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IN-KIND TRANSFERS AND HOUSEHOLD FOOD CONSUMPTION:

IMPLICATIONS FOR TARGETED FOOD PROGRAMS IN BANGLADESH

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS i

LIST OF TABLES AND FIGURES iii

EXECUTIVE SUMMARY iv

1. INTRODUCTION 1

2. FOODGRAIN DISTRIBUTION PROGRAMS IN BANGLADESH 3

3. UTILIZATION OF CASH TRANSFERS AND TRANSFERS-IN-KIND: SURVEY EVIDENCE 6

4. IMPACT OF TRANSFERS ON FOOD CONSUMPTION: REGRESSION ANALYSIS 18

ESTIMATING WHEAT CONSUMPTION: REGRESSION RESULTS 19

ESTIMATED MARGINAL PROPENSITIES TO CONSUME WHEAT AND ELASTICITIES 21

ESTIMATED MARGINAL PROPENSITIES TO CONSUME CALORIES 23

5. IMPLICATIONS OF TRANSFER PROGRAMS FOR WHEAT MARKETS 25

6. CONCLUSIONS 30

REFERENCES 32

APPENDIX — SUMMARY STATISTICS OF VARIABLES USED IN THE REGRESSION MODELS 34

LIST OF TABLES AND FIGURES

Table 2.1 — Foodgrain Distribution by Channels, Budget and Actual 1998/99 (Thousand MTs) 4

Table 3.1 — Characteristics of Households Receiving Transfers 7

Table 3.2 — Value of Transfers of Rice, Cash and Wheat by Type, Round and Period for Receiving Households 8

Table 3.3 — Percentages of Households Receiving Transfers by Type and Quintiles 9

Table 3.4a — Households Consuming Food Commodities, Average Food Budget Share and Calorie Shares by Receiving Households 11

Table 3.4b — Households Consuming Food Commodities, Average Food Budget Share and Calorie Shares by Receiving Households 12

Figure 3.1 — Household Participation in Wheat Transfer Program and Wheat Consumption April/May '99 13

Table 3.5a — Utilization of Transfers of Wheat and Rice 15

Table 3.5b — Utilization of Transfers of Wheat and Rice 16

Table 4.1 — Impacts of Wheat Transfers and Cash Income on Wheat Consumption 20

Table 4.2 — Marginal Propensity to Consume Wheat out of Wheat Transfers and Total Income, by Income Level and Size of Transfer 22

Table 4.3 — Impacts of Wheat Transfers and Cash Income on Calorie Consumption 24

Table 5.1 — Effect of Wheat Transfer Programs on Demand and Market Price: 1998-99 26

Figure 5.1 — Wheat Prices and Quantity of Private Wheat Imports in Bangladesh, 1993-2000 27

Table A.1 — Summary Statistics of Variables Used in the Regression Models 34

EXECUTIVE SUMMARY

This paper examines the impact of wheat transfers and cash incomes on wheat consumption, total calories consumed, and wheat markets. Econometric estimates using data from a recent survey of households in rural Bangladesh indicate that the total marginal propensity to consume (MPC) wheat out of small wheat transfers to poor households is approximately 0.25, while MPC's for wheat out of cash income are near zero. This increase in demand reduces the potential price effect of the three major targeted programs by about six percent. Likewise, the total MPC calories out of wheat transfers is approximately twice as large as that from cash income.

1. INTRODUCTION

In the ongoing debate on the merits of food and cash transfers, one key factor is the extent to which food transfers have a greater positive impact on food consumption than do cash transfers of an equal monetary value.[1] In other words, to what extent is the marginal propensity to consume food greater for transfers in-kind than for cash transfers? The magnitude of this effect is important because food transfer programs incur high costs in handling and transportation, thus making them less efficient in terms of the cost incurred per unit value of food or cash delivered to the target household.[2] Moreover, if food transfers do not lead to significant increases in consumption, then market prices of food are more likely to be depressed by the increase in supply, to the detriment of local producers.

Traditional neo-classical theory suggests that the size of the transfer matters in determining its effect on consumption. If the transfer-in-kind is less than the amount of the food the household would normally purchase, then the transfer-in-kind simply replaces cash purchases and thus has the same effect as an income transfer.[3] If there are significant transaction costs of re-selling food, however, a large transfer-in-kind might result in more food consumed than a cash transfer of equal value.

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[1] Numerous econometric analyses of household consumption data (e.g. Devaney and Fraker, 1989; Senauer and Young, 1986), as well as experimental evidence (Fraker, Martini and Ohls, 1995), have demonstrated empirically that the marginal propensity to consume food out of in-kind transfers (in the form of commodities or food stamps) is higher than the marginal propensity to consume out of cash income.

[2] The efficiency of cash transfers may not be greater than the efficiency of food transfers if leakages from cash transfers are significantly larger than leakages from food transfers. Leakages from Food For Work programs in Bangladesh are estimated at about 30 percent (Hossain and Akash, 1993; Working Group on Targeted Food Interventions (WGTFI), 1994; del Ninno, 2000).

[3] A transfer-in-kind that is less than the size of consumption without the transfer is termed an infra-marginal transfer. See Southworth (1945) and Senauer and Young (1986).

The modern theory of the household suggests that who receives or controls the transfer is also important. Transfers-in-kind received by female members of the household might result in higher levels of household food consumption than do cash transfers, particularly if cash transfers are controlled by male members of the household (See Haddad, Hoddinot and Alderman, 1997).

In this paper we use data from a 1998-99 survey of rural households in Bangladesh to econometrically estimate marginal propensities to consume (MPC's) out of wheat transfers in several distribution programs. The resulting MPC's are then used to calculate the potential impacts of these programs on household wheat consumption and wheat market prices in Bangladesh.[4]

Section Two provides a brief description of various in-kind distribution programs in Bangladesh. Section Three contains a description of the survey design, and data on household characteristics, types and quantities of transfers received, and consumption and sales out of transfers. Empirical econometric estimates of the marginal propensity to consume wheat out of transfers-in-kind are presented in section four. Section Five examines the implications of the results for wheat demand and market prices in Bangladesh. Policy implications and conclusions are found in Section Six.

[4] Earlier analysis by Dorosh and Haggblade (1995) used an assumed MPC for wheat transfers based on data on wheat consumption by Food For Work participants; this paper extends that analysis by using econometrically estimated measures of marginal propensities to consumer that vary by program.

2. FOODGRAIN DISTRIBUTION PROGRAMS IN BANGLADESH

Table 2.1 shows distribution of foodgrain through the Public Foodgrain Distribution System (PFDS) in 1998/99, a year marked by widespread floods from July through September 1999. For the fiscal year as a whole, 2.13 million MTs of foodgrain were distributed, 0.53 million MTs of rice and 1.60 million MTs of wheat. 88 percent of the foodgrain was distributed through programs targeted to poor households or those in need of emergency relief. The remaining 255 thousand MTs was sold at subsidized prices to select groups, including the military, or to the poor through Open Market Sales and Fair Price Shops.

