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Iowa grain producers' survey: an empirical analysis of factors affecting storage, drying, and choice of market outlets

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Iowa grain producers' survey: An empirical analysis of factors affecting storage, drying, and choice of market outlets

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CHAPTER I. INTRODUCTION

One quality which has always been a key to progress is the singular ability to harness the discoveries of science in the service of man. The impact of research and science on agriculture has been most spectacular. It has been largely responsible for impressive gains in productivity. Total United States agricultural output in 1971 was almost one-fourth larger than ten years earlier, despite a reduction of one-third in man-hours of labor and of four to five percent in the acres used for harvest (10).

Agriculture's producing unit - the individual farm - has been steadily undergoing change. Farms are becoming larger, and farm population is declining while total output is continuously growing. In 1971, the average size of the farms in the United States was about 389 acres compared with 297 acres for 1960 and 213 acres for 1950. Correspondingly, the number of farms in the United States has dropped from over 5.6 million in 1950 and 3.9 million in 1960 to approximately 2.8 million in 1971. Farm output per man-hour[1] has been increasing tremendously from 35 units in 1950 to 67 units in 1960 and 122 units in 1971. As a result, total income per farm-operator family has increased from $5102 per

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[1]Index of farm output (production) divided by index of man hours used.

annum to $11,207 per annum in 1970 (49).

A continuing trend of increased acreage per farm and output is also evidenced in Iowa. The number of farms declined from 180,595 in 1960 to 133,190 in 1971, while the average acreage per farm increased from 191.7 to 253.0 during the corresponding period. Average yield per acre of corn for grain was 99.8 bushels in 1971 compared with 63.2 bushels in 1960. In 1971, Iowa produced 1,141 million bushels of corn, 175 million bushels of soybeans and over 1.3 million bushels of grain annually places Iowa among the leading grain producing states in the nation.

Different periods in national and world history bring different needs, and different needs require new emphasis in research. Thus, today we must have not only a constant stream of research to enable producers to replace less productive means of farming and marketing with more productive methods but also a continuing flow of new information to help farmers face new challenges of the time. Providing the future food supply of developing countries, with population growing at 2.5 to 3 percent a year, will continue to be the main role that agriculture must fill, in the view of the Indicative World Plan. The authors of this plan say that by 1985 the developing countries will require nearly two and a half times as much food as they did in 1962. About two-thirds of this will result simply from the multiplication of mouths to be fed, while only one-third will be due to higher individual purchasing power (21). Providing for human needs with limited resources requires the efficient organization of production and an equitable system of distribution.

Statement of Problem

During the past decade harvesting methods in the United States have rapidly changed from the use of conventional mechanical pickers to field shelling. The introduction of field shelling has in turn stimulated a series of related technological adjustments in the production, harvesting, and marketing of corn.

An increasing proportion of an expanding production is being harvested as high-moisture shelled corn and marketed during a gradually shortening harvest period. The response to this pressure has been a rapid adjustment in drying capacity and associated services by farmers and country elevators. In 1970, over 20 percent of the crop moved to elevators at harvest time. As more high-moisture corn flows to elevators, additional investment in grain drying equipment, storage facilities, and high speed receiving facilities are required.

Shelled corn storage capacity is often a prerequisite to the addition of a dryer to the farm grain handling system. A dryer without matching storage capacity adds to the seasonality of the labor requirements and does not increase appreciably the farmer's flexibility in his marketing decisions.

Field shelling of corn has caused an increased rate of delivery to the elevator at harvest, creating a demand for greater receiving capacity. Harvesting of high-moisture grain has made the use of grain dryers accompanied by additional storage a virtual necessity and the drying and storage of grain a major activity of many elevators. Grain-storage capacity at elevators in Iowa rose from about 350 million bushels in the late 50's to about 443 million bushels as of January 1, 1971 (34).

Grain producers of Iowa have several channels for marketing their grains. One of the primary objectives of farmers is to increase farm income. The relationship between cost and pricing determines the value of the net income. There are both economic and noneconomic factors that influence a farmer as to the choice of market channel and the time of sale. The interrelationships existing between and among various variables - the harvesting methods and corn drying, corn drying and storage capacity, farm prices and elevator services, and personal relationship between farmer and elevator manager - make the study of grain producers complex.

The traditional approach to studying each of the sectors of production, processing, transportation and marketing in isolation cannot offer a meaningful explanation as to how the farmer makes his decision at every level of operation. There is, therefore, a need for an integrated analytical approach, so that investment and management decisions can be improved by the use of guidelines with which farmers can measure the efficiency of their operation.

Closely associated with farmer decisions, are those firms providing supply and services for agricultural operations. Changes in industry structure affect their operating conditions or conversely, their operating methods may affect the industry structure.

Objectives

Iowa farmers are continuously making decisions with regard to uses of relatively fixed land for alternative crops, methods of harvesting corn, adding storage facilities, buying drying equipment, selling grain or feeding livestock or both, and if selling, choosing from among the alternative market channels. This study analyses, as an overall objective, the various factors that influence farmers' decisions, particularly with respect to grain storage, grain drying, and choice of markets.

The specific objectives are:

1. To analyze interrelationships among grain drying, grain storage and grain marketing operations.

2. To identify the factors affecting the choice of markets and to measure the extent of these effects.

3. To identify the variables that significantly influence farmers' decisions for owning grain dryers on the farm as well as the probability of purchasing grain dryers within the next five years.

While describing the interrelations among the marketing operations, the analysis will be focused upon nine groups of farmers stratified on the basis of farm size. The analysis will cover Iowa's three major grain crops - corn, soybeans and oats.

CHAPTER II. SAMPLING THEORY AND DESIGN

Sample Survey Methods

Sample survey methods and theory present in a comprehensive form both the theory of sampling as it exists today and its application to practical problems. In most of the applications for which this theory was constructed, the aggregate about which information is desired is finite and delimited - the corn farmers of a country, the corn dryers in a state, the livestock in a county. In some cases it may seem feasible to obtain information by taking a complete enumeration or census of the aggregate. The relative advantages of sampling as compared with complete enumeration largely favor the use of the sampling method. The principal advantages (12) are: (1) reduced cost (b) greater speed, (c) greater scope, and (d) greater accuracy.

The operation known as market research is heavily dependent on the sampling approach. Business and industry have many uses for sampling in attempting to increase the efficiency of their internal operations. Opinion, attitude, and election polls, which did much to bring the technique of sampling before the public eye, continue to be a popular feature of newspapers.

The purpose of a survey might be to estimate the proportion of farmers who produce soybeans or to estimate the average number of acres per farm or the total acres of cropland, say for the state of Iowa. The individuals whose characteristics are to be measured in the analysis are called elementary units; and the aggregate of the units, i.e., the entire group whose characteristics are to be estimated, is termed either the universe or the population. Sample surveys deal with samples drawn from populations which contain a finite number N of units. If these units can all be distinguished from one another, the number of distinct samples of size n units that can be drawn from the N units is given by the combinatorial formula

$$\binom{N}{n} = {}_N C_n = \frac{N!}{n!\,(N-n)!}$$

Simple random sampling is a method of selecting n units out of the N such that every one of the ${}_N C_n$ samples has an equal chance of being chosen.

Stratified random sampling

Stratification provides another method of utilizing supplemental information to get greater precision in sample estimates. In stratified sampling the population of N units is first divided into subpopulations or groups of N_1, N_2, ..., N_L units respectively. These subpopulations are nonoverlapping, and together they comprise the whole of the population, so that

$$N_1 + N_2 + \ldots + N_L = N$$

Whenever a population is divided into such groups, and some kind of a random sample is taken in each group, the sample is called a stratified sample, the groups from which the sample is drawn are called strata and the process of dividing this population into groups is called stratification. To obtain the full benefit from stratification, the values of the N_h must be known. The sample sizes within the strata are denoted by $n_1, n_2, \ldots, n_L$ respectively. Once the strata have been determined and the size of sample to be taken from each stratum has been specified, the sample is selected in exactly the same way as a simple random sample, except that the sampling is done independently within each stratum.

Role of stratification

Stratification can be used to increase the reliability of sample results. The increase in precision of sample estimates accomplished by stratification will depend on the degree of homogeneity that is achieved within strata. The important steps to be taken in stratified random sampling are: (a) defining the strata to be used; (b) determining the size of sample to be taken from each stratum; (c) selecting the sample from the strata as defined; (d) preparing the estimates from the sample; and (3) evaluating the reliability of the sample estimates.

When random samples of n_1, n_2, ..., n_L units are drawn from the L strata, we have stratified simple random sample. It is not necessary, however, that the same proportion be included from each stratum. The proportion in the sample from the hth stratum is equal to $f_h = n_h/N_h$ and in any particular problem this fraction in the sample may vary slightly, widely, or not at all, from one stratum to the next.

Stratified random sampling estimates

The number of strata into which the population under consideration is designated by L, N will represent the total number of elementary units in the entire population, and N_h will represent the number in the hth stratum. Therefore,

$$N = \sum_{h}^{L} N_h = N_1 + N_2 \dots + N_L \qquad (2.1)$$

Similarly, the size of the sample drawn from the hth stratum will be designated by n_h, and

$$n = \sum_{h}^{L} n_h \qquad (2.2)$$

is the total size of the sample drawn from all strata. If X_{hi} is the value of a characteristic X of the ith unit in the population within the hth stratum and x_{hi} is the value of the characteristic for ith unit in the sample from the hth stratum, then

$$X_h = \sum_{i}^{N_L} X_{hi}, \quad \text{and} \quad x_h = \sum_{i}^{n_L} x_{hi} \tag{2.3}$$

Similarly,

$$X = \sum_{h}^{L} X_h = \sum_{h}^{L} \sum_{i}^{N_L} X_{hi} \tag{2.4}$$

represents the sum of the stratum totals over all strata, or the sum over all units in the entire population; and

$$x = \sum_{h}^{L} x_h = \sum_{h}^{L} \sum_{i}^{N_L} x_{hi} \tag{2.5}$$

is the total value of the characteristic under consideration for all units in the sample of size n. $\overline{X}$ represents the mean over the entire population, so that

$$\overline{X} = \frac{X}{N} \tag{2.6}$$

The mean within the hth stratum will be designated by

$$\overline{X}_h = \frac{X_h}{N_h} \tag{2.7}$$

and the mean of a sample of n_h units from that stratum will be designated

$$\overline{x}_h = \frac{x_h}{n_h} \tag{2.8}$$

The weighted mean of the population, $\overline{X}$, is

$$\bar{X} = \frac{\sum^{L} N_h \bar{X}_h}{\sum^{L} N_h} \tag{2.9}$$

and, thus is the weighted average of the stratum means where the weight used in the hth stratum is N_h, the number of units in the stratum.

Assuming simple random sampling is used within each stratum, $\bar{x}_h$ is consistent and unbiased estimate of $\bar{X}_h$, the true stratum mean. Consequently, the estimate of the mean for the entire population will be the weighted average of the estimates for the individual strata

$$\bar{x} = \frac{\sum^{L} N_h \bar{x}_h}{\sum^{L} N_h} \tag{2.10}$$

and will be an unbiased estimate of $\bar{X}$. The proof that $\bar{x}$ is an unbiased estimate of $\bar{X}$ follows from the fact that $N_h\bar{x}_h$ is an unbiased estimate of $N_h\bar{X}_h$ and from the fact that the expected value of the sum, $\sum^{L} N_h\bar{x}_h$ is equal to the sum of the expected values of the individual terms. It will be unbiased no matter what sampling fractions are used in the various strata, provided at least some sample is taken from each stratum and provided, of course, that the estimate used is that given by Equation (2.10) and not merely a simple mean of the sample observation (23).

Sampling Design

During the past few years, there has been a significant increase in the use of the consumer panel (a fixed sample) as a source of information for research purposes. One such panel has been constructed and operated by the Agricultural Market Research (AMR), Inc., Des Moines, since 1969. The AMR is an independent agricultural research firm composed of 1200 Iowa farm consultants (panel members) who are interested in improving the farm industry.

Construction of farm panel

According to the survey by AMR, there were 120,000 farmers in Iowa in 1971. Of these farmers, a sample of 30,000 was selected on a random basis without any regard to characteristics of the farms or farmers. These selected farmers were asked if they were interested in becoming members of a panel, after the advantages of being members of such a panel had been explained to them. The advantages of becoming a member of the panel, according to the operator of the panel, are: (a) a farmer consultant can play a very influential role in determining the quality and usefulness of the products and services that he and his fellow farmers buy and use each year; (b) AMR will award each member "merit points" for each month's questionnaire that he completes and returns on time and the accumulated merit points could be used to select gifts from AMR's Premium Gift Catalog; and (c) the AMR will send each member a Newsletter regularly which summarizes much of the information accumulated from the entire farm panel (45).

Of the 30,000 farmers who were sent letters by the AMR asking them to indicate their interest in becoming members, only 9000 farmers responded indicating their willingness. Through a questionnaire, information regarding the personal profiles of these 9000 willing farmers was collected. Based on information regarding the size of the farm, geographical location, and income earnings, 1200 farmers were finally selected as the farm consultants of the panel. The sample of 1200 farmers represents the following stratification with respect to farm size (2).

Farm Size Classification

Strata	%
1. 1-99 acres	5.8
2. 100-179 acres	20.5
3. 180-219 acres	8.9
4. 220-259 acres	10.4
5. 260-379 acres	24.2
6. 380-499 acres	14.8
7. 500-799 acres	12.6
8. 800-1100 acres	1.8
9. Over 1100 acres	1.0
Total	100.0

The sample of 1200 from the population of 120,000 implies one percent sample size and it represents all the 99 counties and 9 crop reporting districts of Iowa. The panel operators claim there is a need for replacement of approximately 5 percent of the panel every year. The panel member dropouts result from the mortality of members and retirement from farming.

As part of the North Central Regional Marketing Research Program, the AMR was asked to obtain the requested information for an Iowa Grain Producers Survey from the panel members. A questionnaire relating to the grain producers survey was mailed to the panel members in early 1972 (see Appendix A). Returned and completed questionnaires numbered 856, giving a response rate of 71.3%.

Observations on a consumer panel operation

One criticism often made of the panel method is that repeated questioning of the same group of persons will influence future attitudes and behavior sufficiently to make respondents no longer typical or representative of the universe from which they were drawn. This hypothesis has caused many operators of consumer panels to limit the time which members are permitted to serve on a panel. Some operators follow the practice of arbitrarily dropping one-fourth or one-third of all members each year which means a complete turnover of membership every three or four years. Dr. C. H. Sandage's study undertaken to obtain specific evidence on the question of whether consumer panel develop bias as a result of being interviewed repeatedly reveals no significant evidence of such bias resulting from long sustained membership (42).

Ortengren claims that the information of opinion on matters relating to actual experience and which are well understood by the respondents should not be expected to differ between people acquiring training in answering questions and those not receiving such training. Thus the effect of training as a result of long membership on the panel, should not be expected a priori to cause much bias in a case like Sandage's study. But he asserts that panels used for questions such as consumer product testing introduce bias (36). According to Ortengren, some consumers 'spot's particular brand of product if they are repeatedly utilized for tests on the same product, in which case they give stereotyped and clearly brand-directed answers toward or against the test product, which consciously or subconsciously they seem to recognize as a "common element" of the repetitive tests.

CHAPTER III. REVIEW OF RELATED LITERATURE

In 1970, Iowa produced 859 million bushels of corn and 187 bushels of soybeans. This production of over a billion bushels of grain annually places Iowa among the leading grain-producing states in the nation. Grain production and marketing are thus of great importance in Iowa's agricultural economy. Operations of agri-business, from harvesting to marketing grains involve many decisions on the part of farm firms and related industries. This chapter provides an overview of some of the past researches made related to this study.

Mikes, Fletcher, and Futrell (34) studied Iowa's elevator industry and found that grain production has been increasing for many years, leading to a larger movement of grain off farms to elevators. The increased grain production has been accomplished by a dramatic shift in corn harvesting technology. They observed in 1960, only 10 percent of the corn crop was harvested as shelled corn by picker-shellers and corn combines. The rest was harvested as ear corn by mechanical pickers. By 1970, the authors claim, 54.2 percent of the corn was harvested shelled. Field shelling has been encouraged by the ability to handle a larger volume of grain with a given labor supply, reductions in risk of excessive field losses due to severe weather, improved field shelling equipment, and other factors.

The above authors also found that field shelling of corn results in large quantities of high-moisture corn moving to elevators in a short period in the fall. In 1970, over 20 percent of the crop moved to elevators at harvest time and 42 percent of the crop was sold off the farm. According to these authors, high-moisture corn is a perishable product and requires specialized drying and conditioning. As more high-moisture corn flows to elevators, additional investment in grain-drying equipment, storage facilities, and high-speed receiving facilities is required.

The phenomenal acceptance of combines as a method of field shelling corn is having a decided effect upon methods of handling grain at country elevators. While many country elevators have owned drying equipment, heavy deliveries of wet grain beginning about September 15 and extending to November 15 will require some distinct alterations and changes in the wet grain holding and drying facilities. Bockhop and Norton (8) suggest five alternatives, by which the existing facilities with proper adaptations and reasonable additions to drying facilities can meet the demand for increased field shelling.

The alternatives suggested by Bockhop and Norton are: (1) buy more drying capacity so that the 24-hour capacity will be about equal to the daily rate of truck delivery only the wet grain that accumulates during the day will need to be held more than overnight so that the wet grain storage will be relatively empty at 8 a.m. the next day - wet corn storage, then, will only need to be equal to approximately 14 hours operating time of the dryer; (2) modify the present dryers and equip the dry corn storage with bin cooling - bin cooling not only saves time during the busy fall season but permits the bins to be used for cooling plus storage and aeration; (3) with extensive flat storage capacity, much of which is usually equipped with aeration equipment, it is possible to hold corn for an indefinite period by cooling corn with natural air; (4) hold the corn in refrigerated storage at approximately 28°F - by this system, high-moisture grain can be dried and marketed as commercial corn, can be blended into farm rations or sold as wet corn to feeders; and (5) extend the drying time with controlled atmosphere - this can be made possible by a combination of natural air cooling and dehydrofrigeration.

