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Asymmetric Prices: Implications on Trader's Market Power in Philippine Rice

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INTRODUCTION

The dynamics of prices is of profound interest among policymakers in the Philippines, particularly because increasing prices are more frequently experienced than decreasing prices. Rising prices are commonly blamed on the oligopolistic structure of the local marketing system, where a handful of Filipino traders are allegedly able to amass unreasonably huge profits at the expense of the impoverished and already disadvantaged Filipino consumers. Most Filipinos believe that this is because traders have market power which enables them to deliberately manipulate market prices. It is perceived that because of market power, unscrupulous traders exploit abnormal market situations by unfairly raising prices when the market is distressed while not allowing them to fall when market conditions improve. For example, during the critical months of September to November when the market is tight or during inclement weather, traders have been known to hoard thereby creating an artificial market shortage enabling them to inflate prices which further accentuate the market crisis (Manila Times, November 9, 1998). On the other hand, they have been known to

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resist lowering prices when rice is plentiful and when market conditions become more favorable.

Increasing prices are a policy concern because they have serious equity and efficiency implications particularly for an estimated 30 million poor Filipinos who spend a significant portion of their meager income on food.[1] Inflationary food prices could significantly reduce food consumption of poor households which could further jeopardize the health and welfare of the vulnerable segment of the population already living on a very tight income. Price distortions, if allowed to persist, could result in acute and prolonged imbalances in inter-regional trade. Consequently, it could impair the poor's access to available food in the market and could further threaten the already food insecure, most especially those households which reside in remote and already deficit areas. Without appropriate safety net programs, the path of adjustments for many of the country's poor is precarious and perhaps for some, even perilous.

Yet, much of the ongoing public exchange and debate on price behavior and market power is misinformed because not much is empirically known and understood about the dynamics of prices, and their implications on trader behavior and response. This paper proposes the symmetry model that allows one to test for the presence of market power. Price symmetry is the market's ability to respond similarly and instantaneously to both a rise and fall in prices. An over-reaction to price increases while remaining opposed to price decreases could indicate the presence of market power among traders.

The price symmetry model is empirically tested on Philippine rice where allegations of noncompetitive market behavior among rice traders are pervasive. The price symmetry model employed in this paper tests two hypotheses that are central to the issue of market power:

[1] An estimate of Bouis (1990) showed that rice purchases alone amount to 13 percent of the food budget of urban Filipinos and 24 percent for rural Filipinos.

1) Is there evidence to support the popular allegation that Filipino rice traders exploit a market crisis by hiking the price of rice unnecessarily?, and
2) Do Filipino traders pass on price increases more rapidly than price decreases to consumers?

Differentiating prices as falling and rising and analyzing their impact on market responses provide a better and clearer understanding of price behavior and their implications on the structure and performance of markets which previous studies of spatial market integration in the Philippines (Silvapulle and Jayasuriya 1994; Mendoza and Rosegrant 1995; Baulch 1997) did not address.

The next section provides a brief description of the Philippine rice market and the government's regulatory role. This is followed by a discussion of the behavior of rice prices for the period 1973-1996, which provides the basis for the empirical model specified in the next section where the analytical procedures and steps involved in the estimation are also presented. Following that section is the discussion of results. The conclusion and some policy implications are presented in the last section.

THE PHILIPPINE RICE MARKET

Historically, the Philippine government intervened in all aspects of the rice market in the country, but its participation has largely been in *market entry, grain stocks,* and *pricing.* For instance, market entry in rice trading was restricted in 1958 by the Rice and Corn Board (RCB) to discourage the participation of Chinese traders who then dominated local rice trading (Barker et al. 1985). This restriction continued until the mid-1980s when the National Food Authority (NFA), taking over the RCB functions, curbed market entry in rice trading by issuing a limited number of licenses to a handful of private traders.

