PN-ABL-326
ISN 77314

AGRICULTURAL POLICY ANALYSIS PROJECT, PHASE II

Under contract to the Agency for International Development, Bureau for Science and Technology, Office of Agriculture
Project Office Hampden Square, 4800 Montgomery Lane, Suite 500, Bethesda, MD 20814 • Telephone: (301) 913-0500
Telex: 312636 • Fax: (301) 652-7530 • Fax: (301) 652-7791

A MODEL FOR SHORT TERM AGRICULTURAL PRICE MONITORING AND FORECASTING

December 1991

APAP II Methods and Guidelines
No. 404

Prepared for

Agricultural Policy Analysis Project, Phase II (APAP II)
A.I.D. Contract No. DAN-4084-Z-00-8034-00 and the Government of the Philippines, Department of Agriculture

Author: David Dawe, Harvard Institute for International Development

Prime Contractor: **Abt Associates Inc.,** 55 Wheeler Street, Cambridge, MA 02138 • (617) 492-7100

Subcontractors: **Harvard Institute for International Development,** Harvard University, One Eliot Street, Cambridge, MA 02138 • (617) 495-2164
Food Research Institute, Stanford University, Stanford, CA 94305-6084 • (415) 723-3941
North Carolina State University, Department of Economics and Business, Box 7645, Raleigh, NC 27695-7645 • (919) 737-7187
Abel, Daft & Earley, 1410 King Street, Alexandria, VA 22314 • (703) 739-9090
International Science and Technology Institute, 1129 20th Street, NW, Suite 800, Washington, D.C. 20036 • (202) 765-0831

A MODEL FOR SHORT TERM AGRICULTURAL PRICE MONITORING AND FORECASTING

David Dawe
Harvard Institute for International Development
Department of Agriculture

Appendix A
Rayna Lyn Roxas

Cover Illustration
Marieju Riñon

UNITED STATES OF AMERICA

FUNDED BY:
UNITED STATES AGENCY
FOR INTERNATIONAL DEVELOPMENT

TABLE OF CONTENTS

ACKNOWLEDGEMENTS iii

ABOUT THE DISKETTE iv

INTRODUCTION 1

I. THE THEORY BEHIND THE PRICE MONITORING AND FORECASTING MODEL 3

A. Seasonal Factors 3
B. Analyzing Past Prices: What Prices "Should Have Been" 5
C. Forecasting Future Prices 9

II. IMPLEMENTATION OF THE MODEL IN LOTUS 1-2-3 18

A. Generating the Forecast using the file RICEFCST.WK1 18
B. Generating the Confidence Intervals 22
C. Producing the Report for the Secretary 25

APPENDIX A 28

ACKNOWLEDGEMENTS

The work surrounding the development of this model and the production of this manual was made possible with funding from the Agricultural Policy Analysis Project (APAP) Phase II of the Accelerated Agricultural Production Project (AAPP) of the United States Agency for International Development (USAID), Contract Number DAN-4084-Z-00-8034-00. APAP Phase II is a worldwide project of USAID for which Abt Associates is the prime contractor and the Harvard Institute for International Development (HIID) is one of the subcontractors. The financial support necessary for the completion of this work is very gratefully appreciated.

Thanks are also due to Rayna Lyn Roxas, who, in addition to writing Appendix A, also patiently and skillfully set the manual in Word Perfect.®

ABOUT THE DISKETTE

The diskette provided with some versions of this manual contains three Lotus® 1-2-3® files, Ricefcst.wk1, Ricesamp.wk1, and Riceconf.wk1. These files are necessary in order to follow along in Chapter II. In order to use these files, however, one needs a copy of Lotus version 2.2 or higher. If no diskette has been included with this manual, one should contact the Policy Analysis Division of the Department of Agriculture for copies of the files.

INTRODUCTION

This manual will describe the price monitoring and forecasting model currently in use at the Policy Analysis Division (PAD) of the Planning and Monitoring Service (PMS) at the Department of Agriculture (DA) of the Republic of the Philippines. The model was developed by the author drawing upon work done earlier by Richard Goldman and Thomas C. Pinckney in Kenya. The model is a simple yet powerful one that is easily implementable in a variety of situations. It allows one to compare how prices in agricultural markets have moved in actual fact in the recent past with how they would have moved if they had followed normal seasonal patterns. This can serve as an early warning system by drawing prompt attention to abnormal movements in market prices. In addition, the model allows one to make forecasts of prices for the short term future.

At the DA, the model was first used to follow recent developments in rice markets. After a while, it was then applied to yellow and white corn. The model is flexible enough that it can be applied to not only rice and corn at all levels of the marketing system (i.e. farmgate, wholesale and retail), but to any agricultural crop that exhibits seasonal price patterns. It can also be used at the national level or at the regional level. The regional focus could be useful to the National Food Authority (NFA) in planning operations such as procurement, distribution and movement of stocks. The only requirement for implementation is that there exist a monthly time series of past prices for the market in question and a time series for the consumer price index (CPI).

It is hoped that the output of the model will complement current situation and outlook reports by making them more quantitative and objective. It will always be important to talk with farmers, traders and consumers in assessing the current state of the market, but this model will help to provide a more balanced view of the situation in light of the fact that all of the above groups of individuals have their own interests to defend when discussing current market developments.

As noted above, the data requirements of the model are very simple. No data on production, stocks or expectations of traders are needed. All that is necessary is a time series for the consumer price index (CPI) and a time series of prices for the commodity under consideration, including the most recent data for both. The former is released by the National Statistics Office (NSO) sometime in the first few days of each month, and the latter data, at least for rice and corn, will come from the Bureau of Agricultural Statistics (BAS). The model is very simple to implement, requiring about one staff person day of work per month in order to carry out all the calculations and produce the report. Implementation of the model is done on Lotus 1-2-3, but the knowledge of 1-2-3 required is fairly rudimentary, and most of it is explained fully in the text of the manual. A complete 1-2-3 novice may have some problems, however.

The manual is divided into two chapters. The first describes the theory behind the model in order that the user can understand intuitively how the forecasts are being generated. The second describes the mechanical process of generating the forecast in a Lotus 1-2-3 spreadsheet and describes how to produce the forecast report in a form that is suitable for presentation to the Secretary.

I. THE THEORY BEHIND THE PRICE MONITORING AND FORECASTING MODEL

This chapter of the manual will discuss the theory behind the price monitoring and forecasting model. The goal of the text is to impart an intuitive understanding of the steps involved in making the forecasts. While numbers are used as illustrative examples, no attempt has been made to show exactly how to rigorously translate the words in the text into the abstract, general mathematical form required in the Lotus 1-2-3 worksheet. If one desires this level of understanding, the way to approach it is to read the text while sitting at a computer with the spreadsheet RICEFCST.WK1 on the screen. One can then compare the words in the text with the mathematical formulas in the cells of the worksheet. If this is done carefully, there should be little trouble in achieving the requisite understanding.

A. Seasonal Factors

The price model described here has two main components. It analyzes price movements in the recent past, and it makes forecasts of future prices for the short term. The technique for generating both sets of numbers is roughly the same, and it involves the use of seasonal factors.

Prices of farm products are generally lower during the harvest than during the lean period immediately before the next harvest comes in. This is a well known fact of life that is caused by simple considerations of supply and demand (primarily the former). Seasonal factors allow us to quantify this relationship by telling us exactly how much higher or lower

prices are in any given month, be it harvest or pre-harvest. As an example, let us look at the seasonal factors by month for palay, which are shown below in Table 1.