Substantial food aid inflows in response to the flood situation enabled a large increase in public distribution of wheat from an originally planned 905 thousand MTs to an eventual 1.603 million MTs for the entire July 1998 through June 1999 fiscal year. Food For Work (FFW) was the largest distribution channel, though this program operates mainly from January through May when drier soil conditions permit heavy earthwork. Case studies from five FFW sites in 1998 found that in three of the sites workers were paid in cash, not foodgrain, however, (Del Ninno, 2000). Similarly, a survey done to collect data on work norms for FFW (World Food Programme, 1997) found that 50 percent of the workers received payments in cash instead of in-kind. The second largest program, Food For Education (FFE), in principle operates nearly year round, though almost no distribution took place from July through December 1998, as FFE was postponed until December 1998, in order to conserve foodgrain stocks for distribution to flood-affected households.

The major two channels for government food relief efforts following the flood were Gratuitous Relief (GR), designed to provide emergency relief to disaster victims, and Vulnerable Group Feeding (VGF), aimed at assisting households over a longer period

Table 2.1 — Foodgrain Distribution by Channels, Budget and Actual 1998/99 (Thousand MTs)

	Budget 1998/99			Actual 1998/99		
	Rice	Wheat	Total	Rice	Wheat	Total
Priced Channels						
Essential Priorities (EP)	124	85	209	127	85	212
Open Market Sales (OMS)	200	0	200	2	0	2
Fair Price Campaign (FPC)	0	0	0	9	5	14
Other Priority (OP)	6	6	12	7	5	12
Large Employee Industries (LEI)	0	15	15	0	14	14
Non-Priced Channels						
Food For Work (FFW)	125	400	525	8	690	698
Vulnerable Group Development (VGD)	60	120	180	11	193	204
Food for Education (FFE)	150	200	350	60	227	287
Test Relief (TR)	40	16	56	37	53	90
Vulnerable Group Feeding (VGF)	20	10	30	167	297	464
Gratuitous Relief (GR)	66	24	90	66	8	74
Others	22	29	51	37	24	61
Total	813	905	1718	530	1603	2133

Source: FPMU, Ministry of Food

(ultimately, from September 1998 through April 1999). Immediate short-term relief through GR was targeted by location. In contrast, the VGF program included all areas of the country (both flooded and non-flood affected areas), and was administratively targeted to poor households through selection by local committees (Del Ninno, Dorosh, Smith and Roy, forthcoming). The size of these programs was limited, however, both by available wheat stocks (up through early November when government commercial imports and food aid arrivals added to government stocks) and the financial cost of the programs (covered to a large extent by food aid).[5]

In the initial budget for 1998/99, VGF was only a small program, but it was

[5] See del Ninno, Dorosh, Smith and Roy (forthcoming) for further details on Government of Bangladesh foodgrain distribution in 1998/99.

rapidly expanded in August 1998 with an initial distribution of 1.3 million cards entitling the holder to 8 kgs of rice per month. During August and September, a total of 28,500 MTs of rice were distributed through this program. At 8 kgs/card, an estimated 1.35 and 2.13 million households received VGF rations in August and September, respectively. Almost no wheat was distributed through relief channels in the initial months of the flood. At the urging of the World Food Programme (WFP), the Government of Bangladesh expanded the VGF program to 4 million cards with an allotment of 16 kgs of grain/card, half rice and half wheat in October, and all wheat thereafter.

3. UTILIZATION OF CASH TRANSFERS AND TRANSFERS-IN-KIND: SURVEY EVIDENCE

The data on household characteristics, expenditures and transfers is taken from a multi-round survey of 757 households in seven flood-affected thanas.[6] The first round was conducted from 28 November to 23 December 1998, shortly after the massive floods that inundated much of Bangladesh from July through September 1998. The second round was conducted from 26 April to 22 May 1999.

51.0 and 39.2 percent of the households in the survey received some type of transfer in the first period and second periods, respectively (Table 3.1). In both periods, households receiving transfers were on average poorer than households not receiving transfers, as measured by per capita expenditures. Calorie consumption of households receiving transfers was 177 calories/person/day less than that of non-receiving households in the post-flood period. In the second period, calorie consumption of transfer recipients was actually 136 calories/person/day higher than that of non-receiving households.

In the immediate post-flood period (round 1), average rice transfers were twice the value of wheat transfers (280 Taka/household versus 165 Taka/household) and covered a larger number of households (333 and 205, respectively), (Table 3.2). Gratuitous Relief (47.9 percent) and Vulnerable Group Feeding (43.0 percent) accounted for 90.9 percent of the transfers recorded in the survey. VGF distribution to sample households generally

[6] The seven flood affected thanas, representing all six division of the country, were selected according to three criteria: the severity of flood as determined by the Water Board, the percentage of poor people in the district in which the thana is located, and the inclusion in other studies. Households were randomly selected using multiple stages probability sampling technique (with the exception of one thana). First, three Unions per thana were randomly selected, then six villages were randomly selected from each union with PPS, then two clusters (paras) were randomly selected per village. Finally, three households were randomly selected in each cluster. As a result, we selected approximately six households per village, 36 per Union, 108 per thana for a final sample size of 757 households in 126 villages (see Del Ninno, Dorosh, Smith and Roy (forthcoming) for a more detailed description of the sampling frame).

Table 3.1 — Characteristics of Households Receiving Transfers

Round 1 (June to November 1998)

	Receiving		Non receiving		All
	Number	Average	Number	Average	Average
Cash (Taka / Household)	125	118	632	-	19
Wheat (Taka / Household)	205	165	552	-	45
Rice (Taka / Household)	333	280	424	-	123
All (Taka / Household)	386	367	371	-	187
Household Size		5.15		5.49	5.32
Per Capita Monthly Expenditure (Taka)		688		830	757
Per Capita Daily Calorie Consumption		2,088		2,265	2,174
Number of Households		386		371	757

Round 2 (January to April 1999)

	Receiving		Non receiving		All
	Number	Average	Number	Average	Average
Cash (Taka / Household)	50	362	697		24
Wheat (Taka / Household)	266	522	481		186
Rice (Taka / Household)	191	214	556		55
All (Taka / Household)	293	674	454		264
Household Size	293	5.34		5.40	5.38
Per Capita Monthly Expenditure (Taka)	293	593		714	667
Per Capita Daily Calorie Consumption	293	2,286		2,422	2,369
Number of Households		293		454	747

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.

included both rice and wheat; GR was mainly rice, though some of the households receiving GR received some wheat and cash. In contrast, in round 2, the value of wheat distribution to sample households, mainly through VGF and Food For Education (FFE), was greater than the value of rice distribution. In the sample, nearly all VGF participants received both rice and wheat transfers, though the wheat transfers were on average nearly twice the value of the rice transfers. 66 households, 8.9 percent of the total sample, received Food For Education transfers, almost exclusively in the form of wheat.

