# Seasonal Adjustment of Palay Time Series Data Using X-11 ARIMA

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## 1.0    Introduction

Palay is a major component in Philippine agriculture. It contributes around 25 percent of the total value of crop output. Majority of Filipinos depend on this industry. Rice is the staple crop in the country and the cheapest source of energy and protein.

For deseasonalization exercises, data series on aggregate palay production and prices at farmgate, wholesale and retail levels were used. Data on palay production have been collected by the Bureau of Agricultural Statistics (BAS) through its nationwide quarterly Rice and Corn Survey. On the other hand, monthly average farm, wholesale and retail prices at the national level were taken from the Weekly Cereals and Fertilizer Price Monitoring of the BAS. Price series on special palay was used for the farm price levels while data on special or well milled rice was considered for both wholesale and retail levels. Quarterly data on palay/rice prices were derived by taking the simple average of the monthly average prices.

## 2.0    Seasonal Adjustment Using X11-ARIMA

## 2.1    Palay Production

On the trial run of X11-ARIMA (all options at default), monthly palay production series from 1985 to 1992 was used. (Summary Measures are in Attachment 1). Results of this run show that seasonality is present at 1 percent level, but the four built-in models of the X11 program failed to fit the series. Furthermore, some statistical measures failed particularly on the additive model. Trial runs using quarterly series gave results which are much better than the first run, with no measures failing. Thus, quarterly data were considered for seasonal adjustment. However, like the monthly series run, all built-in models also failed to fit the series. Thus, a different ARIMA model was considered. With the user-supplied model (2,1,2) (0,1,1), better results for both the additive and multiplicative seasonal adjustments were derived. These preliminary runs indicated that the multiplicative model fits better to palay production series than the additive model.

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Finally, the model (2,1,2) (0,1,1) was tried using the multiplicative option with and without logarithmic transformation. This yielded satisfactory results with F-value of the model without logarithmic transformation a little bit lower than the one with logarithmic transformation, but a measure (M5) failed in the latter model.

Furthermore, the multiplicative model of (2,1,2) (0,1,1) with no logarithmic transformation has higher F-value than the multiplicative model of (0,2,2) (0,1,1). Results of stability test runs on both models indicate that (2,1,2) (0,1,1) was better.

Thus, the final model chosen for palay production was the multiplicative model of (2,1,2) (0,1,1) with no logarithmic transformation. Palay production series up to the second quarter of 1993 was used in the analysis.

## 2.2 Palay/Rice Prices

The monthly palay/rice price series from 1988 to 1992 were used in the preliminary runs on X11-ARIMA. (Summary Measures are in Attachment 2). Results of the X11 run showed that all of the built-in multiplicative models of the program failed to fit the farm price series. However, default options chose the additive model (0,1,1) (0,1,1) with no logarithmic transformation. Considering the relatively higher F-value, the farm price series (1988-1992) was re-run forcing the multiplicative model (0,1,1) (0,1,1) without logarithmic transformation giving better results with no failing summary measures. The fit of the model still holds when the series was updated one month at a time until April 1993. The default options on the preliminary runs showed that the model (0,1,1) (0,1,1) fits well to both wholesale and retail price series more particularly the multiplicative model with logarithmic transformation. The model gave good results when the two series were updated until April 1993.

However, for analytical consistency with the palay production series, quarterly price series were also used. Results of the X11 runs of the three quarterly price series' reveal that the multiplicative model (0,1,1) (0,1,1) with logarithmic transformation fits the quarterly wholesale and retail price series of rice. However, both series showed irregularity. All models failed on the multiplicative run on the farm price series of palay while a (0,1,1) (0,1,1) was chosen on the additive run. Nevertheless, F-value of the multiplicative run is higher than the additive. ~Thus, the multiplicative model, which was considered satisfactory, was forced in the X11 program for this series. The model was (0,1,1) (0,1,1).

Farm, wholesale and retail price series were updated to the second quarter of 1993 with their respective models with satisfactory results.

## 3.0 Analysis of Seasonally Adjusted Series Until Second Quarter, 1993

### 3.1 Palay Production

*Production*

Palay production for the second quarter of 1993 was 2.69 million metric tons, 10.9 percent above the first quarter level of 2.41 million metric tons. This increase in palay output resulted from good weather conditions, more input application and rehabilitation of some irrigation facilities. Moreover, a significant shift or delay in harvest was noted in some areas as an after effect of the drought. Areas usually harvested in the first quarter were now harvested in the second quarter. This boosted further the second quarter output.

*Trend*

Palay production trend has been decreasing since the third quarter of 1991. This was due to the effects of the long drought that hit the country from October 1991 to May 1992. The increased fourth quarter 1992 output reversed this decreasing trend. Since then, production has continued to rise until the second quarter of 1993 (Attachment 3).

