) and (3), we have

$$LEAK_t = Q_t + Z_t - PROC_t - R_t - C_t \qquad (4)$$

The variable, LEAK is the residual derived from the wheat balance sheet which is what equation (4) is. It measures the extent of leakage from the system. The leakage could occur

for any number of reasons including wastage and smuggling. In case of aero wastage and zero smuggling, the LEAK would be zero as well. Otherwise it would be nonzero with a positive number indicating the presence of wastage and smuggling out of the country and a negative figure indicating smuggling into the country.

In conducting such an analysis, data reliability is a major issue. The advantage of the method that we have just discussed is that it is parsimonious in its use of data. It relies mainly on official figures of imports of wheat which are conducted only by the government and the official procurement or release of wheat-- all of which are fairly reliably available. However, official data collectors and statisticians will readily point out uncertainties that surround even basic data such as agricultural and wheat production leave alone information on marketed surplus and on-farm storage. Furthermore, reliable figures on the consumption of wheat are also not available.

For our purposes the primary areas of concern are therefore the reliability of data on production and consumption. The approach taken here is to take the official figure on production as given and analyses the sensitivity of leakages to various estimates of individual consumption. The results of this analysis are presented in Table 7.

According to the Pakistan Agricultural Statistics 1992, percapita wheat consumption in Pakistan is about 10.5 kilograms per month. At that level of consumption, Table 7 shows that on average about 21 percent of production in each year of the last decade is unaccounted for, or in the realm of leakage from the system. Even if we were to accept the official estimate of 10 percent for waste in terms of say feed, seed etc., we still have about 11 percent that cannot be accounted for.

Since the consumption estimate of the Pakistan Agricultural statistics 1992 is not considered accurate, the sensitivity of the leakage estimate to this figure is also presented in Table 7.[27] If consumption is assumed to be one kilogram less than the official figure, the leakage amounts to an annual average of about 30 percent of production over the last decade. Once again taking away the official figure for wastage of 10 percent there is an average of about 20 percent that is unaccounted for in each of the last 10 years. The last column of the Table 7 illustrates that about percapita monthly

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[27] *Larry Morgan (1989) quotes the rather high figure of 13.4 kgs as the monthly per capita consumption from the National Nutritional Survey (1988). That figure would probably require smuggling into the country. Alternatively, that figure would cast considerable doubt on our production figures. In any event, this serves to further highlight the point of this section that there remains a considerable need to examine the data, the balance sheet issues and the leakage issue seriously in future research.*

Table 7:

WHEAT: Usage and Disappearance.
Alternative consumption estimates.

Year	Production (Harvested in April) (Jul-Jun)	Imports (Jul-Jun)	Procurement	Releases	Leakage with consumption at 10.5 kg per capita per month 1/	Leakage as % of Production	Leakage with consumption 9.5 per capita per month	Leakage as % of Production	Leakage with consumption 11.5 per capita per month	Leakage as % of Production
1982/83	12.41									
1983/84	10.88	0.29	3.82	3.25	1.24	9.99	2.28	18.35	0.20	1.64
1984/85	11.70	0.98	2.28	3.70	2.05	18.86	3.12	28.68	0.98	9.03
1985/86	13.92	1.91	2.53	3.54	3.05	26.02	4.15	35.45	1.94	16.60
1986/87	12.02	0.38	5.04	3.79	1.12	8.03	2.25	16.19	-0.02	-0.14
1987/88	12.68	0.60	3.98	5.20	1.53	12.74	2.70	22.50	0.36	2.99
1988/89	14.42	2.17	3.49	5.72	4.39	34.63	5.60	44.16	3.18	25.10
1989/90	14.32	2.24	4.14	4.95	4.39	30.46	5.64	39.09	3.15	21.82
1990/91	14.57	1.74	4.41	5.61	3.77	26.35	5.06	35.32	2.49	17.38
Mean	13.06	1.29	3.71	4.47	2.69	20.89	3.85	29.97	1.54	11.80

1/ leakage=production+imports-procurement+releases-consumption.
Based on the assumption that private stocks are not held for purposes of interannual storage. Change in government stocks = procurement-releases.

consumption of about 11.5 kilograms would balance out the wheat balance sheet at about the official 10 percent level of wastage.

The analysis serves to illustrate the need to improve our information on production as well as the uses of agricultural commodities. Such balance sheet exercises should be conducted for all agricultural commodities to examine the uses of these commodities or to lay bare the data weaknesses. Further information on areas such as marketed surplus and on-form and private storage would further help in clarifying the situation in agriculture.

The information developed here does point to the incidence of either smuggling or wastage of wheat or both to explain the residual in the balance sheet of wheat. As discussed above, this could be directly related to the price differentials that exist across virtually open, unpoliceable borders. The study of price differentials especially in bordertowns of Pakistan, India, Afghanistan and Iran and the relationships of price movements in these towns would be interesting areas of research to shed further light on the possibilities of unofficial commodity flows.[78]

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[78] Unfortunately, despite efforts, I was unable to get data from India. It would be of obvious interest to get data from towns in India, Afghanistan and Iran that are near to the Pakistan border and compare them to prices

For the proper administration of the subsidy, a certain cost has to be incurred to police the system and ensure that such cheating is punished. In Pakistan where such strong administration is not in place it would not be at all surprising to find that a substantial portion of the subsidy is not reaching the target audience.[10]

In the case of wheat, an intermediate good, and not the final good (i.e. flour and atta) is subsidized . Consequently, the issue of whether as intended the subsidy goes to the population at large or whether it is the flour mill-owner that is being subsidized is also a subject of considerable debate. In a recent paper, Khan and Ryan (1992) have shown that over the last two decades, the release price of wheat has not been a significant determinant of the price of flour. From this they have concluded that the subsidy has not been passed on to the consumer by the millowners[11].