In both rounds, the average value of transfers received was greater for poor households than for non-poor households. For example, in the first round 64.5 percent of households in the lowest expenditure quintile (the poorest 20 percent of the households)

Table 3.2 — Value of Transfers of Rice, Cash and Wheat by Type, Round and Period for Receiving Households

Round 1 (June to November 1998)

Program	Wheat		Rice		Cash		All	
	Number	Value (Tk)	Number	Value (Tk)	Number	Value (Tk)	Number	Value (Tk)
FFE	1	476	0	-	0	-	1	476
Stipends	0	-	1	171	22	297	23	291
GR	34	89	152	166	41	45	185	163
TR	6	66	45	268	7	38	46	277
VGF	158	120	163	198	0	-	166	308
VGD	19	583	7	225	00	-	20	633
CARE	0	-	66	304	52	26	67	320
Other NG Assist.	1	21	16	106	132	472	20	322
Other GO Assist.	0	-	0	-	0	-	0	-
Total	205	165	333	280	125	118	386	367

Round 2 (January to April 1999)

Program	Wheat		Rice		Cash		All (Jan-May)		All (Jan-Apr)		All (Apr-May)	
	Number	Value (Tk)	Number	Value (Tk)	Number	Value (Tk)	Number	Value (Tk)	Number	Value (Tk)	Number	Value (Tk)
FFE	63	368	1	381	4	73	66	362	65	344	6	255
Stipends	0	-	1	135	21	111	21	101	15	29	8	211
GR	5	277	4	102	8	111	15	179	13	165	2	270
TR	1	2573	2	755	1	150	3	1411	3	1353	1	173
VGF	181	383	181	199	8	46	182	581	182	459	129	172
VGD	20	642	2	163	1	300	20	674	19	554	13	226
FFW	17	1732	1	2110	3	840	18	1893	14	2200	7	467
Other NG Assist.	1	88	1	200		-	1	107	1	107	0	-
Other GO Assist.	0	-	0	-	6	1878	6	1878	6	1221	3	1315
Total	266	522	191	214	50	362	293	674	285	566	163	223

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.

Table 3.3 — Percentages of Households Receiving Transfers by Type and Quintiles

Round 1 (June to November 1998)

Program	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5		Total	
	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount
FFE	0	-	0	-	0	-	0.7	476	0	-	0.1	476
Stipends	1.3	165	2.0	127	2.6	328	3.3	232	5.9	391	3.0	291
GR	28.9	152	26.5	174	30.5	157	20.5	155	15.8	187	24.4	163
TR	5.3	171	6.6	168	6.6	468	7.3	299	4.6	246	6.1	277
VGF	34.9	323	27.2	298	21.9	325	16.6	303	9.2	255	21.9	308
VGD	5.9	757	2.0	516	2.6	468	1.3	1,049	1.3	164	2.6	633
CARE	7.2	315	13.2	315	7.3	321	6.6	331	9.9	323	8.9	320
Other NG Assist.	3.3	182	4.0	216	2.6	231	2.6	77	0.7	3,000	2.6	322
Total	64.5	374	53.0	379	54.3	369	46.4	329	36.8	383	51.0	367
Number of Hh	152		151		151		151		152		747	

Round 2 (January to April 1999)

Program	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5		Total	
	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount
FFE	9.2	378	10.6	340	13.9	339	6.0	396	3.9	407	8.8	362
Stipends	0.7	15	2.0	250	0.7	18	3.3	66	7.2	91	2.8	101
GR	2.0	421	1.3	168	2.6	79	2.6	147	1.3	88	2.0	179
TR	0.7	444	0.7	150	0.7	3,639	0	-	0	-	0.4	1,411
VGF	33.6	637	27.2	508	25.8	548	19.2	640	14.5	567	24.4	581
VGD	6.6	785	2.6	538	2.0	504	2.0	651	-		2.7	674
FFW	3.9	1,671	2.6	1,949	1.3	4,686	1.3	262	2.6	1,587	2.4	1,893
Other NG Assist.	52.6	-	0.7	107	0	-	0	-	0	-	0.1	107
Other GO Assist.	0	-	0.7	2,500	0.7	1,235	2.0	2,365	0.7	440	0.8	1,878
Total	52.6	717	42.4	626	41.7	708	31.1	694	25.7	587	39.2	674
Number of Hh	152		151		151		151		152		747	

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.

received transfers, while only 36.8 percent of the households in the top quintile received transfers (Table 3.3). The average size of the transfers was approximately the same, though. VGF transfers were well-targeted to poorer households; 34.9 percent of the households in the lowest expenditure quintile received VGF in the first round, compared with 9.2 percent in the top expenditure quintile. The percentage of households receiving GR in round 1 was more evenly distributed across expenditure quintiles, though Del Ninno and Dorosh (2001) have shown that degree of exposure to the flood was a major determinant of participation in GR. Food For Education appears to have been well-targeted to the bottom 60 percent of the expenditure distribution in round 2, though the share of households participating in the first quintile (9.2 percent) is less than the share in the third quintile (13.9 percent).

As shown in Table 3.4, the percentage of households consuming wheat, the average amount of wheat consumption per capita per day, and the share of calories from wheat were all significantly larger in April/May 1999 than in November/December 1998, for households receiving transfers, as well as for households that did not receive transfers. Average per capita wheat consumption of households receiving transfers rose dramatically, in part because of the larger number of households receiving wheat transfers in round 2. The percentage of households consuming wheat among those receiving rice, wheat or cash transfers rose from 66.3 to 80.2 percent; the average amount of per capita daily quantity of wheat consumed rose from 60.2 to 84.1 grams/day/capita; and the share of calories deriving from wheat rose from 10.2 to 13.0 percent. Wheat consumption among non-receiving households rose as well, most likely due to do greater wheat availability and lower wheat prices after the wheat harvest in March and April 1999. Comparing round 2 with round 1, 49.3 percent of households not receiving wheat transfers consumed wheat in round 1, compared with 64.0 percent in round 2, with average per capita daily quantity consumed increasing from 41.3 to 52.5 grams/day/ capita and the share of calories increasing from 6.7 percent to 7.0 percent. By comparison with wheat, rice consumption was much more stable across the two rounds of

Table 3.4a — Households Consuming Food Commodities, Average Food Budget Share and Calorie Shares by Receiving Households

Round 1 (June to November 1998)