The NFA regulates local rice prices by setting a support price and a ceiling price. The level of support price—the minimum price

farmers could receive for their rice—is based on projected estimates of the current year's cost of producing rice and is commonly announced during the rainy months of June to December just in time for the planting season. On the other hand, the ceiling price—the maximum amount paid by consumers for rice—is announced between the months of January to November. Over the past 12 years, the NFA has pursued an aggressive pricing policy by continuously revising its program on domestic rice prices. For instance, from 1974 to 1985, the NFA changed the ceiling price for rice 12 times, twice each in 1983, thrice in 1984, and once in all other years. For the same period, it changed the support price to farmers 15 times, twice in 1980 and 1983, four times in 1984, and once in the other years (BAS 1989). This support-ceiling price band is the margin within which the NFA carries out its "buy high, sell low" mandate. [2] To defend its pricing policy, the NFA maintains a 30-day rice stock in all its 371 warehouses nationwide (Balisacan et al. 1992). It also buys rice directly from farmers through its 205 buying depots and 51 rice mills located all over the country.

The government's efforts to stabilize rice prices, however, have been unsuccessful. Total NFA local purchases were minimal to bolster rice prices at the government's guaranteed levels. In the 1970s, the NFA total buyout amounted to only 10 percent of total rice production shrinking to 5 percent in the 1980s (BAS 1989). Consequently, more rice found their way in the open markets resulting in prices that are more varied even during the years when the NFA's presence in domestic trading is most significant. This has been blamed on insufficient budget to adequately support the NFA's operation to buy rice directly from farmers, particularly during the months of December and January when prices are depressed, and to release rice from its warehouses when prices rise. Relief coming from imports has also been ineffective as poorly timed disbursements

[2] This quote came from a reviewer which pointed out the critical role of the price band in triggering NFA's market operations.

of imported rice have often resulted in either too much or too little rice in the market further aggravating an already fragile market (Balisacan et al. 1992).

DYNAMICS OF PRICE BEHAVIOR AND HYPOTHESIS ABOUT FILIPINO TRADERS' MARKET BEHAVIOR

This section discusses the behavior of rice prices in 1973 to 1996 and provides the groundwork for the price symmetry hypothesis empirically tested in the next section.

Historically, rice prices have been increasing and are highly unstable. Over the years, the government has exerted varying degrees of control in the rice market that had different effects on price behavior. Results in Table 1 reveal that levels of real[3] farm, wholesale, and retail prices for rice are higher and more varied in 1973-1985 when the government heavily intervened in the rice market as indicated by the coefficient of variation of 28 percent. This is more than twice of what was obtained in 1986-1996 at an estimated 11 percent, when the rice market was partially deregulated. Another measure of instability, deviations from the moving average, yielded similar results which showed that rice fluctuated by as much as 7 percent around the average in 1973-1985, compared to only 3 percent in 1986-1996. These indicators suggest that Filipinos experienced more instability in 1973-1985 than in 1985-1996 and support the general consensus that the government's stabilization programs in the early period were ineffective in insulating the Filipino consumers from wide price swings (Barker et al. 1985; Balisacan et al. 1992).

What has been the effect of government market intervention on trader margins? Estimated real price spreads in the vertical rice marketing channels show a real farm-retail margin of P5.05 per kilogram from 1973 to 1996. Dividing this period between the period of control in 1973-1985 and the period of decontrol in 1986-1996, the real farm-retail price spread was found to be larger (in absolute terms)

[3] All prices are deflated using the Consumer Price Index with 1990 as the base year.

Table 1. Yearly fluctuation in real rice prices, Philippines, 1973-1996.

Period	Mean[a]			Coefficient of variation[b]			Annual growth rate[c]			Moving average price[d]		
	Farm	Wholesale	Retail	Farm	Wholesale	Retail	Farm	Wholesale	Retail	Farm	Wholesale	Retail
1973-1985	5.70	10.80	11.50	28.36	27.05	27.59	-0.38	-0.72	-0.78	5.30	10.10	10.75
1986-1996	4.20	7.80	8.40	11.20	10.97	10.50	0.02	0.04	0.05	4.07	7.53	8.10
All years	5.05	9.45	10.10	28.50	28.30	28.14	-0.15	-0.30	-0.31	4.50	8.40	8.95

Source of basic data: BAS (1997)

[a] In pesos per kilogram.
[b] Calculated as standard deviation divided by the mean.
[c] In percentage.
[d] Calculated as 5-year moving average, in pesos per kilogram.

in the earlier period, P5.80 per kilogram, compared to P4.20 per kilogram in the latter period as shown in Table 2.