Table 1. Seasonal Factors for palay in the Philippines

	1981-1990	1986-1990
January	0.98	0.98
February	1.01	1.01
March	1.00	1.01
April	1.01	1.02
May	1.03	1.03
June	1.05	1.05
July	1.06	1.06
August	1.05	1.04
September	0.98	0.98
October	0.94	0.94
November	0.93	0.92
December	0.95	0.95

The seasonal factors given in the first column of numbers in the table were calculated using data from April 1981 to March 1990. Notice that all of the numbers are clustered around 1. This is not by coincidence, but by design. It is not really necessary to scale the numbers in this fashion, but doing so makes it easy to interpret them. What the table tells us is that palay prices in July (seasonal factor of 1.06), the leanest month of the year, are 6% higher than they are in March (seasonal factor of 1.00). Prices in March are in turn about 7% higher than they are in November, which is the peak harvest month. The seasonal factors used here are derived after the effects of general inflation have been

removed. Thus, when we say that prices in March are 7% higher than they are in November, we are referring to a difference in real terms, not nominal.

Theoretically, the choice of time period for which to use data will influence the values of the seasonal factors, but it turns out that this influence is very small, at least for the case of palay in the Philippines. This can be seen by comparing the seasonal factors in the second column of numbers, which were calculated using data from April 1986 to March 1990, with those in the first column. Casual inspection shows that the differences between the numbers in the two columns are very small, and such differences are nothing to worry about for the purposes of this model. If the model is applied to different crops or different countries, however, this kind of sensitivity analysis should be undertaken in order to ascertain if the choice of time period on which to calculate seasonal factors may be important.

B. Analyzing Past Prices: What Prices "Should Have Been"

Once the concept of a seasonal factor is understood, it is possible to understand how past price movements are analyzed and how predictions about the future are made. We will start with an example of the former. The reasoning used here can be a little complicated at times, so the remainder of this section should be read very carefully.

In order to analyze price movements in the recent past, we will basically make a forecast of what past prices "should have been" if they had followed the typical seasonal

pattern observed in the past, and then we will make a comparison of what prices actually were and what they should have been.

In order to calculate what past prices should have been, we will need to multiply three numbers together. This calculation will require us to know both the average real price of palay and the seasonal factors for palay over some interval of time. This interval should not include any data from the past five months, as the past five months will be the months for which we will compare actual prices with what they should have been, and it does not make sense to compare actual price data with some hypothetical norm for that month if the actual data for that month went into the calculation of what the norm is. As currently set up, the model uses data from the most recent four years (48 months) possible in order to determine these numbers.

Once the time period on which to do the calculations has been chosen, we need to calculate the average real price for that time period. The real price is simply the nominal price divided by the consumer price index (CPI), and the average real price for the time period is simply the arithmetic average of all the month by month real prices over the chosen interval. The average real price is likely to be much more sensitive to the choice of time period than are the seasonal factors, and we will examine the implications of this shortly. For now, though, we will just note that once again this does not seem to be an important factor for palay in the Philippines, as the average real price for palay from April 1981 to March 1990 differs by less than 1% from the average real price over the interval April 1986 to March 1990.

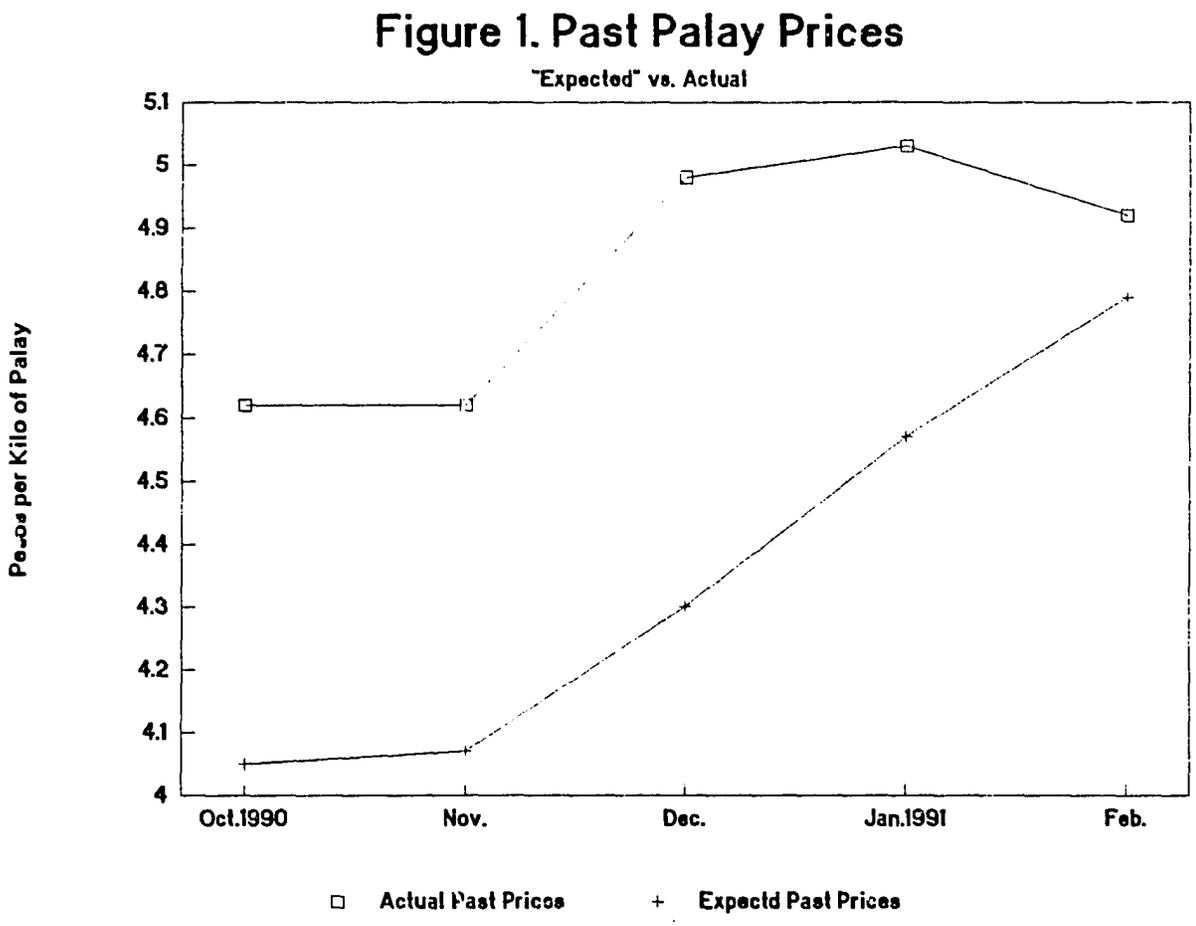
The average real price serves to "anchor" in a sense the calculation of what past prices should have been. As an example, the average real price for palay from April 1986 to March 1990 was 0.84. This means that the average price of palay over this four year period was 0.84 1978 pesos (since the CPI being used in the calculation has a base value of 100 in 1978). Once this anchor is calculated, the next step is to multiply it by the seasonal factor for whatever month is under consideration. For example, if we want to calculate what prices should have been in February of 1991, we will multiply the average real price of 0.84 1978 pesos by the seasonal factor for February. Referring back to Table 1, we see that prices in February are typically 1% above the average real price for any given crop year (since 1.01 is 1% greater than 1). Thus, multiplication of the average real price by 1.01 will serve to make the price higher, which is what we expect for prices in February since this is part of the lean season.