Food Group	Receiving Transfer				Not Receiving Transfer				All			
	Consuming Hhs (%)	Average Amount (gm/pc/day)	Budget Share (%)	Calorie Share (%)	Consuming Hhs (%)	Average Amount (gm/pc/day)	Budget Share (%)	Calorie Share (%)	Consuming Hhs (%)	Average Amount (gm/pc/day)	Budget Share (%)	Calorie Share (%)
Rice	100.00	397.32	46.14	65.90	100.00	442.64	44.07	67.34	100.00	419.53	45.13	66.60
Wheat	66.32	60.22	5.27	10.23	49.33	41.29	3.61	6.72	57.99	50.94	4.45	8.51
OtherCer	3.11	0.40	0.06	0.06	12.94	1.17	0.17	0.17	7.93	0.77	0.11	0.12
Pulses	82.38	16.25	3.06	2.95	81.13	17.98	2.68	3.05	81.77	17.10	2.88	3.00
Oil	98.96	7.16	2.87	3.40	97.84	8.77	3.24	3.61	98.41	7.95	3.05	3.50
Veges	99.74	177.03	12.21	5.01	99.73	198.51	12.45	5.17	99.74	187.56	12.33	5.09
Meat	46.11	7.23	2.89	0.43	59.30	11.76	4.20	0.60	52.58	9.45	3.53	0.52
Egg	55.44	3.12	1.13	0.26	60.92	4.28	1.30	0.34	58.12	3.69	1.21	0.29
Milk	40.16	11.52	1.24	0.35	46.36	18.67	1.64	0.53	43.20	15.02	1.43	0.44
Fruits	69.17	21.69	2.31	0.69	71.43	32.11	3.16	1.03	70.28	26.80	2.73	0.86
Fishes	97.41	37.12	8.20	2.11	98.92	46.35	8.93	2.47	98.15	41.66	8.56	2.29
Spices	99.74	23.61	5.03	1.67	99.46	25.43	5.49	1.80	99.60	24.50	5.26	1.73
Snac/etc	87.56	22.25	4.12	4.04	86.79	27.95	4.57	4.66	87.19	25.04	4.34	4.35
Tea/Bete	73.32	8.78	3.71	0.32	70.89	10.17	3.52	0.47	72.13	9.46	3.61	0.40
Prepared	27.98	19.71	1.77	2.57	24.80	14.59	0.97	2.02	26.42	17.20	1.38	2.30
No of Hhs	293				371				757			
Total Hh Food Expenditure			2,587				3,219				2,897	
Calories Per capita per day				2,088				2,265				2,174

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.

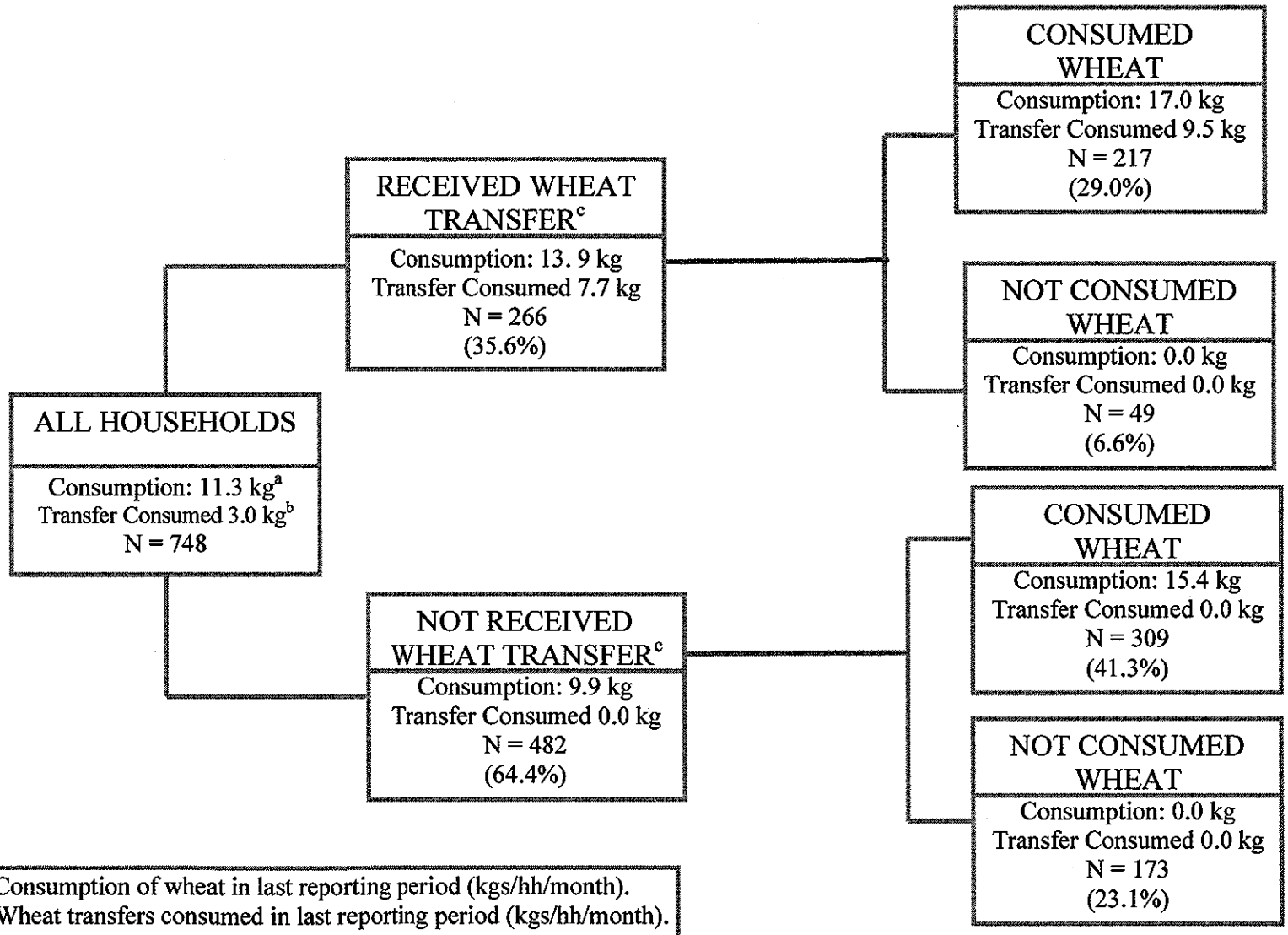
Table 3.4b — Households Consuming Food Commodities, Average Food Budget Share and Calorie Shares by Receiving Households

Round 2 (January to April 1999)

Food Group	Receiving Transfer				Not Receiving Transfer				All			
	Consuming Hhs (%)	Average Amount (gm/pc/day)	Budget Share (%)	Calorie Share (%)	Consuming Hhs (%)	Average Amount (gm/pc/day)	Budget Share (%)	Calorie Share (%)	Consuming Hhs (%)	Average Amount (gm/pc/day)	Budget Share (%)	Calorie Share (%)
Rice	100.00	404.63	38.73	61.75	100.00	444.73	36.56	64.38	100.00	429.02	37.41	63.35
Wheat	80.20	84.06	6.95	13.02	63.96	52.42	3.36	6.95	70.32	64.81	4.77	9.32
OtherCer	11.26	1.66	0.16	0.28	17.36	2.23	0.22	0.33	14.97	2.01	0.19	0.31
Pulses	91.47	23.55	3.59	3.56	92.53	23.63	3.28	3.37	92.11	23.60	3.41	3.44
Oil	98.98	7.32	2.93	3.01	99.12	8.99	3.07	3.57	99.06	8.34	3.01	3.35
Veges	100.00	228.45	14.47	6.77	100.00	281.24	15.07	7.62	100.00	260.56	14.83	7.29
Meat	40.27	6.44	2.53	0.29	52.09	11.36	4.08	0.55	47.46	9.43	3.48	0.45
Egg	62.80	3.18	1.36	0.25	74.73	4.45	1.49	0.32	70.05	3.96	1.44	0.29
Milk	59.73	28.16	2.32	0.76	70.77	36.35	2.94	1.00	66.44	33.14	2.70	0.90
Fruits	78.16	52.17	5.18	1.49	87.91	84.33	6.95	2.23	84.09	71.74	6.26	1.94
Fishes	94.20	21.67	6.35	1.23	96.26	28.86	7.44	1.52	95.45	26.04	7.02	1.41
Spices	100.00	27.67	4.43	1.64	99.34	25.08	4.28	1.55	99.60	26.09	4.34	1.58
Snac/etc	90.44	25.59	4.82	4.29	94.07	34.36	5.85	5.41	92.65	30.93	5.45	4.98
Tea/Bete	79.86	8.56	4.90	0.30	80.44	9.97	4.54	0.31	80.21	9.43	4.69	0.30
Prepared	24.57	9.75	1.27	1.34	27.03	6.61	0.81	0.91	26.07	7.84	0.99	1.08
No of Hhs	293				455				748			
Total Hh Food Expenditure			2,529				3,106				2,880	
Calories Per capita per day				2,286				2,422				2,369