Of this margin, half was received by farmers in both periods. Retail price accounts for twice the farm price. The calculated retail-to-farm price ratio of two for 1973-1985 and 1986-1996 is similar to the earlier findings of Barker et al. (1985) who concluded that "a ratio of retail price to farm paddy price of two reflects a reasonable margin, but does not necessarily indicate the absence of excessive middlemen profits", p. 181. Thus, while the real absolute margin for rice was larger during the period of government control of the rice market, this does not imply unreasonable earnings on the part of the traders.[4] This finding, however, may suggest that Filipino rice traders employ a cost plus pricing strategy in determining the price of rice that they sell in the market. If traders value their rice based on a cost plus pricing, Filipino traders would commonly keep their costs down to maintain their margins, and thus, adjust their prices depending on whether costs are rising or falling. That is, one would observe traders to raise prices upward when costs are

Table 2. Marketing margins for Philippine rice, 1973-1996

Period	Farm-retail price spread[a]	Farmer's share (%)	Retail/Farm ratio
1973-1985	5.80	50	2
1986-1996	4.20	50	2
All years	5.05	50	2

Source of basic data: BAS (1997)
Note: All prices are real, deflated by the Consumer Price Index, 1990=100.
[a] In pesos per kilogram.

[4] In the absence of information on cost items in rice marketing, no assertion can be made on whether rice trading is profitable or not.

increasing and then reduce prices when they realize some savings in their operations. Pricing based on constant margins is consistent with symmetric prices and the absence of market power. This is empirically tested in this paper.

The ability to adjust prices downward or upward depending on the market tone indicates that the market is flexible and therefore, would exhibit symmetric movement in prices. This means that traders would react immediately to both good and bad market news and therefore, would make the necessary adjustment in their prices depending on the direction of the price movement in the market. Of course, this assumes the absence of impediments in the market. In real markets, however, there are factors that could impair the ability of traders to fully and rapidly respond to any type of market news. One factor is the difference in the traders' perception about the direction and stability of the change in prices. For example, traders may perceive the government's announcement of price support increases prior to the planting season as permanent changes, and therefore, would rapidly translate this cost increase as an increase in the price of rice they would sell for that season. On the other hand, decreases in prices, which occur infrequently, may be seen by traders as transitory, thus, providing less incentive to adjust their prices downward. Another factor is access to storage and the traders' ability to mobilize their stocks out of storage. Traders may decide to keep rice for some period of time when prices are low, as is commonly observed, releasing them only when prices are booming. In this case, the market may not respond immediately to falling prices as rice is retained in anticipation of better prices in some future months. Other factors such as the high costs of making frequent price adjustments, associated with private negotiations, price search, and information gathering, may also deter Filipino rice traders from making periodic revisions in their prices, retarding their responses to sudden and repeated changes in market conditions. Naturally occurring structural obstacles may likewise obstruct the traders' ability to quickly and accurately read and interpret market signals. Being insular, shipping rice between major ports in the

Philippines usually takes some time and the schedules of departure of a few shipping lines operating between major ports are infrequent, about twice to thrice weekly. Because travel schedules are often irregular and unreliable, the timing of arrivals of shipments from supply areas is often unpredictable. Poorly developed roads, inadequate public trucking facilities, and the high cost of transportation further compound the problem of moving rice to critical areas, especially during the monsoon months of July to August when many roads are impassable.

PRICE DATA, SYMMETRY MODEL, AND ESTIMATION PROCEDURES

This section presents the price data used in the analysis. It also describes the empirical symmetry model used in the analysis and the step-by-step procedure employed in the estimation.