Thus, multiplication of the average real price by the seasonal factor gives us an adjusted number that tells us what the average real price for that specific month is. At this point, however, the number is still in terms of 1978 pesos. We would like the number to be in terms of current pesos, and this can be done simply by multiplying by the CPI for that month and then dividing by 100. In this example, the CPI for February of 1991 was 567.3. Thus, the palay price in February of 1991 should have been 0.84*1.01*567.3/100 = 4.81 pesos. This is in contrast to the actual price in February of 1991, which was 4.92 pesos. In this context, "should have been" means what would have happened if the level of real palay prices was the same this year as it had been on average over the last four years and if

normal seasonal patterns had been followed (the meaning of normal being determined by patterns over the last four years).

Here, the difference between the actual and "expected" past price is rather small. What is probably of more interest to the DA, however, is the pattern of how prices have been moving recently, not what any one single price is in comparison with what it "should have been." In order to examine this pattern, we need to calculate what prices should have been for each of the last five months. Let us assume the present date is March 1991. This means we will calculate "expected" past prices for October 1990 until February 1991. Carrying out these calculations as explained above and then plotting the results on a graph yields Figure 1. From the graph, we can see that actual prices have been above expected prices at least since October, but that the typical seasonal price rise expected from January to February (as shown in the expected prices graph) did not occur. Instead, as can be seen in the graph of actual prices, palay prices at the farmgate took a plunge.

What does this mean? One possibility is that the dry season harvest in March and April is expected to be larger than usual and that traders are trying to unload stocks. The implication of this for the government is that it may be a bad idea to place orders for imports for the lean season, especially if this downward trend in prices were to continue in contrast to the normal pattern of rising prices. As it turned out, this downward trend did continue in defiance of normal seasonal patterns, and the government did decide on a zero import policy for the year. The information contained in this analysis can thus provide a relatively objective indicator of the current state of the market, which should help the government and any other users of the model to make informed decisions.



C. Forecasting Future Prices

A simple adaptation of the above technique for analyzing past prices can be used to forecast future prices. Again, the idea is to multiply three numbers together: the "anchor" price, an adjustment for inflation, and an adjustment for the seasonality of prices. When forecasting future prices, however, we will use a different "anchor" price other than the average real price for the last four years, we will need to make a forecast of the future inflation rate since this will be unknown at the time the forecast is made, and an adjustment

will need to be made for the variability (in real terms) of seasonal price rises and falls from year to year.

In the case of forecasting future prices, we do not want to use the average real price over the last four years as an anchor because the current level of prices in real terms may be very different than the average of the past four years. If one used the four year average as the anchor for the forecast in such a situation, it is almost certain that the forecast would be very inaccurate since the actual level of current prices would be so far removed from the level of prices over the past four years. Thus, we will use as an anchor the most recent actual price available. This will insure that our forecast is anchored to current market conditions.

Starting from this anchor, we will multiply by an adjustment for inflation. Since we do not know what the future rate of inflation will be, we will need to make a forecast of that number. In theory, it would be possible to use National Economic Development Authority (NEDA) forecasts of the inflation rate provided that they supply them on a monthly basis in the form required by the model and at the beginning of every month. If such forecasts can be procured from NEDA, then there is no problem whatsoever in using them in the worksheet instead of using internally generated forecasts. Until the time when the DA has established a system whereby timely access to such projections is assured (assuming NEDA even makes these forecasts with the required frequency), however, there needs to be a substitute method. The method that is described here will serve that purpose well.

In order to understand how the inflation forecasts will be made, one first needs to understand a little about the form in which NSO releases estimates of past inflation rates.

NSO's published inflation figures are calculated on a year to year basis. Thus, the inflation figure that is released in early April for the month of March in a given year measures the inflation from April 1 of the preceding year to March 31 of the current year.[1] Thus, in trying to forecast the inflation rate for March 1991, as it will be released by NSO, we need to take account of the fact that we already know how much inflation has accumulated from April 1 of 1990 to February 28 of 1991 before the forecast is released. If we are then willing to assume that prices do not fall in the month of March, we will have generated a lower bound on what the reported inflation rate for March will be. The assumption that prices will not fall in a month is a reasonable one. Inflation rates do go down, but they very rarely become negative, which is what falling prices means. In the present case, where we are trying to forecast the inflation rate that will be released by NSO for March of 1991, the accumulated inflation from April 1, 1990 to February 28, 1991 is 17.9%. This number thus becomes a lower bound for our inflation estimate.

Next, we will proceed to make a "first guess" at what the inflation rate will actually be. This first guess is generated mechanically by annualizing the inflation already accumulated over the last 11 months (whereas generation of the lower bound assumed that inflation in the month of March was zero). This approach assumes that inflation in March will continue at exactly the same rate that it has for the last 11 months. In the present case, this results in a first guess of 19.2% for the inflation rate. Thus, at this point, we have both

[1]This is not how it is commonly reported in the United States, where inflation rates would be reported for the current month of March only, after which that figure is annualized. This is a measure of the month to month inflation, not the year to year.

a first guess (19.2%) and a lower bound (17.9%) on the inflation rate without the forecaster having made any assumptions whatsoever other than the one that prices will not fall.

At this point, it becomes necessary for the forecaster to make an intelligent judgement as to what the actual inflation rate will be. This judgement is not final, however, and can always be subjected to sensitivity analysis. In the present case, we would probably want to guess that inflation would be less than our mechanically generated first guess because this first guess assumes that inflation will continue in March at the same rate that it has in the last 11 months, a span of time that included the Gulf War, which was clearly a period of abnormally high inflation. Thus, a reasonable guess would be something between 17.9% and 19.2%. If we are going to engage in sensitivity analysis by making a high and a low inflation forecast, we might want to make a high inflation forecast of 18.8% and a low inflation forecast of 18.1%. Both of these are above the lower bound but below the "first guess."

In other cases, one might want to make a forecast that is greater than the first guess instead of less. This will depend on what has been happening in the economy over the last year. For example, if there had been a devaluation recently, or if the Central Bank had stepped up growth of the money supply in order to drive down interest rates, it might be wise to guess that inflation will be greater than the mechanically generated first guess. In any event, the lower bound and the first guess are meant to provide guidelines to the forecaster, and they should be helpful for that purpose. As mentioned above, the forecasts of prices that are ultimately generated by, among other things, the forecast of the inflation

rate, should be subjected to sensitivity analysis in order to provide a range for the price forecasts.

This process of making high and low inflation forecasts for the first month is then repeated for the succeeding two months. The worksheet then automatically calculates for the user a set of inflation adjustment factors. These are the actual month on month inflation rates implied by the year on year inflation forecasts inputted by the user. These month on month rates do not actually show up explicitly in separate cells in the worksheet, but they are used in the calculations. After the inflation forecasts have been made, the final step is to apply an adjustment for the seasonality of prices.

In order to make this adjustment for the seasonality of prices, we need to have a quantitative idea of how much future prices are likely to rise or fall in real terms due to the seasonal nature of agriculture. This is precisely what the seasonal factors provide us with, so it is a simple matter to simply multiply by a factor that adjusts for the expected percentage rise in the real price due to seasonal factors. For example, using the numbers in the last column of Table 1, the expected percentage rise in real prices between February and March is (1.0101 - 1.0097)/1.0097 = 0.0005 (the number of digits has been extended beyond the rounding off given in the table so that the percentage change will not appear to be exactly zero). The seasonal adjustment factor we will use is 1 plus the percentage change calculated above. Thus, in this case, the adjustment factor is 1.0005.