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.

Figure 3.1 — Household Participation in Wheat Transfer Program and Wheat Consumption April/May '99



[a] Consumption of wheat in last reporting period (kgs/hh/month).
[b] Wheat transfers consumed in last reporting period (kgs/hh/month).
[c] Received wheat transfer in last four months.

the survey, with 100 percent of households consuming rice in both periods and smaller differences in per capita daily quantities consumed and calories from rice. Budget shares of rice were sharply lower in April/May 1999 than in November/December 1998 because rice prices were on average 16.4 percent lower than in the former period.

The difference in wheat consumption between wheat consumers who received and consumed wheat transfers and those who did not receive wheat transfers April/May 1999 was significant, (Figure 3.1). Average current wheat consumption of the 35.6 percent of the households who received and consumed a wheat transfers in during the previous four months was 13.9 kgs/household/month, compared to 9.9 kgs/household/month for the 64.4 percent of households who did not receive a wheat transfer during that period.

Considering only those households who consumed wheat in April/May 1999, average wheat consumption for the 29.0 percent of households who received a wheat transfer in the previous four months was 17.0 kgs/household/month compared with 15.4 kgs/household/month for wheat consuming households not receiving a wheat transfer. Thus, among households that consumed wheat in April/May 1999, consumption per household of those receiving wheat transfers was 10.4 percent greater than the consumption per household of those not receiving a transfer in the previous four months. Though wheat-consuming households that received a wheat transfer in the previous four months consumed 9.5 kgs/household/month of transfer wheat in the survey period, their consumption was only 1.6 kgs/household/month (20 percent) greater than wheat-consuming households that did not receive a transfer.

This small observed difference in wheat consumption between households receiving a wheat transfer and those not receiving a wheat transfer is not due to sales of the wheat transfers, however. As shown in Table 3.5, sales out of wheat transfers are small. Only 15.7 percent of households receiving a wheat transfer in round 2 sold their wheat, and on average sales by these households were only 190 Taka, equal to 42.1 percent of the amount of the transfer. What accounts for the small increase in wheat

Table 3.5a — Utilization of Transfers of Wheat and Rice

Round 1 (June to November 1998)

Program	Hhs Receiving Transfers			Hhs Selling Transfers				Hhs Consuming Transfers			
	No. of Hhs	Average (Kg)	Amount Taka	No. of Hhs	Average (Kg)	Amount Taka	Sale Price	No. of Hhs	Average (Kg)	Amount Taka	Price[a]
FFE	1	42	577	0	0	0	-	1	42	577	14.0
GR	165	11	146	2	5	68	12.0	161	11	141	13.0
VGF	158	23	296	6	4	54	13.0	152	21	281	13.0
VGD	22	60	740	8	29	357	12.0	22	49	610	12.0
Total	298	19	253	14	17	208	13.0	272	18	236	13.0

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.
Note: a) Average purchase price of consumes in the same region.

Table 3.5b — Utilization of Transfers of Wheat and Rice

Round 2 (June to November 1998)

Program	Hhs Receiving Transfers			Hhs Selling Transfers				Hhs Consuming Transfers			
	No. of Hhs	Average (Kg)	Amount Taka	No. of Hhs	Average (Kg)	Amount Taka	Sale Price	No. of Hhs	Average (Kg)	Amount Taka	Price[a]
Rice											
FFE	0	0	0	0	0	0	-	0	0	0	-
GR	3	14	188	0	0	0	-	3	14	188	13.4
VGF	176	16	214	3	4	39	9.7	171	15	202	13.2
VGD	1	70	894	0	0	0	-	1	70	894	12.8
FFW											
Total	180	16	218	3	4	39	10	175	16	205	13.0
Wheat											
FFE	62	51	448	15	17	136	7.8	59	49	426	9.0
GR	4	37	324	0	0	0	-	4	37	324	9.0
VGF	182	42	373	16	16	123	7.9	177	40	354	9.0
VGD	20	77	675	9	31	245	7.9	19	63	547	9.0
FFW	16	222	1,939	4	67	540	8.2	15	219	1,912	9.0
Total	262	57	498	41	24	190	8.0	254	53	468	9.0

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.
Note: a) Average purchase price of consumes in the same region.

consumption for households receiving transfers? Households receiving wheat transfers purchase less wheat than they would have if they did not receive a wheat transfer, so their wheat consumption increases by less than the amount of the transfer.

4. IMPACT OF TRANSFERS ON FOOD CONSUMPTION: REGRESSION ANALYSIS

Data for the regressions are taken from the first two rounds of the integrated household survey of 757 households described above. We focus here on wheat consumption in the second round of the survey (i.e., in April/May 1999), using the following functional form:

$$w = a0 + a1*HHSIZE + b1*YT + b2*YT^2 + c1*WT + c2*WT^2 + e,$$

where w is the budget share of wheat consumption in the month preceding the interview, HHSIZE is the household size, YT is total income (expenditure) per household per month, WT is the average monthly value of the wheat transfers received per household since January 15, 1999, and e is the error term, assumed to have a normal distribution. Including the squared terms for YT and WT allow for curvature in the relationship between these variables and the budget share.[7] Means and variances of the variables are reported in Appendix Table 1.

In order to correct for endogeneity of total expenditures (a proxy for household income), we use the fitted value of total expenditures from a regression using instrumental variables. Because not all households are wheat consumers, we also estimate a second equation (model 2), correcting for selectivity bias using the inverse Mills ratio from a probit regression on whether households consume wheat (see Wessels and Heien, 1990 for a similar approach to estimate demand systems with microdata). Finally, in all regressions, we calculate robust standard errors corrected for cluster effects.

[7] In an alternative model specification, we also included an interaction term (YT * WT), but the estimated coefficient was very small and statistically insignificant.