Selecting and assembling a system of machines to harvest, process, and store grains efficiently and economically is complicated by many types and sizes of machines available. Changing technology in farm operations requires a farmer to know functions and capacities of the machines. Ayres et al. (4) have developed a formula to estimate the field capacity of the harvesting machines in the system as

$C = SWE/825$, where C = field capacity (acres/hour), S = average field speed (miles/hour), W = machine operating width (feet), and E = field efficiency (percent). Field efficiency is a measure of the relative productivity of a machine under field conditions and will vary between 60 and 80 percent for most harvesting machines.

Ayers et al. further state that by multiplying the estimated field capacity of the main harvesting machine by the numbers of working hours per day, the average daily harvesting capacity can be estimated. The proper size for the harvesting machine can be found by adjusting the machine width and the number of working hours per day until the average daily harvesting capacity equals the required system capacity. According to these authors the hourly harvesting rate for the system can be estimated by multiplying the harvesting-machine field capacity in acres per hour by the harvested crop yield in bushels per hour. The transport, handling, and processing equipment should have enough capacity to equal or exceed this hourly harvesting rate.

Schwart and Harms (43) in their study related to Illinois farmers in 1967 regarding on-farm conditioning and storage of field shelled corn state that improperly dried corn has posed many problems in the movement of grain for processing. Farmers, the authors claim, have shifted to field shelling in order to handle greater acreages. When farmers shift to field shelling they must either decide to dry and store on the farm or find local commercial facilities to handle their grain. In most localities in Illinois, commercial facilities are not available for bigger operators who harvest 1500 to 2000 bushels per day. Many of them will need some drying equipment to keep harvest equipment operating throughout the season. In areas where commercial facilities are available to handle the harvest flow, the farmer needs to decide whether to hire the jobs done or to do them on the farm. Commercial costs must be compared with estimated on-farm costs to help decide the issue.

In his study about field shelling, conditioning, storage, and drying corn related to twenty Illinois counties, Lowell Hill (25) observed that the amount of storage space for shelled corn has expanded rapidly, both on farms and at elevators. If field shelling expands to 80 percent of the crop by 1980 and corn production stays around the present 1.1 billion bushel level in Illinois, an additional 80 to 100 million bushels of shelled corn storage space will have to be built on farms and at elevators according to Dr. Hill.

Describing the trends in drying grain in Illinois, Hill states that one of the most dramatic trends of the recent years has been the development of on-farm drying capacity. He found that the volume of corn dried by farmers had increased 400 percent since 1963, whereas the increase at elevators had been only about 100 percent during the same period. The development of on-farm drying capacity, he claims, is influenced by high drying charges at elevators, high moisture discounts, waiting in lines, and inadequate services at the elevators. Finally, Hill concludes that the expansion of drying facilities at elevators depends on (1) the demand for the service, (2) competition from farm dryers, and (3) the profitability of commercial drying at a competitive level of charges.

A recent study conducted by Baumel et al. (5) reveals that the amount of grain moving off the farm in the fall as a proportion to total grain movement increased from 31 percent in 1964 to 46 percent in 1969 for the state of Iowa. The increase in the amount of corn moving from the farm to elevators in the fall, according to these authors, reflects to a large extent the increasing use of corn field shelling. Field shelled corn requires the use of aeration and drying equipment, which is often more accessible at elevators during harvest than on farms.

Based on the survey data taken for $6\frac{1}{2}$ counties in the Fort Dodge area to estimate the monthly flow of grain from farms to elevators, Baumel et al. observed that the largest amount of corn for sale was moved during October and November from farms to elevators, each month respectively accounting for 26 and 14 percent. They projected to 1980 that a greater share of corn movements would take place during the months of October and November accounting for 24 and 45 percent respectively of the 1980-81 shipments. The other 31 percent of the corn was projected to be received at the elevators from the farms during the other ten months ranging from one to six percent every month. The largest amount of soybean shipments for sale was during October accounting for 33 percent of the 1970-71 shipments. However, it was projected to 1980 that 50 percent of the total shipments of 1980-81 commercial soybeans for sale would be received at elevators during October. The remaining 50 percent of the projected sales of soybeans would be moved to the elevators from farms during the remaining 11 months of the year ranging from two percent to eight percent every month.

The choice between drying corn on the farm or at the elevator has an important effect on the future structure of the grain industry and on the profit positions of individual elevators and farmers. Analyzing the country census data for Illinois, Hill in another study (26) states that farm dryers are primarily used by farmers who harvest with a combine or picker-sheller. Therefore, the percent of corn field-shelled in a county is closely related to the number of dryers. He used multiple regression techniques using the number of dryers on farms as the dependent variable to estimate the linear relationship between the number of dryers on farms and the selected farm characteristics data for 1959 and 1964. The selected farm characteristics used as independent variables are: (1) number of farms in the county, (2) percent field shelled, (3) percent of cash grain farms, (4) acres of corn, (5) bushels stored on farm, (6) percent marketed at harvest, and (7) farms with dryers.

Hill found that approximately 80 percent of the variation in the number of dryers per county was accounted for by the linear influence of the selected variables. Much of the county-to-county variation in the number of dryers on farms is caused solely by the number of farms in the county. Other things being equal, according to Hill, larger counties have a potential for owning more dryers than smaller counties. He estimated that the number of dryers per county is increased by 7 for each additional 100 farms in a county.

The decision to purchase a durable factor of production such as a grain dryer may be characterized as a dichotomous nature of such a decision implies that there exists a "breaking point" or threshold in the dimension of the explanatory variable below which a stimulus elicits no observable response. Only when the strength of the stimulus reaches the threshold level does a reaction occur. Additional increases in stimulus strength results in no effect on the observed response.

In a more recent study, Hill and Kau (27) attempted to explain the variables affecting the dichotomous choice of grain producers of Illinois - (1) would purchase grain dryers (taking '1' value), and (2) would not buy a dryer (taking '0' value), by using estimation procedures based on Finney's probit analysis. They hypothesized that the variables of farm size, farm type, method of harvest, farm ownership, shelled corn storage capacity, percent of grain sold at harvest, and age of the farmer were significant variables in an explanatory model of farmers' decision to purchase a grain dryer. The multivariate probit model was used to estimate the parameters involved in these relationships. Of the variables used in the model, Hill and Kau found only the variables, farm size, farm type, percent field shelled, percent sold at harvest, and operator's age were statistically significant when applied to 1967 data. When they used 1970 data, they found only two variables, farm size and operator's age to be statistically significant.

Berk (6) studied the tenure patterns of farmland owners in Iowa, using the technique of discriminant analysis. He classified the Iowa farmland operators into four groups: (1) full-owner operators (FOO) - owners who operate only the land they own, (2) part owner operators (POO) - owners who own and operate their lands but rent additional lands,

(3) operating land lords (OL) - who operate part of their land and rent out the rest, and (4) nonoperating landlords (NOL) - who rent all the land they own and operate none. He tested the diagnostic hypotheses: (1) each tenure group consists of a homogeneous class of owners by itself, with similar goals and distinctly different from the rest, (2) debt-free full ownership is the goal of all tenure groups rather than operatorship.

The full-owners' (FOO) objective function is expected to consist primarily of obtaining debt-free title to land while the objective function for operators (POO and OL) is expected to be maximizing profits and maximizing income for the nonoperators (NOL). The findings did not confirm the expectations. The first three tenure groups, FOO, POO, and PL formed one homogeneous class which he further classified as "operators' class". This result castes doubt to the overriding importance of the norm of ownership, at least in the short run. Because characteristics of operatorship have been the strongest link force between these tenure members, as opposed to ownership, the last group, as expected, formed the nonoperator tenure class.

On further analysis of the two tenure classes - operator and nonoperator classes of owners, Berk successfully classified owners into their declared tenures. The rate of successful classifications was 70 percent for the operators and

79 percent for the nonoperators. The misclassified owners were identified as 'borderline owners' if they exhibited some of the characteristics of the opposite class, as opposed to their declared class, but still retained their class identity. Berk found a minority of owners, less than 7 percent, who strongly indicated belonging to the opposite class instead of their declared class, and he identified these owners as 'response likely'. These are the owners who are expected to change tenure status within a foreseeable future, according to Berk.

Sequence of Empirical Analysis to be Followed in this Study

The Review of Literature cited in the preceding pages centers around the problems grain producers often face in their decision making framework of farm operations. The following three chapters analyze the variables affecting those decisions using three approaches, each making unique contributions to the final composite answer: (1) descriptive analysis, (2) linear multiple regression technique, and (3) linear multivariate discriminant analysis.

The changing harvesting methods, availability of storage and drying facilities on the farm, the future demand for additional storage space and grain drying equipment, and the characteristics associated with farm and farmer are the major factors that affect the farmer's decisions as well as the structure of the farm industry. Chapter IV takes into consideration all these factors and a descriptive analysis of these variables as well as their inter-relationships are presented in detail.

Grain producers of Iowa are faced with several outlets for marketing their saleable grains. A proper choice of a marketing channel by a grain producer is certainly another factor that determines his farm income. There may be both economic and noneconomic factors that influence the final choice of a market channel. The linear multiple regression technique is found to be appropriate to identify those variables and quantify their effects on the volume of grains sold to various marketing channels. The theory and the application of multiple regression procedures and the statistical results with interpretations are presented in Chapter V.

Chapter VI deals exclusively with linear multivariate discriminant analysis. Ownership of drying equipment on the farm as well as the intentions of farmers to buy grain dryers in the foreseeable future are important decision variables that affect the farmers and farming industry. Owning a dryer on the farm or not owning, implies a binary choice. But the intentions to buy dryer capacity in the next five years are reported in terms of probability ranging from 0 to 100 percent. As a matter of convenience, these probabilities are classified into six groups. The variables influencing the ownership of dryer on the farm (two-class case), and the probability of purchasing a dryer within the next five years (six-class case) are identified and analyzed using the disciminant and classification procedure.

CHAPTER IV. DESCRIPTIVE ANALYSIS OF GRAIN PRODUCERS' SURVEY

Iowa is a leading state in the production of corn for grain in the United States. About 12 million acres of corn was harvested and about 1.141 billion bushels of corn was produced in 1971 which accounted for 21 percent of national corn production. Iowa is the second largest soybean producing state in the nation; next to Illinois having harvested about 176 million bushels accounting for 15 percent of national soybeans production for 1971. The state's third major crop is oats of which Iowa produced about 86 million bushels. Iowa ranks fifth in the country in oats production accounting for 10 percent (49).

Production technology is advancing rapidly and is reflected in increased yields. According to the Iowa Annual Farm Census for 1971 (28), average production of corn per acre was 100 bushels, while 32 bushels of soybeans on the average per acre was harvested. The per acre production of oats stood at 58 bushels.

There are other grains, such as sorghum, wheat, barley, rye and popcorn which are produced in Iowa. The acreage and production levels of these crops are relatively small, hence this study is limited to three major grains, viz., corn, soybeans and oats.

Characteristics of Farms and Farmers

Iowa is essentially an agricultural state. According to the AMR survey in 1971, there were 120,000 farmers in Iowa. The classification of farms based on farm size is presented in Table 4.1. The largest acreage group, accounting for 24.2 percent of the total farms belonged to the farm size group, 260-379 cropped acres. The average size of the farm for the state was 306.3 acres.

Based on the stratified sampling estimating procedure, the estimated state total cropped acres for 1971 were 36,723,832 compared to about 34 million cropped acres estimated by Iowa Department of Agriculture (28). The difference of about 6 percent in estimate which is not significantly large may be due to sampling errors.

Age and Education

Age, education, farm experience as well as acreage are major factors in many of the decisions on farm production. The average age, average years in farming, and average years of education corresponding to each of nine different farm size groups are listed in Table 4.2.

The average age of the grain producer for the state was 47 years. As we analyze the data for each of the strata, we notice that the larger the acreage cropped the

Table 4.1. Characteristics of farms and farmers in Iowa

Farm category No.	Farm-size (cropped) acreage	Farms in the State Numbers	Farms in the State %	No. of respondents	Average size of farm	Estimated State total cropped acres
1	1-99	6,960	5.8	107	59.8	416,208
2	100-179	24,600	20.5	212	139.4	3,429,240
3	180-219	10,680	8.9	91	196.8	2,101,824
4	220-259	12,480	10.4	94	237.7	2,966,496
5	260-379	29,040	24.2	181	310.4	9,014,016
6	380-499	17,760	14.8	94	426.6	7,576,416
7	500-799	15,120	12.6	63	610.0	9,223,200
8	801-1100	2,160	1.8	9	873.2	1,886,112
9	Over 1100	1,200	1.0	5	1,258.6	110,320
Total		120,000	100.0	856	306.8	36,723,832

Table 4.2. Personal characteristics of grain producers by farm-size

Farm category No.	Total respondents	Average age	Average years in farming	Average years of education
1	107	50.4	24.0	11.1
2	212	50.0	26.1	10.9
3	91	47.2	23.7	11.4
4	94	46.5	23.3	11.8
5	181	45.9	23.0	11.7
6	94	45.8	22.9	12.0
7	63	44.9	23.2	11.9
8	9	44.8	23.3	12.3
9	5	47.8	24.0	12.8
Sample Average		47.0	23.7	11.8

younger is the farm operator with one exception, strata number nine, where the largest acreage is managed by older farmers. However, no significant difference is found in average years in farming between the various acreage groups. An interesting characteristic of grain producers is that the average years of education had some correspondence with the size of the farms. Farmers of larger acreage group had relatively higher levels of education. The average level of education in terms of years is estimated to be 11.8 years for the state.

Land Ownership and Farm Type

Land ownership determines some of the major land investment decisions. In Iowa, 39.37 percent of the farmers surveyed owned all the land they operated. The other 60.63 percent of the farmers were either part-owners or rented all the land they formed. The percentage of farmers owning all the land they operated declined as the size of the farm increased. In other words, more farmers expanded their scale of operating by renting some portion of their total operating unit.

The type of farm is another factor that influences grain producer's decision making processes. For the purpose of our analysis, if 50 percent or more of the total revenue is derived from either cash grain, or livestock, etc., then the type of farm is considered as cash grain type, or livestock type, etc., as the case may be. Of the 856 grain producers who responded, 227 were cash grain farmers accounting for 26.5 percent, 423 were livestock farmers accounting for 49.4 percent and 206 belonged to other categories which include dairy, poultry, fruits and vegetables, or general. Strata-wise analysis of data indicates that the percentage of cash grain farmers to total respondents steadily increased as the scale of operation expanded. Thus, increased acreage is largely represented by cash grain farm type. Strata-wise classification of farmers with respect to land ownership and type of farm are given in Table 4.3.

Corn Harvesting Methods

Farmers have rapidly shifted from picking ear corn and the use of crib storage to field shelling with the necessary grain conditioning and bin storage. Farmers have about 22 days (nine out of 10 years) to harvest corn from October 18 to November 20 in Central Iowa. According to Wendell Bowers (9, p. 4) corn contains about 26 percent moisture by mid-October and by the first week in November dries to about 20 to 21 percent. Visible field losses average about 6 percent at 26 percent moisture and increase to about 14 percent when moisture content reaches 20 percent. Invisible kernel damage is greater when harvesting at the higher moisture levels and is reduced as the moisture level is reduced. If we add to field loss the damaged kernels from harvesting corn at higher moisture content, quality of the product becomes a problem that farmers must recognize.

Field shelling enables farmers to reduce losses in harvesting and to handle larger acreages. When operators shift to field shelling they must either dry and store on the farm or find local commercial facilities to handle their grain. In 1971, 61.8 percent of the corn harvested by the respondents was field shelled. Total acres and bushels of

Table 4.3. Characteristics related to land ownership and type of farm

Farm category No.	Total respondents	Land Ownership				Type of Farm			
		All owned	All rented	Owned and rented	% of all owned to total	Cash-grain farms	Live-stock farms	Others	% of cash-grain to total
1	107	78	10	19	72.9	16	38	53	14.9
2	212	133	43	36	62.7	38	113	61	17.9
3	91	33	25	33	36.2	23	46	22	25.3
4	94	28	23	43	29.8	25	51	18	26.6
5	181	41	37	103	22.6	63	86	32	34.8
6	94	14	15	65	14.9	35	51	8	37.2
7	63	9	8	46	14.3	21	32	10	33.3
8	9	-	-	9	-	3	5	1	33.3
9	5	1	1	3	20.0	3	1	1	60.0
Total	856	337	162	357	39.47	227	423	206	26.5

corn harvested, and methods of harvest adopted by the respondents within each strata are given in Table 4.4. The survey data shows that farmers belonging to the acreage group of 800-1100 acres reported to have field shelled 92.3 percent of their total harvest compared to only 43 percent in the case of the producers in the 1-99 acre group. This indicates a strong increase in field shelling as the size of the farm increased which substantiates the hypothesis that ability to handle greater acreage is a factor for shifting from mechanical harvesting of ear corn to field shelling.

Grain Storage Facility

The amount of storage space for shelled corn has expanded rapidly, both on farms and at elevators. Much of the storage space existing before the change to field shelling has become obsolete before its time, and considerable investments are required to keep pace with the changing harvesting method.

Based on the survey data of the 11,454,000 bushels of storage facility of various kinds owned by the respondents in 1971, 43.0 percent were metal bins, 7.6 percent converted cribs, 8.3 percent silos, 31.7 percent ear corn cribs, 2.1 percent other ear corn storage, and 7.3 percent other shelled corn storage. If the storage capacity of metal bins and other

Table 4.4. Corn harvesting methods practiced by Iowa grain producers

Farm category No.	Total acres of corn harvested	Bushels of Corn Harvested Mechanical (100)	Shelled (100)	Total (100)	% of shelled to total
1	3,782	2,046	1,543	3,589	43.0
2	14,672	8,765	6,413	15,178	42.2
3	8,084	4,396	4,208	8,604	48.9
4	12,013	4,828	6,626	11,454	57.8
5	26,175	11,070	17,395	28,465	61.1
6	18,379	6,499	14,085	20,584	68.4
7	17,971	4,622	15,190	19,812	76.7
8	2,872	260	3,110	3,370	92.3
9	3,080	1,260	2,420	3,680	65.8
Total	107,746	43,746	70,990	114,736	61.8

shelled corn storage are used for storing shelled corn, the total capacity available for shelled corn constitutes 50.3 percent of the total capacity with the remainder available for ear corn storage. Table 4.4 shows that 61.8 percent of the total corn harvested was shelled corn and the other 38.2 percent was earcorn. One reason for the discrepancies between the shelled corn harvested ratio and shelled corn storage capacity ratio may be explained by inadequacy of the present storage capacity.