### 3.2 Prices

Prices increased despite the significant increase in production in the second quarter of 1993. This was due to the very low carry over rice inventory brought about by the drought from October 1991 to May 1992. The increased second quarter production was not enough to compensate for the decline in carry over rice stocks.

*Farm Price of Palay*

Farm price of palay averaged P5.37 per kilo in the second quarter of 1993, up by 2.92 percent from the first quarter level of P5.22 or 11.18 percent more than last year's price for same quarter. This price increase could be attributed to the low stock control inventory at the beginning of the quarter. Rice stock on April 1, 1993 was 504,000 metric tons short of that same period in 1992.

*Wholesale Price of Rice*

Wholesale price of rice compared to the year-ago level increased by 10.43 percent from P9.30 per kilo to P10.27. The increase of 0.77 percent over the first quarter's P10.04 per kilo was partly due to the increase in NFA release price of rice from P8.50 to P9.50 per kilo, during the later part of June.

*Retail Price of Rice*

Retail price of rice during the second quarter of 1993 surpassed the previous quarter level by 2.3 percent from P11.14 per kilo in the first quarter to P11.39 in the

second quarter. Compared to the same period last year, it increased by 12 percent. The price increase was mainly due to the tightening rice supply situation and the increase in NFA release price from P8.50 to P9.50 per kilo in June 1993.

## Attachment 1    Seasonal Adjustment of Palay Production Series - Summary Measures

| SERIES | DESCRIPTION | PERIOD COVERED | OPTIONS | SUMMARY MEASURES | REMARKS |
|---|---|---|---|---|---|
| MPALAY | PALAY PRODUCTION, PHILIPPINES ('000 MT) | Jan '85 - Dec '92 Monthly | Multiplicative<br>All models failed<br>F-value:       153.8<br>MAVS:.         3 x 3<br>MAVTC:        13 term<br>MCD:          12<br><br>Additive<br>All models failed<br>F-value:       193.2<br>MAVS:          3 x 5<br>MAVTC:        23 term<br>MCD:          12 | Accepted at the level 0.54 Check M5<br><br><br><br><br>Accepted at the level .72 Check M3, M4, M5 | * run quartely series |
| QPALAY1 | PALAY PRODUCTION, PHILIPPINES ('000 MT) | 1st '85 - 4th '92 Quarterly | Multiplicative<br>All models failed<br>F-value:       253.8<br>MAVS:          3 x 3<br>MAVTC:        5 term<br>QCD:          2<br><br>Additive<br>All models failed<br>F-value:       289.9<br>MAVS:          3 x 3<br>MAVTC:        5 term<br>QCD:          2 | Accepted at the level .39<br><br><br><br><br>Accepted at the level .34 | * force the model (0,2,2)(0,1,1)<br><br>- the model w/ least APE |
| QPALAY2 | PALAY PRODUCTION, PHILIPPINES ('000 MT)<br><br>Forced the model (0,2;2)(0,1,1) on both multiplicative and additive | 1st '85 - 4th '92 Quarterly | Multiplicative<br>F-value:       293.2<br>MAVS:          3 x 3<br>MAVTC:        5 term<br>QCD:          2<br><br>Additive<br>F-value:       263.6<br>MAVS:          3 x 3<br>MAVTC:        5 term<br>QCD:          2 | Accepted at the level .35<br><br><br><br>Accepted at the level .36 | * test suitability on mult |
| QPALAY3 | PALAY PRODUCTION, PHILIPPINES ('000 MT)<br><br>STABILITY TEST: Forced the model (0,2,2)(0,1,1)<br>MAVS:   3 x 3<br>MAVRC: 5 term | 1st '85 - 1st '92 Quarterly<br><br>1st '85 - 2nd '92 Quarterly<br><br>1st '85 - 3rd '92 Quarterly | Multiplicative<br>F-value:       238.6<br><br>Multiplicative<br>F-value:       243,5<br><br>Multiplicative<br>F-value:       260.8 | Accepted at the level .43<br><br>Accepted at the level .38<br><br>Accepted at the level .35 | * model is stable<br><br>* try forcing the model (2,1,2)(0,1,1) |