Unfortunately, apart from the Khan and Ryan (1992) work, there are few systematic attempts to study this issue even though the argument frequently continues to be made that the

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[10] *It is not surprising to find that some of the government's efforts at subsidizing the poor could end up subsidizing the rich. Lower tariffs on jeeps and utility vehicles and diesel fuel have made these vehicles the choice of the rich. Cheap credit directed at small farmers and entrepreneurs has on occasion made its way to individuals who did not fit the description.*

[11] *This conjecture has been mentioned in passing in several studies. See for example Hamid et. al. (1989) and Pinckney (1988)*

millowners are the beneficiaries of the subsidy. For this hypothesis to be true, however, the milling sector has to be monopolistically organized or function as a cartel. Surprisingly little work is available to confirm or reject this hypothesis. There remain unanswered questions such as is the milling sector competitive i.e., is production atomistic? Alternatively what are the concentration ratios in the milling sector? Does any group have or individual have the capability of being a price leader in the milling industry? Is there any evidence of collusive behavior or price-fixing in the behavior of the miller's trade organization? For example, do they restrict output in any way or distribute quotas of production?

There are about 500 flour mills with an average size of Rs. 1.7 million in fixed assets in the country as Table 8 shows. It is difficult to imagine that small firms in such large numbers would be able to maintain a collusive pricing and quantity-restricting approach for a reasonable length of time. However, as the table also shows that a typical mill is only working 1.2 shifts per day. Consequently, there appears to be a fair amount of excess capacity in the milling sector. There are a number of reasons why this could be so. For example, credit market imperfections which provides cheap credit and allows over-leveraging and relatively easy, penalty-free default. Again excess capacity may allow greater access to government wheat at the subsidized release price

Table 8: The Flour Milling Industry.

	Number of Mills	Shifts (8 hr) per day (average)	Fixed Assets per firm Million Rs.
Punjab	290		
Sindh	110		
NWFP	70		
Baluchistan	30		
Total	500	1.2	1.71

Source: Maxon (1992) and 1986-87 census of Manufacturing Industries

even thought he government tries from time to time to prevent access to 'ghost' mills. Nevertheless, these remain issues that need to be examined in the context of a study of the milling sector.

Khan and Ryan (1992) using annual data from 1970 to 1991 estimated an equation for the determinants of the price of flour. They were able to test whether the elimination of the rationing system had a positive effect on the price of flour and also whether increases in the release and the wholesale price of wheat had the effect of increasing the price of flour. In only one of their equations did they find that the elimination of rationing increased the price of flour. As for the wholesale and release price of wheat, neither of these variables were significant in determining the price of flour. This led the authors to conclude that the price of flour was independent of market considerations and that the subsidy was merely accruing to the millowners. Surprisingly, they even called for a re-introduction of the rationing system in some form.

The elimination of the rationing system introduced a whole new marketing regime in the wheat and flour market. Consequently, the data prior to 1987 cannot be treated the

same as the data after 1987.[11] Moreover, prior to 1987, the rationing system ensured that the market did not clear whereas after 1987 the wholesale price can be considered to be market determined. For a proper test of the relationship between the wheat release and wholesale prices, Khan and Ryan should have taken this change in market regimes into account. In these circumstances, it cannot be assumed that the same relationship would hold for the two periods as the Khan and Ryan single equation estimations assumes.

It should be recalled that the government only procures about 20 percent of production. The rest is in private storage and released presumably at the wholesale price. Hence, that is the price that is likely to affect the miller's production decisions and not the release price since that price will be considered as inframarginal by him/her. In fact the exact price facing the miller is the weighted average of the two and since the release price remain constant over time the weighted average moves in keeping with the wholesale price. Consequently, we should expect flour pricing and output decisions to be based on the wholesale price of wheat and not the release price.

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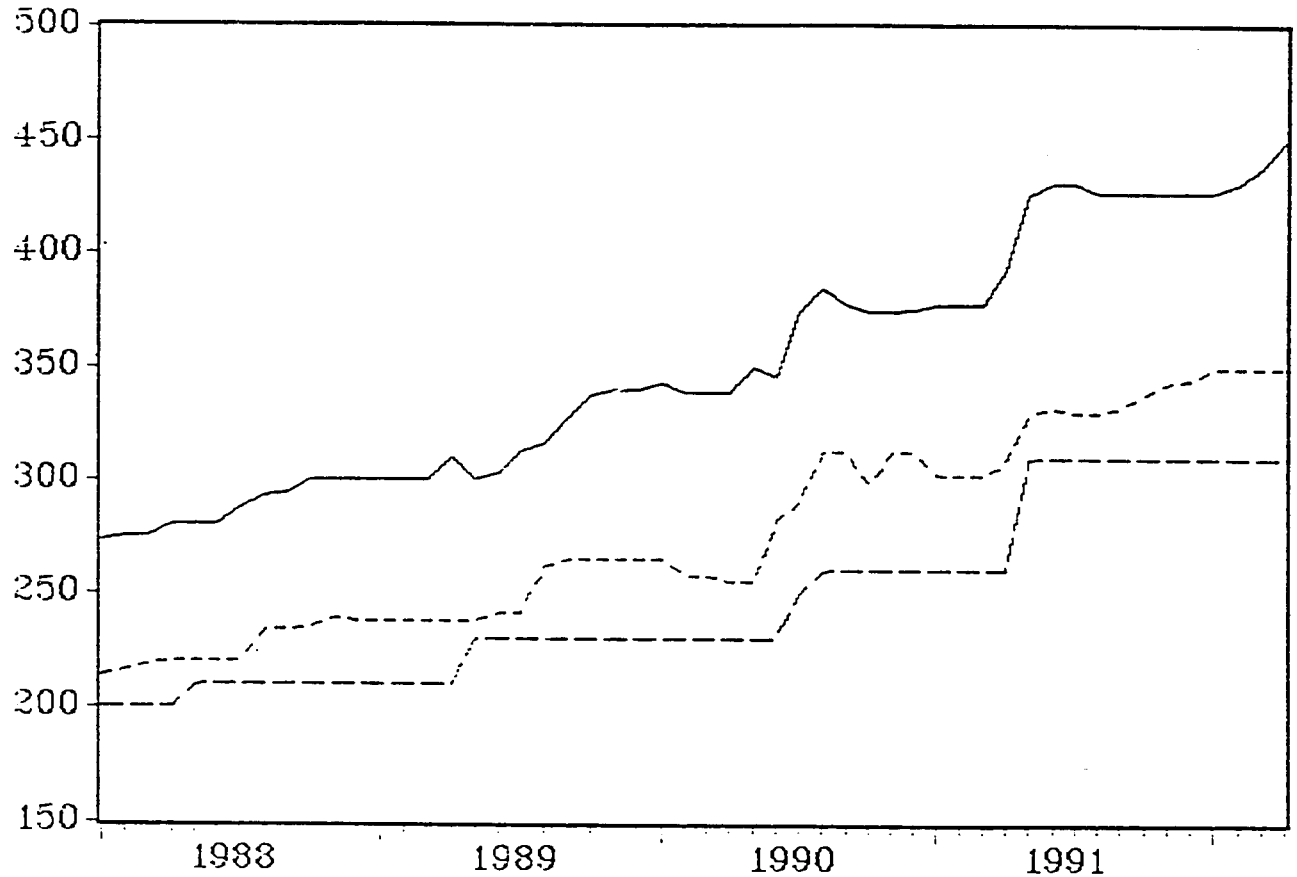
[11] *As discussed below, the question of whether annual data can allow us to pick out enough variation in prices to determine causality is also worth considering.*