Of 856 respondents, 71.4 percent reported that the present capacity of storage is adequate and 28.6 percent reported inadequate. The average capacity of storage of each kind and percent of respondents reporting that the existing storage capacity of each kind was adequate are indicated in Table 4.5.

With regard to the planning by grain producers for additional storage space during the next five years, 221 farmers of 856 respondents planned to have additional storage space totaling 1,626,000 bushels. An extrapolation of survey data to all of Iowa indicates that 33,852 farmers are planning additional storage space on farms during the next five years. Total bushels of storage capacity to be added as planned is estimated to be about 284 million bushels. We also note that average storage space planned increases as the size of the farm increases. The number of farmers planning to have additional storage and amount of space planned under each of the nine strata are listed in Table 4.6.

Drying of Grain

With the increasing trend of field shelling, grain producers are required to decide to dry and store on the farm or find local commercial facilities to handle their grain. In most localities commercial facilities are not available for the bigger operators harvesting 1500 to 2500

Table 4.5. Storage capacity and adequacy of capacity as indicated by grain producers

Kind of Storage	Present Capacity of Storage				Number Indicating Capacity		
	No. reporting[a]	Capacity (1000 bu)	% of total capacity	Average capacity (1000 bu)	"Adequate"	"Inadequate"	% of "adequate" of those responding
1. Metal bins	519	4,927	43.0	9.49	334	176	65.5
2. Converted cribs	168	875	7.6	5.21	99	34	74.4
3. Silo	98	961	8.3	9.81	75	18	80.6
4. Earcorn crib	647	3,630	31.7	5.10	402	156	72.0
5. Other (earcorn)	64	227	2.1	3.55	150	41	78.5
6. Other (shelled corn)	202	834	7.3	4.13			
Total/Average	-	11,454	100.0	6.22			

[a]A respondent may have entries under more than one kind of storage.

Table 4.6. Additional storage space planned by grain producers during the next five years by farm size

Farm category No.	Plans to Add Storage Space			Estimated State Total	
	Numbers	Bushels (1000)	Average (1000 bu)	Numbers	Bushels (1000)
1	14	38	2.7	911	2,472
2	51	245	4.8	5,918	28,429
3	19	92	4.8	2,230	10,797
4	28	162	5.8	3,717	21,508
5	44	338	7.8	7,079	54,229
6	31	273	8.8	5,857	51,580
7	31	395	12.7	7,440	94,800
8	2	33	16.5	480	7,920
9	1	50	50.0	240	12,000
Total	221	1,626	8.4	33,852	283,735

bushels per day. Many of them will need some drying equipment to keep harvesting equipment operating throughout the season. The final distribution of drying capacity between farm and elevator will have significant effects on the structure and profitability of the grain industry.

Drying and storage cannot be separated. For the use of dryer proper storage is needed. Any advantage possessed by the elevator as a result of economics of size will be less important once farmers have made long-term investments in drying and storage equipment. The relative advantages of on-farm versus off-farm drying should be identified while the industry is still in a fluid state of transistion.

The survey data shows that 35 percent of 856 respondents had owned drying equipment on the farm. Strata-wise computation of dryer-owners reveals that the percentage of owners increased as the size of the farms increased. The percentage of farmers owning dryers ranged from 0.9 percent for the farm acreage group of 1-99 acres to 80 percent for the farm acreage group of 1100 acres and over. Economics of scale, among other factors, suggest that some minimum size of corn volume is necessary to justify purchasing a grain dryer.

Based on the stratified survey data, out of 120,000 farmers farming in the state of Iowa, 40.9 percent of them is estimated to have owned grain dryers in 1971. The other 59.1 percent did not own dryers. The classification of farmers owning and not owning the grain dryer according to farm size is given in Table 4.7.

Probability of Purchase of Grain Drying Equipment

The probability that grain drying equipment would be purchased by the grain producers within the next five years was expressed in terms of discrete values ranging from 0 to

Table 4.7. Owning drying equipment on the farm

Farm category No.	Total respondents	Number owning	Number not owning	Number not answering	% of owners to total	Estimated State Total: Number owning	Estimated State Total: Number not owning
1	107	12	95	-	0.9	781	6,179
2	212	41	170	1	19.3	4,758	19,726
3	91	25	65	1	25.5	2,934	7,629
4	94	32	62	-	34.0	4,249	8,231
5	181	81	99	1	44.8	12,996	15,884
6	94	55	38	1	58.5	10,391	7,180
7	63	43	20	-	68.3	10,320	4,800
8	9	7	2	-	77.8	1,680	480
9	5	4	1	-	80.0	960	240
Total	856	300	552	4	-	49,069	70,349
%	100	35.0	64.5	0.5	-	40.9	58.6

100. These values were formed into six groups as convenient means for analysis. The formation of groups is quite arbitrary and they are: (1) zero probability, (2) 1 to 25 percent probability, (3) 26 to 50 percent probability, (4) 51 to 75 percent probability, (5) 76 to 99 percent probability, (6) 100 percent probability.

Of 856 respondents, 71.4 percent of them indicated zero probability which implies that they would not buy a grain dryer within the next five years. Only 5.8 percent of the respondents expressed 100 percent probability of purchasing a grain dryer. The remaining 22.8 percent of the respondents indicated the probabilities ranging from 1 to 99 percent. Of this 22.8 percent, the probability group of 26-50 percent had the largest number of respondents accounting for 12.9 percent. Probability groups and stratawise classification of respondents and the extension of this analysis to state estimates are given in Table 4.8.

Producers' Preference of Grain Market Outlet

Iowa grain producers have many alternative outlets to market their grains. The preference of a particular outlet may be influenced by, among other things, the kind and amount of services offered to producers in various stages of the farm operation. Cooperatives were the preferred market outlet

Table 4.8. The probability of purchase of grain drying equipment within the next five years viewed by responding producers

Farm category No.	No. of respondents	Probability of Purchase						Estimated State Total					
		0	1-25	26-50	51-75	76-99	100	0	1-25	26-50	51-75	76-99	100
1	107	100	5	1	1	-		6,505	325	65	65	-	-
2	212	163	10	26	5	1		18,914	1,160	3,017	580	116	812
3	91	62	7	13	5	1		7,276	822	1,526	587	117	352
4	94	65	3	13	3	1		8,630	398	1,726	398	133	1,195
5	181	117	15	26	5	3		18,772	2,407	4,171	802	481	2,407
6	94	60	9	16	2	1		11,336	1,700	3,023	378	189	1,134
7	63	37	6	12	1	-		8,880	1,440	2,880	240	-	1,680
8	9	4	1	1	1	1		960	240	240	240	240	240
9	5	2	-	1	-	-		480	-	240	-	-	480
Total	856	611	56	110	22	7		81,753	8,492	16,888	3,290	1,276	8,300
%	100	71.4	6.5	12.9	2.6	0.8		68.1	7.1	14.1	2.7	1.1	6.9

for 34.8 percent of the 856 respondents, 26.4 percent of them had no preference of any outlet at all, 13.9 percent of respondents preferred independent outlets, and only 7 percent preferred a line outlet. 17.7 percent of the respondents did not answer the question related to market outlet preference. Producers' preference of grain market outlet by farm size as indicated in Table 4.9.

Grain Sales

Country elevators are the major outlet for respondents' grain. Country elevators' share in the total grain sales of all grain outlets combined, accounted for 79 percent. Terminal and sub-terminal elevators' share in the total grain sales amounted to 7.2 percent. Then come the shares of other farmers, truckers, grain processors and feed dealers accounting for 4.6, 3.8, 3.2, and 2.2 percents respectively. The relative shares of each market outlet in the purchase of individual grains in terms of quantity and percentages are presented in Table 4.10.

Sources of Grains for Sale

One can conceptualize a relationship among the methods of harvesting corn, availability of storage capacity, ownership of drying equipment and selling of grains at harvest. Assuming that grain producers are profit maximizers, they try

Table 4.9. Producers' preference of grain market outlet by farm-size

Farm category No.	Total respondents	Prefer a Coop.		Prefer an Independent		Prefer a Line Co.		Have No preference		No response	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	107	35	32.7	16	15.0	9	8.4	24	22.4	22	20.6
2	212	72	34.0	24	11.3	17	8.0	49	23.1	50	23.6
3	91	29	31.9	13	14.3	5	5.5	27	29.1	16	17.5
4	94	30	31.9	15	16.0	5	5.3	25	26.6	19	20.2
5	181	68	37.6	28	15.5	14	7.7	51	28.2	20	11.0
6	94	29	30.8	15	16.0	4	4.2	30	32.0	16	17.0
7	63	30	47.6	7	11.1	5	7.9	15	23.8	6	9.6
8	9	4	44.4	-	-	1	11.1	2	22.2	2	22.2
9	5	1	20.0	1	20.0	-	-	3	60.0	-	-
Total/ Average	856	298	34.8	119	13.9	60	7.0	226	26.4	151	17.7

Table 4.10. Distribution of sales of major grains to various marketing outlets in 1971

Market Outlets	No. of respondents who sold grains	Quantity of grains sold (100 tons)	% of Quantity	Corn		Soybeans		Oats	
				Qty.	%	Qty.	%	Qty.	%
				(in 100 bushels)					
Country Elevator	541	1581.7	79.0	42,671	76.9	12,711	86.5	347	62.5
Other Farmers	69	99.5	4.6	3,414	6.1	96	0.7	61	11.0
Truckers	32	73.5	3.8	2,304	4.1	276	1.9	45	8.1
Ter. & Subterm. Elev.	50	142.9	7.2	3,858	7.0	1,151	7.8	27	4.9
Grain Processors	18	43.4	2.2	1,225	2.2	270	1.8	33	6.0
Feed Dealer	45	63.8	3.2	2,033	3.7	185	1.3	42	7.5
Total	755	2004.8	100.0	55,505	100.0	14,689	100.0	555	100.0

to obtain the maximum price for their grains. Grain prices are subject to seasonal fluctuations and the prices are generally low during the harvest time. The farmer's ability to store the marketable grains until he thinks that a fair price has been reached, greatly affects his profit making objective. Farmers who produce grains for sale usually have two choices to make: (1) they can move the surplus grains after properly drying to the storage on the farm, or off the farm in which case they have to pay drying and storage cost if off-farm drying and storage facilities are used; and/or (2) they can sell at harvest.

Farmers have also to consider other factors relating to the economics of harvesting, storing, drying, and marketing of grain. The implications of field shelling on corn marketing are: (1) an increasing flow of high-moisture corn requiring drying and specialized handling, and (2) an increasing proportion of corn moving to elevators during the harvest period. In areas where commercial facilities are available to handle the harvest flow, the farmer needs to decide whether to provide the services on the farm or to have them done commercially. Commercial costs must be compared with estimated on-farm costs to help decide the issue. The location of drying and storing is important to those who prefer to hold title to the grain expecting price increases.

Of those producers surveyed grain sales at harvest accounted for 45.2 percent of total grain sales. Of the total grains sold to country elevators, sales at harvest constituted 43.7 percent. The relative shares of other market outlets with respect to 'purchase at harvest' grains are listed in Table 4.11.

Description of Local Elevator by Grain Producers

Country elevators as primary receivers of grain from farms are important in the total grain marketing system. They receive most of their grains directly from farmers. Because the country elevator is the primary outlet for the grain sold off-farms in Iowa, the various functions of the country elevator are of direct interest and importance to producers.

The country elevator provides facilities for receiving grain directly from farmers, and drying, storing, and reloading the grain for rail, truck, or, in some instances, barge shipment. The other activities often include feed mixing and retailing, and retailing other than farm supplies. These other activities are often complementary to the elevator's grain business because of better seasonal utilization of labor force, management, and facilities as well as providing a package service to its patrons. There also is a

Table 4.11. Sources of grains for sale by outlet

Marketing Outlet	Total grains sold	Grains sold at harvest	%	Grains sold from storage (100 bu)	% to total sales
Country Elevator	56,503	24,721	76.1	31,782	43.7
Other Farmers	3,633	2,248	7.0	1,385	61.8
Truckers	2,650	971	3.0	1,679	36.6
Ter. & Subterm. Elev.	5,207	2,225	6.8	2,982	42.7
Grain Processor	1,615	1,115	3.4	500	69.0
Feed Dealer	2,246	1,195	3.7	1,051	53.2
Total	71,854	32,475	100.0	39,379	100.0

relationship between the grain and other activities in terms of attracting more customers.

According to the responses of the grain producers in the survey, 76.8 percent thought elevators collected reasonable drying charges, while 95.7 percent believed elevator employees were friendly, helpful, and personal. Storage capacity in local elevators was adequate according to 75.4 percent of the respondents and 96.7 percent stated that elevators provided needed services, such as, grain drying, storage, etc. The producers' responses indicated that 88.1 percent of them felt local elevators had fair prices, grades and discounts. Total responses with respect to each of the activities of the local elevator are detailed in Table 4.12.

Factors Influencing the Grain Producers' Choice of Outlets

'Convenience' was considered as a major factor by the largest number of respondents. Of 555 responses, 24.3 percent considered 'convenience' as the first choice, while 42.4 and 33.3 percents of them considered it as a second and third choices respectively. 'Higher prices' was considered the first choice by the largest number of respondents. Of 546 respondents who indicated 'higher prices' as one of the major factors, 70.4 percent of them considered it as

Table 4.12. Description of local elevator by grain producers

Criteria	Total favored	Total unfavored	Total respondents	% of favored to total
a. Reasonable drying charges	404	122	526	76.8
b. Friendly, helpful, and personal	693	31	724	95.7
c. Fair prices grades, and discounts	578	78	656	88.1
d. Grain handling ability satisfactory	559	85	644	86.8
e. Storage capacity adequate	467	152	619	75.4
f. Grain unloading efficient	429	250	679	63.0
g. Modern, up-to-date facility	515	85	600	85.8
h. Pays for grain within reasonable time	678	8	686	98.8
i. Provide needed services	585	20	605	96.7
j. Pays premium on large lot	75	26	101	74.3

their first choice. The second largest number of respondents considered first choice to be the factor 'loyalty to the firm or manager'. The relative importance of other factors considered as major ones by the grain producers are analyzed and listed in Table 4.13.

Table 4.13. Order of importance of factors in grain producers' decision making regarding the choice of marketing outlet

Factors	First Choice		Second Choice		Third Choice		Total respondents
	No.	%	No.	%	No.	%	
1. Loyalty	61	27.1	51	22.6	113	50.3	225
2. Grading Practice	39	13.5	137	47.6	112	38.9	288
3. Higher prices	384	70.4	121	22.1	41	7.5	546
4. Farm supplies	43	15.8	112	41.0	118	43.2	273
5. Convenience	135	24.3	235	42.4	185	33.3	555
6. Credit	22	11.5	52	27.2	117	61.3	191
7. Others	12	66.7	4	22.2	2	11.1	18

CHAPTER V. THEORY AND APPLICATION OF LINEAR MULTIPLE REGRESSION ANALYSIS

Models, assumptions, estimation techniques and other statistical procedures to establish a reference point for the models of analysis will be discussed. This chapter deals with multiple regression as applied to the analysis of grain producers in the survey.

Statistical models employed in this study are of a multivariate type. There are possibly many factors influencing a grain producer to sell his grains to a particular market outlet. The multiple regression technique provides a comprehensive procedure to determine how various factors jointly influence the quantity, say, corn sales to a given market outlet. By using the multivariate regression approach, it is believed that relationships can be identified for the purpose of estimating the quantity of corn, soybeans and oats sales to country elevators, terminal and sub-terminal elevators, feed firms and processors, and other farmers.

Theoretical Model

Models fitted in this study are linear multiple regression model with parameter estimated obtained by ordinary least squares.

A relationship is assumed between a dependent variable, Y, k independent variables X_1, X_2, ..., X_k and a disturbance term u. For a sample of n observations on Y and the X's the model is:

$$Y_i = B_0 + \sum_j B_j X_{ij} + u_i \quad \begin{matrix} i = 1,2,\ldots, n \\ j = 1,2,\ldots, k \end{matrix} \quad \text{and} \qquad (5.1)$$

By the usual convention, B_0 is the constant or intercept term which is estimated by fitting a column of ones. Of interest are the parameters B_j and σ^2. Linear here means linearity of the parameters B_j or that the collective influence of the independent variables is additive.

In order to make the following discussion concise the matrix notation for (5.1) is:

$$Y = XB + U \qquad (5.2)$$

where Y and U are n element vectors, X is an n x k+1 matrix and B is a k+1 element vector (29, p. 106). A minimum set of assumptions permitting the estimation of B is:

$$E(U) = 0 \qquad (5.3)$$

$$E(UU') = \sigma^2 I_n \qquad (5.4)$$

X is a set of fixed numbers (5.5)

X has rank of $k<n$ (5.6)

The first assumption indicates that disturbances have an expectation of zero. Number (5.4) is actually two assumptions about the matrix of expected value E(UU').

First, the diagonal terms have expectation σ^2, all u_i have a constant variance. Second, the off-diagonal terms are zero making the u_i must be independently distributed. A fixed X means that the independent variables are known without error or that the variation in Y is due to variation in the u_i. The fourth assumption (5.6) is a mathematical condition requiring the X matrix to the nonsingular and for the number of parameters estimated for B to be less than the number of observations. A nonsingular X matrix rules out the existence of any exact relations between independent variables, which characterizes perfect multicollinearity to be discussed later. Violation of nonsingularity condition prevents the formation of the inverse $(X'X)^{-1}$ a vital quantity in the least squares estimation procedure.