To calculate our forecast for the palay price in March of 1991, we multiply the actual February price of 4.92 pesos (the anchor) by each of the high and low inflation adjustment factors, and then by the seasonal adjustment factor. Using numbers, these calculations are

4.92*1.0073*1.0005 = 4.96 pesos/kilo for the forecasted palay price under the high inflation scenario and 4.92*1.0013*1.0005 = 4.93 pesos/kilo under the low inflation scenario.[2]

The implied band of 4.93 to 4.96 pesos/kilo in between which the March palay price is predicted to fall by this technique is fairly narrow. In reality, it is not as easy to forecast the price that will actually materialize as the narrowness of this band might imply. While this band is helpful as a kind of best guess as to what the price will turn out to be, it would also be useful to have some idea of how much uncertainty inheres in this estimate. We have already taken into consideration uncertainty in the future rate of inflation via the making of high and low inflation forecasts, but this is not the major source of uncertainty as regards the formation of future palay prices. Rather, it is year to year variability in the actual seasonal rise or fall (in real terms) from month to month. For example, the seasonal factors tell us that prices typically fall in real terms by 0.7% from October to November. In actuality, however, they do not fall every year by 0.7%: in the 1980's, they have fallen by as much as 5.5% or risen by as much as 4.9%. This variability is due to a host of factors such as expectations regarding the size of the coming harvest, variability in the actual harvest, expectations regarding future imports/exports, as well as a myriad of other influences.

It is difficult to measure these influences directly, but there is a fairly easy way in which to obtain a reasonable estimate of how they quantitatively affect the variability of month to month price formation. This is done by calculating the extent to which price changes in real terms have historically deviated from what is implied by the seasonal factors,

[2]1.0073 is the adjustment factor implied by an inflation forecast of 18.8% for March 1991, while 1.0013 is the adjustment factor implied by a forecast of 18.1%.

which measure the average change from month to month. Thus, for example, we can calculate the actual percentage change in the real price of palay between January and February, February and March, March and April, and so on for a long time series of data, and then compare these numbers to what is expected on the basis of the seasonal factors. Once this has been done, it is then easy to come up with "confidence interval" expressions such as "28% of the time the deviation of the actual price change from that predicted by the seasonal factor is less than 1%," "59% of the time it is less than 2%," and so on. An example of this is shown in Table 2 for palay prices. The "confidence intervals" have been calculated on the basis of data from 1980-1990.

With these confidence intervals, one can take the high and low inflation forecasts and adjust them up and down respectively by the required amount. For example, to create a 70% confidence interval for the March palay price, one would add 3% to the high inflation forecast of 4.96 pesos/kilo and subtract 3% from the low inflation forecast of 4.93 pesos/kilo.[3] Similarly, to create a 70% confidence interval for the April palay price, one would add 4% to whatever the high inflation forecast is and subtract 4% from whatever the low inflation forecast is (find the 0.66 in the "2 months ahead" column).

I have implicitly assumed that these confidence intervals are the same across months. In other words, I have pooled all the 1 month ahead data (January to February, February to March, March to April, etc.) instead of treating the variability of January to February price rises as fundamentally different than the variability of February to March price rises

[3]This is determined by finding 70% in the "1 month ahead" column. 0.70 is not there, but 0.69 is close enough, and it is found in the "≤3%" row. Thus, one adds or subtracts 3% from the previously mentioned high and low inflation forecasts.

Table 2. Data for the Construction of Confidence Intervals for Palay in the Philippines.

	1 Month Ahead	2 Months Ahead	3 Months Ahead
x≤1%	0.28	0.16	0.15
x≤2%	0.59	0.33	0.32
x≤3%	0.69	0.54	0.47
x≤4%	0.78	0.66	0.61
x≤5%	0.88	0.77	0.70
x≤6%	0.93	0.84	0.74
x≤7%	0.98	0.88	0.84
x≤8%	0.98	0.93	0.89
x≤9%	0.99	0.96	0.93
x≤10%	1.00	0.98	0.94
x≤11%		1.00	0.96
x≤12%			1.00

In the table, the left hand column represents the deviation from normal for the actual rise or fall from month to month in real terms. The number in the body of the table is the fraction of the time that the actual rise or fall deviates from normal by less than that indicated in the left hand column. As an example, for price changes from one month to the next (e.g. January to February), the actual change deviates from normal by less than 5 percentage points 88 times out of 100. For two month ahead changes (e.g. January to March), the actual change deviates from normal by less than 4 percentage points 66 times out of 100.

(the same procedure was followed for the 2 and 3 months ahead data). In addition, I have assumed that the variability of real price movements is symmetrical above and below the average (as represented by the seasonal factor) by using the absolute value of deviations from normal instead of calculating separate confidence intervals for deviations above and below average. Both of these assumptions are made necessary by the fact that there are only 10-20 years of time series data available. In any event, relaxing these assumptions would likely add very little information to the model, and this would come at the added cost of much greater complexity. The added cost would come in the form of 72(!) separate

confidence intervals for palay price movements instead of the 3 currently being used for one month ahead, two months ahead and three months ahead.[4]

These confidence intervals will vary significantly from crop to crop and from one level of the marketing chain to another. For example, a 70% confidence interval for white corn at the farmgate requires one to add and subtract 4.5% to the one month ahead forecasts, 7.5% to the two months ahead forecasts and 9% to the three months ahead forecasts. This is very different than the 3%, 4% and 5% for palay, or the 2%, 3% and 4% for rice. Thus, different intervals need to be calculated for every crop at every marketing stage. Separate calculations are also required for white and yellow corn. Under no circumstances whatsoever should intervals for one crop at one level of the marketing chain be used for either a different crop or for the same crop at a different marketing stage. Section B of the next chapter describes how to determine these confidence intervals in a Lotus 1-2-3 spreadsheet.

This concludes the discussion of the theory behind the price monitoring and forecasting model. All that remains is to understand how to perform all these calculations in a spreadsheet, the use of which makes implementation of the model a simple process indeed. The technique for doing this is explained in the next chapter.

---

[4]The 72 intervals required comes from 3*2*12 = 72, where the 3 is for one, two and three months ahead, the 2 is for deviations above and below normal, and the 12 is for each month of the year.

II. IMPLEMENTATION OF THE MODEL IN LOTUS 1-2-3

The process of updating the model and generating forecasts every month is a very simple process. This chapter will take a cookbook approach and explain step by step in detail what operations to perform in a Lotus 1-2-3 spreadsheet in order to do this. Because of the way the chapter is written, one must have the worksheet on a computer screen in front of you while following the instructions. Some familiarity with Lotus 1-2-3 is assumed, but it is of a fairly rudimentary nature (e.g. how to retrieve worksheets, how to move the cursor from cell to cell, how to enter numbers in a cell).

A. Generating the Forecast using the file RICEFCST.WK1

This section will explain how to make the forecast using the example of palay and rice, both of which are contained in the same worksheet. This process needs to be carried out on a monthly basis.

1. Enter the new CPI and palay price at the bottom of their respective columns.

2. Extend the calculations in the REAL PRICE column down one entry by using the Copy command (/C).

3. Extend the calculations in the MOVING AVERAGE and RATIO columns down one entry using the Copy command (/C). Do not extend them down any further.

4. Update the SEAS column. Unlike the other columns, the SEAS column consists of only 12 cells near the top of the worksheet, one for each month of the year (cells G10 to G21 in RICEFCST.WK1). In order to do the updating, first take note of the month corresponding to the latest addition to the RATIO column (this can be read in column A of the worksheet in the same row as the latest addition to the RATIO column). Now move

the cursor to the cell in the SEAS column corresponding to that month. The formula in this cell takes the average of the entries in four other cells. Delete the first of these entries from the formula, and at the end add the latest addition to the RATIO column from step 3. For example, if the appropriate cell in the SEAS column before updating contained the formula (F82+F94+F106+F118)/4, and the latest addition to the RATIO column was in cell F130, the amended formula in the SEAS column would be (F94+F106+F118+F130). As a final check after the update is made, successive cell addresses in this formula should always differ by exactly 12 rows, e.g. F80, F92, F104, and F116.

