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PHILIPPINE RICE SUPPLY DEMAND PROSPECTS AND POLICY IMPLICATIONS*

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INTRODUCTION

Rice continues to be the most important commodity in the Philippines accounting for about 15 percent of gross value added in agriculture It is grown on nearly two thirds of the country s arable land and is a major source of livelihood among many small farmers and agricultural landless households Rice also remains to be main staple food contributing 35 percent of the population s total calorie intake on average and as much as 60 65 percent of the households in the lowest income quartile Rice constitutes about 11 percent of total household expenditures and double that ratio among the poor hous holds

With the political and economic importance of rice in the country the rice sector has historically been the central focus of government agricultural policy Government interventions have been aimed to achieve several often conflicting objectives — to stabilize prices raise farm

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incomes, provide low prices to consumers, and attain rice self-sufficiency in pursuit of food security.

Over the past three decades, however, the level and nature of these government interventions and the relative importance of policy objectives have changed in response to changes in the domestic rice demand and supply factors, the macroeconomic environment, and the political economy forces. Likewise, changes in the world rice and fertilizer markets and technological developments through public and private international research have had an equally important impact on the performance of the Philippine rice economy and in shaping the nature of government interventions.

This paper aims to analyze the changes in the Philippine rice economy during the past three-and-a-half decades, and to evaluate the policy options in light of the prospective rice supply and demand situation over the next decade and beyond.

POLICY FRAMEWORK

A variety of policy instruments have been adopted to achieve rice policy objectives, i.e., price intervention policies to influence the incentive structure, public expenditures for irrigation, research and extension to increase productivity, and land reform to improve distribution of factor incomes from rice farming.

Price Intervention Policies

Domestic rice prices have been directly influenced by the government monopoly on international trade and domestic marketing operations under the National Food Authority (NFA). The NFA sets the level of rice imports or exports based on the estimated gap between rice production forecast and projected demand to ensure adequate rice supply at politically acceptable price levels. Domestic marketing operations are then undertaken to defend a uniform official farm floor price and retail ceiling price across seasons and geographic regions.

Except in the case of fertilizers, import tariffs and advance sales tax were the policy instruments directly affecting domestic prices of tradeable inputs such as pesticides and farm machineries. The advance sales tax was abolished in 1986, thereafter leaving only the import tariffs to continue driving a wedge between domestic and border prices of tradeable inputs. Quantitative trade restrictions imposed on fertilizers in the early 1970s were also lifted in 1986.

Price incentives are affected not only by those commodity-specific policies, but indirectly — and often more importantly — by economy-wide policies that distort the exchange rate. The domestic currency had been overvalued due to the industrial protection system and the unsustainable deficits in the external account that were temporarily defended by foreign borrowing and/or expansionary macroeconomic policies.

The impact of price intervention policies on price incentives from 1960-1994 are shown in Table 1. The trends in the nominal protection rates (NPR)[1] for rice, fertilizer, pesticides, and agricultural machineries measure the impact of commodity-specific policies on their respective domestic prices. The trends in effective protection rates (EPR)[2] measure the combined effects of output and input price policies on the value added of rice production. The effect of exchange rate distortions (ERD) on rice value added is reflected by the net effective protection rate (NEPR).

Overall, price intervention policies have not been favorable to the rice sector. The government output price interventions have been aimed mainly at insulating the domestic market from extreme price fluctuations. NPRs for rice varied greatly over time and averaged about 9 percent between 1960 and 1994. Figure 1, which depicts the trends in domestic and border prices in nominal and real terms, shows that domestic prices of rice are more stable than their corresponding world prices. However, domestic prices have

1. NPR is the percentage difference between domestic and border price converted at the official exchange rate. The order price represents the price that would have prevailed without government. intervention.

2. EPR is the percentage difference between valued-added and domestic border prices converted at the official exchange rates.

TABLE 1

Trends in Nominal Protection Rates (NPR) of Rice, Urea, Pesticides, and Farm Machineries, Degree of Exchange Rate Distortion (ERD), and Effective (EPR) and Net Effective Protection Rates (NEPR) of Rice, Philippines, 1960-1994 (In %)

	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994
NPR[a]							
Rice	38	10	-1	-11	-8	11	25
Urea	49	55	-13	28	21	11	16
Pesticides	24	24	29	35	35	20	12
Tractors							
2 wheel	24	20	21	46	46	30	28
4 wheel	24	20	21	24	24	10	10
Threshers	24	24	24	24	24	30	28
EPR	32	7	-3	-18	-15	-10	6
ERD[b]	-20	-20	-20	-27	-27	-27	-36
NEPR	12	-13	-23	-45	-42	-37	-30

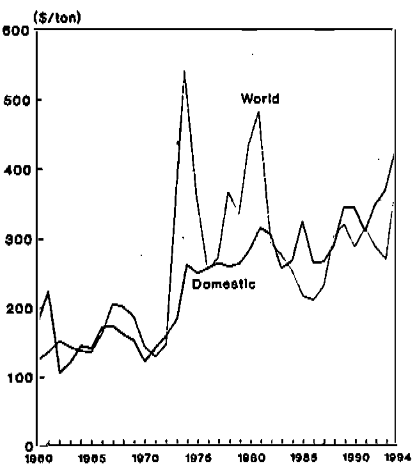
[a]For rice, NPR is percentage difference between domestic wholesale price and Thai 35% brokens FOB Bangkok raised by 20% to adjust cost of insurance and freight; for urea this is the percent difference between ex-warehouse price and CIF import unit value raised by 5% to adjust for domestic transport cost. NPR for other inputs are based on book tariff rates; from 1960-1984 this also includes an advance sales tax (10% and 25% mark-up that was abolished in 1986).

[b]1960-1989 from Intal, P. and J.H. Power (1991). The figures for 1990-1994 were from the ADB study on "Comparative Advantage of Estate Crop Production: Selected Asian Countries."