Least squares estimation

Consider the regression equation (also referred to as prediction or estimation equation) corresponding to model (5.2) which is:

$$Y = Xb + e \qquad (5.7)$$

where Y and X are the observations on the dependent and independent variables and b is a k+1 element vector of estimates for B and e is an n element vector of residuals equal to Y-Xb which corresponds to U. By taking the first derivatives of the sum of the squared residuals to be minimized:

$$e'e = (Y-Xb)'\ (Y-Xb) \tag{5.8}$$

which gives

$$\sigma(e'e)/\sigma b = -2X'Y + 2X'Xb \tag{5.9}$$

and setting (5.9) to zero gives the normal equations

$$(X'Xb = XY \tag{5.10}$$

and taking the inverse of X'X gives the least squares estimators

$$b = (X'X)^{-1}X'Y \tag{5.11}$$

Estimators b can be established as best linear unbiased estimators (BLUE) and b has minimum variance (29, p. 109, p. 111). The expected value of b $(\hat{B})$

$$E(\hat{B}) = E[(X'X)^{-1}X'Y] \tag{5.12a}$$

$$= E[(X'X)^{-1}X'(X\hat{B}+u)] \tag{5.12b}$$

$$= B+E[(X'X)^{-1}X'u] \tag{5.12c}$$

$$= B \quad \text{since} \quad E(u) = 0 \tag{5.12d}$$

Thus b is an unbiased estimator of B.

It can be shown that least squares estimates have minimum variance of all linear unbiased estimates of B, e.g., Yamane (51, pp. 493-495) and Goldberger (22, pp. 163-165).

The variance of b $(=\hat{B})$

$$V(\hat{B}) = E(\hat{B}-B)(\hat{B}-B)' \quad (5.13a)$$

$$= E[(X'X)^{-1}X'uu'X(X'X)^{-1}] \quad (5.13b)$$

$$= (XX)^{-1}X'E(uu')X(X'X)^{-1} \quad (5.13c)$$

$$= (X'X)^{-1}X'\sigma^2 IX(X'X)^{-1} \quad (5.13d)$$

$$= \sigma^2(X'X)^{-1} \quad \text{using} \quad (5.4) \quad (5.13e)$$

This establishes the Gauss-Markov least squares following Goldberger (22, p. 164). In the classical linear model the best (= smallest variance) linear unbiased estimator of B, is the least squares vector,

$$\hat{B} = (X'X)^{-1}X'Y$$

whose covariance matrix is

$$V(\hat{B}) = \sigma^2(X'X)^{-1} \; .$$

Additional properties of the least squares-hyperplane are given in Goldberger (22, p. 169).

Adding a correction for the mean $(\Sigma Y_i)^2/n = n\bar{Y}^2$ and with the least squares estimators we can summarize the regression results in a tabular form given below.

Analysis of Variance (ANOVA):

Source of variation	Degrees of Freedom (DF)	Sum of Squares (SS)	Mean Square (MS)
Total (Corrected)	n-1	$Y'Y - n\bar{Y}^2$	
Regr. (Corrected)	k	$b'X'Y - n\bar{Y}^2$	MS_r
Residual	n-k-1	$Y'Y - b'X'Y$	MS_e

If the linear regression model is correct, then $MS_e = s^2$ is an unbiased estimate of σ^2 and $\sqrt{s^2} = s$ is the standard error of the estimate.

Information from the ANOVA table defines the coefficient of multiple determination $R^2 = (b'X'Y - n\bar{Y}^2)/(Y'Y - n\bar{Y}^2)$. This summary statistic measures the proportion of the total variance in the dependent variable after correcting for the mean that is explained by the linear regression.

Significance tests and confidence intervals

We have made no assumption about the form of distribution of disturbances. Assumption (5.4) established that the disturbances had to be serially independnet. If we can further assume U normally distributed, that is:

$$U \text{ is } NI(0, \sigma^2 I_n) \qquad (5.14)$$

then significance tests and confidence limits which are based on t and F-distribution are valid[1]. Although the t-test is appropriate for testing hypotheses about any linear combination of B_j's, this study will use the t-test for only the null hypotheses $B_j=0$ and $B_i=0$, $(i \neq j)$. Error terms for these tests are obtained from the variance-covariance matrix, var(b). For b_i and b_i-b_j the corresponding diagonal and off-diagonal elements are chosen from $s^2(X'X)^{-1}$ so that test statistics are

$$t = b_i/s\sqrt{c_{ii}} \text{ and} \tag{5.15}$$

$$t = (b_i-b_j)/s\sqrt{c_{ii}+c_{jj}-2c_{ij}} \tag{5.16}$$

where the c_{ij} are terms from the $(X'X)^{-1}$ matrix and each test has n=k degrees of freedom.

F-tests will be used to test the overall significance of the B_i with the null hypothesis of $B_1 = B_2 = \ldots, = B_k = 0$ and that a subset of P parameters are each equal to zero, $B_{m+1} = B_{m+2} = \ldots B_{m+p} = 0$ where $i=2,3,\ldots,m, m+1,\ldots,m+p$ and $m+p=k$. For the overall test $F = MS_r/MS_e$ with k and n-k degrees of freedom and is calcuable directly from Table 5.1.

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[1]Johnston (29, p. 116) indicates that without the explicit assumption of normality for the disturbances the tests may be approximately correct by appealing to the Central Limit Theorem.

Lastly, we may obtain the confidence intervals for est. Y. Let est. Y be the estimated value of Y at X_0 (est. Y = b_0 + $\Sigma b_j X_{0j}$) where X_0' is a k element row vector whose elements are of the same form as a row of the matrix X without the columns of ones. Estimated error for the estimated mean Y is:

$$s^2(\text{est. } Y) = [1/n + X_0'(X'X)^{-1}X_0]s^2 \qquad (5.17)$$

while for a single forecast

$$s^2(\text{est. } Y) = [1+1/n + X_0'(X'X)^{-1}X_0]s^2 \qquad (5.18)$$

Using the t-table and degrees of freedom equal to v, the number of degrees of freedom on which s^2 is based, the corresponding 95 percent confidence interval for the estimated mean value of Y at X_0 is:

$$\text{est. } Y \pm t(v,\ 0.975)\ s\sqrt{1/n + X_0'(X'X)^{-1}X_0} \qquad (5.19)$$

and for a single est. Y at X_0:

$$\text{est. } Y \pm t(v,\ 0.975)\ s\sqrt{1+1/n + X_0'(X'X)^{-1}X_0} \qquad (5.20)$$

Similarly, the 95 percent confidence interval for b_i is:

$$b_i \pm t(v,\ 0.975)\ s\sqrt{(X'X)^{-1}} \qquad (5.21)$$

Confidence interval (5.19) means that if repeated samples were taken of the same size and fixed values of X as were used to fit the prediction equation, 95 percent of est. Y for the X_0 sets from these samples would contain the true mean value of Y. Confidence interval (5.20) is for one observation of an X_0.

Multicollinearity

Perfect multicollinearity is characterized by the determinant of X'X equal to zero, X'X=0, which implies the violation of assumption (5.6) stating that rank of X=k. The perfect case results from having at least one independent variable which is an exact linear combination of one or more independent variables in the regression model. However, it is not the perfect case that is of most concern in regression analysis since when X'X=0 the mathematical procedure for obtaining the parameter estimates becomes inoperable and no results are obtained.

Although the above situation can arise from a careless specification of X, the usual multicollinearity problem is one of highly but not perfectly correlated independent variables. While the elements of $(X'X)^{-1}$ do not exist with X'X = 0 (or perfect correlation between two or more independent variables), the elements of $(X'X)^{-1}$ are important in defining errors for estimates which are instrumental in confidence intervals and tests of significance. Thus, inflated errors of the b_i is one of the symptoms of multicollinearity which contributes to obtaining nonsignificant b_i with the t-test.

When multicollinearity approaches severe proportions, explained variation tends to be allocated arbitrarily between independent variables (19, p. 93). This result makes it very difficult to identify the separate influences upon the dependent variable of correlated independent variables. "Rules of thumb" are often used to identify the serious cases of correlated independent variables. Remedies may be needed when the simple correlation coefficient, r_{ij}, for two independent variables is between 0.8 and 0.9 or if r_{ij} is equal to or greater than R, the multiple correlation coefficient for the regression, $R = \sqrt{R^2}$, R^2 defined above (19, p. 98).[1] Multicollinearity may be responsible for unexpected signs and magnitudes for coefficients in the regression equation. An additional possible symptom is the sensitivity of affected parameter estimates to changes in the other independent variables included and the sample coverage.

Depending upon the severity of the problem, corrective action may range from none to obtaining additional data. Often one of a pair of correlated independent variables

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[1]Farrar and Glauber (19) argue "rules of thumb" are inadequate for complete diagnosis of the problem. They offer techniques for identifying the severity, location and pattern of multicollinearity so adequate corrective action can be taken. However, their technique will not be considered in this study.

is simply dropped from the analysis particularly if it is not crucial to the theoretical basis of the model. Usually, of two correlated variables, the variable dropped is the one with the unexpected sign or the lower simple correlation with the dependent variable. Johnston (29, p. 207) points out that when the primary purpose of the regression is for forecasting, intercorrelation of explanatory variables is less serious if the situation is expected to continue in the future.

Application of Regression Techniques to Grain Producers' Survey Choice of Market Outlets by Grain Producers

One of the major objectives of any grain producer may be to maximize the total net returns from his farming enterprise. Closely related to the maximizing criteria are the decisions made by the grain producers in the various phases of production and disposition of marketable grains. The choice of market to sell grains is one of those decisions to be made by the grain producers and this section of the chapter is intended to analyze the market structure in which grain producers as economic agents behave and perform and the factors affecting those performances.

The farming industry is considered to be a close approximation to the case of perfect competition. Usual assumptions of perfect competition seem to apply in grain production and marketing industry. Firstly, there are sufficiently large numbers of grain producers, each producer's share is so small relative to the total grain production, that he cannot exert a perceptible influence on price. From the standpoint of grain buyers, there are enough numbers of buyers and no buyer can obtain any special consideration from the sellers. The outlets under discussion in this chapter are not consumers in this sense, although they buy grain from the producers. They only perform certain functions of marketing. Secondly, the product of any one grain producer must be identical to the product of any other producer. This ensures that buyers are indifferent as to the firm from which they purchase. Thirdly, all resources are perfectly mobile - that each resource required in farming can move in and out in response to pecuniary signals. Finally, grain producers, consumers, and resource owners possess perfect knowledge about prices and quality of the product.

Very little grain produced on farms is purchased directly by consumers. Most of the grains grown have to go through many intermediaries such as elevators, processors, feed millers, truckers, other farmers, wholesalers, and finally, retailers often undergoing transformation of its physical characteristics. These intermediate channels primarily exist for handling grain and doing related business with an objective of profit maximization. Each of these middlemen competes for producers' marketable grains in order to increase the volume of business. Invariably these intermediaries, besides buying grains, offer many services, such as drying and storage facilities, credit, supply of feed, fertilizers seed, etc. to patronize their clients. These services, among other factors, are assumed to have a significant influence on the producer's decision with respect to choice of market outlet.

Country elevators, terminal and subterminal elevators, grain processors and feed dealers, and other farmers are considered as the major market outlets by Iowa grain producers. Therefore, the analysis in this chapter is confined to these four market outlets.

In order to identify and measure the variables that determine the producers' choice of marketing outlets, the multiple regression technique is employed. The models are developed for each of the three kinds of grains, viz., corn, soybeans, and oats as well as for each of the four major market outlets, viz., country elevator, terminal and subterminal elevator, processor and feed dealer, and other farmers. Each of the 12 models (3 kinds of grains x 4 kinds of market outlets) is fitted to the selected variables. The quantity of each grain sold to each of the outlets, then, is treated as the regressand or dependent variable. The primary purpose of estimating relations in this system is for prediction. We are interested in predicting the value of regressand from a set of regressor or independent variables.

Defining the variables

Index	Name of variable	Unit of measurement
Regressors		
X_1	Total acres cropped	Acres
X_2	Age of operator	Years
X_3	Land ownership	If all owned = 1, otherwise = 0
X_6	Corn field shelled	Percentage to total corn harvested
X_7	Corn fed to livestock	Percentage to total corn harvested
X_8	Shelled corn storage capacity	1000 bushels
X_9	Ear corn storage capacity	1000 bushels
X_{12}	Number of firms checked before sale of corn	-
X_{13}	Number of firms checked before sale of soybeans	-
X_{14}	High prices of great importance	If great importance = 1, otherwise = 0
X_{15}	Convenience of great importance	If great importance = 1, otherwise = 0
X_{19}	Adequacy of elevator services	Sum of weighted index[1]

[1] $X_{19} = \sum_{i=1}^{12} W_{ij}/100$, where i=1,...,12 (number of services), j=1,10 (if service is favorable = 10, otherwise = 1)

For individual services, see questionnaire in the Appendix.

Regressands	Name of variable	Unit of measurement
Y_1	Bu. of corn sold to country elevator	% to total corn sales
Y_2	Bu. of corn sold to other farmers	"
Y_3	Bu. of corn sold to Term. & Subterm. elevator	"
Y_4	Bu. of corn sold to grain processor and feed dealer	"
Y_5	Bu. of soybeans sold to country elevator	% to total soybean sales
Y_6	Bu. of soybeans sold to other farmers	"
Y_7	Bu. of soybeans sold to Term. & Subterm. elevator	"
Y_8	Bu. of soybeans sold to grain processor & feed dealer	"
Y_9	Bu. of oats sold to country elevator	% to total oat sales
Y_{10}	Bu. of oats sold to other farmers	"
Y_{11}	Bu. of oats sold to Term. & Subterm. elevator	"
Y_{12}	Bu. of oats sold to grain processor and feed dealer	"

While selecting the independent variables for multiple regression models, only those variables were chosen which are assumed to have a perceptible influence on the farmer's decision with regard to choice of market outlets and which appear to have economic relationships.

Hypotheses to be tested

First of all, a simple correlation matrix will be computed, and each element of which is called a simple correlation coefficient, r. The hypothesis to be tested is that the population correlation coefficient under the null hypothesis is zero. The probability value of a coefficient being zero will be computed for each pair of variables.

Secondly, extending the correlation analysis to multiple regression, analysis of variance (ANOVA) table will be constructed for each of the models and Snedecor's F-test will be made against the null hypothesis that $B_1 = B_2 = \ldots, = B_p = 0$, where p is number of independent variables in the model.

Finally, the regression coefficients of each model will be tested against the null hypothesis that $B_1 = 0$, $B_2 = 0, \ldots, B_p = 0$.

Simple Correlation Coefficient

Correlation is a pure number, independent of the units in which variables are measured. It is often called Sample Product-Moment Correlation Coefficient. It measures the degree of association between two variables. It does not, however, provide cause-effect relationships. If there is a high degree of association between a pair of variables, the r will close to either +1 or -1. If r is positive, then

Y increases when X increases, or Y decreases when X decreases. If r is negative, then Y increases when X decreases, or Y decreases when X increases. Any significant degree of association between independent variables indicates the presence of multicollinearity. If variables are not closely related, then r will be near zero. The degree of linear association, therefore, varies from 0 to $\pm$ 1.

Empirical Results

The general multiple regression models take the form of

$$Y_{ijk} = b_{0ij} + b_{\ell ij}X_{\ell ijk} + \ldots + b_{pij}X_{pijk}$$

where

i = 1, 2, 3 kinds of grain

j = 1, 2, 3, 4 number of market outlets

k = 1, 2, ..., 856 number of observations

ℓ = 0, 1, ..., p number of regressors.

Y_{ijk} = predicted values of Y's, i.e., percent quantity of ith grain sold to jth outlet by kth farmer

$X_{\ell ijk}$ = measured values of X's, i.e., ℓth regressor value related to ith grain, jth outlet, and kth farmer.

$b_{\ell ij}$ = regression coefficient associated with $X_{\ell ij}$.

The regressors used in all of the models are almost identical except a slight variation in model relating to the sale of oats. Since the information regarding the number of price checks made before the sale of oats is not available, the models, 9 through 12 would have a less of one regression than the models, 1 through 8.

Simple linear correlation

The correlation matrix containing the coefficients of all the variables considered in the regression models is presented in Table 5.1. Correlation is an integral part of regression analysis. The correlation coefficient serves as an index measuring the intensity of the linear relation between variables considered in the regression models.

When r is 0.5 or less, only a minor portion of the variation in Y can be attributed to its linear regression on X (6, p. 177). For example, at r = 0.30, about 9 percent (0.30 x 0.30 = 0.09) of the variance of Y is associated with X which is called Coefficient of Determination, r^2. This suggests that 70 percent of the variation in Y was not explainable through its relation with X. A verdict of statistical significance shows merely that there is a linear relation with nonzero slope. We should also remember that convincing evidence of an association, even though close, does not prove that X is the cause of the variation in Y. Evidence of causality should come from other sources, such as economic model, etc.