## Attachment 1   Seasonal Adjustment of Palay Production Series - Summary Measures

| SERIES | DESCRIPTION | PERIOD COVERED | OPTIONS | SUMMARY MEASURES | REMARKS |
|---|---|---|---|---|---|
| QPALAY8 | PALAY PRODUCTION, PHILIPPINES ('000 MT)<br><br>Forced the model (2,1,2)(0,1,1)<br><br>Forced the model (2,1,2)(0,1,1)LOG | 1st '85 - 4th '92 Quarterly<br><br><br><br><br>1st '85 - 4th '92 Quarterly | Multiplicative<br>F-value:     298.5<br>MAVS:        3 x 3<br>MAVTC:      5 term<br>QCD:          2<br><br>Multiplicative<br>F-value:   . 303.2<br>MAVS:        3 x 5<br>MAVTC:      5 term<br>QCD:          3 | Accepted at the level .35<br><br><br><br><br>Accepted at the level .44<br>Check M5 | * test stability on mult. model (2,1,2)(0,1,1) |
| QPALAY10 | PALAY PRODUCTION, PHILIPPINES ('000 MT)<br><br>STABILITY TEST:<br>  Forced the model (2,1,2)(0,1,1) | 1st '85 - 1st '92 Quarterly<br><br>1st '85 - 2nd '92 Quarterly<br><br>1st '85 - 3rd '92 Quarterly | Multiplicative<br>F-value:     287.1<br><br>Multiplicative<br>F-value:     285.0<br><br>Multiplicative<br>F-value:     283.5 | Accepted at the level .41<br><br>Accepted at the level .36<br><br>Accepted at the level .35 | * model is stable<br><br>* final model chosen<br><br>* update to 1st Q. 1993 |
| QPAL1 | PALAY PRODUCTION, PHILIPPINES ('000 MT)<br><br>Forced the model (2,1,2)(0,1,1) | 1st '85 - 1st '93 Quarterly | Multiplicative<br>F-value:     300.1<br>MAVS:        3 x 3<br>MAVTC:      5 term<br>QCD:          3 | Accepted at the level .35 | * update to 2nd Q. 1993 |
| QPAL4 | PALAY PRODUCTION, PHILIPPINES ('000 MT)<br><br>Forced the model (2,1,2)(0,1,1) | 1st '85 - 2nd '93 Quarterly | Multiplicative<br>F-value:     218.0<br>MAVS:        3 x 3<br>MAVTC:      5 term<br>QCD:          3 | Accepted at the level .36 | |

## Attachment 2 Seasonal Adjustment of Palay/Rice Price Series - Summary Measures

| SERIES | DESCRIPTION | PERIOD COVERED | OPTIONS | SUMMARY MEASURES | REMARKS |
|---|---|---|---|---|---|
| F88 - 1292 | Farm Prices of Palay, Phils. | 1/88 - 12/92 (monthly) | Additive: MODEL (0,1,1)(0,1,1) NONE F-value: 9.8**<br><br>Multiplicative: All models failed F-value: 20.6** MA for Seasonal Factors: 3 x 9 TC MA: 9 term MCD: 2 | Accepted at the level .47<br><br>Accepted at the level .34<br><br>Check M6 | ** seasonality present at the 0.1% level |
| F88 - 1292A | Farm Prices of Palay, Phils.<br><br>Forced the model (0,1,1)(0,1,1) | 1/88 - 12/92 (monthly) | Multiplicative: MODEL (0,1,1)(0,1,1) NONE F-value: 9.2** MA for Seasonal Factors: 3 x 9 TC MA: 9 term MCD: 2 | Accepted at the level .47 | - to be updated until Jan. 93 |
| F88 - 193 | Farm Prices of Palay, Phils. | 1/88 - 1/93 (monthly) | F-value: 12.8** | Accepted at the level .35 | |
| F88 - 293 | Farm Prices of Palay, Phils. | 1/88 - 2/93 (monthly) | F-value: 13.3** | Accepted at the level .34 | |
| F88 - 393 | Farm Prices of Palay, Phils. | 1/88 - 3/93 (monthly) | F-value: 13.5** | Accepted at the level .34 | |
| F88 - 393 | Farm Prices of Palay, Phils. | 1/88 - 4/93 (monthly) | F-value: 13.5** | Accepted at the level .34 | |
| F188 - 492 | Farm Prices of Palay, Phils. | 1st '88 - 4th '92 (quarterly)<br><br>1st '88 - 4th '92 (quarterly) | Additive: MODEL (0,1,1)(0,1,1) F-value: 16.8 MAVS: 3 x 5 MAVTC: 5 term QCD: 1<br><br>Multiplicative: All models failed F-value: 25.6 MAVS: 3 x 9 MAVTC: 5 term QCD: 1 | Accepted at the level .37<br><br>Accepted at the level .46<br><br>Check M1, M6 | 1st Run |
| F188 - 492A | Farm Prices of Palay, Phils.<br><br>Forced the model (0,1,1)(0,1,1) | 1st '88 - 4th '92 (quarterly) | Multiplicative: F-value: 16.0 MAVS: 3 x 5 MAVTC: 5 term | Accepted at the level .42 | No evidence of moving seas.<br><br>Update to 1st '93 |
| F88 - 193 | Farm Prices of Palay, Phils. | 1st '88 - 1st '93 (quarterly) | Multiplicative: F-value: 24.6 | Accepted at the level .39 | Update to 2nd '93 |