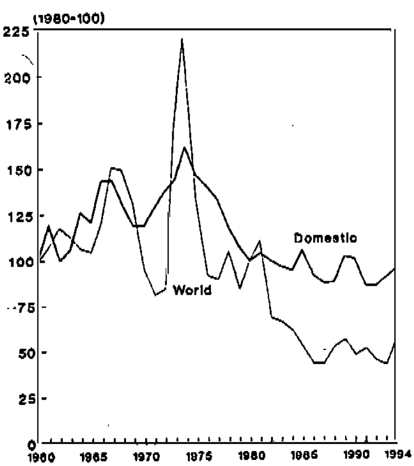
FIGURE 1

Trends in Nominal and Real Domestic and World Price of Rice, Philippines, 1960-1994

NOMINAL



REAL



generally followed the general trends in world prices. It is somewhat too early to interpret whether the rising NPR for rice since the 1980s is a sign of growing protectionism in developed countries, or whether it is simply an adjustment mechanism to cushion the adverse effects on rice farmers of the secular drop in the world price of rice. It should be emphasized that the downward trend in real domestic price had not been reversed by the increasing NPRs since 1980.

The common belief that government input price policy is intended to increase farm incentives is not borne out by the pattern of NPRs. Tradeable inputs have generally received higher protection rates than rice output and thus, the EPRs have been negative or low for most of the period. With trade liberalization and tax reforms in the 1980s, NPRs for tradeable inputs have generally declined leading to a small positive EPR for rice in the early 1990s. When the impact of economy-wide policies on the exchange rate is taken into account, the NEPRs for rice have been significantly negative since the mid-1960s. Indeed, distortions in the exchange rate turned out to be an even more important source of bias against incentives to increase rice production than commodity-specific policies.

Therefore, whether and to what extent price intervention policies will become more or less favorable to rice production depends significantly on the overall progress of trade liberalization. With the growing acceptance of the principles of a more open economy and the country's membership in the World Trade Organization (WTO), there are prospects for lower input prices, less distorted exchange rates, and slightly higher world rice prices. Under the WTO agreement, the country is allowed to maintain quantitative trade restrictions in rice for the next ten years. Moreover, the fact that the minimum access requirement for rice imports is very low (50,000 mt) means that the future nominal protection rate on rice will continue to depend on domestic political economy factors and not necessarily conditioned by the trade liberalization policies under the WTO.

Public Expenditure Policies

Public expenditures for the rice sector are allocated to irrigation development, research and extension, cost of output and input price interventions, and cost of the land reform program. This section will focus on irrigation and research and extension, in which public expenditures will have a direct impact on future rice production. The land reform program by and large, has been implemented in the 1970s and no major impact on future production is likely to occur. The impact of government interventions on output and input prices depends not so much on their budgetary cost, but on how much input and output prices are affected. Nonetheless, the budgetary cost of NFA operation is reported in this section to show how budget reallocations within the rice sector may contribute to production growth.

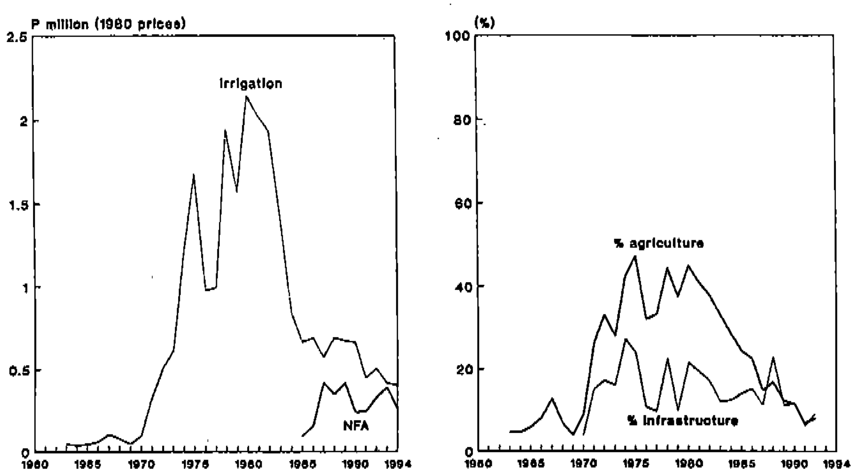
Irrigation

Irrigation in the Philippines has been predominantly the gravity type which typically requires collective investment, operation, and maintenance. About half of the irrigated area is under the communal-run-of-the-river gravity irrigation systems that service less than 1,000 hectares. For these systems, the government provides no-interest loans for capital investments amortized over 50 years; however, farmers' irrigators associations are responsible for their operations. The larger-sized national irrigation systems which are constructed, operated, and maintained by the government account for about 40 percent of irrigated area. Although irrigation fees are charged, actual collections do not fully cover the cost of operation and maintenance. Shallow and deep tube well pump systems, which service about 10 percent of irrigated area, are mostly funded privately.

Fig. 2 depicts the trends in public expenditures in real terms for irrigation; as a point of comparison, the trends in public expenditure for NFA market operations in recent years are also shown. The priority accorded to irrigation expansion in the 1970s up to the early 1980s is clearly indicated. At its peak in 1979-1980, expenditures for irrigation increased by 15 times more than the levels in the 1960s. Irrigation expenditures accounted for

FIGURE 2

Trends in Public Expenditures for Irrigation, Market Interventions (NFA), and Irrigation Expenditure as Ratio to Infrastructure Investments and Public Expenditure for Agriculture, Philippines, 1960-1994



over 40 percent of total public expenditure for agriculture and nearly 20 percent of total spending in infrastructure. More than 90 percent of irrigation expenditure was allocated to national irrigation systems. Although irrigation investments have been historically the main policy instrument to increase yields and cropping intensity, the introduction of modern rice varieties that were suited to irrigated and dry season conditions as well as the high world rice prices largely explain the acceleration of irrigation investments during this period (Hayami and Kikuchi 1978).