Between dependent and independent variables, percent of

Table 5.1. Correlation matrix for regression variables

	X_1	X_2	X_3	X_6	X_7	X_8	X_9	X_{12}	X_{13}	X_{14}	X_{15}
X_1	1.00										
X_2	-0.16	1.00									
X_3	-0.37	0.26	1.00								
X_6	0.32	-0.05	-0.14	1.00							
X_7	-0.04	-0.18	0.11	-0.15	1.00						
X_8	0.60	-0.10	-0.15	0.37	-0.04	1.00					
X_9	0.25	-0.10	-0.18	-0.21	0.04	-0.02	1.00				
X_{12}	0.12	-0.02	-0.08	0.06	-0.19	0.08	0.04	1.00			
X_{13}	0.20	-0.03	-0.17	0.11	-0.23	0.13	0.06	-0.05	1.00		
X_{14}	0.14	-0.11	-0.11	0.15	-0.14	0.11	-0.001	0.12	0.27	1.00	
X_{15}	-0.007	0.03	-0.06	0.01	-0.19	-0.08	-0.003	0.05	0.17	0.21	1.00
X_{19}	0.06	-0.05	-0.10	0.10	-0.12	-0.03	0.06	0.07	0.12	0.21	0.30
Y_1	0.14	0.08	-0.11	0.18	0.18	-0.47	0.19	0.07	0.16	0.15	0.16
Y_2	-0.05	0.004	0.009	-0.01	-0.09	-0.04	-0.03	0.05	0.03	0.03	0.05
Y_3	0.09	-0.01	-0.07	0.08	-0.09	0.06	-0.01	0.07	0.08	0.08	0.06
Y_4	-0.003	-0.01	0.04	0.04	-0.04	-0.03	-0.07	0.10	0.10	0.10	0.02
Y_5	0.12	0.07	-0.14	0.16	-0.44	0.08	0.05	0.12	0.17	0.17	0.19
Y_6	0.02	-0.04	-0.05	0.06	0.002	0.02	-0.04	-0.004	0.03	0.03	-0.01
Y_7	0.04	-0.01	-0.01	-0.05	-0.01	-0.02	0.05	0.03	0.07	0.07	0.05
Y_8	0.03	0.07	0.08	-0.03	0.05	0.02	-0.03	0.12	0.03	0.03	0.02
Y_9	0.02	0.02	-0.02	0.01	-0.05	0.04	0.02	0.04	0.08	0.08	0.06
Y_{10}	-0.06	0.04	-0.04	-0.003	-0.02	-0.03	-0.02	0.05	0.03	0.03	-0.02
Y_{11}	-0.02	0.04	-0.01	-0.01	-0.002	-0.02	-0.01	-0.02	-0.04	-0.04	-0.04
Y_{12}	-0.03	0.03	0.02	-0.04	-0.05	-0.03	-0.04	0.04	0.02	0.02	0.03

	X_{19}	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9	Y_{10}	Y_{11}	Y_{12}
	1.00												
	0.21	1.00											
	-0.03	-0.13	1.00										
	-0.01	-0.11	-0.03	1.00									
	-0.01	-0.14	-0.02	-0.01	1.00								
	0.22	0.72	0.03	-0.06	-0.03	1.00							
	-0.03	-0.05	0.10	-0.01	-0.01	-0.004	1.00						
	-0.05	-0.08	0.01	0.33	0.001	-0.16	-0.01	1.00					
	0.05	-0.06	0.11	-0.03	0.16	-0.13	-0.01	-0.03	1.00				
	0.05	0.09	-0.04	-0.03	0.06	0.03	-0.01	-0.04	-0.03	1.00			
	0.08	0.04	0.06	-0.02	0.01	0.09	0.01	-0.02	-0.02	-0.02	1.00		
	-0.09	-0.04	-0.01	0.22	-0.01	0.03	-0.002	0.07	-0.01	-0.01	-0.004	1.00	
	0.04	-0.07	0.06	-0.01	0.09	-0.04	-0.01	-0.02	0.16	-0.01	-0.01	-0.003	1.00

corn sold to country elevator, Y_1 is fairly associated with percent of corn fed to livestock, X_7 as indicated by a negative value of correlation coefficient of -0.47. The inverse relation suggests that an increase in percentage of corn fed to livestock to total corn harvested is associated with a decrease in the percentage of corn sold to country elevator, and vice versa. A positive value of 0.21 between the elevator services, X_{19} and the dependent variable, Y_1 indicates that percent of corn sales to country elevator would increase as the total services of elevator increase, or sales would decrease if services decreased. The variable X_{13}, number of price checks before the sale of soybeans is positively correlated with the percent of soybeans sold to the country elevator as evidenced by the correlation coefficient value of 0.36. There is a fairly strong relationship between the variables, the percent of corn fed to livestock, X_7 and the percent of soybeans sold to the country elevator as indicated by the value of r, -0.44. Increase in percent of corn fed to livestock is associated with the decrease in percent sale of soybeans to country elevator or vice versa. One explanation for this phenomenon is that the farmers who produce corn for their own livestock produce fewer soybeans as their livestock enterprices put more pressure on their corn supply.

Among the independent variables, shelled corn storage capacity, X_9 is fairly highly correlated with acres cropped, X_1, as indicated by a positive correlation coefficient value of 0.60. This is obvious that as the cropped acreage increases shelled corn storage facility increases as we expect that the grain producers expand the storage space for shelled corn due to the increasing shift from mechanical harvest to shelled corn harvest method. No other significant relations were found to exist between other dependent variables.

Model 1: Corn sales to country elevator

Country elevators were the largest buyers of corn, accounting for 79 percent of combined sales of corn to all of the market outlets. The multiple regression results are presented in ANOVA, Table 5.2.

The sum squared due to regression is 54.45, and due to error is 143.63. The computed F value is significant at one percent level of significance. 27 percent of total variation in Y_1 has been explained by the model and the remaining 73 percent is unexplained, which may be due to variables that are not incorporated into the model, or due to random error.

The null hypothesis that $b_j = 0$ has been tested by the use of T-test. The significant variables are X_6, X_7, X_9, X_{12}, and X_{19}. The other variables are not significant at or

Table 5.2. Analysis of variance (ANOVA) for dependent variable Y_1

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	54.45	4.95	29.09**	0.27
Error	844	143.63	0.17		
Total (Corrected)	855	198.08			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-value
Intercept	0.3179	0.0956	3.32**
X_1	0.001	0.001	1.12
X_2	0.0014	0.0014	0.99
X_3	-0.0052	0.0324	-0.16
X_6	0.0010	0.0004	2.61*
X_7	-0.0049	0.0003	-13.23**
X_8	0.0007	0.0013	0.56
X_9	0.0083	0.0031	2.64**
X_{12}	0.0049	0.0031	1.56†
X_{14}	0.0316	0.0328	0.96
X_{15}	0.0285	0.0329	0.86
X_{19}	0.1786	0.0453	3.93**

*Significant at 5 percent level.

**Significant at 1 percent level.

†Significant at 20 percent level.

higher than the 20 percent level. The regression coefficient of variable X_7, the percent of corn fed to livestock, indicates that a one percent increase of corn fed to livestock is associated with a 0.4 percent decrease in the percentage of corn sold to country elevator. Increase of elevator services would have a significant increasing effects on the sales of corn to the country elevator, as indicated by a positive b value.

Model 2: Corn sales to other farmers

Other farmer's share in the total corn sold to all the outlets combined was only 4.6 percent. There was no appreciable relationship between the dependent variable and any of the independent variables, the model is able to explain only two percent of the total variation in the dependent variable. The F-test is not significant at 20 percent or higher level, with the result we have to accept the null hypothesis that $b_1 = b_2 = \ldots = b_p = 0$. Of 11 independent variables in the model, only coefficients of X_7 and X_{17} are significant at five and twenty percent levels respectively. The results of this model do not indicate that there is any significant linear relationship. The greater unexplained part of variation in Y_2 may be either due to random sales of grain producers or there may be other variables that are not in the model or there may be another form of relationship which might explain the variation. The results of this regression model are given in the ANOVA Table 5.3.

Model 3: Corn sales to terminal and subterminal elevators

Only 7 percent of the total corn sold by the grain producers went to terminal and subterminal elevators. The computed F-value is significant only at the 10 percent level, and the coefficient of determination, R^2 is 0.03 an indication that the model explained only 3 percent of the variation in Y_3 as shown in ANOVA Table 5.4. However, regression coefficients of four variables out of 11 variables in the model are significant at the 20 percent level. The other seven coefficients associated with the corresponding variables are not significant at any of the levels under consideration and support the acceptance of null hypothesis that each of those nonsignificant coefficients is zero, i.e., $b_j = 0$.

Model 4: Corn sales to grain processors and feed dealers

Grain processors and feed dealers could share only 5.9 percent with other grain buyers of the total corn sales of the farmers. The null hypothesis that $b_1 = b_2 = \ldots = b_p = 0$ has been rejected at 10 percent level of significance. However, a very negligible part of the variation in Y_4 is explained by the model.

As regards the significance of regression coefficients,

Table 5.3. ANOVA for dependent variable Y_2

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	0.4469	0.0406	1.2662	0.02
Error	844	27.0838	0.0321		
Total (Corrected	855	27.5307			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-value
Intercept	0.0985	0.4154	2.37*
X_1	-0.0000	0.0000	-0.73
X_2	-0.0004	0.0006	-0.63
X_3	0.0020	0.0140	0.14
X_6	-0.0000	0.0001	-0.27
X_7	-0.0003	0.0001	-0.27*
X_8	-0.0003	0.0006	-0.50
X_9	-0.0007	0.0013	-0.56
X_{12}	0.0013	0.0042	1.01
X_{14}	0.0088	0.0143	0.61
X_{15}	0.0148	0.0143	1.03
X_{19}	-0.0276	0.0197	-1.40†

*Significant at 5 percent level.

†Significant at 20 percent level.

Table 5.4. ANOVA for dependent variable Y_3

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	0.3987	0.0352	1.9875***	0.03
Error	844	15.3955	0.0182		
Total (Corrected)	855	15.7922			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	0.0155	0.0313	0.49
X_1	0.0000	0.0000	1.13
X_2	-0.0000	0.0004	-0.05
X_3	-0.0103	0.0106	-0.97
X_6	0.0001	0.0001	0.99
X_7	-0.0001	0.0001	-0.56†
X_8	-0.0000	0.0004	-0.04
X_9	-0.0005	0.0010	-0.48
X_{12}	0.0012	0.0010	1.17
X_{14}	0.0138	0.0107	1.28†
X_{15}	0.0142	0.0107	1.31†
X_{19}	-0.0210	0.0148	-1.41†

***Significant at 10 percent level.

†Significant at 20 percent level.

only four out of 11 variables are significant. Variable X_3, ownership of land has a positive effect on the percent of sales of corn to the grain processors and feed dealers, indicating that all-owned land is a significant factor in choosing the grain processor and feed dealer as a corn marketing outlet. Number of price checks before marketing and high prices as a factor, represented by X_{12} and X_{14} respectively which are significant at one percent level would have positive effects on the amount of corn sales to the grain processor and feed dealers. The details of the results of the regression model are listed in ANOVA Table 5.5.

Model 5: Soybean sales to country elevators

The country elevator is the largest buyer of soybeans of all the agencies under consideration, accounting for 86.5 percent of total soybeans sales by the grain producers as indicated by the value of the coefficient of determination. 29 percent of total variation in Y_5 has been explained by the model. The F-value is significant at one percent level of significance, rejecting the null hypothesis that $b_1 = b_2 = \ldots = b_p = 0$.

On the analysis of regression coefficients, of all 11 variables in the model, coefficients of only six variables are statistically significant. Number of price checks made

Table 5.5. ANOVA for dependent variable Y_4

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	0.6051	0.0550	2.2663**	0.01
Error	844	20.4854	0.0242		
Total (Corrected	855	21.0905			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	0.0247	0.0361	0.68
X_1	-0.0000	0.0000	-0.25
X_2	-0.0002	0.0005	-0.49
X_3	0.0174	0.0122	1.42†
X_6	0.0000	0.0001	0.18
X_7	-0.0000	0.0001	-0.40
X_8	0.0002	0.0005	0.54
X_9	-0.0019	0.0011	-0.62
X_{12}	0.0033	0.0011	2.78**
X_{14}	0.0324	0.0124	2.61**
X_{15}	0.0020	0.0124	0.16
X_{19}	-0.0131	0.0171	-0.76

**Significant at 1 percent level.

†Significant at 20 percent level.

before sale, X_{13} and total elevator services, X_{19} which are significant at one percent level have positive effects on the percent of sales to the country elevators. The details of results of this model are stated in ANOVA Table 5.6.

Model 6: Soybean sales to other farmers

A very negligible share in total sales of soybeans to various market outlets was accounted for by other farmers. Grain producers' decisions to sell only 0.7 percent of their total soybeans sales appears to be random and the variables considered in the model do not explain any appreciable amount of variation in Y_6. The test of null hypothesis that $b_1 = b_2 = \ldots b_p = 0$ indicates that the computed F-value is significant only at a level less than 20 percent. Of 11 variables considered regression coefficients of only three variables, X_6, X_{13}, and X_{19} are significant. Variables X_{13}, number of price checks before sales which is significant at the five percent level indicates that one percent increase in the number of price checks made before sale would have 0.3 percent increase in the percent of sales of soybeans to other farmers. ANOVA Table 5.7 gives detailed results of regression model.

Table 5.6. ANOVA for dependent variable Y_5

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	57.9099	5.2645	31.6269**	0.29
Error	844	140.4902	0.1664		
Total (Corrected)	855	198.4001			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	0.1955	0.0949	2.06*
X_1	0.0000	0.0001	0.14
X_2	0.0016	0.0014	1.14
X_3	-0.0352	0.0321	-0.09
X_6	-0.0009	0.0003	2.30*
X_7	-0.0039	0.0003	-10.75**
X_8	0.0001	0.0013	0.10
X_9	0.0050	0.0031	1.61***
X_{13}	0.0895	0.0119	7.48**
X_{14}	0.0061	0.0330	0.18
X_{15}	0.0494	0.0327	1.51†
X_{19}	0.0693	0.0448	3.77**

*Significant at 5 percent level.

**Significant at 1 percent level

***Significant at 10 percent level.

†Significant at 20 percent level.

Table 5.7. ANOVA for dependent variable Y_6

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	0.0451	0.0041	1.1659	0.01
Error	844	2.9718	0.0035		
Total (Corrected)	855	3.0169			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-value
Intercept	0.0112	0.0138	0.81
X_1	-0.0000	0.0000	-0.14
X_2	-0.0001	0.0002	-0.81
X_3	-0.0042	0.0046	-0.91
X_6	0.0001	0.0000	1.35†
X_7	0.0000	0.0000	0.61
X_8	-0.0001	0.0002	-0.39
X_9	-0.0000	0.0004	-0.97
X_{13}	0.0036	0.0017	2.10*
X_{14}	0.0017	0.0048	0.36
X_{15}	-0.0008	0.0047	-0.17
X_{19}	-0.0084	0.0065	-1.29†

*Significant at 5 percent level.

†Significant at 20 percent level.

Model 7: Soybean sales to terminal and subterminal elevators

Grain producers sold only 9.6 percent of their total soybean sales to the terminal and subterminal elevators. ANOVA Table 5.8 indicates the F-value is significant at the 20 percent level. The variables in the model explain only a small fraction of the total variation in Y_7. A major portion of the variation is unexplained. One of the reasons could be a random chance in the decision making by grain producers with regard to the choice of market outlets.

The regression coefficients associated with X_{13} is significant at the one percent level of significance which explains that increase of a price check before sale of soybeans would cause a 19 percent increase in the share of soybean sales to terminal and subterminal elevators. Another interesting result is that as the local elevator services increase, a decrease in the percent of soybean sales to terminal and subterminal elevators as indicated by negative value of regression coefficient of X_{19}, index for total services of local elevator.

Model 8: Soybean sales to grain processors and feed dealers

Analysis of ANOVA table 5.9 pertaining to this model indicates that the variables included in the model explained only a very negligible amount of total variation in Y_8. The null hypothesis that $b_1 = b_2 = \ldots = b_p = 0$ is

Table 5.8. ANOVA for dependent variable Y_7

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	1.0331	0.0939	2.7810**	0.03
Error	844	28.5036	0.0337		
Total (Corrected)	855	29.5367			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	0.0041	0.0427	0.09
X_1	0.0000	0.0000	1.34†
X_2	-0.0000	0.0006	-0.04
X_3	0.0103	0.0144	0.71
X_6	-0.0002	0.0001	-1.26
X_7	0.0000	0.0001	0.46
X_8	-0.0057	0.0006	-1.24
X_9	0.0007	0.0014	0.55
X_{13}	0.0190	0.0053	3.53**
X_{14}	0.0232	0.0149	1.55†
X_{15}	0.0183	0.0147	1.24
X_{19}	-0.0479	0.0202	-2.37*

*Significant at 5 percent level.

**Significant at 1 percent level.

†Significant at 20 percent level.

Table 5.9. ANOVA for dependent variable Y_8

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	11	0.9435	0.0857	3.4804**	0.04
Error	844	20.8004	0.0246		
Total (Corrected)	855	21.7440			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	-0.1049	0.0365	-2.87**
X_1	0.0000	0.0000	1.89***
X_2	0.0011	0.0005	2.00***
X_3	0.0306	0.0123	2.47*
X_6	-0.0002	0.0001	-1.50†
X_7	0.0003	0.0001	2.41*
X_8	-0.0001	0.0005	-0.19
X_9	-0.0002	0.0012	-1.70***
X_{13}	0.0180	0.0046	3.92**
X_{14}	0.0019	0.0127	0.15
X_{15}	-0.0019	0.0125	-0.15
X_{19}	0.0398	0.0172	1.72***

*Significant at 5 percent level.

**Significant at 1 percent level.

***Significant at 10 percent level.

†Significant at 20 percent level.

rejected only at the 10 percent level of significance. Most of the regression coefficients are significant at various levels.

Variables X_{13} is significant at the one percent level, indicating that an increase of a number of price checks before sale of soybeans would cause an increase of 1.8 percent in the percent sales of soybeans to the grain processors and feed dealers. Acres cropped X_1, age of the farmer X, and land ownership X_3, have all positive effects on the percent of sales of soybeans to grain processors and feed dealers.

Model 9: Oat sales to country elevators

Grain producers sold 62.5 percent of total sales of oats to country elevators. However, the variables contained in the model do not explain any appreciable amount of variation in Y_9. The computed value of F is not significant, so we have to accept the null hypothesis that $b_1 = b_2 = \ldots = b_p = 0$. Out of 10 variables in the model, the coefficient of only one variable, X_{14} is significant at the 10 percent significant level. Higher price as a factor has a positive effect on the sale of oats to country elevator. The results of this model are given in ANOVA Table 5.10.