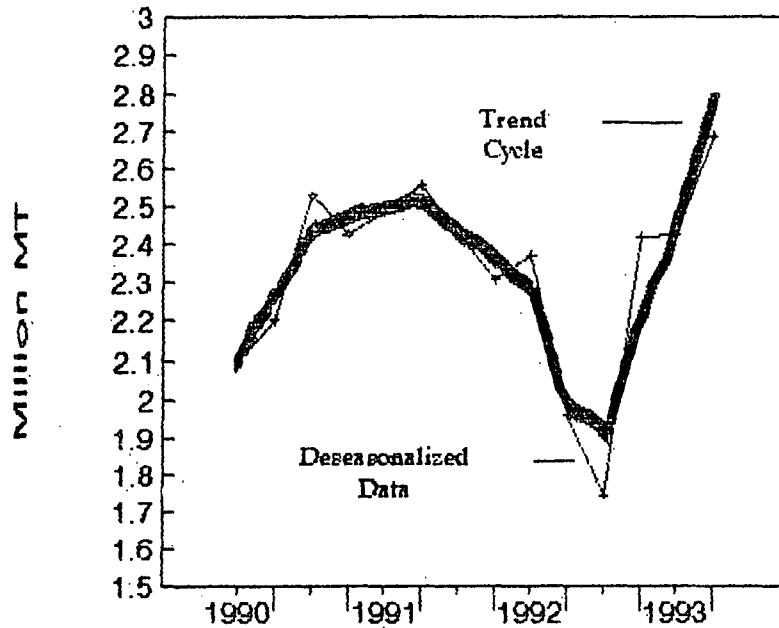## Attachment 2    Seasonal Adjustment of Palay/Rice Price Series - Summary Measures

| SERIES | DESCRIPTION | PERIOD COVERED | OPTIONS | SUMMARY MEASURES | REMARKS |
|---|---|---|---|---|---|
| FF293 | Farm Prices of Palay, Phils. | 1st '88 - 2nd '93 (quarterly) | Multiplicative:<br>F-value:      27.3 | Accepted at the level .38 | |
| WPALAY | Wholesale Prices of Rice, Phils. | 1/88 - 12/92 (monthly) | Additive:  MODEL (0,1,1)(0,1,1) NONE<br>F-value:      11.8**<br><br>Multiplicative: MODEL (0,1,1)(0,1,1) LOG<br>F-value:      12.5**<br>MA for Seasonal Factors:      3 x 5<br>TC MA:      9 term<br>MCD:      1 | Accepted at the level .45<br><br>Accepted at the level .40 | ** seasonality present at the 0.1% level -<br><br>- to be updated until Jan. 1993 |
| WRICE | Wholesale Prices of Rice, Phils. | 1/88 - 1/93 (monthly) | Multiplicative: MODEL (0,1,1)(0,1,1) LOG<br>F-value:      21.5**<br>MA for Seasonal Factors:      3 x 5<br>TC MA:      9 term<br>MCD:      1 | Accepted at the level .27 | ** seasonality present at the 0.1% level<br><br>- with graph and and analysis |
| W88 - 293 | Wholesale Price of Rice, Phils. | 1/88 - 2/93 (monthly) | F-value:      22.0** | Accepted at the level .28 | |
| W88 - 393 | Wholesale Price of Rice, Phils. | 1/88 - 3/93 (monthly) | F-value:      21.8** | Accepted at the level .29 | |
| W88 - 493 | Wholesale Price of Rice, Phils. | 1/88 - 4/93 (monthly) | F-value:      22.0** | Accepted at the level .28 | |
| W188 - 492 | Wholesale Price of Rice, Phils. | 1st '88 - 4th '92 (quarterly) | Additive:<br>MODEL (0,1,1)(0,1,1)<br>F-value:      10.5<br>MAVS:      3 x 3<br>MAVTC:      5 term<br>QCD:      1<br><br>Multiplicative: MODEL (0,1,1)(0,1,1) LOG<br>F-value:      10.6<br>MAVS:      3 x 3<br>MAVTC:      5 term<br>QCD:      1 | Accepted at the level .59<br>Check M1<br><br><br><br>Accepted at the level .53<br>Check M1 | 1st Run<br><br><br><br><br>Update to 1st '93 |
| W188 - 193 | Wholesale Price of Rice, Phils.<br><br>Forced the model (0,1,1)(0,1,1) LOG | 1st '88 - 1st '93 (quarterly) | Multiplicative<br>F-value:      23.3<br>MAVS:      3 x 5<br>MAVTC:      5 term<br>QCD:      1 | Accepted at the level .33 | No evidence of moving seas.<br><br>Update to 2nd '93 |
| WR293 | Wholesale Price of Rice, Phils.<br><br>Forced the model (0,1,1)(0,1,1) LOG | 1st '88 - 2nd '93 (quarterly) | Multiplicative<br>F-value:      15.9<br>MAVS:      3 x 5<br>MAVTC:      5 term<br>QCD:      1 | Accepted at the level .59<br>Check M1 | |