With the sharp drop in world rice prices, foreign debt problems, and severe budgetary squeeze from the early 1980s, public expenditures for irrigation fell sharply in real terms as well as in proportion to the total infrastructure budget and the total public expenditure for agriculture. As will be noted in a later section, irrigated crop area continued to increase up to 1990 despite the sharp fall in irrigation expenditures. This is not only due to the long gestation period of irrigation investments, but also to the shift in irrigation investments from the large national irrigation systems to the expansion of communal irrigation and rehabilitation of existing irrigation systems.

Research and Extension

The Philippines has had a fairly early history of public efforts to raise productivity through rice research and extension. From the early post-war period up to the early 1970s, improved rice varieties bred by the Bureau of Plant Industry and the University of the Philippines at Los Baños gained modest acceptance. As the high-yielding, semi-dwarf, and fertilizer- responsive modern varieties developed at the International Rice Research Institute (IRRI) began to be widely adopted, however, national rice research was phased out by the early 1970s. The government then believed that IRRI can adequately serve the rice research needs of the country, and the former's scarce budgetary resources could be better allocated to extension and research on other agricultural commodities. Indeed, extension efforts were strengthened through production programs that included supervised credit, occasional fertilizer subsidies, and subsidized seeds (the so-called Masagana 99 Program).

With the achievement of rice self-sufficiency by the late 1970s, the drop in world prices of rice, greater budgetary constraints, and the slow-down of technological development, public support for rice production programs also dwindled. It was not until the late 1980s, when the country resumed importing rice, that the government decided to develop a national rice research program through the establishment of the Philippine Rice Research Institute (PHILRICE). Before the 1980s, the priority on irrigated and favorable rainfed lowland areas pursued by IRRI was generally consistent with the Philippine environmental conditions. But with IRRI's shift in research priority toward upstream or strategic research and toward unfavorable environmental conditions which were more predominant in other countries, national rice research has become imperative to maintain applied research on the irrigated and favorable areas. Moreover, national rice research which tends to be highly location specific, should have comparative advantages in research on crop management and on the unfavorable areas.

Public Investments Prospects

With continued high population growth, limited land resources, and rapid urbanization, prospects for growth in rice output depend critically on the potentials for productivity growth. The latter, in turn, depends to a large extent on public investments in irrigation and rice research. Studies show that given the prevailing low world rice prices, socially profitable investments in irrigation would be confined to the construction of smaller-sized irrigation projects and selective rehabilitation of existing irrigation systems (World Bank 1991; Rosegrant et al. 1986). David (1992) also argues that government assistance on aquifer characterization and drilling technology improvements will promote private sector investments in shallow tube well irrigation. Despite the government's apparent strong support for irrigation as embodied in the recent passage of the Irrigation Act which sets an ambitious target of irrigation expansion, the intent to accelerate irrigation investments remains largely rhetorical. And it seems unreasonable to expect that current budgetary allocation for irrigation will increase significantly. This is not only because of very modest estimated social rates of returns on irrigation projects but more importantly, investments in market infrastructure, education, health, water, energy, and peace and order are perceived to have higher social rates of return.

While there are no *ex ante* estimates of social rates of return for rice research, there is a higher probability of substantially raising budgetary resource for this, simply because the current allocation is so low. A potentially successful strategy for increasing budgetary allocation would be to argue for a reallocation of budget within the rice sector away from supporting NFA operations toward productivity enhancing investments in irrigation and rice research. NFA budgetary cost is averaging about half of irrigation expenditure and over 10 times rice research expenditures. Yet, the government rice pricing policy can be achieved more efficiently by using indirect instruments, such as tariffs, rather than dissipating scarce government revenues on the administrative cost of direct market interventions.

Performance of the Rice Economy

Dramatic changes in the Philippine rice economy have occurred over the past three decades. Before the introduction of the modern rice technology in 1966, rice production was growing at rates (2.1%), below that of the population growth (Table 2). Between 1965 and 1980, the yearly growth rate of rice production accelerated to 4.6 percent on average, and the country turned from being a net importer of 5 percent to 10 percent of its annual rice requirements to being self-sufficient, and even a marginal rice exporter by the late 1970s (Table 3). Moreover, the rising trend in the real price of rice observed during the early 1960s shifted to a long-term decline after the mid-1970s (Fig. 5).

The strong growth performance in the late 1970s, however, was not sustained into the 1980s. Growth in rice production (1.9%) again fell to a rate below the population growth rate which remained at a high level of 2.3

TABLE 2
Growth Rates of Palay Production, Area, and Yield by Production Environment, 1960-1994 (In %)

	1960-1965	1965-1980	1980-1994
Total			
Production	2.1.	4.6	1.9
Area	1.6	1.2	-0.1
	(76)	(26)	(-5)
Yield	0.5	3.4	2.0
	(24)	(74)	(105)
Irrigated areas			
Production	5.4	6.5	3.4
Area	5.3	2.6	2.1
	(98)	(40)	(62)
Yield	0.1	3.9	1.3
	(2)	(60)	(38)
Rainfed areas[a]			
Production	0.8	3.7	-0.8
Area	1.0	1.2	-2.6
	(125)	(32)	(-125)
Yield	-0.2	2.5	1.8
	(-25)	(68)	(225)
Upland areas			
Production	-1.0	0.4	
Area	-1.6	-1.7	
	(160)	(-425)	
Yield	0.6	1.3	
	(-60)	(325)	

[a] Data for rainfed and upland areas have been combined since 1980.