ESTIMATING WHEAT CONSUMPTION: REGRESSION RESULTS

Table 4.1 shows the regression results. In model 1, all the coefficients are significantly different from zero at the 5 percent confidence level except for the coefficient on income squared (YT^2). In model 2, the coefficient on the inverse Mills ratio is also significant, and the explanatory power of the regression is considerably improved as evidenced by the increase in R-squared from 0.099 to 0.196.

The positive sign of c1, the coefficient of the value of wheat transfers (WT), together with the negative sign of c2, the coefficient of the squared term (WT^2), indicates that at low levels of transfers, an increase in the transfer tends to increase the budget share of wheat, but as the size of the transfer increases, the marginal increase in the share of wheat diminishes. Similarly, the negative sign on the coefficient b1, the coefficient of the fitted value of total expenditures per household (YT), together with the positive sign of b2, the coefficient of the squared term, indicates that the budget share of wheat tends to decline as income increases, but at a decreasing rate.

The third regression (model 3) includes dummy variables for the participation in some of the wheat distribution programs: DVGD for the Vulnerable Group Development (VGD) program, DVGF for the Vulnerable Group Feeding (VGF) program and DFFW for the Food For Work (FFW) program.[8] The coefficients on DVGD and DVGF are positive and significant at the 10 percent confidence level, suggesting that the budget shares for wheat of VGD and VGF participants are significantly higher than for other

[8] We also tested for selection bias in the Food For Work program by including an inverse Mills ratio variable estimated from a probit regression of Food For Work participation. The estimated coefficient was statistically insignificant. Note that participants in Vulnerable Group Feeding, the program with the most participants from our sample, were not self-selected, but rather chosen by local committees on the basis of household characteristics including level of poverty and gender of the household head.

Table 4.1 — Impacts of Wheat Transfers and Cash Income on Wheat Consumption

Dependent Variable: Monthly Household Consumption of Wheat

	Model 1		Model 2		Model 3	
Variables	**coef.**	**T**	**coef.**	**t**	**coef.**	**t**
Constant	4.318	7.457	7.235	8.750	6.634	7.845
Household Size	0.291	2.754	0.403	3.607	0.385	-4.765
Tot Hh Expenditure (Pred.)	-0.954	-4.537	-1.201	-4.967	-1.100	3.228
Square of Tot Hh Expenditure (Pred.)	0.000	2.939	0.000	3.251	0.000	2.131
Value of Total Wheat Transfer	18.721	4.987	15.252	4.863	8.581	-2.152
Square of Value of Total Wheat Transfer	-0.014	-4.505	-0.012	-4.270	-0.005	2.118
Receive VGD					3.745	3.762
Receive VGF					1.945	-2.523
Receive FFW					-3.246	-6.835
Inverse Mills Ratio			-4.356	-7.535	-7.535	7.845
R2	0.115		0.233		0.272	
Observations	743		743		743	
Number of Clusters	22		22		22	

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999 and authors' calculations.
Note: Household expenditure and value of transfers are expressed in thousands of Taka.

households, taking into account the other determinants of the wheat budget share included in the regression.

ESTIMATED MARGINAL PROPENSITIES TO CONSUME WHEAT AND ELASTICITIES

The marginal propensities to consume wheat out of wheat transfers (WT) and total income (YT) can be calculated from the regression equations by taking the partial derivatives of the wheat expenditures with respect to WT and YT. Since $w = p_w q_w/YT$, using equation 1, we have:

$$p_w q_w = YT * w = YT * (a0 + a1*HHSIZE + b1*YT + b2*YT^2 + c1*WT + c2*WT^2 + e)$$

and $d(p_w q_w)/dYT = w + b1*YT + 2b2*YT^2$ = MPC of wheat out of total income.

Similarly, $d(p_w q_w)/dWT = YT * (c1 + 2*c2*WT)$ = MPC of wheat out of wheat transfers.

Using an average monthly household income of wheat recipients of 3072 Taka and an average wheat transfer equivalent to 155 Taka/month/household, the calculated marginal propensity to consume wheat out of wheat transfers is 0.358 using the coefficients from model 2 and 0.216 using the coefficients from model 3. These MPC's show the change in the value of wheat consumption given a marginal change in the value of wheat transfers.

However, in order to calculate the total change in wheat consumption as a result of the wheat transfer programs, we use the regression coefficients to compute "arc" MPC's, equal to estimated consumption with the transfer less estimated consumption without a transfer, divided by the size of the transfer (Table 4.2). Using the parameters from model 3 and the average income of households in the lowest income tercile, the "arc" marginal propensity to consume wheat out of a small wheat transfer (of 120

Table 4.2 — Marginal Propensity to Consume Wheat out of Wheat Transfers and Total Income, by Income Level and Size of Transfer

	MPC from Wheat Transfer by Program				MPC from	Income
	VGD	VGF	FFW	Others	Income	Elasticity
MPC Model 2						
Tercile 1, small transfer	0.351	0.353	0.353	0.354	0.049	0.972
Tercile 1, large transfer	0.286	0.288	0.288	0.289	0.045	0.900
Tercile 2, small transfer	0.510	0.512	0.512	0.513	0.025	0.669
Tercile 2, large transfer	0.388	0.389	0.389	0.391	0.022	0.586
Program Means	0.327	0.471	0.329	0.465	0.030	0.830
MPC Model 3						
Tercile 1, small transfer	0.239	0.222	0.170	0.204	0.046	0.910
Tercile 1, large transfer	0.149	0.133	0.081	0.114	0.043	0.845
Tercile 2, small transfer	0.312	0.295	0.243	0.277	0.024	0.641
Tercile 2, large transfer	0.164	0.148	0.096	0.130	0.021	0.566
Program Means	0.219	0.276	0.029	0.248	0.029	0.789
Means used for the calculations						
Amount of transfer						
Small transfer	120	120	120	120		
Large transfer	500	500	500	500		
Mean program transfer	190	120	650	155		
Level of Total Expenditure						
Tercile 1	2082	2082	2082	2082		
Tercile 2	3400	3400	3400	3400		
Mean program participant	1947	3063	3357	3072		
Hhsize	5.00	5.43	5.41	5.75		

Source: Authors' calculations.

Taka/household/month) ranges from 0.170 to 0.239. For the same programs and household income, the "arc" marginal propensity to consume wheat out of a large wheat transfer (500 Taka/household/month) ranges from only 0.081 to 0.149. Using the average total household expenditures of each program's participants and the average size of transfers in each program, the "arc" marginal propensity to consume ranges from 0.029 for Food For Work (a program that involves a very large wheat transfer equal to 650 Taka/household/month) to 0.276 for Vulnerable Group Feeding, a program with small transfers targeted to poor women.

Note that, in general, the MPCs for wheat transfers are significantly higher than

the MPCs for total income.[9] Using average incomes of the lowest tercile of households, the MPC wheat for an increase in income is only 0.049 with model 2 and 0.046 with model 3. Thus, small transfers in kind result in significantly higher wheat consumption than do increases in total cash income. The marginal propensity to consume wheat out of the large Food For Work transfers using model 3 coefficients is, however, essentially the same as the MPC wheat out of cash income (0.029).