Table 5.10. ANOVA for dependent variable Y_9

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	10	0.3300	0.0330	1.1210	0.01
Error	845	24.8803	0.0294		
Total (Corrected)	855	25.2103			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	-0.0229	0.0396	-0.57
X_1	-0.0000	0.0000	-0.28
X_2	0.0005	0.0006	0.83
X_3	-0.0023	0.0134	-0.17
X_6	-0.0000	0.0001	-0.52
X_7	-0.0001	0.0001	-0.77
X_8	0.0006	0.0005	1.06
X_9	0.0006	0.0013	0.51
X_{14}	0.0264	0.0136	1.93***
X_{15}	0.0134	0.0137	0.98
X_{19}	0.0112	0.0188	0.59

***Significant at 10 percent level.

Model 10: Oat sales to other farmers

Other farmers purchased 11 percent of total sales of oats of the grain producers. The F-value is not significant at any one of the levels under consideration, thus accepting the null hypothesis. The variables incorporated into this model did not explain any significant amount of variation in Y_{10}. The variables, land ownership X_3, and total elevator services X_{19} have negative effects on the percent of sales of oats to other farmers. This suggests that as the number of all-owned farmers and the total elevator services increase, the percent of oats sales to other farmers decrease. The results of the model are listed in ANOVA Table 5.11.

Model 11: Oat sales to terminal and subterminal elevators

Grain producers sold only 4.9 percent of their total oat sales to the terminal and subterminal elevators. The variables contained in the model explain almost nothing in the total variation in Y_{11}. The unexplained variation may be due, among other factors, to the occurrences of random chances in the producers' decision with respect to the choice of outlets. The coefficients of all the variables except one variable, X_{19} are nonsignificant. The only significant regression coefficient, which is negative in value, suggests that as services of local elevators increase, there would be

Table 5.11. ANOVA for dependent variable Y_{10}

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	10	0.1444	0.0144	1.7829	0.02
Error	845	6.8469	0.0081		
Total (Corrected)	855	6.9913			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	-0.0098	0.0207	-0.47
X_1	-0.0000	0.0000	-1.97*
X_2	0.0005	0.0003	1.57†
X_3	-0.0154	0.0070	-2.18*
X_6	-0.0000	0.0000	-0.02
X_7	-0.0000	0.0000	-0.08
X_8	0.0000	0.0003	0.27
X_9	-0.0001	0.0006	-0.17
X_{14}	0.0057	0.0071	0.79
X_{15}	-0.0120	0.0071	-0.68***
X_{19}	-0.0247	0.0098	2.58*

*Significant at 5 percent level.

***Significant at 10 percent level.

†Significant at 20 percent level.

a decrease in the percent of sales of oats to the terminal and subterminal elevators. ANOVA Table 5.12 gives the details of results relating to the regression model.

Model 12: Oat sales to grain processors and feed dealers

The share of the grain processors and feed dealers in the total sales of oats was only 3.1 percent. Like the preceding three models relating to oat sales, this model does not explain any appreciable amount of variation in the dependent variable. Since the F-value is not statistically significant, the null hypothesis that $b_1 = b_2 = \ldots = b_p = 0$ has to be accepted. However, regression coefficients associated with variables X_6, X_7, and X_9 are significant at low levels. The values of these regression coefficients are very small, and hence exerts no perceptible influence on the dependent variable. The results of the model in detail are listed in ANOVA Table 5.13.

While comparing the results of the preceding 12 models, we observe that regressors in Model 1 and Model 5 explained only a fair amount of variations in regressands, accounting for 27% and 29% respectively. A very negligible amount of variation, ranging from one to four percent was explained in the rest of the models. Of the regressors used, variables that are consistently significant in most of the models are: corn field-shelled X_6, corn fed to livestock X_7, and

Table 5.12. ANOVA for dependent variable Y_{11}

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	10	0.0135	0.0013	0.9721	0.01
Error	845	1.1811	0.0013		
Total (Corrected)	855	1.1946			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	0.0046	0.0086	0.53
X_1	-0.0000	0.0000	-0.29
X_2	0.0001	0.0001	1.16
X_3	-0.0027	0.0029	-0.93
X_6	0.0000	0.0000	0.37
X_7	-0.0000	0.0000	-0.13
X_8	-0.0000	0.0001	-0.49
X_9	-0.0000	0.0002	-0.04
X_{14}	-0.0013	0.0029	-0.44
X_{15}	-0.0012	0.0029	-0.40
X_{19}	-0.0092	0.0041	-2.24*

*Significant at 5 percent level.

adequacy of elevator services X_{19}. These variables together with additional variables not available for this study, such as distance to market outlet, transportation costs, and premiums for grains sold may explain a larger portion of variations in the dependent variables.

Table 5.13. ANOVA for dependent variable Y_{12}

Source	Degree of Freedom (d.f.)	Sum of Squares (S.S.)	Mean Square (M.S.)	F-Value	R^2
Regression	10	0.0641	0.0064	0.9201	0.01
Error	845	5.8937	0.0069		
Total (Corrected)	855	5.9578			

Regression coefficients and statistics of fit:

Source	b-value	Standard Error	T-Value
Intercept	0.0083	0.0192	0.43
X_1	0.0000	0.0000	0.55
X_2	0.0000	0.0002	0.30
X_3	0.0019	0.0065	0.30
X_6	-0.0001	0.0000	-1.76***
X_7	-0.0000	0.0000	-1.33†
X_8	-0.0001	0.0002	-0.58
X_9	-0.0010	0.0006	-1.62***
X_{14}	0.0039	0.0066	0.58
X_{15}	0.0001	0.0066	0.02
X_{19}	0.0088	0.0091	0.96

***Significant at 10 percent level.

†Significant at 20 percent level.

CHAPTER VI. DEVELOPMENT AND APPLICATION OF DISCRIMINANT ANALYSIS

Background of Discriminant Analysis

The idea of discriminating between multivariate populations is not novel and could probably be traced far back in history. Scientifically, however, the subject is regarded to have begun with the work of Karl Pearson around 1920 (30, p. 111). The original developments in the field were mainly concerned with seeking a coefficient which would "measure the distance" between two populations. Pearson's C^2 (his coefficient of racial likeliness) was first applied on anthropometric data, on Burmese skulls by Miss Tildesley (47).

About this time, Mahalanobis was interested in the subject and came to the conclusion that Pearson's C^2 had not achieved its purpose.[1] Therefore, Mahalanobis worked out a new coefficient he called D^2 and used this measure on a racial mixture of Bengal in 1925. Hotelling's contribution to the analysis came during the 1930's when he generalized "student's" t. Hotelling's T^2 was, in fact, equivalent to Mahalanobis's D^2, but it was some time before this fact was realized (30).

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[1] "C^2 varied very much with the sample number and, although it provided a test of significance, it did not measure the magnitude of the difference between two populations" (1, p. 112).

Fisher's contribution to the analysis begins with the publication of his paper on classifying plant specimens in the biological sciences in 1936 (20). The most important difference between Fisher and Mahalanobis was that while the latter was measuring the distance between the two regions, the former was only dividing the sample space into two regions, allocating an item to one of the populations according to the region it fell into. As can be observed, the two approaches are quite similar.

Further theoretical developments in discriminant analysis are largely attributed to Rao (38, 39, 40, and 41). Meanwhile, quite a few scientists were concerned with the practical problems of application (3, 13, 14, 37, 44 and 50). As early as 1941, economists had realized the potentials of the techniques of discriminant functions in application to practical economic problems. Durand (18) has adapted the technique and applied it successfully in determining good and bad car loans. Tintner (48) utilized it in order to construct an "index" which best discriminates between consumers' goods and producers' goods on the basis of cyclical behavior of relevant prices. More recently, a similar approach is followed by Higgins (24) to discriminante between employment in defense and nondefense industries.[1]

[1]A very interesting application of discriminant analysis has recently beed made by Adleman and Morris (1) for evaluating economic development potentials of underdeveloped countries.

The application of linear discriminant analysis in agricultural economics has been of more recent origin. Blood and Baker (7) have utilized the technique to delineate production situations in the Northern Great Plains which favor wheat or range forage production. While recently Ladd (32) has used the technique in his analysis of ranking of dairy bargaining cooperative objectives. The most recent of the applications of discriminant analysis in agricultural economics are reported (35) on farm size and efficiency problems in Yugoslavia and (6) on Iowa farmland ownership structure.

The Analytic Technique of Discriminant Analysis

The central theme of discriminant analysis is to investigate if differences between group centroids exist, given a set of random variables. If significant difference is found, we may be further interested in studying the directions or dimensions along which the major differences occur. The problem of studying the direction of group differences is, equivalently, a problem of finding a linear combination of the original predictor variables that shows large differences in group means. Discriminant analysis is a method for determining such linear combinations. The general theory and test procedures adopted in this section follow closely Kendall's approach to multivariate analysis (31, pp. 264-272).

Discriminant criterion

The first step toward determining a linear combination of a set of variables such that group means on the linear combination will differ widely among themselves it to decide on a criterion for measuring such group-mean differences. Once a linear combination is constructed, we are dealing with a single transformed variable.

If there are p predictor variables, X_1, X_2, ..., X_p, and we form a linear combination,

$$Y = v_1X_1 + v_2X_2 + \dots + v_pX_p \qquad (6.1)$$

of these variables, the within groups and between-groups-sums-of-squares of Y both turn out to be expressible as quadratic forms. If we denote the sum of squares of Y for the kth group by $SS_k(Y)$ and let $v' = (v_1, v_2, \dots, v_p)$ we obtain

$$SS(Y) = v'Wv$$

where

$W = \sum_{k=1}^{k} SS_k(Y)$ is the pooled within-groups SSCP (sums-of-squares-and-cross-products) matrix.

Denoting $SS_b(Y)$ for between-groups sum-of-squares or between-groups SSCP matrix, of B for the variables taken one at a time are:

$$b_{ii} = \sum_{k=1}^{K} n_k(\bar{X}_{ik}-\bar{X}_i)^2 \quad i = 1,2,\ldots,p \tag{6.2}$$

where

n_k is size of the kth group;

$\bar{X}_{ik}$ is the kth group mean of X_i; and

$\bar{X}_i$ is the grand mean of X_i.

The off-diagonal elements of B are the between-groups-sums-of-products for pairs of variables. Thus, the (i,j) element is

$$b_{ij} = \sum_{k=1}^{K} n_k(\bar{X}_{ik}-\bar{X}_i)(\bar{X}_{jk}-\bar{X}_j) \quad i,j = 1,2,\ldots,p \tag{6.3}$$

In matrix notation, the between-groups sums of squares matrix may be written as

$$v'Bv = v'(\bar{X}-\bar{\bar{X}})'(\bar{X}-\bar{\bar{X}})v \tag{6.4a}$$

$$= (\bar{X}v-\bar{\bar{X}}v)'(\bar{X}v-\bar{\bar{X}}v) \tag{6.4b}$$

where

$$B = (\bar{X}-\bar{\bar{X}})'(\bar{X}-\bar{\bar{X}}), \tag{6.5}$$

and

$\bar{X}$ = group means of p variables;

$\bar{\bar{X}}$ = grand means of p variables.

If we divide each element of SS matrix by (n-k), we get pooled with-in dispersion matrix, C. And if we divide each element of SS_b matrix by (n_k-1), then we get between dispersion matrix, C_k.

The ratio of between-groups to within-groups sums-of-squares becomes the discriminant criterion. Our task is to determine a set of weights $(v_1, v_2, \ldots, v_p)$ which maximizes the discriminant criterion.

Maximizing the discriminant criterion

Let us consider K multivariate normal populations with means typified by μ_{ik} $(i = 1,2,\ldots,p;\ k = 1,2,\ldots,K)$ and dispersions by γ_{ijk} or equivalently $\sigma_{ik}\sigma_{jk}\rho_{ijk}$. Let there be a sample of n_k from the kth population. If α_{ijk} is inverse to γ_{ijk} the likelihood function of all samples together is

$$L_1(\mu_{ik},\gamma_{ijk}) = \prod_{k=1}^{K} \frac{|\alpha_k|^{\frac{1}{2}n_k}}{(2\pi)^{\frac{1}{2}pn_k}} \exp\{-\frac{1}{2}\sum_{k=1}^{K} \underset{n_k}{S} \sum_{i=1}^{p} \alpha_{ijk}(X_{ik}-\mu_{ik})(X_{jk}-\mu_{jk})\} \quad (6.6)$$

If all μ's and γ's are equal, the corresponding likelihood is

$$L_0(\mu_i,\gamma_{ij}) = \frac{|\alpha|^{\frac{1}{2}n}}{(2\pi)^{\frac{1}{2}pn}} \exp\{-\frac{1}{2} \underset{n}{S} \sum_{i,j=1}^{p} \alpha_{ij}(X_i-\mu_i)(X_j-\mu_j)\} \quad (6.7)$$

where

$$n = \sum_{k=1}^{K} n_k \quad (6.8)$$

We need to estimate the parameters in (6.6) by maximum likelihood and substitute in it to obtain the unconditional maximum L_1. Likewise for (6.7) to obtain the conditional maximum L_0. We then use the ratio $\ell = L_0/L_1$, or some monotonic function of it, as the test criterion.

The logarithm of the likelihood (6.6) becomes the sum of K terms which, being independent, can be maximized separately. We find, as expected,

$$\hat{\mu}_{ik} = \overline{X}_{ik} \tag{6.9}$$

$$\hat{\alpha}_{ijk} = A_{ijk} \tag{6.10}$$

$$\hat{\gamma}_{ijk} = C_{ijk} \tag{6.11}$$

Substitution in the exponential term in (6.6) yields a constant, for

$$\sum_{i,j} A_{ijk}C_{ijk} = 1 \tag{6.12}$$

Thus, except for a constant,

$$L_1 = \prod_{k=1}^{K} \frac{1}{|C_{ijk}|^{\frac{1}{2}n_k}} \tag{6.13}$$

Likewise from (6.7) we obtain

$$L_0 = \frac{1}{|C_{ij}|^{\frac{1}{2}n}} \tag{6.14}$$

where C_{ij} is the dispersion for all K samples pooled together.

Homogeneity test criterion

The problem is to inquire if samples from K different p-variate populations may be identical. There are three types of hypotheses to consider:

H: that the populations have the same means and dispersions, namely are identical;

H_1: that the populations have the same dispersions but may differ in means;

H_2: it is known that the populations have the same dispersions; the hypothesis is that they have the same means.

Following the likelihood functions given in (6.6) and (6.7), the test criterion is then given by

$$\ell_H = \frac{L_0}{L_1} = \frac{\pi |C_{ijk}|^{\frac{1}{2}n_k}}{|C_{ij}|^{\frac{1}{2}n}} \tag{6.15a}$$

$$= \prod_{k=1}^{K} \left\{\frac{|C_{ijk}|}{|C_{ij}|}\right\}^{\frac{1}{2}n_k} \tag{6.15b}$$

The ℓ_H may vary from 0 to 1. The nearer to unity, the more we are inclined to accept the hypothesis that all means and dispersions are equal. The same technique gives us tests for H_1 and H_2. We quote the results without proof.

Let C_{ija} be the average dispersion taken over the K populations, namely

$$C_{ija} = \frac{1}{n} \sum_{k=1}^{K} \sum_{u=1}^{n_k} (X_{iu}-\bar{X}_i)(X_{ju}-\bar{X}_j0 \qquad (6.16)$$

Then for H_1,

$$\ell_{H_1} = \prod_{k=1}^{K} \{\frac{|C_{ijk}|}{|C_{ija}|}\}^{\frac{1}{2}n_k} \qquad (6.17)$$

For H_2,

$$\ell_{H_2} = \{\frac{|C_{ija}|}{|C_{ij}|}\}^{\frac{1}{2}n} \qquad (6.18)$$

Our test criteria thus appear as the ratios of dispersion determinants.

Distribution of test criterion

To apply the tests we require the distributions of the test criteria. For practical purposes, however, it is enough to rely on an approximation due to Wilks in (30) to the effect that $-2\rho \ln \ell_H$ is distributed as χ^2 with degree of freedom equal to the number of parameters in likelihood function (6.6) less the number in (6.7), i.e., the number of constraints imposed by the hypothesis, where,

$$\rho = 1\cdot 0 - \{\sum_{n=1}^{n_k} \frac{1}{n_k-1} - \frac{1}{n-k}\} \frac{2p^2+3p-1}{6(p+1)(k-1)} \qquad (6.19)$$

$$\ell_H = \prod_{k=1}^{K} \left\{\frac{|C_{ijk}|}{|C_{ij}|}\right\}^{\frac{1}{2}n_k} \qquad (6.20)$$

$$d \cdot f = \cdot 5(k-1)p(p+1) \qquad (6.21)$$

For details of χ^2 approximation to the distribution of and the derivation of moments, please see Kendall (30, pp. 266-270).

Applications to classification

Given at hand a sample from each k well-defined populations, with measures for each individual on p variables that are known or deemed to be important in differentiating among the several populations or groups, we wish to classify him as a member of one or another of these K groups - the one with which he shows greatest 'resemblance'.

The crux of the matter obviously lies in how we define 'resemblance' in this context. Various measures of profile (or pattern) similarity and of distance (that is, dissimilarity) have been proposed in the literature (33, pp. 49-55, 11, pp. 279-298, 17, pp. 121-131). We here choose the familiar Mahalanobis' D^2 statistic to serve as a measure of dissimilarity. This is a reasonable choice, since the larger the D^2 value of an individual with reference to a given group, the farther away (in the generalized distance sense) is the point $(X_{1i}, X_{2i}, \ldots, X_{pi})$ representing his set of scores from the centroid $(\bar{X}_{1k}, \bar{X}_{2k}, \ldots, \bar{X}_{pk})$ of that group. Thus, he may be said to be the more deviant from the 'average member' of that group, the larger his D^2 value. Conversely, an individual with a small D^2 value with reference to a group is 'closer' to the average member of that group, and may hence be said to resemble that group.

<u>Classification scheme</u>

Throughout the sequel, a basic assumption needed for strict validity of the significance tests is that the variables under study follow a multivariate normal distribution. For the case of two variables X_1 and X_2, the bivariate normal density function is

$$\phi(X_1,X_2) = \frac{1}{2\pi\sigma_1\sigma_1\sqrt{1-\rho^2}} \exp\{\frac{-1}{2(1-\rho)^2}[\frac{(X_1-\mu_1)^2}{\sigma_1^2} + \frac{(X_2-\mu_2)^2}{\sigma_2^2}$$

$$- 2\rho\frac{(X_1-\mu_1)(X_2-\mu_2)}{\sigma_1\sigma_2}]\} \qquad (6.22)$$

where μ_i and σ_i^2 are the mean and variance of X_i $(i = 1,2)$ and ρ is the correlation coefficient.