TABLE 3
Trends in Rice Production, Imports, and Per Capita Availability, 1960-1994

Year	Rice Production (000 mt)	Net Imports (000 mt)	Availability per capita (kg/cap)
1960	2,318	-2	84
1961	2,474	118	91
1962	2,557	-	87
1963	2,536	256	95
1964	2,538	300	97
1965	2,613	339	93
1966	2,653	108	86
1967	2,811	310	98
1968	2,893	-15	83
1969	3,179	-1	87
1970	3,459	-2	91
1971	3,416	379	101
1972	3,324	451	98
1973	3,501	308	96
1974	3,607	165	91
1975	4,148	147	100
1976	4,253	55	99
1977	4,715	-15	112
1978	4,688	-47	111

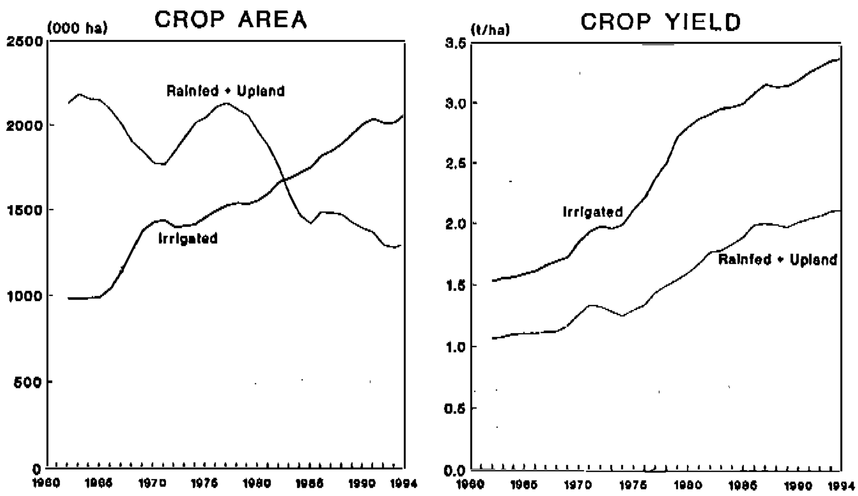
TABLE 3 (Continued)

Year	Rice Production (000 mt)	Net Imports (000 mt)	Availability per capita (kg/cap)
1979	4,995	-127	110
1980	4,970	-231	95
1981	5,142	-83	101
1982	5,417	-0	109
1983	4,742	-40	81
1984	5,089	190	97
1985	5,724	541	122
1986	6,010	-	110
1987	5,551	-	92
1988	5,831	151	101
1989	6,148	209	103
1990	6,058	593	113
1991	6,288	-10	102
1992	5,934	-30	88
1993	6,132	210	93
1994	6,850	-	99

Sources: Bureau of Agricultural Statistics.
National Census and Statistics Office.

FIGURE 3

Trends in Palay Area and Yield, Total and by Production Environment, Philippines, 1960-1994 (3-year moving average)



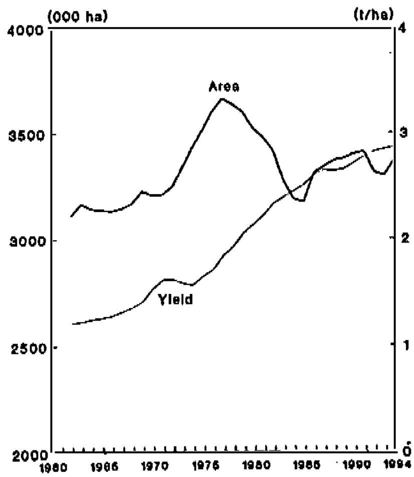
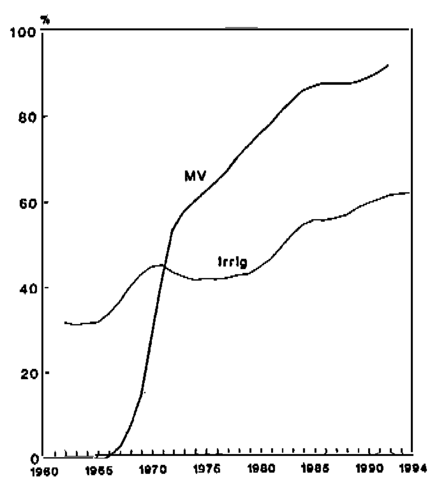


FIGURE 4

Trends in the Adoption of Modern Varieties and Rate of Irrigated Area, Philippines, 1960-1994 (3-year moving average)