5. Update the "average real price" (cell H8) by removing the first observation from the sum in the parentheses and adding one observation at the end. For example, @ AVG (D80..D127) would become @ AVG (D81..D128).

6. Using the Range Erase command (/RE), delete the first cell in the EXPECTED PAST PRICES column. Then, using the copy command (/C), copy the last cell in the EXPECTED PAST PRICES column to the row immediately below it. It is possible that the last entry in this column is now 0.00 (if it is not 0.00, there is no problem). This is a mistake and needs to be corrected. The problem is due to the way in which the seasonal factors are calculated elsewhere in the worksheet. For example, when moving from May to June in the EXPECTED PAST PRICES column, the cell with the seasonal factor that needs to be used in the calculation changes from cell G21 to cell G10 (take a look at the SEAS column to see why this is so). Using the copy command, however, changes the cell in the formula from G21 to G22, the latter being a blank cell. This therefore sometimes prevents a strict copying of the formula down to the cell below, and appropriate modifications must therefore be made. The appropriate modification in this case is to change G22 to G10 in the formula in the cell that reads 0.00. This can be done with the edit key (F2). Once this change is made, there should not be any more zero entries in the EXPECTED PAST PRICES column.

Finally, before moving on to the next step, use the Move command (/M) to move the entire block of words (EXPECTED PAST PRICES, EXPECTED FUTURE PRICES LO FCST, and EXPECTED FUTURE PRICES HI FCST) down one row as a group.

7. Using the Range Erase (/RE) command, delete the first entry in both of the EXPECTED FUTURE PRICES columns. Now move the cursor to what is now the first entry in the EXPECTED FUTURE PRICES LO FCST column. Using the edit key (F2), change all <u>numbers</u> in the formula in this cell that are "anchored" (i.e. all <u>numbers</u> that are <u>immediately</u> preceded by a $ sign) by adding one to them. For example, C$139 becomes C$140, while $B129 stays $B129 (since the number is not immediately preceded by a $ sign in the latter). If the process of adding one to some of the numbers in this fashion results in an error message (ERR), there is a problem. Again, it is due to the way the seasonal factors are calculated in column G. As explained in step 6 above, this can be corrected by changing G22 to G10 in the appropriate formula. Once this is done, the ERR message should disappear. If no error messages result in the first place, there is nothing to worry about.

Using the Copy command (/C), copy the formula in this cell to the two cells below it. There should now be 3 cells once again in the EXPECTED FUTURE PRICES LO FCST column. If any of the cells read as 0.00, there is again a problem, and it is again due to the way in which seasonal factors are calculated in column G. The appropriate modifications to make in such cells are to change G22 to G10 and G23 to G11. If none of the cells read as 0.00, everything is all right. Once the EXPECTED FUTURE PRICES LO FCST column has been updated as explained in this step, the process should be repeated for the EXPECTED FUTURE PRICES HI FCST column. Do not copy the formulas in the LO FCST column to the HI FCST column. The two columns need to be updated separately.

8. Using the Move command (/M), move the entire inflation "block" down one row. The word "block," as used in this step, includes all the words and numbers in the block. Thus, the block is 7 columns wide and 8 rows long. Once this command has been executed, an ..RR message will appear in the bottom cell of both the EXPECTED FUTURE PRICES columns. This should be corrected immediately by using the Copy command (/C) to copy the formula in the second cell of each of these columns to the third cell in each of the columns.

When this is finished, the numerical factors at the end of each cell entry in these two columns must be updated (due to the length of the formula, these numerical factors in the formulas are not visible unless one uses the F2 edit key to display the formula in its entirety). These numerical factors represent the confidence interval adjustments discussed above in Chapter I, section C. For the first entry in the LO FCST column, the factor should be 1 minus the percentage that corresponds to the 70% (or whatever level one is using) confidence interval. For palay, this number is 3%, so the appropriate factor should be 1-0.03, or 0.97. For the HI FCST column, the factor at the end of the formula in the first cell should be 1 plus this percentage, or 1.03 for palay. The low and high forecasts for two and three months ahead also need to be adjusted by using the appropriate factor.

9. Using the Range Erase command (/RE), delete all 3 numerical entries in the FORECAST column of both halves of the inflation block. Do not delete the word "FORECAST," however.

10. Using the Move command (/M), move all of the <u>words</u> in the inflation block (7 columns wide by 4 rows long) down by one row.

11. Using the Copy command (/C), copy the formulas in the top row of numbers in each half of the inflation block down one row <u>only</u>.

12. Using the Range Erase command (/RE), delete the entire top row of the inflation block (including the name of the month in the center column of the block).

13. Using the Copy command (/C), copy the formulas in the bottom row of numbers in each half of the inflation block down to the row below. There should now be three rows

of numbers in the inflation block once again (some of them will contain negative numbers, but this is only a temporary situation). Once this is done, type in the name of the next month in the bottom row of the center column.

14. Following the guidelines given in Chapter I, section C. make an inflation forecast for the first month and enter it in the FORECAST column of the LOW INFLATION SCENARIO half of the inflation block. This will recalculate certain cells in the first two columns of that half of the inflation block. Again following the guidelines, make an inflation forecast for the second month and enter it. This will again recalculate certain cells in the first two columns of the first half of the inflation block. Finally, make an inflation forecast for the third month and enter it. Once this has been done for the LOW INFLATION SCENARIO, repeat the process for the HIGH INFLATION SCENARIO. For any given month, the inflation forecast in the LOW half of the block should be less than that in the HIGH half of the block. It is possible, however, to have the inflation forecast for one month in the LOW half of the block be greater than the inflation forecast for a different month in the HIGH half of the block.

15. Both of the EXPECTED FUTURE PRICES columns will now be complete with estimates of future prices for the next three months. With all of this information, one can prepare a graph showing actual past prices and expected past prices (what prices "should have been") for the past five months, and high and low forecasts of prices for the next three months. For an example, see the sample memo in section C of this chapter. Once the graph has been prepared, an interpretation in words should be provided.

16. Repeat steps 1-15 for rice at the retail level (rice retail prices are in column I of the worksheet). This will be much easier than for palay since the inflation forecasts have already been made, which means that steps 8-14 have already been completed. In addition, steps 6 and 7, which are rather cumbersome, can be vastly simplified by simply copying (using the Copy command /C) all three EXPECTED PRICES columns (one PAST and two FUTURE) as a group from columns F, G and H to columns L, M and N. In doing this, one should also include one blank row of cells above the EXPECTED PRICES block in the "Enter range to copy from" portion of the Copy command. This is to insure that, as the months pass, the portion of the worksheet dealing with rice at the retail level does not accumulate a lengthy sequence of the word EXPECTED. After this, the formulas in the cells in columns L, M and N need to be edited to reflect the appropriate confidence interval factors for rice (which are different than those for palay) as was explained at the end of step 7.

B. Generating the Confidence Intervals

Calculation of the confidence intervals would be an extremely tedious and time consuming process indeed if it were done without the assistance of spreadsheet technology. With a spreadsheet such as Lotus 1-2-3, however, the process is vastly simplified. The technique for calculating such confidence intervals is explained in this section of the chapter. It is probably not terribly important to update these intervals more than once every ten years or so, however, so mastery of these spreadsheet techniques is not essential.