The data used are monthly prices of rice at the farm, wholesale, and retail market levels. Rice prices, reported in pesos per kilogram, were obtained from the market news publication of the Bureau of Agricultural Statistics of the Department of Agriculture in the Philippines. The analysis covered 282 observations from April 1973 to September 1996. This period was chosen to determine the impact of varying government intervention on the behavior of rice prices and on trader behavior. To accomplish this, the period was divided into two subperiods: 1973-1985, the period characterized by heavy and direct government control in the local rice market and 1986-1996, the period of deregulation.

To determine whether response to rising and falling prices is equal, the following symmetry model was estimated:

$$\Delta P_t^i = \alpha + \sum_{i=1}^{k} \theta_1 POS_{t-i}^j + \sum_{i=1}^{k} \pi_1 NEG_{t-i}^j + \sum_{l=1}^{11} \psi_l SEASON_l \qquad (1)$$

where ΔP_t^i are changes in rice prices at market level i, where i refers to farm, wholesale, and retail. The term ΔPOS_{t-k}^j are positive changes in rice prices in the other market j, j not equal to i, in the

current month *t*, for *k* equals 0, and in the previous months *t* - *k*, for *k* equals *1* to *n*. The next term ΔNEG^{j}_{t-k} are negative changes in rice prices in market *j*, *j* not equal to *i*, in the current month *t* for *k* equals 0 and in the previous months *t* - *k* for *k* equals *1* to *n*. The lag length, *k*, is measured in months and denotes the impact of past prices over *k* number of months. The number of lags, *k*, is identified using the Akaike Information Criter (AIC), Akaike (1969).. AIC selects the value of *k* that minimizes the criteria:

$$AIC(k) = -2 \max L(\theta_k) + 2r$$

where *r* is the number of parameters in the equation and $L(\theta_k)$ is the maximum likelihood function. The AIC procedure circumvents the subjectivity often exercised by researchers when using the Box and Jenkins method and other lag identification procedures. The binary variable D is used to capture the seasonal pattern of movement commonly observed in rice prices from one month to the next where *l* equals 1 to 11 months.

To estimate equation (1), the following steps were employed: First, price changes in each of the farm, wholesale and retail levels are expressed as the first differences of their natural logarithms multiplied by 100. This definition is consistent with previous studies and is therefore appropriate for use in the analysis.

The second step involve differentiating the variables on the right hand side of equation (1) as positive and negative price changes in the other market, *j* not equal to *i*. This is calculated using the variable splitting procedure of Wolffram (1971). This procedure assigns an initial value, ΔP^{j}_{0}, which is equal to the first difference of the natural logarithm of the first data points, and then segmenting the succeeding calculated first differences of the natural logarithms of the series as positive and negative values:

$$\Delta POS^{j}_{t} \text{ if } P^{j}_{t+1} > P^{j}_{t}, 0 \text{ otherwise; and}$$

$$\Delta NEG^{j}_{t} \text{ if } P^{j}_{t+1} < P^{j}_{t}, 0 \text{ otherwise}$$

Thus, positive values were calculated recursively as:

$$\Delta POS^j_{t+1} = \Delta P^j_0 + \{\ln(P^j_{t+1}) - \ln(P^j_t)\} \text{ for all } P^j_{t+1} > P^j_t \qquad (2)$$

and the negative values as:

$$\Delta NEG^j_{t+1} = \Delta P^j_0 + \{\ln(P^j_{t+1}) - \ln(P^j_t)\} \text{ for all } P^j_{t+1} < P^j_t \qquad (3)$$

From equation (2), if the price change in market *j* is positive at time *t*, then the series of positive price changes, ΔPOS^j_t will increase by the amount of the change while ΔNEG^j_t will retain its previous value. On the other hand, equation (3) specifies that if the price change in market *j* is negative, then ΔNEG^j_t will increase by the amount of the negative change and ΔPOS^j_t will retain its previous value.

After prices are differentiated, several regressions of equation (1) are estimated in the next step. Since there are no prior information on which price series belongs to the right or to the left hand side, equation (1) is estimated for four sets of price pairs: one equation involved using price changes at the wholesale level as the dependent variable and then positive and negative price changes at the farm as the independent variable. Then in the next regression, the reverse formulation is specified with price changes at the farm level as the dependent variable and then the positive and negative price changes at wholesale as the independent variable. The next sets of regressions specify wholesale price changes as the right hand side variable and positive and negative price changes at retail as the left hand side variables, and then in the last regression, the reverse causation is estimated where retail price changes are the dependent variable and the positive and negative price changes at wholesale as independent variables.