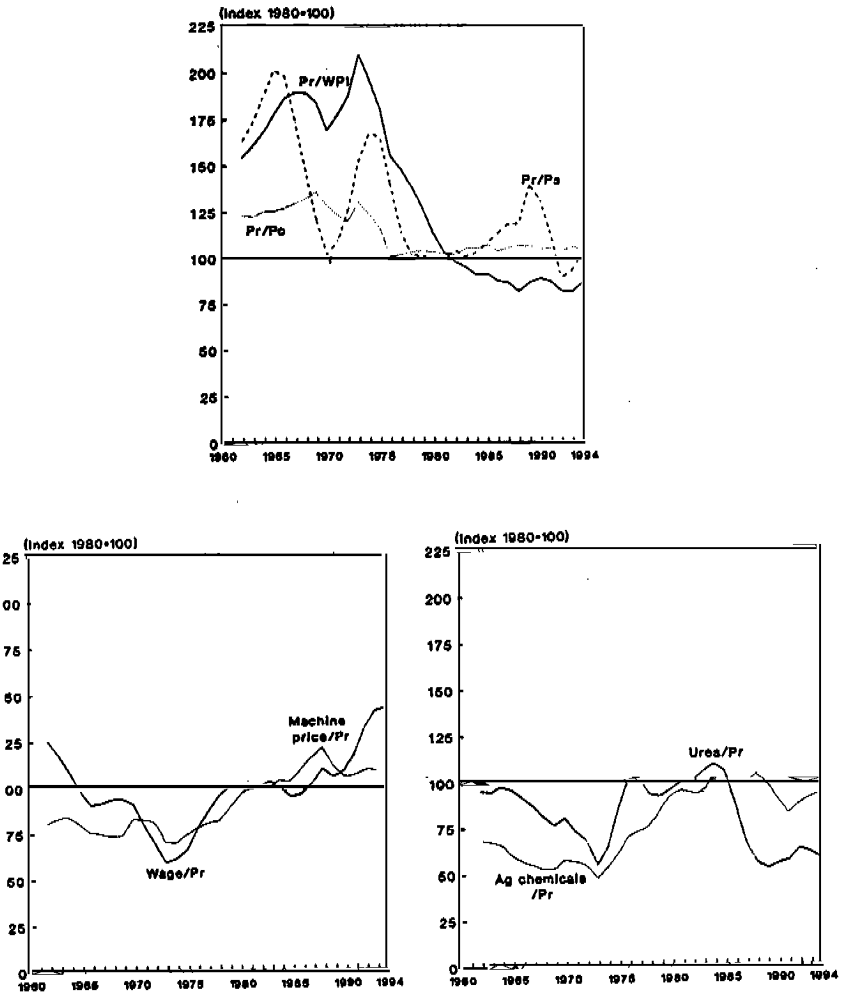


FIGURE 5

Trends in Relative Price of Rice (Pr) to the Whosale Price Index (WPI), Corn (Pc), Sugar (Ps), and Relative Prices of Farm Inputs to Rice Price, Philippines, 1960-1994 (3-year moving average)

percent. Consequently, the country resumed being an importer of rice in 1984 and continued to do so in six out of the past 11 years. It should be emphasized that, despite the slowdown in domestic rice production, the fall in the real rice price which began in the mid-1970s continued to a point where in the early 1990s it was only about 50 percent the average level in the 1960s. Furthermore, the proportion of imports to total production is on the average lower in 1984-1994 (less than 2.8%) compared to the 1960s (5.4%). The fact that rice imports have not risen more rapidly despite the lower growth of rice production than population suggests a declining average per capita demand for rice in recent years.

Nature of Production Growth

Three distinct phases characterize the nature of growth in rice production since the post-war period (Table 2 and Fig. 3). Before 1965, three-fourths of the growth in rice production was accounted for by increases in crop area, mainly through the opening up of the cultivation frontier. In contrast, the acceleration of growth in rice production between 1965 and 1980 was achieved primarily through greater productivity. Yield doubled as the annual growth rate increased sharply from 0.5 percent in 1955-1965 to 3.4 percent in 1965-1980. Increases in yield accounted for nearly 80 percent of production growth, which was more than twice its contribution during the previous period. Crop area planted to rice continued to expand, but at a lower rate and mostly by increasing cropping intensity.

After 1980, the growth rate of production declined as crop area expansion halted and yield growth fell to 2.0 percent. In fact, increases in the area planted due to increases in rice cropping intensity merely offset the decline in physical land area planted to rice in rainfed lowland and upland areas. Thus, growth in rice production became completely dependent on yield growth during this period.

The changing trends and nature of growth in rice production is consistent with the trends in technological change, irrigation development, price incentives, and the shifts in crop area planted to rice between favorable and less favorable growing production environment (see Figures 3 to 5). Yield and crop area grew rapidly between 1965-1980 due to irrigation expansion, widespread adoption of MVs, and highly favorable output and input prices. By the 1980s, real rice price has dropped quite sharply, adoption of MVs has levelled off, expansion of irrigated area slowed down, and except for fertilizers, input prices had risen relative to rice prices. Rainfed and upland rice crop areas contracted substantially as rice production ceased to be profitable at the low real prices in these less favorable environments.

It is interesting to note, however, that despite these adverse developments and rapidly increasing land prices, rice production grew modestly, at rates close to the pre-Green Revolution period. Moreover, real rice price remained low, even as average rice imports were kept relatively low. This suggests that there are other technological improvements occurring that can only be reflected by measures of total productivity indices. Evidently also, growth in demand for rice is slowing down.

Indeed, there are several major technological advances raising productivity (lowering cost per unit of output) that cannot be easily measured because of both conceptual and data problems. For example, the changing quality of MVs is not reflected in the adoption rate variable. Later generation MVs had better eating quality, greater resistance to major pests and diseases, shorter growth duration, and more tolerance to adverse environmental conditions, all contributing to increasing the total factor productivity. The introduction of herbicides together with rising wages led to the widespread adoption of direct seeding, a labor-saving technology. Adoption of integrated pest management has lowered the cost of production and has also reportedly increased yields. Farmers' education and management know-how are also improving.

Changing Demand Patterns

Demand for rice depends on its own price, prices of related commodities, population growth, changes in the urban ratio, and changes in income. Fig. 6 illustrates the trends in these variables (except for population which grew at about 2.3%), together with the trends in the per capita availability of rice as an indicator of demand or consumption of rice per capita. The rate