1. The first step is to retrieve a worksheet that has the same data as that used to forecast prices, namely a time series of the consumer price index (CPI) and a time series of prices for the relevant commodity. In addition, the calculations in columns D-G of RICEFCST.WK1 are also necessary. We will do our example with palay, and the worksheet RICESAMP.WK1 has the required data and calculations. It is possible to carry out the calculations described here in the same spreadsheet as that used to make the forecasts, but it is much more convenient to do it in a separate file (this can be done by saving the file RICEFCST.WK1 under a different name, e.g. RICESAMP.WK1).

2. The next step is to create a table of calculations below the data already present in the file. To do this, move the cursor to a cell well below the bottom of the data. In this case, we will use cell D155. In row 155, we need to type headings for each column in the table of calculations. Our example will involve calculating confidence intervals for price changes one month ahead, so in cell D155 we will type Aug-Sep (the month to start with is completely arbitrary. It could just as well be Jan-Feb). This column will calculate percentage price changes from August to September (the prices being in real terms). Similarly, we will type Sep-Oct in cell E155 for price changes from September to October. Continue this process until there are 12 column headings (in this case, the last one will be Jul-Aug). If we were calculating two month ahead price changes, the first column would be Aug-Oct, followed by Sep-Nov, and so on until Jul-Sep (make sure you understand why).

3. Now move the cursor to the first column of the table (in this case column D), and then to the first cell below the Aug-Sep heading, which in this case is cell D156. In cell D156, we will calculate the percentage price change <u>in real terms</u> from August to September for the oldest data that we want to use in the calculation of the confidence intervals. The oldest August prices available are in cell D12, so the calculation in cell D156 will be ($D13-$D12)/$D12*100. This is the percentage change in real prices from August 1980 to

September 1980 (the $ signs are used in order to facilitate copying to other columns. This will be discussed shortly). Next, in the cell immediately below (cell D157), we will calculate the percentage change in real prices from August 1981-September 1981. This formula is ($D25-$D24)/$D24*100 (just add 12 to all numbers in the preceding formula). Continue entering manually the formulas for successive August-September price changes in cells D158, cell D159, and so on until there is no more data to use. Although not essential, it is probably best to make sure that each of the 12 columns has the same number of calculations. Thus, in this example, we will stop typing formulas into column D at cell D165 even though this means that some data will go unused. It is also usually convenient if the cells containing all these calculations are formatted to display only one digit past the decimal point.

4. The next step is to copy the formulas in column D (Aug-Sep) to columns E-O. This can not be done with a straight Copy command across all the columns, however. If one does do this, every column will contain the exact same formulas (try it and see). The proper way to proceed is to use the Copy command (/C) to copy the formulas in cells D156 to D165 to cells E157 to E166 (i.e. to the column to the right moved one cell down), then to cells F158 to F167 and so on until cells O167 to O176, O being the last column in the table of calculations (the process always proceeds by moving one column to the right and one cell down).

5. Once this is completed, the next step is to organize the table so that it is rectangular. This is done with the Move command (/M). For column E, move the formulas in cells E157 to E166 up one cell so that they occupy cells E156 to E165 (i.e. immediately adjacent to the formulas in column D). Now do this for columns F through O. The end result will be a block of formulas from cell D156 on the upper left to cell O165 on the lower right.

6. We now need to calculate the average percentage month to month change in real prices for each pair of months. This will be based on the seasonal factors calculated in column G. For example, to calculate the average seasonal rise from August to September, the formula would be (G13-G12)/G12*100. This formula should be entered at the bottom of the Aug-Sep calculations (preferably with a blank cell separating it from the other calculations above it in the column). Do this for each of the 12 columns being careful of the point at which the entries in the SEAS column stop at the bottom and continue again at the top. Specifically, the formula for May-June should be (G10-G21)/G21*100 followed by (G11-G10)/G10*100 for June-July.

7. Now move the cursor down two cells from D167 to D169. In this cell, enter the formula:

@IF(@ABS(D156-D$167)< =2,0,1)

This formula compares the percentage change in real prices from August to September of 1980 (cell D156) to the average August-September price change based on the seasonal factors (cell D167). If the absolute value of the difference of these two percentages is less

than or equal to 2, then cell D169 gets the value 0 (the first number after the 2). If the absolute value of this difference is greater than 2, then cell D169 gets the value 1 (the second number after the 2).

After this formula has been entered in cell D169, copy the formula using the Copy command (/C) to the block of cells D169 to O178 (this is a rectangular block of cells exactly the same size as the block of cells above that calculates month to month price changes for specific years).

8. Next move the cursor to cell D180 at the bottom of this second block of cells (again leaving a blank row to separate the block from succeeding calculations). In cell D180, enter the following formula:

@SUM(D169..O178)

This will calculate the sum of all the 0's and 1's in the block of cells immediately above. This represents the number of times in the past 10 years that the actual month to month real price change for any given pair of months was more than 2 percentage points different than the average for that same pair of months (the 2 coming from the @IF formula above).

Next, enter the formula (120-D180)/120 in cell E180. The 120 is the total number of cells in the block, and thus this formula represents the percentage of the time that the actual month to month real price change for any given pair of months was <u>less</u> than 2 percentage points different than the average for that same pair of months.

9. Determination of the confidence interval is now easy. The procedure is to continually change the number immediately after the less than or equal sign in the @IF formula in cell D169 until the number in cell E180 is 70% (0.70), or whatever number is desired. Thus, the "2" can be changed to 3, 1, 2.8 or any number whatsoever. Every time one changes that number, the formula with the new number must be copied to the entire block D169 to O178. This step will then recompute cells D180 and E180. When cell E180 reads as desired, the process is complete. As a check on your work, the 70% confidence interval for one month ahead price changes for palay is ±3.1%. This means that, based on past historical experience, there is a 70% chance that the actual percentage change in real prices will be less than 3.1 percentage points different than that predicted by the average percentage change in real prices.

10. After steps 1-9 have been done for one month ahead price changes (e.g. August to September, September to October), the process must be repeated for two month ahead price changes (e.g. August to October), three month ahead price changes and so on for as many months ahead as price forecasts are to be made. It is best to set up these calculations somewhere else in the worksheet without writing over what has already been done for one month ahead price changes (and also easier). Once all of the confidence intervals have been calculated in this fashion, they can be incorporated into the worksheet that generates the forecasts.

As an example, if one was doing two month ahead price changes, the first entry in the Aug-Oct column would contain the formula ($D14-$D12)/$D12*100, the second entry ($D26-$D24)/$D24*100, and so on. Similarly, the average seasonal price change for that pair of months would be calculated as (G14-G12)/G12*100. The completed worksheet with all of these calculations carried out for palay and rice one, two and three months ahead is on the diskette under the file name RICECONF.WK1.

C. Producing the Report for the Secretary

Once the forecast has been generated via the procedure described in section A of this chapter, the numbers need to be placed into a report that conveys the information to the Secretary and Undersecretaries in an easily understandable form. An example of this is presented here on the next two pages. The technique for creating this particular report using Word Perfect and Borland Quattro-Pro® is described in detail in Appendix A.