From the estimated equations, two hypotheses of price asymmetry were tested for Philippine rice. The first null hypothesis validated in this paper is whether the total effect of rising prices

equals that of falling prices specified as:

$$H_o^1 : \sum_{i=1}^{k} \theta_1 POS_{t-i}^j = \sum_{i=1}^{k} \pi_1 NEG_{t-i}^j \qquad (4)$$

against the alternative hypothesis that price response to increasing and decreasing prices are asymmetric:

$$H_A^1 : \sum_{i=1}^{k} \theta_1 POS_{t-i}^j \neq \sum_{i=1}^{k} \pi_1 NEG_{t-i}^j \qquad (5)$$

The second null hypothesis tested is whether the speed of adjustment is the same for price increases and price decreases specified as:

$$H_0^2 : \theta_1 = \pi_1, \theta_2 = \pi_2, \theta_3 = \pi_3, \ldots\ldots\ldots \theta_{t-k} = \pi_{t-k} \qquad (6)$$

against the alternative hypothesis that the response to rising prices occurs much quicker than to falling prices:

$$H_A^2 : \theta_1 \neq \pi_1, \theta_2 \neq \pi_2, \theta_3 \neq \pi_3, \ldots\ldots\ldots \theta_{t-k} \neq \pi_{t-k} \qquad (7)$$

Each of these hypotheses is tested separately using a joint F test statistic on all coefficients specified on the right hand side of equation (1). Failure to reject these two hypotheses would indicate price symmetry and a very flexible market. Symmetric prices would likewise confirm that Filipino rice traders use cost plus pricing in valuing the rice they sell in the market.

RESULTS AND DISCUSSION

Table 3 summarizes the results of the symmetry tests for two statistically significant price relationships: one specifies the wholesale price changes as the dependent variable, and the positive and negative price changes at the farm as independent variables; the other specifies retail as the dependent variable and the positive and negative price changes at wholesale as independent variables. The results for the subperiods 1973-1985 and 1986-1996, as well as

Table 3. Results of the symmetry test across the vertical marketing channels for Philippine rice.

Tests	All periods (1973-1996)		1973-1985		1986-1996	
	W -> R	F -> W	W -> R	F -> W	W -> R	F -> W
Overall F-Statistic	6.70***	1.82*	9.78***	6.41***	2.68***	1.55*
Coefficient of determination, R^2	0.33	0.09	0.56	0.45	0.29	0.17
Cumulative price effects:						
Rising prices	0.01	0.02	0.85	0.44	0.75	0.02
Falling prices	-0.03	-0.03	-0.63	-0.44	-0.76	-0.02
Symmetry test: [a]	0.41 ns	0.07ns	0.008 ns	1.81ns	1.02 ns	0.03ns
Response time (months) to:						
Rising prices	3	1	2	2	2	1
Falling prices	3	1	2	2	2	1
Speed of response test: [b]	16.21***	0.05 ns	0.33ns	7.50 ***	5.62 ***	2.03 *
Seasonality effects	1.02^{ns}	2.05 ***	0.80^{ns}	2.19 ***	1.66 *	1.92 *

Source of basic data: BAS (1997)
Note: The direction of the arrow indicates that causation originates from the left variable to the right variable.
*** Statistically significant at 1% level.
** Statistically significant at 5% level.
* Statistically significant at 10% level.
ns = not statistically significant.

for the entire 1973-1996 period are presented in the table.

Overall, estimates of the coefficients of determination, R2, from Table 3 reveal a reasonably good fit with values ranging from 0.09 to 0.56 and highly significant overall F values for each of the estimated equations, indicating high explanatory power of the models specified. These significant causal relationships indicate that market shocks generally start at the farm, which are then transmitted to the wholesale market and finally, to the retail market. These findings are consistent with those obtained by Ward (1982), Heien (1980) and Miller (1979). Results in Table 1 also show that most of the coefficients on the right hand side of equation (1) have the expected signs and are statistically significant, thereby, lending greater confidence on the results of the symmetry tests conducted.