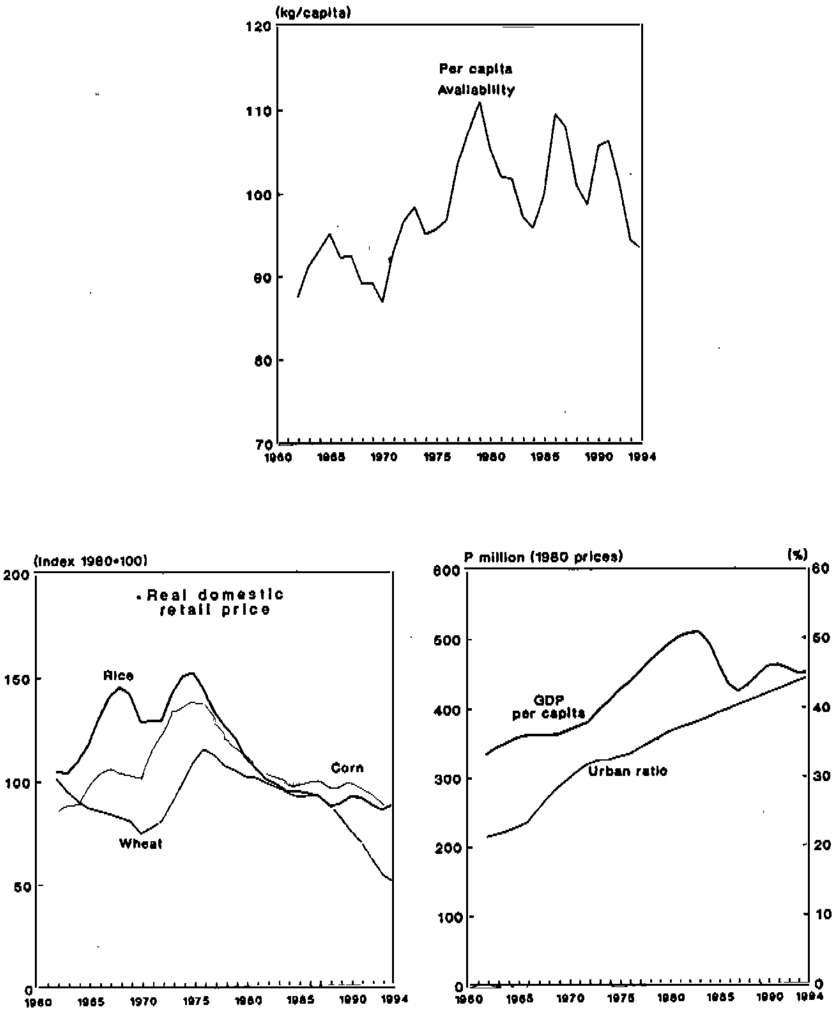


FIGURE 6

Trends in Per Capita Availability of Rice, Real Domestic Retail Prices of Rice, Corn, and Wheat, Real GDP Per Capita, and Urban to Total Population, Philippines, 1960-1994 (3-year moving average)

of population growth largely determines the growth in total rice demand. Rapid growth in average income per capita prior to the 1980s has apparently raised consumption of rice per capita, despite the rising trend in own price, and increasing urban ratio that should have a depressing effect on demand for rice.

During the 1980s, however, consumption of rice per capita began to decline so that total rice demand grew at a slightly less rate than population growth. There are several explanations for this trend. Per capita income has declined from its peak in 1980, which would reduce demand for rice as the estimated average income elasticity for the whole economy remains positive. Since the average rice consumption per capita in urban areas is lower than in rural areas for a variety of reasons, the continued increase in the urban ratio after 1980 would lower demand for rice. It is also interesting to note the more rapid decline in domestic wheat price compared to rice price in real terms, which would promote the substitution of wheat for rice.This changing price relationship has been due both to the liberalization of wheat imports and the rising nominal protection rate for rice, even as the relative price of rice to wheat in the world market has not significantly changed.

SUPPLY-DEMAND PROSPECTS

Past Projections

Because of the perceived importance of rice self-sufficiency as a policy objective, projections of rice supply and demand have often been performed. Table 4 presents a summary of those projections in the recent past by Rosegrant et al. (1986), the World Bank (1991), and Balisacan et al. (1992). These are compared with the actual production, consumption, and imports in 1990 and 1995.

Several important observations can be made when past projections for 1990 and 1995 are compared with the actual levels of production, consumption, and imports. *First,* projected levels of rice production turned out to be significantly lower than actual levels. *Second*, projected demand for 1990

TABLE 4

Summary of Selected Projections of Rice Production, Consumption, and Imports, (000 mt)[a]

	1990	1995	2000	2005
Production				
Actual	6052[b]	6560[c]	-	-
Rosegrant et al.	5619	-	7238	-
World Bank	-	6115	6565	-
Balisacan et al.	5753	5985	6294	
Consumption				
Actual	6229[b]	6610[c]	-	-
Rosegrant et al.	5911	-	7613	-
World Bank	-	6717	7537	-
Balisacan et al.	-	6544	7369	8356
Imports				
Actual	160[d]	160[d]	-	-
Rosegrant	292	313	375	-
World Bank	-	602	972	-
Balisacan et al.	-	788	1407	2058

[a]Results of base runs.

[b]5-year average centered at year shown.

[c] Estimate based on growth trend of actual data from 1990-1994. The 1994 production figure is unusually high at 6850.

[d]Average imports from 1990-1994; average imports from 1985-1994 is 170,000 mt.

Sources: Balisacan, A.M., R.L. Clarete, A. M. Cortez. (1992). "The Food Problem in the Philippines: Situation, Issues, and Policy Options." Final Report submitted to the International Food Policy Research Institute.

Rosegrant, M.W., L. A. Gonzales, H.E. Bouis, and J.F. Sison (1986). "Price and Investment Policies for Food Crop Sector Growth in the Philippines." Draft Final Report of ADB Project, "Study of Food Demand/Supply Prospects and Related Strategies for Developing Member Countries of ADB," Phase II.

World Bank (1991). "Irrigated Agriculture Sector Review of the Philippines," Report No. 9848, Washington, D.C.

and 1995 was fairly close to actual levels despite the relatively simpler methodology used in the estimation of underlying demand relationship compared to what is now available. *Third*, projected import demand for 1990 and 1995 is significantly higher than actual average imports for 1990-1994 (as well as the average for 1985-1994) mainly because the production projections underestimated the actual values.

The fact that the projections underestimated the actual productions is due largely to the inadequacy of the modern variety adoption rate used as a proxy to technological change in these studies. As argued earlier, the MV adoption rate cannot adequately represent the complex nature of technological change. Changes in the characteristics of modern varieties (shorter growth duration, better eating quality, greater pest and disease resistance), improvements in the quality of inputs such as herbicides and better pest management and other crop management techniques, have continued to increase total factor productivity growth. Yet, MV adoption rate has an upper limit if 100 percent, and with the adoption rate already reaching more than 90 percent in the early 1980s, the assumed rate of technological change during the projection period was necessarily quite low. Evidently, however, the rate of technological change has been faster than can be adequately represented by the MV adoption rate. The use of rice research and extension expenditures may be more appropriate than MV adoption rate. But in the Philippines, there has been no significant rice research expenditure despite high rates of MV adoption because of the IRRI presence in the country. Time series data on rice-specific extension are not available. Furthermore, the impact of private sector innovations, such as the introduction of herbicides, will not be taken into account. Proper caution must simply be exercised on the interpretation of production projections.