Figure 3 shows the wholesale and release prices of wheat as well as the price of flour in 6 major urban markets, Karachi, Peshawar, Hyderabad, Lahore, Rawalpindi, and Faisalabad in the post-rationing period. The pictures clearly show that the release price which is determined by fiat is a step function staying constant till an administrative announcement changes it. The wholesale price for wheat and flour price which are market determined show a fair amount of variation and tend to move fairly closely together. Many of the turning points seem to have occurred very close together. Taking monthly data from January 1988 to April 1992 (i.e., the post-rationing period), I tested for whether changes in wholesale prices of wheat can be said to have caused a change in the price of flour. The test used the Granger causality methodology which relies on a regression with the variable that is being caused as the dependant variable with the past values of the dependant variable and the current and past values of the variable that is said to cause the dependant variable as regressors. If the current or past values of the causing variables are significant in such a regression, then that variable is said to have caused the dependant variable.

The results of these tests are presented in table 9 for 6 major urban markets in Pakistan, Karachi, Hyderabad, Lahore, Faisalabad, Rawalpindi, and Peshawar. The test was conducted

FIGURE 3.1 : WHEAT PRICES IN HYDERABAD



HYDF = FLOUR PRICE
HYD = WHEAT PRICE
RELP = RELEASE PRICE

HYDF ---- HYD ---- RELP

FIGURE 3.2 PRICES IN RAWALPINDI

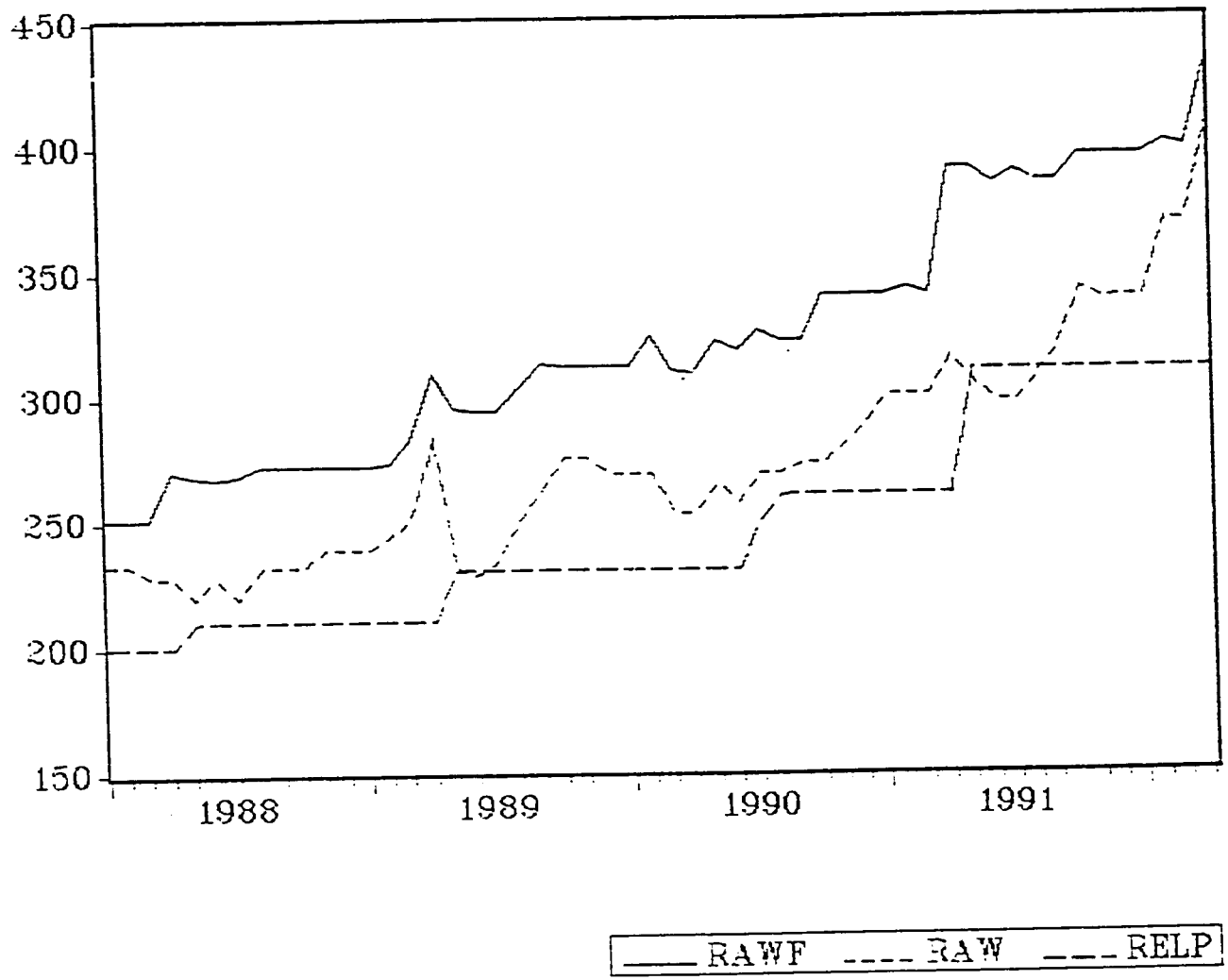


FIGURE 3.2 PRICES IN KARACHI

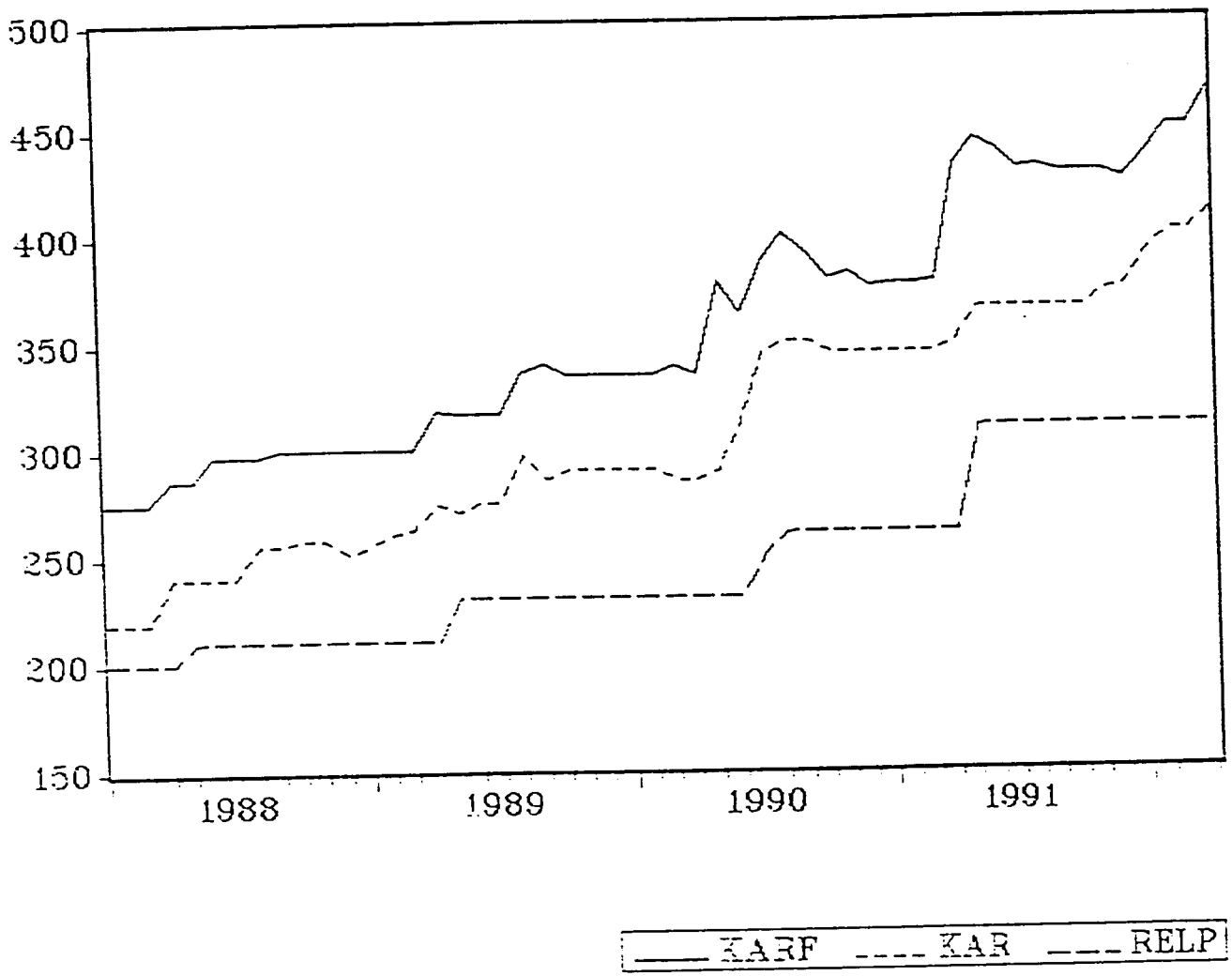


FIGURE 3.4: PRICES IN PESHAWAR

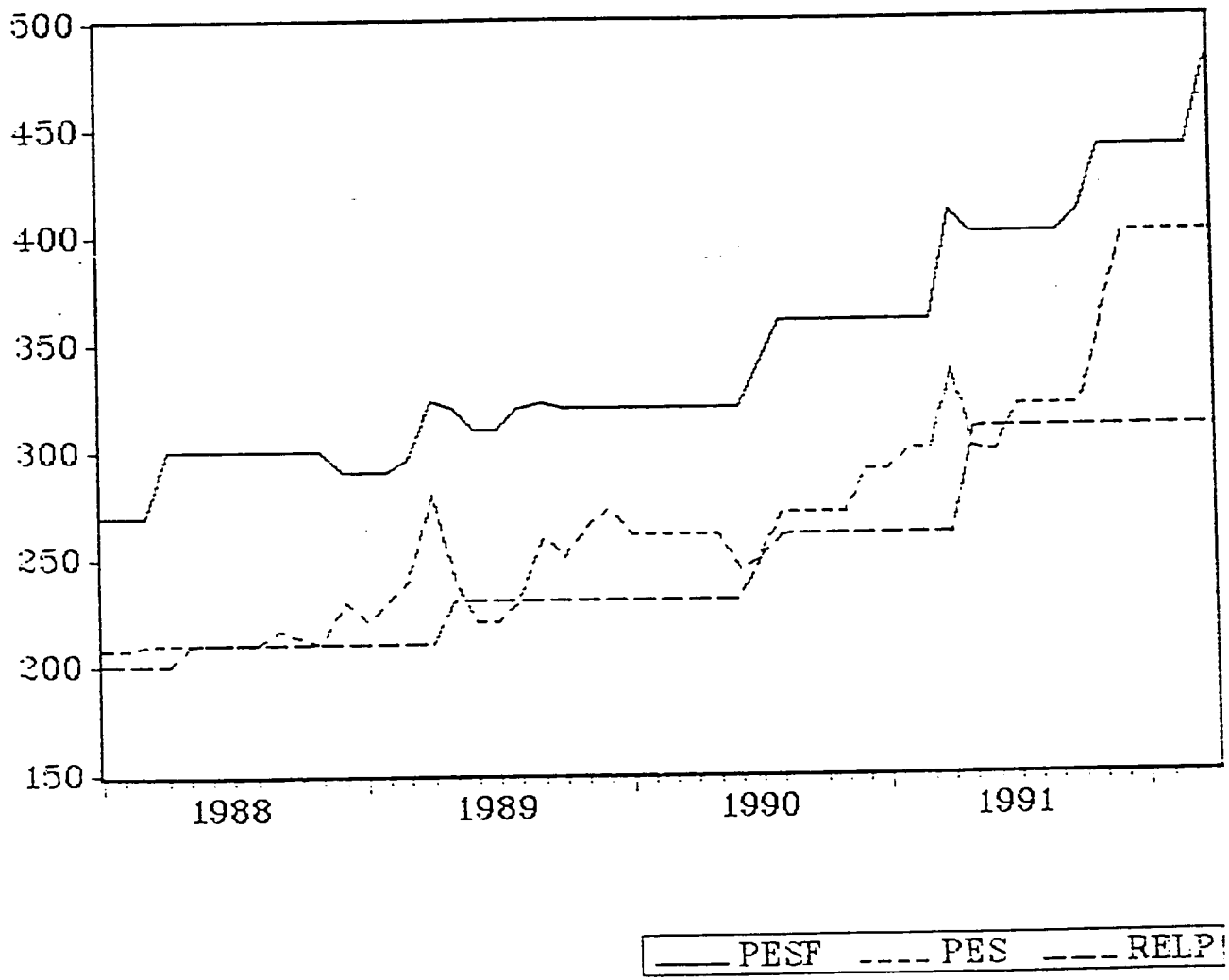


FIGURE 5: PRICES IN FALKLANDS

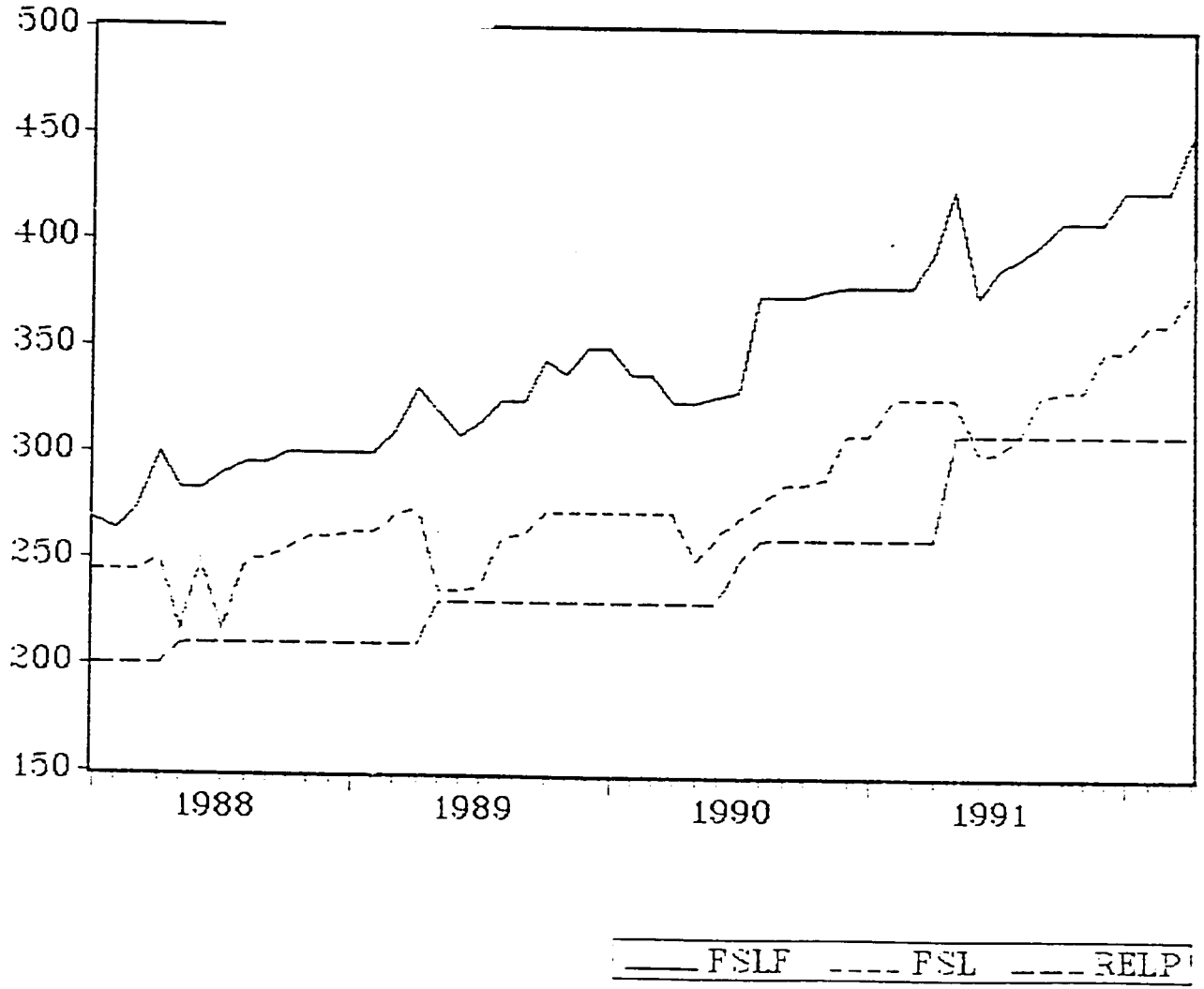


FIGURE 3.6 PRICES IN LAHORE

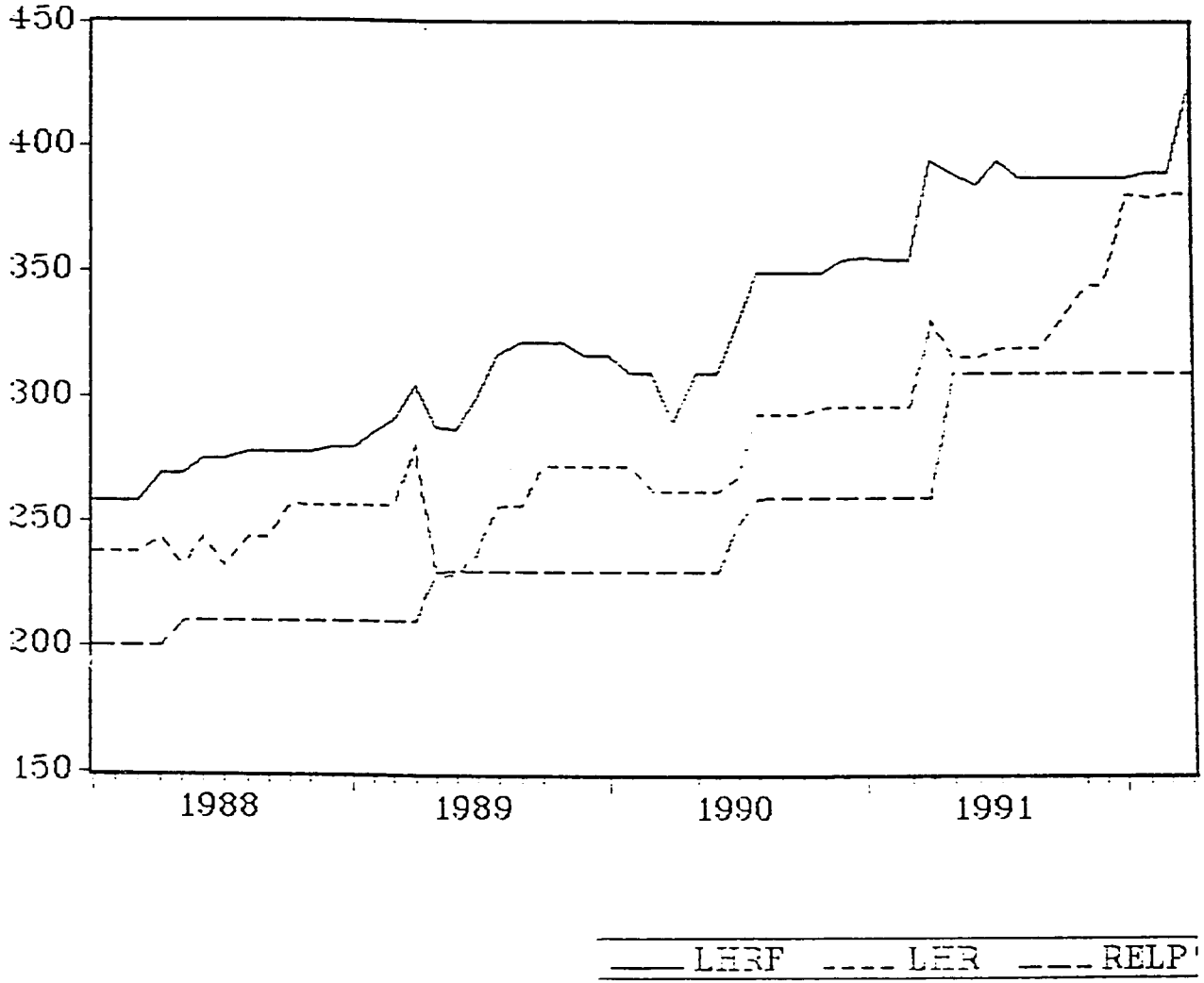


TABLE 9: Causality Tests.

Relationship between Flour and wheat prices.

	Dependant Variable:Flour price in: 2/					
	Faisalabad	Lahore	Karachi	Rawalpindi	Pehaswar	Hyderabad