## Attachment 2    Seasonal Adjustment of Palay/Rice Price Series - Summary Measures

| SERIES | DESCRIPTION | PERIOD COVERED | OPTIONS | SUMMARY MEASURES | REMARKS |
|---|---|---|---|---|---|
| RPALAY | Retail Prices of Rice, Phils. | 1/88 - 12/92 (monthly) | Additive: MODEL (0,1,1)(0,1,1) NONE<br>F-value:    16.1**<br><br>Multiplicative: MODEL (0,1,1)(0,1,1) LOG<br>F-value:    17.8**<br>MA for Seasonal Factors:    3 x 5<br>TC MA:    9 term<br>MCD:    1 | Accepted at the level .48<br><br><br>Accepted at the level .38 | ** seasonality present at the 0.1% level<br><br>- to be updated until Jan. 1993 |
| RRICE | Retail Prices of Rice, Phils. | 1/88 - 1/93 (monthly) | Multiplicative: MODEL (0,1,1)(0,1,1) LOG<br>F-value:    18.0**<br>MA for Seasonal Factors:    3 x 5<br>TC MA:    9 term<br>MCD:    1 | Accepted at the level .41 | ** seasonality present at the 0.1% level<br><br>- with graph and analysis |
| R88 - 293 | Retail Prices of Rice, Phils. | 1/88 - 2/93 (monthly) | F-value:    18.4** | Accepted at the level .47 | |
| R88 - 393 | Retail Prices of Rice, Phils. | 1/88 - 3/93 (monthly) | F-value:    19.2** | Accepted at the level .47 | |
| R88 - 493 | Retail Prices of Rice, Phils. | 1/88 - 2/93 (monthly) | F-value:    19.7** | Accepted at the level .43 | |
| R188 - 492 | Retail Prices of Rice, Phils. | 1st '88 - 4th '92 (quarterly)<br><br><br><br>1st '88 - 4th '92 (quarterly) | Additive: MODEL (0,1,1)(0,1,1)<br>F-value:    13.2<br>MAVS:    3 x 5<br>MAVTC:    5 term<br>QCD:    1.<br><br>Multiplicative: MODEL (0,1,1)(0,1,1) LOG<br>F-value:    13.8<br>MAVS:    3 x 5<br>MAVTC:    5 term<br>QCD:    1 | Accepted at the level .62<br>Check M1<br><br><br><br>Accepted at the level .60<br>Check M1 | 1st run<br><br><br><br>Update to 1st '93 |
| R188 - 193 | Retail Prices of Rice, Phils.<br><br>Forced the model (0,1,1)(0,1,1) LOG | 1st '88 - 1st '93 (quarterly) | Multiplicative: MODEL<br>F-value:    14.5<br>MAVS:    3 x 5<br>MAVTC:    5 term<br>QCD:    1 | Accepted at the level .58<br>Check M1 | No evidence of moving seas.<br><br>Update to 2nd '93 |
| R188 - 293 | Retail Prices of Rice, Phils.<br><br>Forced the model (0,1,1)(0,1,1) LOG | 1st '88 - 2nd '93 (quarterly) | Multiplicative: MODEL<br>F-value:    15.3<br>MAVS:    3 x 5<br>MAVTC:    5 term<br>QCD:    1 | Accepted at the level .56<br>Check M1 | No evidence of moving seas.<br><br>Update to 2nd '93 |