ESTIMATED MARGINAL PROPENSITIES TO CONSUME CALORIES

To test the impact of wheat transfers and cash income on caloric consumption we estimated two alternative Engel functional forms. In the first model,

$$CAL = a0 + a1*HHSIZE + b1*YT + b2*YT^2 + c1*WT + e,$$

where CAL is the total amount of calories consumed by the household in a month.

In the second model, we used the natural logarithm of CAL as the dependent variable.

As shown in Table 4.3, the overall fit of the first model is slightly better, though the coefficient on household expenditure is not significant at the 10 percent confidence level. In the second model, all coefficients are significant and, as expected, the sign of the coefficient of the squared expenditure term is negative, indicating decreasing marginal propensities to consume as income increases.

The implied marginal propensities to consume calories from an additional Taka of cash or wheat transfer are 31.2 and 66.7 respectively using model 1, and 50.6 and 95.3 using model 2. Note that at an average price of Taka 8.76 per kilogram of wheat, 1 Taka of wheat weighs 114 grams and contains 388 calories (at 3.40 calories per gram). Thus,

[9] The difference between the coefficient on predicted income and the coefficient on wheat transfers in equation 3 is statistically significant at the 5 percent confidence interval. The same holds true for the difference between the coefficients on the respective squared terms.

an additional Taka of wheat (388 calories) leads to a 66.7 calorie gain in calorie consumption under model 1 and 95.3 calorie gain under model 2. The figures for marginal propensity to consume calories out of a transfer of 1 calorie are 0.17 and 0.25, under models 1 and 2, respectively.

Table 4.3 — Impacts of Wheat Transfers and Cash Income on Calorie Consumption

	Model 1		Model 2	
Dependent variable	**Caloric Consumption**		**Log Caloric Consumption**	
Independent variable	**coef.**	**T**	**coef.**	**t**
Constant	89,836	3.285	8.430	118.366
Household Size	35,764	7.407	0.079	6.400
Tot Hh Expenditure (Pred.)	16.390	1.543	139.5	4.549
Square of Tot Hh Expenditure (Pred.)	0.002	3.269	-.003	-1.705
Value of Total Wheat Transfer	66.654	1.695	223.4	2.509
R2	0.573		0.443	
Observations	744		744	
Number of Clusters	22		22	

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998-1999.
Note: Household expenditure and value of transfers in Model 2 are expressed in thousands of Taka.

5. IMPLICATIONS OF TRANSFER PROGRAMS FOR WHEAT MARKETS

The higher marginal propensity to consume out of direct food transfers as compared to cash transfers has important implications for market prices of wheat. Table 5.1 presents estimates of the impact of various distribution programs on wheat market prices in 1998/99, based on the addition to supply and demand on an annual basis.[10] The marginal propensities to consume used here are calculated from the regression coefficients in model 3, using the average incomes and size of wheat transfers in each program as given in Table 4.2. These calculations of price changes assume that domestic prices are below import parity and that private imports are not close substitutes for domestic and food aid wheat. Otherwise, changes in demand would only affect the quantity of private sector imports, but have no impact on domestic prices.

For example, the Vulnerable Group Development program in 1998/99 distributed 193 thousand MTs of wheat. With a marginal propensity to consume out of wheat transfers of 0.219, wheat demand in the absence of a price change would increase by 42 thousand MTs. The effect of the program on market prices is thus approximately equal to an injection of only 151 thousand MTs (the total size of the program less the additional consumption due to the MPC of the transfer). Assuming an own-price elasticity of demand of –0.82, the average rural estimate from Goletti (1994), in the absence of the

[10] Baulch et. al., (1998) have shown that wheat wholesale markets are well integrated across space and time. To the extent that the timing and size of the distribution programs are known to market participants, estimating the price effects based on annual national distribution of the wheat programs is a valid approximation, particularly for distribution programs that are spread out relatively evenly throughout the year.

Table 5.1 — Effect of Wheat Transfer Programs on Demand and Market Price: 1998-99

Program	Average Wheat Transfer Kgs/HH/ month	Total Distribution ('000 MTs)	Estimated MPC Out of Wheat Transfers[a]	Total Increase in Demand (MTs)	Net Increase in Supply (MTs)	Effect of Elimination of the Program on the Wheat Market: Percentage Change In Wheat Supply[b] (Percent)	Percentage Change In Wheat Price[c] (Percent)	No MPC effect % Change in Wheat Price[c] (Percent)
FFE	22.1	227	0.248	56	171	-4.7%	5.8%	7.7%
VGD	23.5	193	0.219	42	151	-4.2%	5.1%	6.5%
VGF	15.0	297	0.276	82	215	-6.0%	7.3%	10.0%
Subtotal		717	0.252	181	536	-14.9%	18.1%	24.2%
FFW	77.4	690	0.029	10	680	-18.9%	23.0%	23.3%
Total		1407		191	1216	-33.7%	41.1%	47.6%

Source: Authors' calculations.

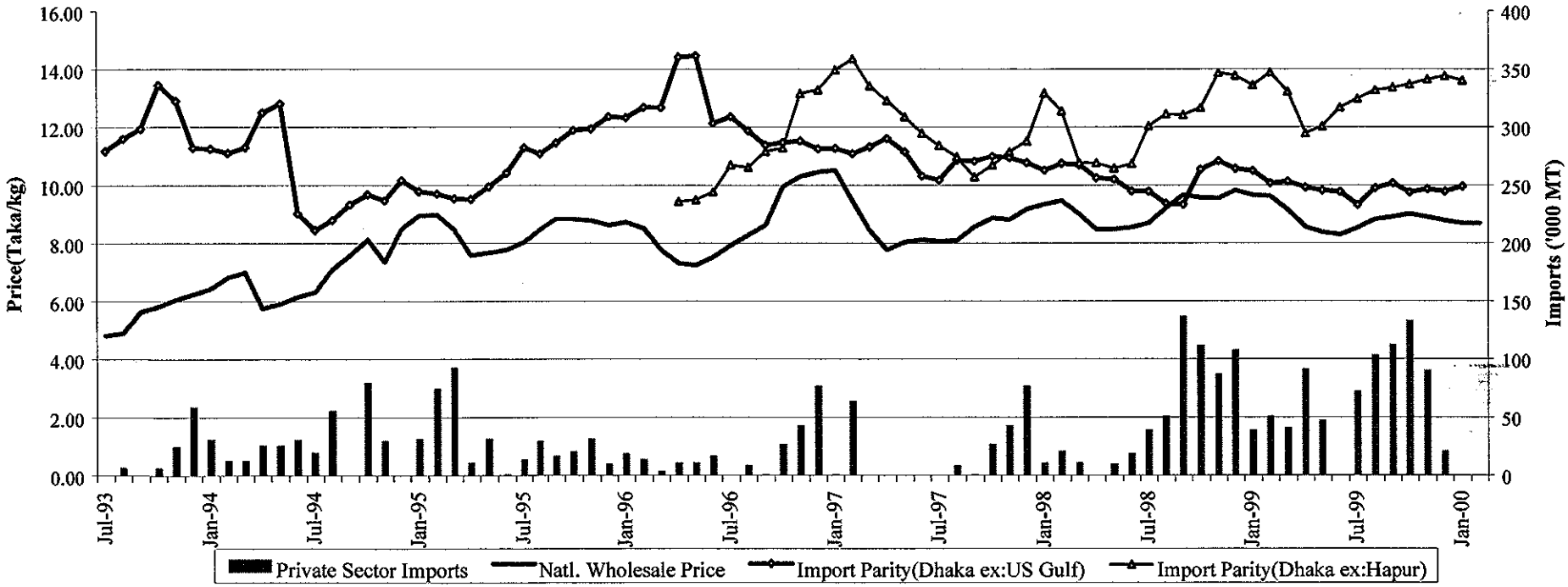
Notes: a. The MPC's are calculated using the average values of total expenditures and transfers received for the program participants. Coefficients are taken from model 3.