Lagged dependant Variable	0.7 (7.33)	0.89 (12.86)	0.61 (4.94)	0.79 (10.37)	0.9 (5.5)	0.77 (6.38)
WP 1/	0.5 (4.03)	0.48 (4.72)	0.69 3.7	0.46 (5.25)	0.43 (4059)	0.44 (3.17)
WP(-1)	-0.05 (-0.33)	-0.3 (-2.4)	-0.18 (-0.67)	-0.3 (-2.5)	-0.33 (-2.4)	0.05 (0.27)
WP(-2)	-0.1 (-0.75)	-0.07 (-0.06)	-0.11 (-0.58)	0.11 (1.07)	0.18 (1.52)	-0.2 (-1.5)
Constant	1.45 (0.11)	5.57 (0.6)	15.23 (1.57)	-0.16 (0.02)	19.7 (1.59)	4.1 (0.7)
R-square	0.95	0.97	0.97	0.97	0.97	0.99
Durbin-Watson	2.27	1.8	1.98	1.9	1.9	2.02

1/ Wheat price in the city.

2/ t-statistivs in parantheses.

Monthly data for January 1988 to April 1992.

for the post-rationing period, from January 1988 to April 1992. The results clearly show that wholesale price of wheat can be said to cause changes in the price of flour in the six markets that we have studied. In each of the six markets much of a change in the price of wheat is transmitted to the price of flour in the same month.

As Figure 3 shows the release price over the years has really behaved like a step function. It has changed occasionally and then kept at that level for a while. It cannot, therefore, be expected that such a price pattern would in any way show a relationship with market determined prices like the wholesale price of wheat and the price of flour. The interesting question to study is whether the announcement of a change in release price does affect the price of flour. This can be done in the context of the framework that we just used. First, I created a dummy variable that picked out the months in which the release price was changed. Then this variable was included in the regressions of Table 9. Table 10 presents the results of these estimations. In all cases, the coefficients of the dummy variable is positive in keeping with the hypothesis. As can be seen in 2 cases, Faisalabad and Peshawar, the coefficients of the dummy variable were highly significant (at 5 percent level of significance). In another two cases, Lahore and Hyderabad, the coefficients of the dummy variable were significant at the 10 percent level of

TABLE 10:

Relationship between Flour and Wheat prices.