By use of elementary analytic geometry, it can be shown that the equation in question, namely

$$\frac{(X_1-\mu_1)^2}{\sigma_1^2} + \frac{(X_2-\mu_2)}{\sigma_2^2} - 2\rho\frac{(X_1-\mu_1)(X_2-\mu_2)}{\sigma_1\sigma_2} = e$$

represents an ellipse with center at the point (μ_1, μ_2) which is called the centroid of the bivariate population.

Before developing the equation for the multivariate normal density function for more than two variables it is convenient to rewrite the quantities in Equation (6.22) in matrix rotation. We first define the variance-covariance matrix, or dispersion matrix, for a bivariate population as follows:

$$\gamma_2 = \begin{bmatrix} \sigma_1{}^2 & \rho\sigma_1\sigma_2 \\ \rho\sigma_2\sigma_1 & \sigma_2{}^2 \end{bmatrix} \tag{6.24}$$

The determinant of this matrix is

$$|\gamma_2| = \sigma_1{}^2\sigma_2{}^2(1-\rho^2) \tag{6.25}$$

Hence, the inverse of γ_2 is given by

$$\gamma_2{}^{-1} = \alpha_2 = 1/\sigma_1{}^2\sigma_2{}^2(1-\rho^2) \begin{bmatrix} 1/\sigma_1{}^2 & -\rho/\sigma_1\sigma_2 \\ -\rho/\sigma_2\sigma_1 & 1/\sigma_2{}^2 \end{bmatrix} \tag{6.26a}$$

$$= 1/(1-\rho^2) \begin{bmatrix} 1/\sigma_1{}^2 & -\rho/\sigma_1\sigma_2 \\ -\rho/\sigma_2\sigma_1 & 1/\sigma_2{}^2 \end{bmatrix}$$

It is now readily seen that the expression in the exponent of Equation (6.22) apart from the factor -1/2, is equivalent to the quadratic

$$[X_1-\mu_1,\ X_2-\mu_2] \quad] \begin{bmatrix} X_1-\mu_1 \\ X_2-\mu_2 \end{bmatrix} \tag{6.27}$$

We let D^2 symbolize this expression, which, on introducing

$$x' = [X_1-\mu_1,\ X_2-\mu_2] \tag{6.28}$$

may be written as

$$D^2 = x'\alpha_2 x \tag{6.29}$$

Next, the constant factor $1/2\pi\sigma_1\sigma_2\sqrt{1-\rho^2}$ of the expression for $\phi(X_1,\ X_2)$ may be written as $(2\pi)^{-1}|\gamma_2|^{-1/2}$, since $\sigma_1\sigma_2\sqrt{1-\rho^2}$ is the square root of $|\gamma_2|$ as seen from Equation (6.25)

Thus, Equation (6.22), specifying the bivariate normal density function, may be written compactly as

$$\phi(X_1,\ X_2) = (2\pi)^{-1}|\gamma_2|^{-1/2} \exp(-D^2/2) \tag{6.30}$$

with γ_2 and D^2 defined by Equations (6.24) and (6.29), respectively.

The extension to the p-variate case is now almost obvious. If we define the dispersion matrix as

$$\gamma = \begin{bmatrix} \sigma_1^2 & \rho_{12}\sigma_1\sigma_1 & \cdots & \rho_{1p}\sigma_1\sigma_p \\ \rho_{21}\sigma_2\sigma_1 & & \cdots & \rho_{2p}\sigma_2\sigma_p \\ \rho_{p_1}\sigma_p\sigma_1 & \rho_{p2}\sigma_p\sigma_2 & & \sigma_p^2 \end{bmatrix} \tag{6.31}$$

where σ_i^2 is the variance of X_i, and $\rho_{ij}(i \neq j)$ is the coefficient of correlation between X_i and X_j, and let

$$D^2 = x'\alpha x \tag{6.32}$$

with

$$x' = [X_1-\mu_1,\ X_2-\mu_2,\ \ldots,\ X_p-\mu_p] \tag{6.33}$$

then the p-variate normal density function is given by

$$\phi(X_1,\ X_2,\ \ldots,\ X_p) = e\ \exp(-D^2/2) \tag{6.34}$$

where only the constant e remains to be determined. Examination of Equation (6.30) alone is sufficient to permit our inferring, for the p-variate case, that

$$e = (2\pi)^{-p/2}|\alpha|^{-1/2} \tag{6.35}$$

Thus, we have, as the complete equation for a p-variate normal density function,

$$\phi(X_1,\ X_2\ ,\ldots\ X_p) = (2\pi)^{-p/2}|\alpha|^{-1/2}\ \exp(-D^2/2) \tag{6.36}$$

with α and D^2 defined by Equations (6.31) and (6.32), respectively. We shall denote this distribution by the symbol $N(\mu,\gamma)$, meaning a multivariate normal distribution with centroid $\mu = [\mu_1, \mu_2, \ldots, \mu_p]'$ and dispersion matrix γ.

We compute the D^2 value of the unclassified individual with respect to each of the K groups, and assign him to that group with respect to which his D^2 value is the smallest.

This rule has the property of minimizing the probability of misclassifications when the K populations have multivariate normal distributions with equal dispersion matrices. If this common dispersion matrix γ is known, it would, of course, be used in computing each of the KD^2 values

$$D^2_{ik} = x'_{ik}\ \alpha\ x_{ik} \tag{6.37}$$

for individual i, where x_{ik} is the vector of his p scores in deviation form - deviations from the kth population centroid $\mu'_k = [\mu_{1k}, \mu_{2k}, \ldots, \mu_{pk}]$ if this is known; deviations from the kth sample centroid $\bar{X}'_k = (\bar{X}_{1k}, \bar{X}_{2k}, \ldots, \bar{X}_{pk})$ is unknown.

Since, in practice, both γ and the μ_k are usually unknown, sample estimates have to be used for both the dispersion matrix and the centroids. In our case, γ is replaced by its within-groups estimate $SS/(n-k) = C$, where C is the pooled within-groups dispersion matrix, and $n = n_1+n_2+ \ldots +n_k$. Thus, the formula for ${D_{ik}}^2$ that is of greatest practical use becomes

$$D_{ik}^2 = x_{ik}' \; A \; x_{ik}, \quad \text{where} \quad A = C^{-1} \tag{6.38}$$

When the K population dispersion matrices are not to be equal, the separate matrices or their respective sample estimates are used in place of α or C in computing D^2. Thus, the formula for the D^2 statistic now becomes

$$D_{ik}^2 = x_{ik}' \; A_k \; x_{ik} \quad \text{where} \quad A_k = C_k^{-1} \tag{6.39}$$

where $C_k = SS_k/(n_k-1)$ is the dispersion matrix of the kth sample. At the same time, the classification rule is modified to be based on minimizing, not D^2 itself, but an adjusted quantity D'^2 defined as follows:

$$D_{ik}'^2 = D_{ik}^2 + \ln |C_k| \tag{6.40}$$

which is proportional to the natural logarithm of the multivariate normal density function $N(\overline{X}_k, C_k)$ evaluated at the point $X_i' = (X_{1i}, X_{2i}, \ldots, X_{pi})$. That is, for each individual to be classified, we compute the quantity $D_{ik}'^2$, defined by Equations (6.39) and (6.40) for each of the K groups, and assign him to that group for which his D'^2 value is the smallest.

Taking prior probability into consideration

The preceding classification rules do not take into consideration the prior probabilities. Let p_k denote the probability that an individual selected at random from a mixed population comprising all K groups is a member of the kth group. Then the appropriate modification of the D'^2 statistic is given by a constant times the natural logarithm of the multivariate normal density function for group k, multiplied by p_k. That is

$$D''^2_{ik} = D'^2_{ik} - 2 \ln p_k \qquad (6.41)$$

where D'^2_{ik} is as defined in Equation (6.40). Again, the decision rule is to assign the individual to that group for which his D''^2 value is the smallest.

The term involving p_k is $-2 \ln p_k$, and p_k is a positive number less than 1, the following conclusions may be drawn: (1) the additive component due to p_k is always positive; and (2) the larger the value of p_k, the smaller this additive component. Consequently, if for some two groups j and k, p_k is larger than p_j, then an individual for whom $D'^2_{ik} = D'^2_{ij}$ will have a smaller D''^2_{ik} than D''^2_{ij}. Thus, if this individual's D'^2 value had been smaller for these groups than for any other group, the effect of the prior probabilities is to break the tie in favor of the group with the larger probability, because $D''^2_{ik} < D''^2_{ij}$.

Although we considered the case when $D'^2_{ik} = D'^2_{ij}$ above, it is clear that even if $D'^2_{ik} > D'^2_{ij}$, we may have $D''^2_{ik} < D''^2_{ij}$ provided p_k is sufficiently larger than p_j. That is, a decision based on values (measuring dissimilarity) may be reversed in favor of a group with a larger prior probability of membership (that is, a large group) when D''^2 values are used as the basis of classification.

We thus see that the role played by prior probabilities is, as it were, to temper our decisions based on resemblance alone with considerations of relative group sizes. Where we might tend to oversupply small groups and undersupply large ones by using resemblance as the sole basis for classification, we introduce a corrective effect by taking prior probabilities of group membership into account.

Probability of group membership

The quantities D^2 and D'^2 as measures of dissimilarity are closely related to a certain kind of probability, specified below, provided the variables $X_1, X_2, \ldots, X_p$ follow a multivariate normal distribution in each of the K groups. Considering D'^2, we see from Equation (6.40) that

$$\exp(-D'^2_{ik}/2) = |C_k|^{-1/2} \exp(-D^2_{ik}/2) \qquad (6.42)$$

and hence

$$(2\pi)^{-p/2} \exp(-D'^{2}_{ik}) = (2\pi)^{-p/2}|C_k|^{-1/2} \exp(-D^{2}_{ik}/2) \quad (6.43)$$

which is simply the multivariate normal density function evaluated at the point corresponding to the observed score combination X_i. Therefore, by definition, the quantity

$$(2\pi)^{-p/2} \exp(-D'^{2}_{ik}/2)dX_1, dX_2, \ldots, dX_p \quad (6.44)$$

expresses the probability that a randomly drawn member of group k will have a score combination between

$$(X_{1i}, X_{2i}, \ldots, X_{pi}) \quad (6.45a)$$

and

$$(X_{1i} + dX_1, X_{2i} + dX_2, \ldots, X_{pi} + dX_p) \quad (6.45b)$$

Let us denote this probability by $p(X_i/H_k)$ stands for the statement: "individual i is a member of Group k". The relationship of this probability to D'^2, may be stated as follows: Given that individual i is a randomly selected member of group k, the probability that his score combination lies within the limits displayed in (6.45b) is equal to

$$p(X_i/H_k) = (2\pi)^{-p/2} \exp(-D'^{2}_{ik}/2)dX_1, dX_2, \ldots, dX_p \quad (6.46)$$

where D'^2_{ik} is as defined in Equation (6.40).

On the other hand, the quantity D''^2 introduced in the preceding section, taking prior probabilities of group membership into consideration, cannot be related to a conditional probability of the type shown in Equation (6.46). For the prior probability does not play any role once we confine our attention to a particular group k, as we do in the conditional probability $p(X_i/H_k)$. To take the prior probabilities of group membership into account and still produce a relevant probability after the score combination X_i has been observed, we have to consider a type of probability which is, as it were, the inverse of that displayed in Equation (6.46): the probability that individual i is a member of group k, given that his score combination is X_i. This type of probability, which we denote by $p(H_k/X_i)$, is functionally related to D''^2 as shown below.

In order for $p(H_k/X_i)$ to be definable, we must make one further assumption that was not needed in considering probabilities of the type $p(X_i/H_k)$. This is the requirement that the as yet unclassified individual i must definitely be a member of one or another of the K groups under consideration. That is, the eventuality that he belongs to none of these K groups is prohibited.

Granted the assumption that the set of statements H_1,

H_2, ..., H_k exhausts all the possibilities with regard to the group membership of individual i, we may compute his $p(H_k/X_i)$ by means of Bayes' theorem on "inverse probability", or posterior probability, as it is more commonly known today. The formula is:

$$p(H_k/X_i) = \frac{p_k \cdot p(X_i/H_k)}{\sum_{j=1}^{K} p_j \cdot p(X_i/H_j)} \quad k= 1,2,\ldots,k \qquad (6.47)$$

where p_k is the prior probability of membership in Group k, and $p(X_i/H_k)$ is as defined in Equation (6.46). Substituting from this equation and cancelling the common factor $(2\pi)^{-p/2}$ and dX_1, dX_2, ..., dX_p from numerator and denominator, we may write $p(H_k/X_i)$ explicitly in terms of D''^2 by use of Equation (6.41) in which case we get

$$p(H_k/X_i) = \exp(-D''^2_{ik}/2) / \sum_{j=1}^{K} \exp(-D''^2_{ij}/2) \qquad (6.48)$$

We thus see that, whereas $p(X_i/H_k)$ is expressible only in terms of D^2 or D'^2, $p(H_k/X_i)$ is related to D''^2. This is the posterior probability, after observing individual i's score combination $(X_{1i}, X_{2i}, \ldots, X_{pi})$, that he is a member of Group k.

In using the probability of group membership for classification purposes, the decision rule is of course to assign each individual to that group for which his $p(H_k/X_i)$ value is the largest. This is a reversal from the rules using D^2, D'^2, and D''^2, in which we wought to minimize the values of these statistics. It should be noted, however, that the numerator of expression for $p(H_k/X_i)$ is $\exp(-D''^2_{ik}/2)$, which is monotonically decreasing function of D''^2_{ik}, and that the deconinator does not change with k for any individual i. Hence, the classification based on maximum $p(H_k/X_i)$ is actually identical with that based on minimum D''^2.

Application of Discriminant Analysis

The above - discussed model of discriminant analysis has been applied to the grain producers' survey data. The analysis extends to two models: (1) ownership of grain dryers on the farm, and (2) the probability of purchase of grain dryers within the next five years.

Sequence of discriminant analysis

The results of analysis will be discussed in the following sequence.

Values of the classification variable, i.e., groups, frequencies and prior probabilities followed by simple descriptive statistics for each group will be interpreted. This includes the number of observations in each group, the sum, variance and standard deviation of each variable under consideration.

Secondly, the within dispersion matrices for each group will be constructed from which a simple correlation matrix for each group will be computed. A pooled co-variance matrix will also be constructed from which the partial correlation matrix is developed.

Thirdly, a series of tests will be performed: (1) test of H_1 such that all the grain producer groups are correctly classified on the criteria - ownership of grain dryer in the first model, and the probability of dryer purchase in the second model, (2) test of H_2 for all grain producer groups, if H_1 could not be rejected, and finally (3) if H_1 is rejected, Mahalanobis' D^2 for each observation in each group as well as for each group within population is computed.

The chi-square test of homogeneity of within group dispersion matrix will be conducted to test H_1. If H_1 could not be rejected, we proceed to test equality of mean vectors of groups in H_2. But if H_1 is rejected we proceed to classify each of the observations. The classification results will include the observation number, the group in which the observation actually is, the group in which the developed criterion would classify it, the generalized square distance to each group, and the posterior probability of its membership in each group.

Empirical Results - Model 1

Do the class II respondents not owning a grain dryer on the farm significantly differ from the class I respondents who owned the dryers on the basis of given variables that are assumed to influence either of the decisions.

Variables used

The following explanatory variables are assumed to influence the dryer buying decision by the grain producers. Some of the variables used in the regression analysis are also employed here. However, the designations of those repeated variables are maintained throughout the discriminant analysis.

Designation	Description of Variable	Units of Measurement
X_1	Total acres cropped	Acres
X_2	Age of operator	Years
X_3	Land ownership	If all-owned = 1 otherwise = 0
X_4	Type of farm	If grain cash = 1 otherwise = 0
X_5	Percent of corn field shelled	% of total acres
X_8	Shelled corn storage capacity	1000 bushels
X_{16}	Reasonable drying charges at elevator	If reasonable = 1, otherwise = 0
X_{17}	Adequacy of storage capacity with elevator	If adequate = 1, otherwise = 0

Designation	Description of Variable	Units of Measurement
X_{18}	Needed services such as drying and storage provided by elevator	If favorable = 1, otherwise = 0
X_{19}	Total elevator services	Sum of weighted index
X_{20}	Quantity of grains sold at harvest	100 bushels

Based on the criterion of dryer ownership, the respondents are classified and the frequency and prior probability under each classification is given below.

Criteria	Group or class[1] no.	Group designation	Frequency	Prior Prob.
Not owning dryer on farm	g_1	NDO	557	0.6507
Owning dryer on farm	g_2	DOF	299	0.3493
Total			856	1.0000

Descriptive statistics

Simple descriptive statistics for the two groups, NDO and DOF are given in Table 6.1 and 6.2. By visual observation of means and standard deviation related to variables, we find significant differences between means and relatively less significant differences in standard deviation between the groups. The large difference between means of the groups with respect to variables is probably one of the reasons

[1]Group and class are used interchangeably.