Unlike the analysis of rice supply, the analysis of the nature of demand for rice in the Philippines has been more advanced analytically mainly because of data availability. Rice demand function based on complete demand system models has been estimated using time series aggregate data (World Bank 1991) as well as using a pooled time series-cross country aggregate data (Huang and David 1992). And more detailed specifications of rice demand functions estimated from complete demand systems have been possible with the use of the two nationwide household surveys. These are the Family Income and Expenditures Survey (FIES) periodically conducted by the National Statistics Office since 1957 used by Balisacan (1994) and the Food and Nutrition Research Institute (FNRI) consumption surveys in 1978, 1982, and 1987 used by Bouis (1991).

Supply-Demand Simulations

In this section, the Rosegrant-Rozen Food Crop Supply/Demand Simulation Model (Rosegrant and Rozen, 1993) is employed to assess the likely medium- and long-term patterns of food crop production, consumption and trade for rice, corn, sugarcane, coconut, and wheat in the Philippines. This model also permits the assessment of future food supply/demand balances under alternative policies on output and input prices, irrigation investment, and agricultural technology.

For the Philippine application of the model, three regions (Luzon, Visayas, and Mindanao), two locations (urban and rural), and four income groups (quartiles) are specified. Baseline data on production, consumption, income, and population reflect actual values in 1993; for net imports, the data are five-year averages. (These values thus reflect the effects of various policies, both economy-wide and sector-specific, prevailing in that year as well as in previous years.) Food demand parameters are based on estimates in Balisacan (1994). Supply-side elasticities are based on previous studies, including the authors' perception of the underlying production relationships in Philippine agriculture.

Owing to the very limited information on the responses of quasi-inputs (food crop land area, irrigation, extension) and technology (MV, crop intensification) to changes in relative sectoral incentives, factor endowments, and institutions, the authors opted to "close" the Rosegrant-Rozen model by specifying total crop area and technology as exogenous. To the extent that quasi-inputs and technology are policy choices, this introduces biases in the simulation results, but the other option of simply using "informed" guesses based on estimates for other countries is not necessarily more informative. Because of the absence of reliable data, it has not been possible to estimate econometrically the underlying determinants of investments in quasi-inputs and technology.

The following key assumptions are made for the base simulation:

(1) an average aggregate income growth of 3.0 percent a year for both urban and rural areas;
(2) an average population growth rate of 1.9 percent a year for rural areas and 2.9 percent a year for urban areas;
(3) constant real prices of food commodities;
(4) an annual increase of 1 percent in area planted to rice MVs and an annual increase of 0.5 percent in irrigated paddy area; and
(5) an annual increase of 3.0 percent in area planted to high-yielding corn varieties.

Assumptions concerning the growth of irrigated rice areas and areas planted to modern corn varieties reflect actual values in the second half of the 1980s and early 1990s. Thus, the baseline simulation assumes that in the medium- to long-term the agricultural price and investment policy regimes will remain essentially the same as they were in recent years.

The baseline simulation results for rice and corn are reported in Table 5. Domestic production of rice reaches 7.9 million metric tons in the final year (2010) of the simulation period. This represents an average increase of 1.7 percent a year. Rice consumption grows at a much faster rate—3.0 percent a year. Net imports of rice thus rise from 0.15 million metric tons to 1.66 metric tons at the end of the period. In the case of corn, production grows from about 4.8 million metric tons to 8.1 million metric tons, or at an average growth rate of 4.0 percent a year. Domestic corn consumption increases at an average annual rate of 5.3 percent a year, reaching 8.2 million metric tons at the end of the period. Net imports of corn rise from virtually zero to 1.07 million metric tons at the end of the simulation period.

Table 6 assumes a higher productivity growth in rice and corn than that assumed in the base simulation. The policy handles are irrigation, technol-

TABLE 5
Base Simulation, Philippines

Year	Area (000 ha)	Yield (mt/ha)	Production (000 mt)	Consumption (000 mt)	Net Imports (000 mt)
	Paddy		Rice		
1993	3,283	2.88	6,150	6,324	153
2000	3,314	3.15	6,810	7,504	693
2005	3,358	3.36	7,354	8,484	1,140
2010	3,412	3.57	7,933	9,595	1,662
			Corn		
1993	3,149	1.52	4,795	4,795	0
2000	3,306	1.79	5,932	6,229	297
2005	3,434	2.02	6,934	7,543	610
2010	3,561	2.27	8,074	9,145	1,071

TABLE 6
Productivity Growth Simulations, Philippines

Year	Area (000 ha)	Yield (mt/ha)	Production (000 mt)	Consumption (000 mt)	Net Imports (000 mt)
A. High productivity growth					
	Paddy		Rice		
1993	3,238	2.88	6,150	6,324	153
2000	3,318	3.29	7,101	7,504	403
2005	3,371	3.59	7,888	8,484	596
2010	3,435	3.93	8,791	9,595	804
	Corn				
1993	3,149	1.52	4,795	4,795	0
2000	3,317	1.86	6,166	6,256	90
2005	3,453	2.14	7,386	7,576	191
2010	3,586	2.46	8,819	9,191	372
B. Low productivity growth					
	Paddy		Rice		
1993	3,283	2.88	6,150	6,324	153
2000	3,307	3.00	6,457	7,504	1,047
2005	3,343	3.08	6,718	8,484	1,767
2010	3,386	3.17	6,991	9,595	2,604
	Corn				
1993	3,149	1.52	4,795	4,795	0
2000	3,296	1.73	5,705	6,203	498
2005	3,417	1.90	6,485	7,509	1,024
2010	3,538	2.08	7,365	9,105	1,740

ogy development, and MV adoption. The parameter values for these policy variables are assumed to be 50 percent higher than those assumed in the baseline. The results show a substantially different picture of food supply/demand balances. Net import of rice at the end of the simulation period is about 0.86 million metric tons lower than that in the baseline case. Net import of corn also falls by about 0.7 million metric tons.