	Dependant Variable:Flour price in: 2/					
	Faisalabad	Lahore	Karachi	Rawalpindi	Peshawar	Hyderabad
Lagged dependant Variable	0.7 (7.75)	0.87 (12.77)	0.61 (4.86)	0.78 (10.05)	0.72 (7.86)	0.77 (6.53)
WP 1/	0.62 (5.08)	0.53 (5.12)	0.67 (3.48)	0.49 (5.22)	0.48 (5.17)	0.36 (2.51)
WP(-1)	-0.14 (-0.98)	-0.37 (-2.9)	-0.22 (-0.78)	-0.35 (-2.64)	-0.35 (-2.84)	0.07 (0.42)
WP(-2)	-0.11 (-0.88)	-0.02 (-0.17)	-0.04 (-0.16)	0.13 (1.22)	0.16 (1.69)	-0.14 (-1.06)
DUMREL 3/	15.91 (2.96)	7.78 (1.77)	2.99 (0.46)	3.83 (0.90)	11.24 (2.30)	6.23 (1.85)
Constant	-1.5 (0.13)	3.64 (0.41)	15.01 (1.53)	-0.52 (-0.06)	17.67 (1.53)	2.93 (0.49)
R-square	0.96	0.97	0.97	0.98	0.97	0.99
Durbin-Watson	2.4	2.03	2.01	1.98	2.06	1.95

1/ WP – Wheat price in the city.

2/ t-statistics in parantheses.

3/ DUMREL – Dummy for announcement of release price change.

Monthly data for January 1988 to April 1992.

significance. In the remaining cases, Rawalpindi and Hyderabad, the coefficients were insignificant. Thus in roughly two-thirds of the markets that have been studied, the changes in the release price have affected the price of flour independently of the developments in the wholesale price of wheat.

Although this is not meant to be an exhaustive study of the milling industry, we shall attempt to get another indicator of the extent of competition or collusion in the milling industry. Table 11 presents some evidence on millers margins -- the difference between the flour price and the wholesale price of the wheat. Since wheat constitutes about 90 percent of the millers costs, this difference is a fairly accurate measure of the profitability of flour mills. In the event of collusive or monopolistic behavior, this difference should reflect levels of profitability that are higher than the market. Moreover, collusion would serve to protect profits over time, ie, the trend should either remain flat over time or show an upward trend resisting entry that drives profits down. Table 11 presents some results of trend in the percentage difference between the flour and wholesale price of wheat for the six markets that we studied. The results are quite interesting in that we see a fair amount of variations across cities. In Faisalabad, Peshawar, And Hyderabad, the margin appears to be above 20 percent whereas in the remaining

Table 11:

Trends in flour milling margins 1988.01 - 1992.04

Difference in the log of price of flour and the log of the wholesale price of wheat

	Mean	Trend	t.stat
Lahore	14.6	0.04	0.77
Rawalpindi	16.5	0.04	0.8
Faisalabad	20.2	0.08	1.67*
Peshawar	24.6	-0.3	-5.5**
Karachi	15.3	-0.12	-3.8**
Hyderabad	23.7	-0.02	-1.0

* Significant at 10% level of significance.
* Significant at 5% level of significance.

three cities it is about 15 percent closer to the prevailing interest rate on government paper. In three cases, Peshawar, Karachi, and Hyderabad, there appears to be a negative trend. Of these the data for only two markets, Karachi and Peshawar, suggests a strongly negative trend in the sense that the coefficient is significant. Only Faisalabad shows the surprising case of he presence of a higher than average mean and a positive trend which is significant at the 10 percent level. In the case of Lahore and Rawalpindi the coefficient of the trend variable is insignificant.

Whether the milling industry is organized collusively or monopolistically remains inconclusive given the evidence that has been presented here. Certainly, millers are reacting to announcements of price changes as well as adjusting to changes int eh market-determined wholesale price of wheat. However, the presence of excess capacity as well as the relatively high profit margins, which in some cases appear to have resisted a decline over time, suggest that a closer look at the industry is needed.

Whether the milling industry is competitively organized or not, the possibility of the misuse of the subsidy should in any case be studied more carefully. Indeed the surprise would be to discover no misuse of government's subsidy efforts. Several examples are visible where efforts at subsidizing the

poor end up subsidizing the rich or creating substantial rent-seeking opportunities.[11] Perhaps research efforts ought to be directed at discovering where are the rents in the system, in procurement, storage, milling or the middlemen?

Storage.

For historical reasons and reasons od food security, the government of Pakistan has maintained a policy of stabilizing supplies and prices of key commodities to ensure continuity of essentials at stable prices. This has meant intervention in the market, most often through procurement and releases of staples. The staple food in Pakistan is 'atta' or whole wheat flour. Hence the government has maintained stocks of wheat and has developed considerable storage capacity for pursuing this policy. The government has pursued a policy of purchasing about 20% of the wheat production every year for storage and over the course of the year importing another 10 % of production.

In an IFPRI study of wheat storage in Pakistan the issue was treated exhaustively and made several important policy

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[11] *The latest being the self-employment scheme of the government to allow the unemployed youth to buy taxis at subsidized prices and with the help of cheap credit. Numerous newspaper reports have appeared recently citing evidence of the use of such vehicles for private transportation.*

recommendations.[11] There are basically three reasons for the government to hold stocks of wheat:

a) *interannual supply stabilization stocks* to move wheat from surplus to deficit years;

b) *seasonal stocks* to move wheat from surplus to deficit seasons; and

c) *import buffer stocks* to ensure a smooth flow of supplies at all times, especially when imports are on order but not yet available domestically.

Of these, the first-- the interannual supply stabilization --has been cited most frequently as the primary purpose of government stockholding. Although Pakistan is self sufficient in wheat at prevailing prices, uncertainties associated with agricultural production can lead to exportable surpluses in some years and deficits in others. Given the differences between export and import parity prices, a feasible policy option is to purchase and store a portion of the exportable surplus for release in a following deficit year.