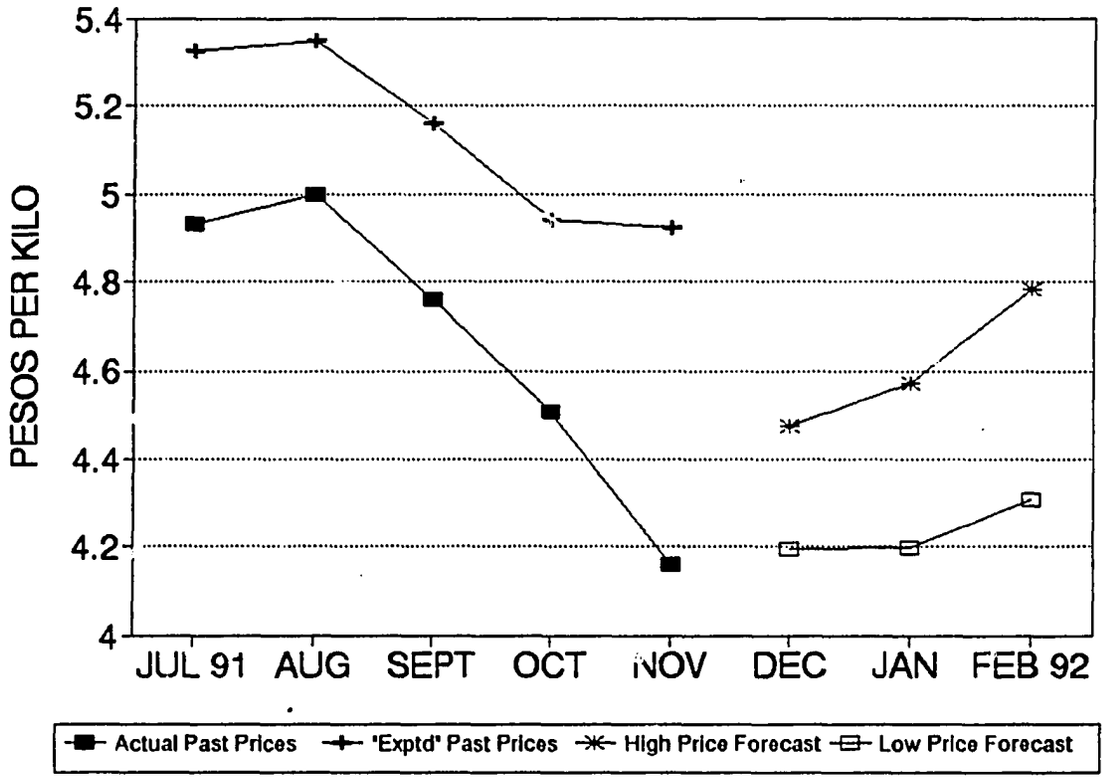
The forecast should be produced every month, and it will compare actual and expected past prices over the last five months as well as making price forecasts for the next three months.

MONTHLY PRICE PATTERNS AND FORECAST

PALAY AND RICE

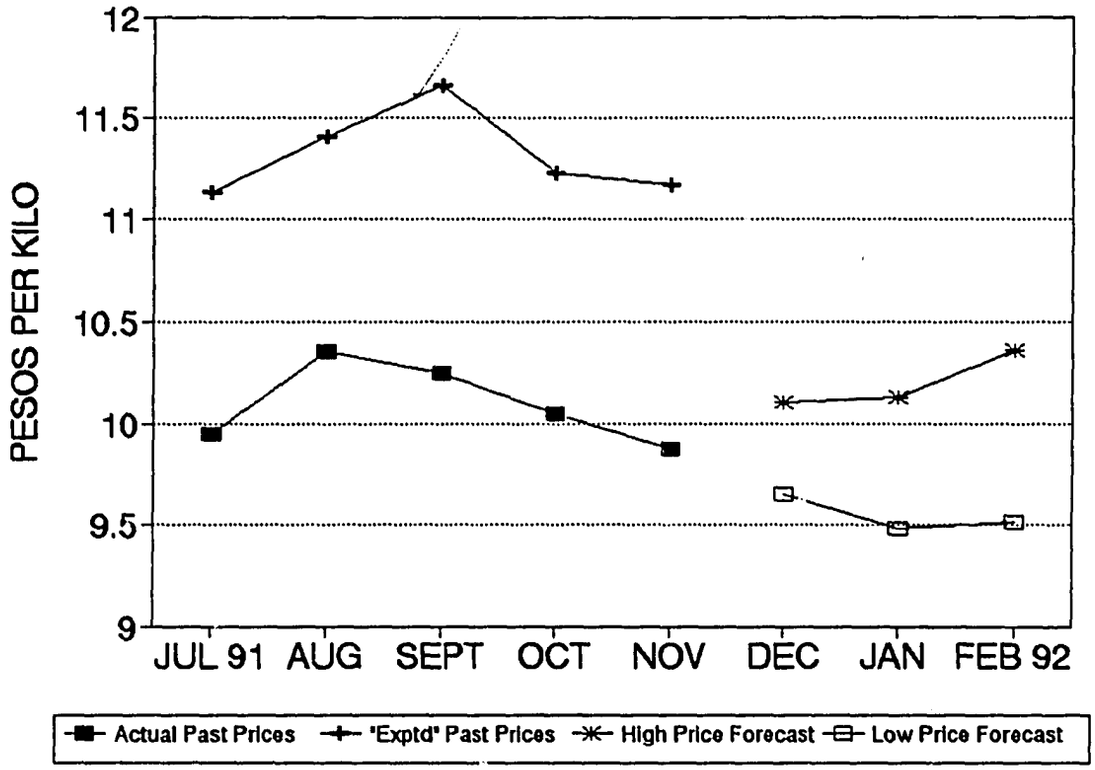
Vol 1 No. 6 December 1991

Figure 1
PALAY PRICES: ACTUAL AND EXPECTED



Actual palay prices continued to fall in November contrary to normal price patterns. The same was, however, not true for rice wherein actual rice prices moved along the seasonal trends. Beginning December, palay prices are forecast to increase when the lean season commences. Rice prices, on the other hand, are expected to stabilize at around ₱10.00 for the next three months.

Figure 2
RICE PRICES: ACTUAL AND EXPECTED



	Palay Price (P/kilo)		Rice Price (P/kilo)	
	High	Low	High	Low
DEC 91	4.48	4.19	10.10	9.66
JAN	4.57	4.20	10.12	9.48
FEB 92	4.78	4.31	10.35	9.51

This monthly report is produced by the Policy Analysis Division, Planning and Monitoring Service, Department of Agriculture. For inquiries, call Precelcs H. Manzo Tel. No: 952-370, 998-741 loc 210.

APPENDIX A

By Rayna Lyn Roxas

1. You will have to download **FONTS** first before changing the sub-directory to **WP51**. At the **C:>** type **CD\FONTS, ENTER** then at the **CD\FONTS>** type **HPDF**. You will be asked what filename to download so you type in **PORTDOC** and hit **ENTER** twice. Go to the **WP51** program by typing **CD\WP51** at the **C:FONTS>**. When the prompt is already **C:WP51>** type in **WP** and hit **ENTER**.