## Attachment 3.1

### PALAY PRODUCTION, Philippines
### Seasonally Adjusted vs Trend Cycle



| Year/ Qtr | PALAY PRODUCTION in Thousand MT | | Qtr-Qtr Change of Seas. Adj. Series | Yr to Yr Change of Unadjusted Series |
|---|---|---|---|---|
| | Unadjusted | Seasonally Adjusted | | |
| 1990 1Q | 2,146 | 2,099 | −4.90 | −10.66 |
| 2Q | 1,337 | 2,203 | 5.00 | −13.96 |
| 3Q | 1,260 | 2,529 | 14.80 | −8.23 |
| 4Q | 4,576 | 2,429 | −4.00 | 10.83 |
| **AVE** | | | **2.73** | **−5.50** |
| 1991 1Q | 2,533 | 2,487 | 2.40 | 18.03 |
| 2Q | 1,515 | 2,555 | 2.70 | 13.31 |
| 3Q | 1,185 | 2,424 | −5.20 | −5.95 |
| 4Q | 4,441 | 2,306 | −4.90 | −3.95 |
| **AVE** | | | **−1.25** | **5.61** |
| 1992 1Q | 2,365 | 2,372 | 2.90 | −6.63 |
| 2Q | 1,141 | 1,961 | −17.40 | −24.69 |
| 3Q | 841 | 1,747 | −10.90 | −39.03 |
| 4Q | 4,782 | 2,421 | 38.50 | 7.66 |
| **AVE** | | | **3.28** | **−13.1** |
| 1993 1Q | 2,315 | 2,424 | 0.20 | −2.11 |
| 2Q | 1,575 | 2,689 | 10.9 | 38.04 |

## Attachment 3.2

**Quarterly Palay Production**
**Philippines, 1990–1993**
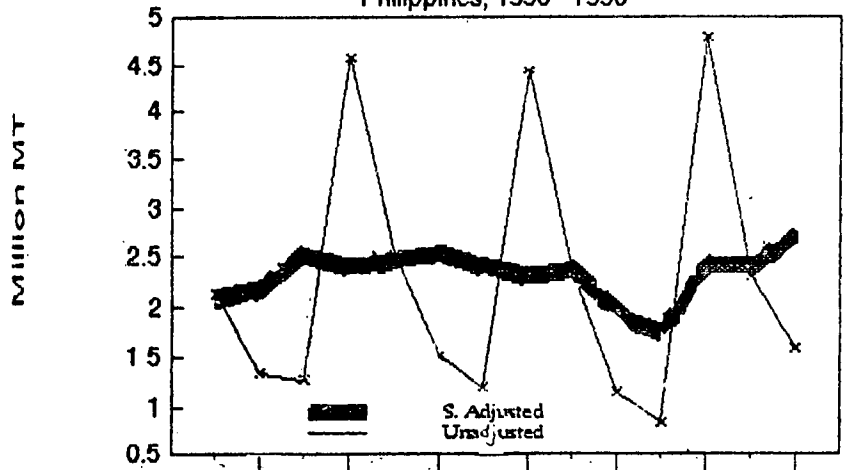


**PALAY PROD'N. QTR–TO–QTR CHANGE**
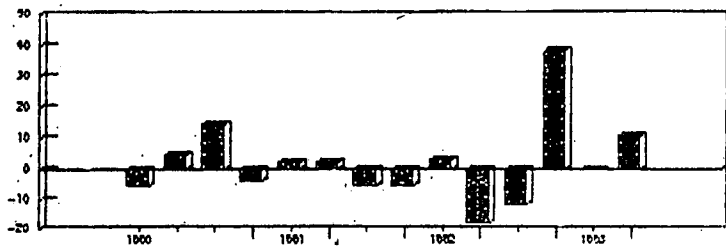


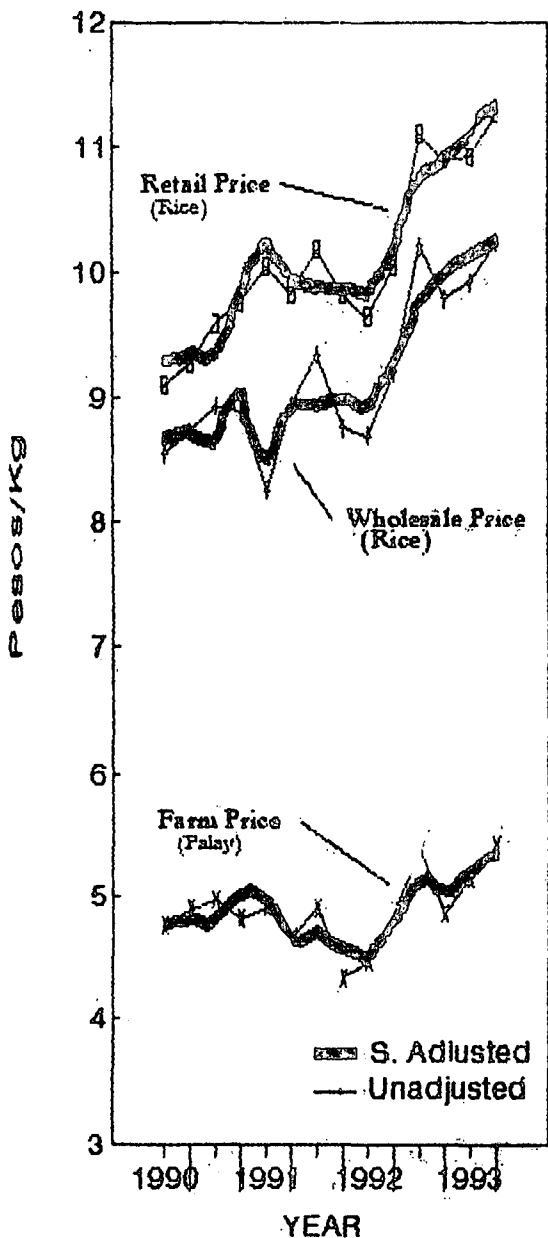**PALAY PRODUCTION, SEASONAL FACTORS**
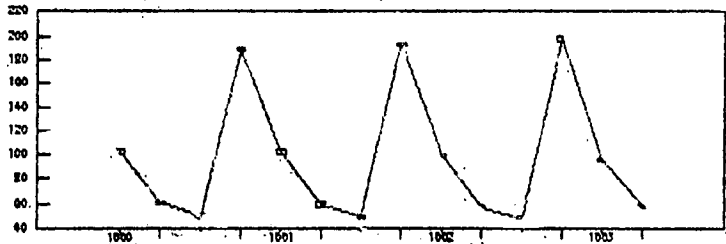