The bottom panel of Table 6 shows the implication of low productivity growth on rice and corn supply/demand balances. The simulation assumes that the parameter values for irrigation, technology and MV adoption are lower by 50 percent than those assumed in the base case. As expected, low productivity growth results in a substantial buildup of food imports. Net rice imports rise to about 2.6 million metric tons at the end of the simulation period, while net corn imports increase to 1.7 million metric tons.

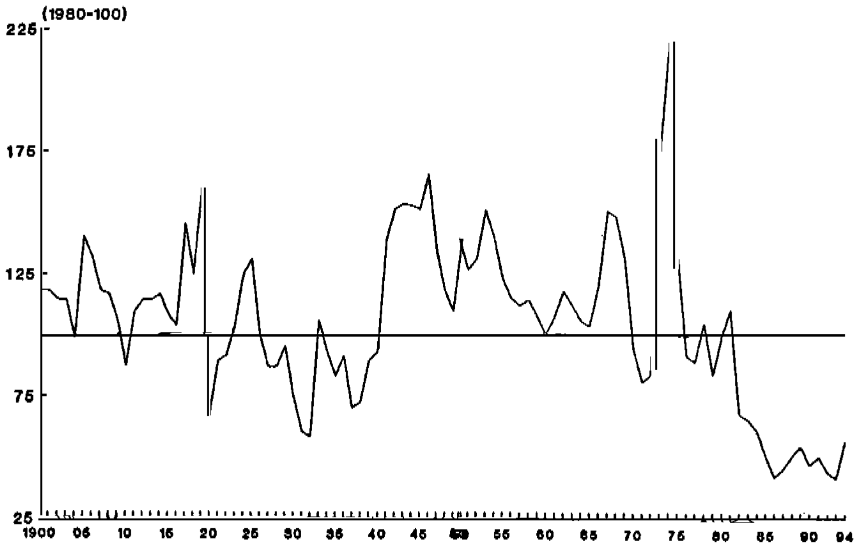
The limitation of this exercise must be noted. *First*, the simulation model, as presently set up, is incapable of adequately capturing the character of technological improvements in corn and rice production. Rice varietal improvements, for example, have taken various forms, including the development of pest- and drought-resistant varieties. *Second*, the estimates of net imports may be biased upwards owing to the likely over-estimation of consumption as aggregate income increases over time. In the model, although (the absolute value of) income elasticities for rice and corn are inversely related to income, the overall rate of growth of consumption may not fall overtime since consumers are grouped into quartiles rather than income levels.

POLICY IMPLICATIONS

Past studies aimed at prospective policy analysis often have analyzed policy options from the viewpoint of minimizing the import gap (Rosegrant et al. 1986; World Bank 1991; Balisacan et al. 1992). First of all, projecting the import gap fairly accurately has proven to be elusive. And given the inherent difficulties in estimating rice supply functions with available Philippine data, it is difficult to be optimistic in being able to do so successfully.

FIGURE 7

Long-term Trends in Real World Price of Rice, Philippines, 1900-1994



The paper's current projections of the import gap will likely prove to be overestimated. Thus, why start from that perspective at all, is not altogether a moot question.

In the Philippine case, rice self-sufficiency has ceased to be a dominant policy objective, and this is just rightly so. From the 1940s up to the late 1970s when world rice prices were relatively high, the rice self-sufficiency objective may have been consistent with efficiency objectives (Fig. 7). But the observed long-term trends in real world rice price tend to indicate that the current low world price may actually be reflective of the future; i.e., the high world rice prices in the 1940s to the late 1970s were the deviations from the long-term trend.

In any case, the Philippine government and the public at large have increasingly accepted the fact that a more open economy would best serve the welfare of the Filipino people. Hence, food security concerns may be better addressed by being self-reliant, i.e., capable of purchasing rice anywhere, rather than being self-sufficient at lower levels of welfare. Viewed from that perspective, the projected import gap may have little policy relevance in the Philippine context. (This may not be the case for large countries such as India, China, Indonesia, or Bangladesh where small changes in trade gap may have significant repercussions in the world market.)

In the pursuit of long-term efficiency objectives, what would be the likely impact of government policies on rice self-sufficiency ratios? This paper's analysis of price intervention policies indicate that when domestic rice output and input prices are allowed to reflect their true social opportunity costs through appropriate domestic policy reforms, price incentives will improve and rice production will consequently increase. Global trade liberalization is also projected to increase world rice price and therefore domestic price incentives.

Moreover, the second-round effects of global trade liberalization would also indirectly increase production by raising the social profitability of productivity-enhancing public investments, such as irrigation and rice research.[3]

What are the current policy issues with respect to the Philippine rice sector? While there are many, this paper highlights two important ones. *First* is the continuing dissipation of the scarce government budget on the NFA marketing operations, which is about P1.5 billion. *Second* is the apparent under investment in rice research.

3. As international researches on irrigation and rice cultivation also increase, the efficiency of national rice research and irrigation will potentially increase further, triggering third-round positive effects on social profitability of domestic public investment in rice. While world rice price may decline as a result of rapid technological progress, this will likely benefit the poor through lower food prices and potentially greater income to redistribute through appropriate fiscal policies.

Current rice research expenditure is about one-fourth of one percent of gross value added in rice. Using the arbitrary target of 1 percent for agricultural research in less developed countries, a four-fold increase in the current Philrice budget or about P300 million of additional budgetary allocation will be required. Reallocating the NFA current budget to achieve rice research expenditure targets will still leave about P1.2 billion unsourced, representing about a third of current irrigation budget. Of course, social profitability of public investments in rice must be evaluated not only among alternatives within the sector, but compared with public investments outside the rice sector.