Estimates for the entire 1973-1996 period presented in the first two columns reveal a higher explanatory power in the wholesale and retail price relationship as shown by the coefficient of determination being equal to 0.33 when compared to 0.09 in the price relationship between the farm and wholesale levels. This simply means that price changes at retail can be better explained by decreasing and increasing changes in wholesale prices while the effects of positive and negative changes in farm prices exert a rather weak influence on price changes at wholesale. Results of the symmetry tests for this period as shown in the fifth row indicate that the effect on retail prices of rising wholesale prices is not significantly different than those of falling wholesale prices. That is, there is no statistical difference between the cumulative sum of the coefficients associated with positive wholesale price changes being equal to 0.01 and falling wholesale prices at 0.03 on price changes at the retail level. Similarly, increasing farm prices at 0.02 and decreasing farm prices at 0.03 is not significantly different and exert the same effect on changes in wholesale prices.

The speed by which adjustment occurred between these market pairs, however, varies for the 1973-1996 period. Results of the F tests conducted show that the positive and negative farm price changes are transmitted as positive and negative changes in

wholesale prices within one month while changes in wholesale prices take three months to effect a change in retail prices. Within each market pairs, results reveal that wholesale prices adjust to rising and falling farm prices within the same period of one month. In contrast, retail prices seem to adjust more quickly to rising wholesale prices than to falling wholesale prices. These findings suggest that retailers take more time to adjust to a market disturbance emanating from the wholesale market while wholesalers tend to react more rapidly from shocks at the farm level.

To determine if the dynamics in price relationships between the significant market pairs differ under varying degrees of government control, the 1976-1996 period was subdivided into two periods: 1973-1985 as the period of control and 1986-1996 as the period of deregulation. The results of the estimation for these periods are presented in the third to the sixth columns in Table 3. For the 1973-1986 period, the coefficients of determination obtained for the farm and wholesale market pair, and the wholesale and retail market pairs are large—0.45 for the former and 0.56 for the latter—indicating high explanatory power for both market pairs. Price symmetry was validated for these market pairs in this period. Results of the symmetry tests show no significant difference between the effects of increases and decreases in price at the farm level on wholesale prices, 0.44. Similarly, price symmetry between the wholesale and retail rice markets cannot be rejected. This is validated by the F test statistic which showed that the cumulative effect of rising wholesale prices, 0.85, on retail prices is not significantly different from the cumulative effect of falling wholesale prices, 0.63.

Overall, the magnitude of the cumulative effects of wholesale prices on retail prices are larger than the effects of farm prices on wholesale prices. These findings show a greater sensitivity of retail prices to upward and downward changes in price at the wholesale market compared to the reaction of wholesale prices to positive and negative price shocks at the farm level. Table 3 reveals that retail prices would increase by as much 0.85 centavos for a P1.00 increase in wholesale prices that occurred over a period of two months, while

wholesale prices will increase by only 0.44 centavos for a P1.00 (peso) increase in farm prices over the same period. Total cumulative effects to ascending and descending prices are, however, less than unitary, suggesting that Filipino rice wholesalers and retailers do not over-react to either favorable or unfavorable changes in the farm and wholesale markets.

While adjustment in these significant market pairs takes the same time, two months, results of the F test statistic on the speed of market within each of these market pair show a different pattern. For instance, retail prices were found to adjust to positive and negative changes in wholesale rice price at the same time, two months. In comparison, increases in farm prices are relayed as changes in wholesale prices more quickly—within a month—than the decreases in farm prices which occur in two months.

Price symmetry was likewise observed in the 1986-1996 period when the government liberalized its domestic rice policy. This finding is supported by insignificant results of the price symmetry tests between the wholesale and retail market pair and between the farm and wholesale market pair. Estimates of the cumulative price effect disclosed that retail prices will respond equally at 0.75 to rising and falling wholesale prices. On the other hand, wholesale prices will change by as much as 0.02 to both increases and decreases in the farm level. As in the early period, the difference in the magnitude of the cumulative price effects, however, indicate a highly susceptible retail market as compared to the wholesale market. There is also no excessive price response to falling or rising prices detected at either the retail market or the wholesale market during this period, as validated by the cumulative price effects being less than one.