**PALAY PRODUCTION, IRREGULAR SERIES**
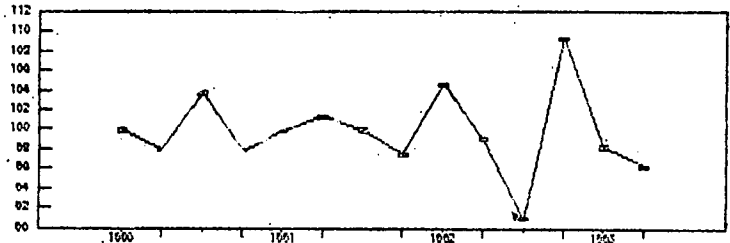
Attachment 4.1

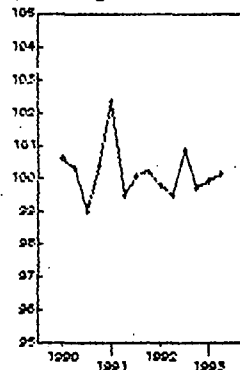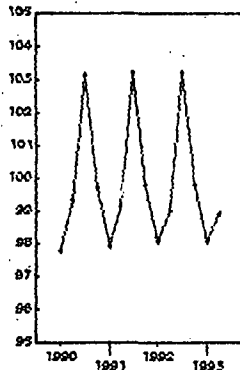## QUARTERLY PALAY/RICE PRICES
### Farmgate, Wholesale and Retail
#### Philippines, 1990−1993



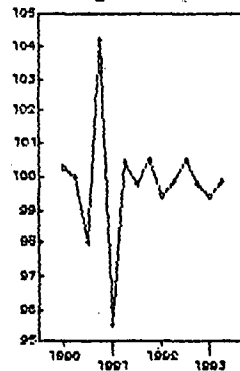RETAIL PRICES: DESEASONALIZED SERIES
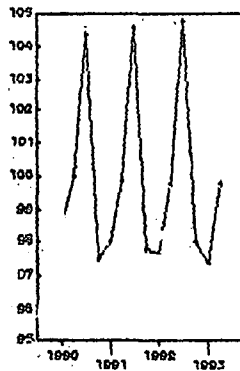
Seasonal Factors     Irregular Series



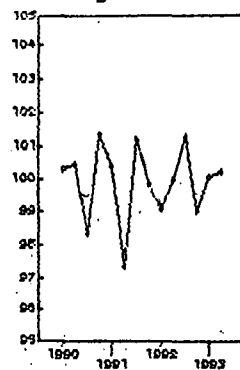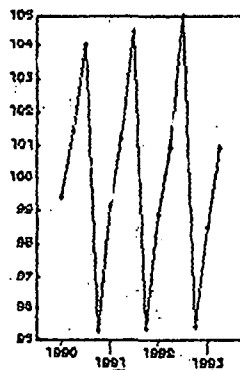WHOLESALE PRICES: DESEASONALIZED SERIES