Despite this oft-cited rationale, empirical evidence shows that wheat production in Pakistan is less volatile than

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[11] *See Pinckney (1989).*

many other countries. Hazell (1988) has shown that the coefficient of variation of production of cereals in Pakistan is the second smallest of the 34 countries that were included in his study.[35] However, in spite of this relatively low level of instability of wheat production, modelling approaches have shown that price variability may be fairly high in the absence of government intervention in the market-- as much as 50% of the lowest price in a 6 year period.

Pinckney develops an optimising model for a government objective function consisting of competing goals of low fiscal expenditure as well as low price and consumption variability. Simulations of this model lead to the important conclusion that "efficient policies do not hold interannual stocks unless the world price for wheat falls below US$ 80 per metric ton". In view of this, the recommendation was for the government to add no more storage capacity to accommodate interannual supply stabilization.

Since the government has always taken a lead role in fixing prices and procu g and storing agricultural commodities and since information on these activities of he

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[35] *Pinckney (1989) showed that the coefficient of variation of wheat production had been increasing over much of the last two decades. However, he was able to isolate the cause of this increasing trend to have been the blight attack in 1978 in the rice wheat area of the Punjab.*

government are readily available, much of the work relates to an analysis of these activities. Relatively little is known of private and on-farm storage which presumably are handling the 'non-procured' output. There are, at the moment, no such estimates available on either of these variables. Neither has there been any study of the price responsiveness of private and on-farm storage. Better information on these could enable us to determine the degree of substitutability between public and private storage.

Storage by the government also represents a cost of the current pricing policy that the taxpayer must bear. the obvious questions that need to be faced are those relating to the efficiency of public storage. Perhaps public storage should also be scrutinised to see if it is cost effective. For example, is public storage in Pakistan more expensive than storage in other countries? Would private storage be more cost-effective?

A partial picture of the efficiency of public storage is presented in Table 12. Storage and handling costs PASSCO, the food departments of Sindh and Punjab and those for imported wheat are presented along with the average storage and handling costs in the US. The results show that public storage is on average about 30 percent more expensive than the storage and handling costs of the US. If the hypothesis that

Table 12

A Comparison of Storage and Handling Costs.

	1988-89	1989-90	1990-91 1/	1991-92 1/
PAKISTAN:				
Imported	408.41	449.83	495.45	545.70
PASSCO	563.29	613.96	621.34	621.34
Food Deptts.				
Punjab	455.94	501.53	551.69	606.86
Sindh	366.7	403.37	443.71	488.08
US Averages	--	--	430.61	431.61

Source: USAID and Dr. Maxon at STDT.

1/ Pakistan figures, except for PASSCO, estimated using the previous year figure and teh average rate of inflation in storage costs over 1988-89/1989-90.

private sector storage would be at least as efficient as that available internationally, then substituting private sector storage over public sector storage would represent a 30 percent saving. In that sense, this figure represents an estimate of the dead weight loss to the country from the maintenance of the current system.

This is an important issue well worth more detailed and careful study. The estimates presented here are crude and only indicative. A more careful examination of storage technologies and their costs along with an evaluation of the existing government technologies and their costs, is required for a better determination of the efficiency of public sector storage. A more rational pricing and storage policy could be developed if such information were on the efficiency of public sector storage and on the behavior of the private sector, were available.

Conclusion.

This paper has attempted to review several important issues relating to pricing policy in agriculture. As such, it has served to open several issues that might be studied in the context of understanding agriculture and agricultural pricing. Considerable useful work has been done especially to show that agriculture has been, and continues to be implicitly taxed.

The magnitude of such taxation has been calculated and shown to be about 5 percent of agricultural incomes. In the current system of agricultural pricing, the potential revenues that can be derived from agriculture, if direct taxation of agricultural incomes is adopted, has also been calculated. However, there is a need to understand the implications of a complete reform of agriculture including the freeing up of prices and direct taxation of agricultural incomes, for output, tax revenue and realizable fiscal savings.

Though little evidence has been collected on the possibility of subsidized agricultural commodities finding their way beyond the boundaries of Pakistan, there is considerable talk of it. Research has shown that most developing countries, despite erecting legal barriers to trade and capital movements, are quite open in practice.[16] Although little empirical evidence is available on the extent of smuggling developing economies, it is generally believed that such economies can be characterized as small open economies. Consequently, for such economies to maintain a price that is different from the rest of the world, and in particular from its neighboring countries, is likely to be difficult and at least quite costly. In the extreme, even stabilizing domestic

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[16] *Haque and Montiel (1990 and 1991) have shown that despite capital controls in many developing countries have been unable to impede the free movement of capital.*

prices may become difficult between bordering countries unless such efforts are coordinated.

Some evidence of possible leakages from the system(smuggling or waste etc) has been derived from studying wheat balance sheets ie., the balance between the sources and uses of wheat. Despite several data difficulties, there is evidence of leakages at about the level of 10 percent of production. This points to the need to study more carefully the issue of leakages. At the same time such an analysis underscores the need for sharpening our data on agricultural output, consumption, marketed surplus, private and on farm storage. The study of price differentials especially in bordertowns of Pakistan, India, Afghanistan and Iran and the relationships of price movements in these towns would be interesting areas of research to shed further light on the possibilities of unofficial commodity flows.

Whether the wheat subsidy reaches the consumer or is consumed by the flour millers has been examined in this paper. Some evidence has been presented to show the difficulties of collusive behavior in the milling sector, yet some questions remain. It has been shown that the price of flour is fairly responsive to changes in the wholesale price of wheat as well as the release price of wheat. Moreover, a study of the miller's margins in six major markets show declining or flat

trends. However, the prevalence of excess capacity in the mill sector suggests that there is a need to develop a more detailed study of the mill sector.

A study of the efficiency of government storage has been presented. The numbers presented here suggest the government may be incurring costs that are higher than those prevailing internationally. Clearly, this points to the need for a deeper understanding of the issue of efficient storage by means of a study that examines storage technology including factor substitutions and alternative forms of ownership to arrive at the best alternative for the country. At the very least much needed fiscal savings could be realized.

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