As also shown in Table 3, results on the binary variables included in equation (1) for the entire 1973-1996 period disclose a pronounced seasonality pattern in rice prices in the Philippines, particularly at the wholesale market, as indicated by statistically significant F test statistics. Seasonality was not observed for retail prices during this period. Results on the seasonality test between the 1973-1985 and 1986-1996 periods, however, were mixed. Wholesale prices exhibited

a statistically significant month-to-month fluctuation during the early period while no seasonality was found for retail prices. In contrast, seasonality was observed at the wholesale and retail prices in the latter period which suggests that the withdrawal of government control in the rice sector in 1986-1996 period accentuated the fluctuation in rice prices from month to month during said period. These findings seem to affirm the strength of the government's efforts in insulating the Filipino consumers from short-term seasonal fluctuations in rice prices.

CONCLUSION AND POLICY IMPLICATIONS

Many Filipinos commonly blame rising rice prices in the Philippines on market power allegedly exercised by a handful of unscrupulous traders in the local rice market. According to popular belief, this market power allegedly enables traders to exploit abnormal market conditions by hiking prices unnecessarily to the disadvantage of the consumers while remaining resistant to adjusting prices downwards when market conditions become favorable. This paper presents evidence that point to the contrary and that these allegations are largely unfounded.

Results show that market shocks originate at the farm level which are then transmitted as price changes at the wholesale market, before being finally reflected as price changes at the retail market. However, retail prices tend to be more sensitive to price changes at the wholesale market than wholesale prices are, to changing conditions at the farm level.

Between periods, the magnitude of price response across market channels was more pronounced during the 1973-1985 period when the rice market was heavily regulated by the government than in the 1986-1996 period when the rice market was liberalized. Cumulative price effects on rising and falling prices between market pairs are larger in the early period than in the latter period, suggesting a more volatile market situation when the government was active in the local rice market.

Overall, results of the symmetry tests cannot confirm the

presence of market power among Filipino traders. Statistically insignificant results of the price symmetry tests validate the price symmetry hypothesis that Filipino rice traders respond similarly to a rise and fall in rice prices in the market. This implies that traders adjust their prices upwards when they experience an increase in costs while similarly passing on savings to consumers as price discounts when prices are falling. There is no evidence to support the popular contention of many Filipinos that traders over-react to unanticipated market news as the magnitude of the cumulative effects of rising and falling prices at any point on the market channels are less than one. These results contradict popular allegations that Filipino traders exploit a market crisis by inflating prices unnecessarily. This may be because traders tend to be vigilant over their stakes on an already very fragile local rice market. The presence of social sanctions against dishonest traders, along with ready access to a broad network of verifiable private market information may likewise effectively deter Filipino traders from exploiting a market crisis, even when a few have some degree of control in the local trading of rice. Thus, even if profit-making market opportunities for arbitrage exist in some markets, traders are unable to exploit them to the disadvantage of the Filipino consumers.

Results of the price symmetry model estimated for the subperiods further show that the concern shared by many that market chaos will result should the government withdraw from the rice market is unwarranted. Findings validate that price responses to increasing and decreasing rice prices are symmetric and less volatile even in the absence of government regulation of the rice market.

The findings of price symmetry also confirm that Filipino traders employ a constant margin in valuing rice. This cost plus pricing strategy suggests that traders maximize their profits by adjusting prices upward in response to cost increases, and then downwards when there are cost savings.

However, although response to increasing and decreasing prices is equal, the response time of the market to these changes differs.