Seasonal Factors     Irregular Series
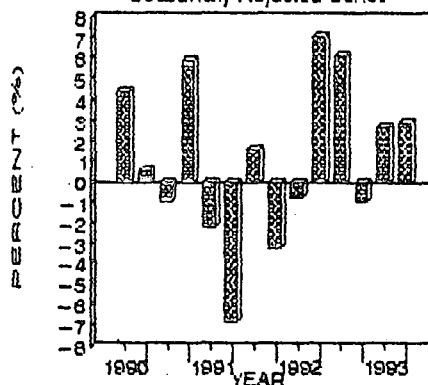


FARM PRICES: DESEASONALIZED SERIES

Seasonal Factors     Irregular Series

## Attachment 4.2

| Year/Qtr | PALAY FARM PRICES (Pesos per kilo) Unadjusted | Adjusted | Quarter to Quarter Change Adj. Series | Year to Year Change Series |
|---|---|---|---|---|
| 1990 1Q | 4.77 | 4.80 | 4.50 | 23.49 |
| 2Q | 4.89 | 4.82 | 0.33 | 21.34 |
| 3Q | 4.97 | 4.78 | -0.94 | 11.89 |
| 4Q | 4.82 | 5.06 | 5.99 | 10.90 |
| 1991 1Q | 4.91 | 4.95 | -2.09 | 2.93 |
| 2Q | 4.67 | 4.62 | -6.78 | -4.30 |
| 3Q | 4.90 | 4.69 | 1.58 | -1.41 |
| 4Q | 4.33 | 4.54 | -3.19 | -10.17 |
| 1992 1Q | 4.46 | 4.51 | -0.64 | -8.18 |
| 2Q | 4.87 | 4.83 | 7.01 | 4.29 |
| 3Q | 5.36 | 5.13 | 6.20 | 9.79 |
| 4Q | 4.85 | 5.08 | -0.97 | 12.01 |
| 1993 1Q | 5.14 | 5.23 | 2.70 | 15.25 |
| 2Q | 5.42 | 5.37 | 2.92 | 11.29 |

**FARM PRICES OF PALAY**
Quarter–to–Quarter Percent Change
Seasonally Adjusted Series

| Year/Qtr | RICE WHOLESALE PRICES (Pesos per kilo) Unadjusted | Adjusted | Quarter to Quarter Change Adj. Series | Year to Year Change Series |
|---|---|---|---|---|
| 1990 1Q | 8.55 | 8.69 | 9.00 | 21.62 |
| 2Q | 8.73 | 8.73 | 0.55 | 14.87 |
| 3Q | 8.93 | 8.56 | -2.01 | 5.69 |
| 4Q | 8.58 | 9.11 | 6.40 | 8.29 |
| 1991 1Q | 9.26 | 8.42 | -7.48 | 9.30 |
| 2Q | 8.94 | 8.95 | 6.29 | 2.41 |
| 3Q | 9.35 | 8.94 | -0.16 | 4.70 |
| 4Q | 8.76 | 8.96 | 0.20 | -1.33 |
| 1992 1Q | 8.69 | 8.90 | -0.67 | -6.18 |
| 2Q | 9.21 | 9.23 | 3.78 | 3.02 |
| 3Q | 10.31 | 9.74 | 5.54 | 9.20 |
| 4Q | 9.79 | 9.99 | 2.47 | 11.78 |
| 1993 1Q | 9.93 | 10.19 | 2.09 | 14.15 |
| 2Q | 10.24 | 10.27 | 0.77 | 11.18 |

**WHOLESALE PRICES OF RICE**
Quarter–to–Quarter Percent Change
Seasonally Adjusted Series

| Year/Qtr | RICE RETAIL PRICES (Pesos per kilo) Unadjusted | Adjusted | Quarter to Quarter Change Adj. Series | Year to Year Change Series |
|---|---|---|---|---|
| 1990 1Q | 9.10 | 9.30 | 4.29 | 22.48 |
| 2Q | 9.28 | 9.34 | 0.43 | 13.46 |
| 3Q | 9.60 | 9.31 | -0.39 | 5.28 |
| 4Q | 9.77 | 9.80 | 5.25 | 9.78 |
| 1991 1Q | 10.05 | 10.26 | 4.76 | 10.44 |
| 2Q | 9.83 | 9.92 | -3.37 | 5.93 |
| 3Q | 10.16 | 9.87 | -0.51 | 6.04 |
| 4Q | 9.53 | 9.84 | -0.22 | 0.51 |
| 1992 1Q | 9.65 | 9.84 | -0.01 | -3.98 |
| 2Q | 10.05 | 10.16 | 3.17 | 2.24 |
| 3Q | 11.10 | 10.75 | 5.89 | 9.04 |
| 4Q | 10.90 | 10.92 | 1.58 | 11.00 |
| 1993 1Q | 10.93 | 11.14 | 1.97 | 13.16 |
| 2Q | 11.27 | 11.39 | 2.30 | 12.14 |

**RETAIL PRICES OF RICE**
Quarter–to–Quarter Percent Change
Seasonally Adjusted Series