2. You will be "Welcomed" into the **WP** version 5.1 program after which you will get a blank blue colored screen with this message at the bottom right corner of the screen:

Doc 1 Pg 1 Ln 1" Pos 1"

3. To make the **Monthly Price Patterns and Forecast** Memo, it is necessary that you familiarize yourself with the following commands and function keys that will often be used:

Function key	Feature
F1	**Cancel Command**
F3	**Help**
Shift-F10	**Retrieve a file**
F7	**Exit WP51(with option to save document before exiting)**
F10	**Save document**
Shift-F6	**Center a line**
F6	**Bold**
F8	**Underline**
Alt-F3, F11	**Reveal Codes**
Shift-F7	**Print Menu/Options**
Shift-F7,6	**View Document**
Shift-F7,1	**Print full document**
Shift-F7,2	**Print page**
Shift-F7,4	**Control Printer (to cancel print jobs)**
Ctrl-F8,4	**Base Font Feature (To change the font sizes of the text, just choose the desired size and hit ENTER. The font size currently in use will be preceded by an * .)**
Alt-F4	**Highlight a block**
Ctrl-F4	**Options to Move, Copy, Delete, Append the block**
Home, Home, ↑	**Move back to top of document**
Home, Home, ↓	**Move down to end of document**
Ctrl-Home	**Go to (page no.)**
Insert	**Typeover**

Alt-F9,3	**Text Box Menu**
Alt-F9,3,1	**Create a box**
Alt-F9,3,2	**Edit the box**
Alt=	**Pull Down Menu Option**

4. Font sizes that you will likely use are:

TmsRmn 18pt Bold (AD) for the 1st **Title Line**(e.g.MONTHLY PRICE...)
TmsRmn 18pt Bold (AD) for the 2nd **Title Line** (e.g. PALAY AND RICE...)
TmsRmn 14pt Bold (AD) for the **Text** and for the **titles** inside the **Text Box** (refer to #7).
TmsRmn 10pt Bold (AD) for the **information** on **Vol. #, Issue #** and the **Month** and **Year** (which are found on the first page after the 2nd Title Line and for the information contained **in the box** at the end of the report (e.g. This monthly report is...)

5. Lotus/Quattro graphs are not imported into the **WP** document because they become condensed (too small) for our purposes. This is the reason why the **text** is done in **WP** and the graph in **Lotus/Quattro**, therefore **running** the document **twice** through the printer. The **Legend** is done in **Quattro-Pro** and you have to edit the size of the font by getting into **Graph, Text, Font, Legend, Point Size** then choose **12 Pt** so that you can fit most of the words like: **Prices** and **Forecast**, which are found in the legend.

6. After the 2nd **Title Line, ENTER 2X** then change the font to **TmsRmn 14pt Bold (AD)**. Draw a line from left to right by pressing **Alt= (Pull Down Menu)** and go to **Tools** then choose **Line Draw, ENTER.** Use the **arrow key** (→) until the **cursor stops.** Hit **F7 (Exit)** then **ENTER** after the arrow. Change the font to **TmsRmn 10pt Bold (AD)** before typing in the **Vol.# Issue No.**, and **TAB** near to the end of the right margin for the **Month** and **Year, ENTER.** Change the font again to **TmsRmn 14pt Bold (AD)** and repeat the **Line Draw** procedure before you start the Text. When making the **Text** in **WP** you have to allow a **wide blank space** after the **information** about the **Vol.#** and **Date** by hitting **ENTER** a couple of times (e.g. **10X**) in order to fit the **Lotus/Quattro** graph later on.

7. If you are limited to using two pages only to make this Memo, fit the 1st **graph (PALAYPRICE...)** in the front page followed by the brief **text**, and on the second page leave another blank space as wide as the one on the first page to fit the 2nd **graph (RICE PRICE...)**. The **Text** of the Memo is done in **TmsRmn 14pt Bold (AD).**

8. On the 2nd page after the wide blank space you have allotted for the 2nd graph, you need to make **Two Text Boxes** for the Palay and Rice forecast for the quarter concerned. To do the **Rice Price** you press **Alt-F9,3,1** and hit **#6** to change the Horizontal Position to **Right.** Then choose **#7** and change the **Size**, and choose **#3** Set Both, making the width

1.5" and the height .8". To help you align the **Palay Price** box with the **Rice Price** box, you should put on the **Reveal Codes (Alt-F3 or F11)** and see to it that there are no **Hard Return Codes [Hrt]** in between [Text Box:1;;][Text Box:2;;] (note the **Pos** of both boxes is 1). For the Horizontal Position of the **Palay Price** you change it to **Center** and the Size is the same with **Rice Price.** In **centering** the words inside the box, press **Shift-F6 (Center Command)** within the box **before** typing in the words (e.g. Palay Price). Press **F7** to exit from the box then **View** your document by **Shift-F7,6** to check if everything is in order.

9. Align the **High** and **Low** title under their respective boxes (Palay Price and Rice Price) by using the **TAB** and the **Space Bar.** Underline the words High and Low. Then align the **forecast numbers** by using the **TAB.**

10. Hit **ENTER** about **3X** before you make a **Table** containing information on **Who** made the Production Outlook and **Who** to contact for further information.

11. a) The **Table** can be generated by **Alt-F7,2,1** after which you will be asked **Number of Columns** (a number will already be there e.g. 3, but we will only be needing **1 column**) to which you will type **1,ENTER** and followed by another **Number of Rows** to which you will type **1,ENTER.** You will get this message:

The inside of this box will be colored red with the cursor blinking at the left corner of the box.

Table Edit: Press **Exit** when done **Cell A1 Doc 1 Pg 2 Ln 1.72" Pos 1.12"**

Ctrl-Arrows Column Widths; **Ins** Insert; **Del** Delete; **Move** Move/Copy;
1 Size; **2** Format; **3** Lines; **4** Header; **5** Math; **6** Options; **7** Join; **8** Split: **0**

b) To get rid of the double border, Choose **#3 Lines** then you will get another set of choices:

Top = Double; Left = Double; Bottom = Double; Right = Double
Lines: 1 left; **2** Right; **3** Top; **4** Bottom; **5** Inside; **6** Outside; **7** All; **8** Shade: **0**

c) Choose **#7 All** and you will get another set of options:

Top = Double; Left = Double; Bottom = Double; Right = Double
1 None; **2** Single; **3** Double; **4** Dashed; **5** Dotted; **6** Thick; **7** Extra Thick: **0**

d) Choose **#2** Single and you will see that the table will have a **single border.**

e) You can then press **F7** to exit from the **Table Edit** mode. Go into the box using the **arrow key**, change the Font size to **TmsRmn 10pt Bold (AD)** and on **Pos 1.19"** type in the necessary information. You can use the **Space Bar** to align the ends of the text inside the box, when you automatically move down to the 2nd Line move the **Space Bar** again to **Pos 1.19"** before starting the second line of the text, and the same for the 3rd Line. When you see that you are going past the right border, don't mind it and don't hit **ENTER**. It will automatically reposition itself inside the box.

12. After all this, you can **Save** the file under **PRICE**. It would also be advisable to **save** and **re-save** the file as you go along so that you don't have to re-do the whole thing over and over again because you made a slight mistake. If ever there is some information or data or command you don't need or shouldn't have made, you can use **Reveal Codes (Alt-F3 or F11)** and delete unnecessary information from there before **Exiting** without saving. To get out of the **Reveal Codes** mode, you just press **Alt-F3 or F11** again to restore screen.

13. Now, you are ready to print out your Memo (without the graph yet) in **WP** (this is after you have **edited** and **viewed** your document over and over). To print **Shift-F7,1** and the printer will process your command.

14. After **WP51** you will now go into the **Lotus Printgraph** or **Quattro Pro GraphPrint** (wherever your graph is located). In **Lotus**, after you have chosen what .pic file to print, you go into **Settings**, **Image**, **Size** and choose **Half**. You will see that the numbers in the lower portion under **Settings** will change. After choosing **Half** you again choose **Manual** and change the **Top Margin** and the **Height** according to the space you have allotted in the **WP** document. It is advisable to print out samples and try to fit it in the blank space of your document first, before you actually run it on your finished **WP** print out of the Text until you get the exact **Top Margin** and **Height** measurement. Make sure to choose **Align** before you hit **Go**.

15. If you are using **Quattro Pro GraphPrint**, you will need to go into the **Layout** portion and enter the necessary measurements **Top Edge, Left Edge, Height, Width** before you hit **Name** (name of graph to print) then **Go**. Also run a couple of samples before you actually run on the finished **WP** print out of your Text.