b. Total wheat demand (availability) in 1998/99 (assuming 400 thousand MTs for feed): 3.607 million MTs.

c. Assumed own-price elasticity of demand for wheat: -0.82, from Goletti, 1994.

Assumes that one half of FFW transfer payments are made in cash.

Figure 5.1 - Wheat Prices and Quantity of Private Wheat Imports in Bangladesh, 1993-2000



Note: Price data for February, 2000 is up to the second week only; Import parity (Dhaka) price is based on US # 2 HRW and includes import tariffs; Private imports are as of 31st December, 1999. From November 1998, the carrying cost from Hapur has increased by 1.1 Tk/kg to 4.1 Tk/kg.

program, net supply would be 4.2 percent smaller and wheat market prices would be 5.1 percent higher.[11] Nonetheless, as shown in Dorosh and Haggblade (1997), even when taking into account a higher MPC for wheat out of direct transfers, large volumes of food aid can depress market prices below import parity levels. The maximum volume of net public foodgrain (from food aid, government commercial imports and change in public stocks) that can be distributed without depressing market prices below import parity levels depends on the level of international prices, the domestic price of rice, and the timing of the food distribution. In the early 1990s, this safe level of food aid was on the order of 600 to 800 thousand MTs. But over time, wheat demand has increased, not only because of population, but for baking (bread, biscuits, etc.) and livestock feed, as well (Dorosh, 2000).

As shown in Figure 5.1, national average wholesale wheat prices were somewhat below import parity Dhaka, (calculated using the price of U.S. hard red winter wheat #2), for most of 1998/99. National wholesale prices averaged 9.18 Tk/kg, 8.7 percent below the calculated import parity, (10.05 Tk/kg). Much of the 805 thousand MTs of wheat that the private sector imported during this period was wheat of different quality, and derived from non-U.S. sources including Australia, Turkey and central Asia.[12] Thus, the large volume of private importers and the information from private traders regarding source of the wheat suggests that the U.S. Hard Red Winter #2 figure overstates true import parity of wheat actually imported, so that domestic wheat prices were in fact close to world prices in 1998/99.

In spite of record boro rice and wheat harvests, national average wholesale wheat prices in the last six months of 1999 remained 9.8 percent below import parity (U.S. hard red winter #2), while 533 thousand MTs of wheat were imported, (an average of 89,000

[11] Note that the impact on market prices is less than it would be if there were no shift in demand because of the transfer. In this case, net supply of wheat would be 5.4 percent smaller and wheat market prices would be 6.5 percent higher.

[12] Personal communications with private wheat importers.

MTs per month). The high level of private sector imports suggests that through the end of 1999 the level of public foodgrain distribution had not reduced price incentives for domestic producers below world price levels. By the end of 2000, however, private wheat imports in Bangladesh indeed slowed as good rice harvests and low rice prices reduced wheat demand and world prices rose.

6. CONCLUSIONS

This paper has presented evidence that the marginal propensity to consume (MPC) wheat out of wheat transfers is significantly higher than the MPC wheat out of income, and that this addition to demand is large enough to potentially have significant effects on market prices. Using a functional form that allows for differences in MPCs according to size of transfers and income levels, regression results indicate that the total MPC wheat out of small wheat transfers (15 to 25 kgs/household/month) is approximately 0.25. Thus, small wheat transfers do not lead to an equivalent increase in consumption, but are partially offset by lower purchases of wheat (and to a lesser extent, sales of transfer wheat). Programs that involve larger transfers of wheat, such as Food For Work, have smaller MPCs, however.

The econometric evidence suggests that increases in cash incomes (and cash transfers) do not lead to significant increases in wheat consumption. Calculated MPCs for wheat out of cash income range are near zero. Overall, programs involving small rations of direct transfers in wheat (Food For Education, Vulnerable Group Development and Vulnerable Group Feeding) are estimated to have increased wheat demand by 181 hundred thousand MTs in 1998/99 from their transfer of 717 hundred thousand MTs. Cash transfers of an equivalent value would likely have resulted in only a very small increase in wheat demand, perhaps less than five thousand MTs. Thus, the potential impact of wheat transfer programs on market prices (when prices are below import parity) is approximately 6 percent less than the impact of cash transfer programs (and a release of the same amount of wheat in the market). Similarly, when domestic prices are below import parity, these small-ration, targeted transfer programs would have the same effect on market demand and market prices as Food For Work or cash programs only about three-quarters as large.

Further analysis is needed to explain the reasons behind the varying MPCs in terms of the opportunity costs of households' time, stigma effects, and other factors. Nonetheless, the econometric analysis of the survey data presented in this paper clearly indicates that transfers-in-kind targeted to poor women and children in Bangladesh lead to greater wheat and total calorie consumption than would result from an equivalent increase in cash income. Moreover, this increased marginal propensity to consume wheat from wheat transfers is large enough to have significant implications for wheat consumption, market prices and program design.

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APPENDIX — SUMMARY STATISTICS OF VARIABLES USED IN THE REGRESSION MODELS

Variable	Obs	Mean	Std. Dev.	Min	Max
Household size	747	5.75	2.21	1.00	22.00
Food Share	748	76.30	11.64	22.86	97.05
Calories per Household per Month	748	404,530	219,349	24,100	1,985,147
Budget Share of Wheat	748	3.67	4.83	0.00	28.58
Per Capita Expends/Month of Wheat	747	20.63	25.52	0.00	153.61
Household Monthly Expends, Wheat	747	113.22	146.73	0.00	1,075.25
Total Household Monthly Expenditure					
Actual	748	3,842	2,741	154	27,348
Predicted	744	3,851	2,219	-884	24,309
Total Monthly Wheat Transfer (Taka)	748	54.94	140.19	0.00	1,797
Dummy VGD	748	0.03	0.16	0.00	1.00
Dummy VGF	748	0.24	0.43	0.00	1.00
Dummy FFW	748	0.02	0.15	0.00	1.00
Inverse Mills Ratio	743	0.60	0.39	0.06	1.92

Source: Authors' Calculations.