Generally, consumers will experience cost increases in the form of price hikes much more quickly, whereas the benefits from cost savings from price reductions will take some time before they are reflected as price discounts. But this result alone is not sufficient evidence to indicate that traders are able to exert market power as there are some factors that could delay the timing of their response to market news. A plausible explanation is that traders may perceive regular increases as permanent changes and, therefore, would be most likely to immediately pass these on to consumers as price increases. Declining prices are experienced less frequently and may be perceived by traders as temporal and therefore, would decrease their prices only after some period of time, making the necessary adjustment only when they feel that the market has settled. Overall, markets take more time to adjust to changing market conditions, about one to three months, which is significantly longer than the time necessary to ship rice between major ports in the Philippines. This slow response may also be attributed to the presence of market impediments rather than to market power. Factors such as the country's heavy dependence on costly and irregular inter- and intra- island transportation to bring rice from surplus areas to deficit areas and poor roads to better link production points and market destinations may slow down price response considerably. This retarded market response can occur even if traders can immediately move enough rice out of storage. The existence of these bottlenecks in the market place emphasize the Philippine governments' important and continuing role in increasing public investments in providing these services in the market, most especially in areas where the private sector is unable to take over.

Overall, the findings obtained in this paper contradict the popular local belief that Filipino rice traders scrupulously take advantage of an impending market crisis. Price hikes are passed on to consumers in the form of high prices, and favorable prices are equally passed on as price discounts. However, there is some delay

in how these prices are transmitted in the market as inflationary prices tend to persist for some time than decreases in prices. The persistence of inflationary prices due to constraints in infrastructure and transportation support in the market, if allowed to fester, has serious implications for the country's poor. High prices, if allowed to linger for some time, could jeopardize food consumption and a balanced nutritional intake of poor households. Prolonged delay in the delivery of rice due to poor inter-island shipping and intra-island road and transportation networks and ill-timed importation schedules further aggravates chronic rice shortages already being experienced by many Filipinos, especially those in deficit and remote areas, and in areas where markets are still missing.

REFERENCES

Akaike, H. 1969. Fitting Autoregressive Models for Prediction. *Annals of Institute of Statistical Mathematics* 21:862-839.

Balisacan, A.M. 1989. The Human Face of Poverty During a Period of Macroeconomic Adjustment, 17-47. In Perspective on Philippine Poverty. Quezon City, Philippines: University of the Philippines Press.

Balisacan, A.M., R.L. Clarete and A.M. Cortez. 1992. The Food Problem in the Philippines - Situation, Issues and Policy Option. Quezon City: Philippines: University of the Philippines.

Barker, R., R. Herdt and B. Rose. 1985. The Rice Economy of Asia. Los Baños, Laguna: International Rice Research Institute.

Baulch, B. 1997. Transfer Costs, Spatial Arbitrage, and Testing for Food Market Integration. *American Journal of Agricultural Economics* 79:477-487.

Bouis, H. 1990. Evaluating Demand for Calories for Urban and Rural Populations in the Philippines: Implications for Nutrition Policy Under Economic Recovery. *World Development* 18:281-299.

BAS (Bureau of Agricultural Statistics). 1997. Rice Price Data. Mimeograph. Quezon City, Philippines: Department of Agriculture.

Heien, D.M. 1980. Markup Pricing in a Dynamic Model of the Food Industry. *American Journal of Agricultural Economics* 62:10-18.

Manila Times. November 1998.

Mendoza, M. and M.W. Rosegrant. 1995. Pricing Behavior in Philippine Corn Markets: Implications for Market Efficiency. International Food Policy Research Report 101, Washington, D.C.: International Food Policy Research Institute.

Miller, S. 1979. The Response of Future Prices to New Information: The Case of Live Hogs. *Southern Journal of Agricultural Economics* 11:67-70.

Silvapulle, P. and S. Jayasuriya. 1994. Testing for Philippines Rice Market Integration: A Multiple Cointegration Approach. *Journal of Agricultural Economics* 45:369-380.

Ward, R. 1982. Asymmetry in Retail, Wholesale, and Whipping Point Pricing for Fresh Vegetables. *American Journal of Agricultural Economics*: 205-212.

Wolffram, R. 1971. Positivistic Measures of Aggregate Supply Elasticities: Some New Approaches - Some Critical Notes. *American Journal of Agricultural Economics* 53: 356-359.