Table 6.1. Description and measure of dispersion of variable used in discriminant analysis (Model I)

Designation	Description of Variables	Standard Deviations of Variable for Groups		Standard Deviation for all groups
		NDO $N_1 = 557$	DOF $N_2 = 299$	$N = 856$
X_1	Total acres cropped	145.7751	207.1279	181.4298
X_2	Age of operator	10.3246	10.1028	10.3124
X_3	Land ownership	0.4963	0.4650	0.4888
X_4	Type of farm	0.4352	0.4865	0.4576
X_5	Percent of corn field shelled	35.8983	31.2228	40.1459
X_8	Shelled corn storage capacity	6.2402	17.9858	13.4513
X_{16}	Reasonable drying charges at elevator	0.5001	0.4984	0.4995
X_{17}	Adequacy of storage with elevator	0.4953	0.5008	0.4982
X_{18}	Needed service provided by the elevator	0.4681	0.4609	0.4654
X_{19}	Total elevator services	0.3510	0.3016	0.3344
X_{20}	Quantity of grain sold at harvest	77.8186	76.2483	77.3635

Table 6.2. Description and means of variables used in the discriminant analysis (Model I)

Designation	Description of Variable	Means of Variable for Groups: NDO $N_1 = 557$	Means of Variable for Groups: DOF $N_2 = 299$	Means for all observations $N = 856$
X_1	Total acres cropped (acres)	215.8240	350.7859	262.9612
X_2	Age of operator (years)	48.5332	46.0066	47.6507
X_3	Land ownership (all owned = 1, otherwise = 0)	0.4362	0.3143	0.3936
X_4	Type of farm (if cash grain = 1, otherwise = 0)	0.2531	0.3812	0.2978
X_5	Percent of corn field shelled	33.7065	77.3731	48.9592
X_8	Shelled corn storage capacity (100 bu)	4.0807	17.8060	8.8750
X_{16}	Reasonable drying charges at elevator (if reasonable = 1, otherwise = 0)	0.4829	0.4515	0.4719
X_{17}	Adequacy of storage with elevator (if adequate = 1, otherwise = 0)	0.5709	0.4983	0.5455
X_{18}	Needed services provided by elevator (if favorable = 1, otherwsie = 0)	0.6768	0.6956	0.6834
X_{19}	Total elevator services (weighed index)	0.7070	0.7086	0.7075
X_{20}	Quantity of grain sold at harvest (100 bu)	18.5224	28.0802	21.8609

that determine the ownership criteria. The less variations between the standard deviations between the groups can not be easily interpreted except to observe that the values of observation with respect to variables are less distantly distributed over the respective mean values.

Interrelationship between variables

To observe the interrelationship between the variables included in the discriminant analysis, correlation matrices for each class as well as for the combined class are presented in this section. Table 6.3 provides the simple correlation matrix for all grain producers irrespective of their ownership status, while Tables 6.4 and 6.5 correlation matrices for NDO and DOF grain producer groups respectively.

Although there are expected variations in the magnitudes of the correlations between variables from DNO, the signs of the most of the elements are in the expected direction. For example, acres cropped, X_1 is negatively correlated with the age of the respondent, X_2 and land ownership, X_3 while positively correlated with type of farm, X_4, percent of corn field shelled, X_5, and shelled corn storage capacity, X_8.

The magnitude of the elements of correlation matrices are also important and reveal some interesting relationships. For example, it is reasonable to assume that storage

Table 6.3. Correlation matrix for the dryer-owner and non-dryer-owner groups pooled

	X_1	X_2	X_3	X_4	X_5	X_8	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}
X_1	1.00										
X_2	-0.16	1.00									
X_3	-0.37	0.25	1.00								
X_4	0.17	0.10	-0.16	1.00							
X_5	0.32	-0.05	-0.14	0.22	1.00						
X_8	0.60	-0.10	-0.15	0.14	0.37	1.00					
X_{16}	0.02	0.04	-0.03	0.06	0.07	-0.01	1.00				
X_{17}	0.03	0.03	-0.02	0.10	0.01	-0.04	0.21	1.00			
X_{18}	0.11	-0.06	-0.10	0.12	0.16	-0.002	0.43	0.43	1.00		
X_{19}	0.06	-0.05	-0.10	0.13	0.09	-0.03	0.57	0.62	0.71	1.00	
X_{20}	0.31	0.02	-0.12	0.20	0.15	0.15	-0.01	0.05	0.05	0.01	1.00

Table 6.4. Correlation matrix for non-dryer-owner-group (NDO)

	X_1	X_2	X_3	X_4	X_5	X_8	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}
X_1	1.00										
X_2	-0.18	1.00									
X_3	-0.40	0.30	1.00								
X_4	0.17	0.12	-0.15	1.00							
X_5	0.25	-0.02	-0.15	0.18	1.00						
X_8	0.39	-0.07	-0.09	0.04	0.20	1.00					
X_{16}	0.01	0.01	-0.03	0.11	0.15	-0.01	1.00				
X_{17}	0.12	-0.01	-0.06	0.10	0.09	0.11	0.29	1.00			
X_{18}	0.18	-0.12	-0.14	0.16	0.24	0.08	0.45	0.46	1.00		
X_{19}	0.11	-0.08	-0.10	0.13	0.14	0.01	0.60	0.65	0.72	1.00	
X_{20}	0.41	0.03	-0.11	0.20	0.19	0.07	0.02	0.05	0.08	0.01	1.00

Table 6.5. Correlation matrix for dryer-owner-group (DOF)

	X_1	X_2	X_3	X_4	X_5	X_8	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}
X_1	1.00										
X_2	-0.07	1.00									
X_3	-0.28	0.15	1.00								
X_4	0.10	0.14	-0.16	1.00							
X_5	0.07	0.08	0.06	0.13	1.00						
X_8	0.63	-0.04	-0.15	0.14	0.18	1.00					
X_{16}	0.06	0.09	-0.05	0.01	-0.12	0.03	1.00				
X_{17}	-0.02	0.09	0.03	0.13	-0.04	-0.08	0.06	1.00			
X_{18}	0.03	0.06	-0.02	0.07	0.03	-0.96	0.40	0.40	1.00		
X_{19}	0.01	0.04	-0.08	0.12	0.02	-0.08	0.51	0.58	0.68	1.00	
X_{20}	0.18	0.01	-0.12	0.19	0.04	0.22	-0.07	0.06	-0.03	0.03	1.00

capacity for shelled corn is important for a producer who owns a dryer on the farm. This is supported by a positive value of correlation coefficient, 0.63 between acres cropped and storage capacity available for shelled corn, where as the coefficient value between these variable, is only 0.37 in the case of NDO (Group I) respondents who did not own a dryer on the farm. Percent of corn field harvested, X_5 is positively correlated with acres cropped, X_1 in case of both the groups. However, the correlation coefficient in NDO is higher than that of DOF group. The reason for a stronger relationship in NDO may be due to the fact that grain producers who did not own dryers might have had a greater tendency to harvest corn by corn sheller and dry the shelled corn either by rented dryer or drying at the elevator.

Another interesting observation may be made with regard to the relationship between the acres cropped, X_1 and quantity of grain sold at harvest, X_{20}. The correlation between these variables is positive in both the groups as expected. However, the relationship is stronger in the NDO group as evidenced by the value of correlation coefficient of 0.41 as opposed to the value of 0.18 in the case of the DOF group. In other words, grain producers of the NDO group have a higher tendency to sell grains at harvest while DOF group members can dry the grain on the farm and store them for future disposition.

Test of homogeneity of within dispersion matrices

Our task is to investigate the test criterion whether the means and variances between NDO and DOF groups significantly differ. The computed determinants of within group dispersion matrices ($|C_k|$) and pooled within group dispersion matrix ($|C|$) are given below:

Group Name	Rank of Dispersion matrix	Natural log of the determinant of the dispersion matrix
NDO	11	$\|C_1\| = 21.9108$
DOF	11	$\|C_2\| = 24.5009$
Pooled	11	$\|C\| = 23.5624$

The test statistic $-2\rho \ln l$ is distributed approximately as χ^2 with degree of freedom equal to $.5(K-1)p(p+1)$, where

$$\rho = 1.0 - \sum_{u=1}^{n_k}\left\{\frac{1}{n_k-1} - \frac{1}{854}\right\} \frac{2(11)^2+3(2)-1}{6(11+1)(2-1)} \qquad (6.49)$$

$$\ell_H = \prod_{k=1}^{K} \left\{\frac{|C_{ijk}|}{23.5624}\right\}^{\frac{1}{2}n_k} \qquad (6.50)$$

$K = 2$, number of groups

$p = 11$, number of variables

$n = 856$, number of observations

n_k = number of observations in the kth group, where k = 1,2

k_1 = 557 observations (NDO group)

k_2 = 299 observations (DOF group)

The computed χ^2 statistic value is found to be 629.6781 with 66 degree of freedom. The null hypothesis, H that the means and variances between NDO and DOF groups are identical is rejected at 0.0001 level of significance. In other words, there is less than one chance in 10000 to obtain a value of χ^2 as high as was found. This suggests that significant differences between group means and between group dispersions exist. The result of H test precludes the test of H_1 and H_2.

Generalized distance and classification results

In accordance with the criterion of minimum D''^2 rule, we now discard the assumption that the dispersion matrices in the two populations are equal, and use a separate dispersion matrix, C_k for each group. These are computed as $SS_k/(n_k-1) = C_k$ where SS_k is the SSCP matrix for the kth sample. We use the already computed natural log of the determinants of the within group matrices for homogeneity test in the preceding section. Using the matrix of deviations from the kth sample centroid $\overline{X}'_k = (\overline{X}_{1k}, \overline{X}_{2k}, \ldots, \overline{X}_{pk})$ and incorporating the natural log of prior probability of the kth group into the function, we obtain the pairwise squared generalized distances ($D''^2(k/j)$ between groups, where

$$D''^2(k/j) = (\bar{X}_k - \bar{X}_j)' A_k (\bar{X}_k - \bar{X}_j) + \text{Ln } |C_k| - 2 \text{ Ln } p_k \qquad (6.51)$$

Generalized squared distance:

From	To: NDO	To: DOF
NDO	22.7702	28.6642
DOF	29.0599	26.6045

If NDO and DOF groups are distinct and homogeneous within itself, $D''^2(k/j)$ for that group should cluster around their mean, resulting in maximum separation among groups.

While comparing the generalized distances, 557 of 856 respondents who were assigned to the NDO group based on prior probability are largely clustered around their group means. Similarly, 299 respondents who were assigned to DOF group also seem to cluster around their means as indicated by the smallest distance values of diagonal elements in the generalized squared distance matrix.

These group distances do not show how the generalized squared distance of each observation is distributed. It is quite possible that generalized squared distance of some members, for example, in group NDO to be classified into DOF group, although, their group distance is found to be smaller. We need to investigate how each member of the group is distributed and measure his generalized squared distance.

Classification results for each observation

The formula for computing generalized squared distance for each observation is given by

$$D''^2_j(X) = (X-\overline{X}_j)A_k(X-\overline{X}_j) + \text{Ln}\ |C_k| - 2\ \text{Ln}\ p_k \qquad (6.52)$$

The dispersion matrices of within groups and their determinants used here are the same as that were used in the preceding section. However, we use the matrix of deviations of individual observed values, $X_i' = (X_{1i}, X_{2i}, \ldots, X_{pi})$ from his group centroid values $\overline{X}_i' = (\overline{X}_{1i}, \overline{X}_{2i}, \ldots, \overline{X}_{pi})$.

Again the decision rule is to assign the individual to that group for which his generalized squared distance value is the smallest. The classification results for each observation giving generalized distance are listed in Appendix B.

Probability of group membership

Since D''^2 values have already been computed for all the 856 respondents, it is but a short step to getting their $p(H_k/X_i)$ values of Equation (6.48). Tables of exponential function usually give e^{-x} as well as e^x as function of X. If such a table is available, we are only to divide each D''^2_{ik} by 2 and enter the table with $D''^2_{ik}/2$ as argument, making sure to interpolate between tabled values because e^{-x} is quite sensitive to small variations in the argument for small and moderate values of $x(=D''^2_{ik}/2)$.

The values of $p(H_k/X_i)$ which is often called posterior probability is computed for each value of D''^2_{ik}, and given under the respective D''^2_{ik} values in the Appendix.

Summary of classification performance

The classification performance table is constructed based on the classification results of individual observations.

Classification Performance:

From	To: NDO	To: DOF
NDO	503	54
DOF	119	180

The diagonal values of the classification performance table indicate those observations that are classified into their respective original groups. The off-diagonal elements of the table suggest the number of misclassified cases. We notice that 119 observations or about 40 percent of 299 observations of original DOF group being misclassified. The following factors may be responsible for a large percent of misclassification.

First of all, there may be other variables, not considered in the model, that are responsible for grain producers' owning or not owning grain dryers on the farm. Due to missing variables, our ability to distinguish groups correctly is obviously reduced.

Secondly, a large number of misclassifications may arise from incorporation of prior probability of respondents into the generalized squared distance function. Since the term involving the prior probability, p_k is $-2 \ln p_k$, and is a positive number less than one. The additive component due to p_k is positive, the larger the value of p_k, the smaller the additive component will be. Since the prior probability of NDO group (Nongrain Dryer Owner group) is as high as 0.65, there is some chance for observations of DOF group (Grain Dryer Owner group) showing smaller generalized squared distance in favor of NDO group. The correct classification can take place only if measuring dissimilarity should be sufficiently strong to offset the higher prior probability effects.

Finally, there may be error in measurement. Some respondents might not have filled the questionnaire correctly. Improper answers could lead to a great number of misclassifications.

Empirical Results - Model II

As it has been discussed in page 44 that the grain producers in the survey are classified into six groups (six-class model) to find out if there is any significant differences between the groups given the characteristics that may be responsible to determine the probability to purchase a grain dryer. The criteria for classification and the respondents under each group, and its prior probability are given below in tabular form.

Criteria for classification (probability)	Group No.	Designation of group	Frequency	Prior Probability
0	g_1	NPG	611	0.7138
1-25	g_2	FQG	56	0.0654
26-50	g_3	SQG	110	0.1285
51-75	g_4	TQG	22	0.0257
76-99	g_5	LQG	7	0.0082
100	g_6	CPG	50	0.0584
Total			856	1.0000

Variables used

The major purpose of the discriminant analysis is to find if groups of grain producers having indicated their intentions by means of probabilities to buy a grain dryer within the next five years significantly differ from each other given a set of characteristics that are assumed to influence purchasing decisions. The following variables are considered to have influenced the determination of probabilities to purchase dryers by grain producers within the next five years.

Designation	Description of Variables	Units of measurements
X_1	Total acres cropped	Acres
X_2	Age of operator	Years
X_3	Land ownership	If all-owned = 1, otherwise = 0
X_4	Type of farm	If cash grain = 1, otherwise = 0
X_5	Percent of corn field shelled	% of total acres
X_{16}	Reasonable drying charges at elevator	If reasonable = 1, otherwise = 0
X_{17}	Adequacy of storage facility with elevator	If adequate = 1, otherwise = 0
X_{18}	Needed services, such as drying and storage provided by elevator	If favorable = 1 otherwise = 0
X_{20}	Quantity of grains sold at harvest	100 bushels

Some of the variables used in this model were used either in the regression model or in Model I of the discriminant analysis. Those variables are repeated here conforming to their designations.

Descriptive statistics

Simple descriptive statistics pertaining to the six groups are presented in Tables 6.6 and 6.7. As expected, appreciable differences exist between the group means with respect to the characteristics considered. The standard deviations from the mean of each variable between groups are significantly different but not varied as much as variations between the means.

Interrelationships between variables

Correlation coefficients for each of the six groups are computed within the dispersion matrix. The significant variations in the variable means and standard deviations between the groups are partially reflected in the magnitude of the correlation coefficients. Cropped acreage, X_1 is negatively correlated with age of the operator, X_2 in all the groups except TQG. We also notice that the absolute value of the correlation coefficient is relatively larger in the case of NPG (g_1), suggesting that increase in age is inversely related with the decreased cropped acreage. This leads to an inference that older farmers are likely to

Table 6.6. Description and means of variables used in the discriminant analysis (Model II)

Designation	Description of Variable	Means of Variables to Groups NPG N_1=611	FQG N_2=56	SQG N_3=110	TQG N_4=22	LQG N_5=7	CPG N_6=50	Grand Means N=856
X_1	Total acres cropped	240.797	299.42	316.16	255.72	285.71	376.00	262.96
X_2	Age of operator	48.96	42.92	44.61	44.22	39.85	46.10	47.65
X_3	Land ownership	0.43	0.30	0.33	0.18	0.28	0.22	0.39
X_4	Type of farm	0.28	0.33	0.38	0.04	0.42	0.34	0.29
X_5	% corn field shelled	47.83	44.68	49.45	43.64	40.23	69.93	48.95
X_{16}	Reasonable drying charges	0.43	0.60	0.58	0.54	0.14	0.56	0.47
X_{17}	Adequacy of elevator storage facility	0.53	0.58	0.59	0.50	0.28	0.56	0.54
X_{18}	Needed service provided by elevator	0.65	0.78	0.75	0.68	0.28	0.84	0.68
X_{20}	Quantity of grain sold at harvest	21.29	13.25	24.83	23.09	12.42	32.64	21.86

Table 6.7. Description and measure of dispersion of variables used in discriminant analysis (Model II)

Designation	Description of Variable	Standard Deviation of Variables for Group						S.D. for all va
		NPG N_1=611	FQG N_2=56	SQG N_3=110	TQG N_4=22	LQG N_5=7	CPG N_6=50	N=856
X_1	Total acres cropped	168.53	168.89	203.91	146.48	91.21	242.72	181.42
X_2	Age of operator	10.26	9.57	10.17	9.70	9.47	8.61	10.31
X_3	Land ownership	0.49	0.46	0.47	0.39	0.48	0.41	0.48
X_4	Type of farm	0.45	0.47	0.48	0.21	0.53	0.47	0.45
X_5	% of corn field shelled	41.15	39.79	38.00	37.06	34.16	28.39	40.14
X_{16}	Reasonable drying charges	0.49	0.49	0.49	0.50	0.37	0.50	0.49
X_{17}	Adequacy of elevator storage facility	0.49	0.49	0.49	0.51	0.48	0.50	0.49
X_{18}	Needed service provided by elevator	0.47	0.41	0.43	0.47	0.48	0.37	0.46
X_{20}	Quantity of grain sold at harvest	87.12	31.33	44.43	39.74	25.19	58.61	77.36

have a smaller cropped acreage or younger farmers tend to operate at a larger scale; but in either case, the probability of buying a dryer within the next five years is zero. The reasons may be that older farmers may not like to make large investments in the dryer, and/or the young farmers may be happy with custom drying.

Percent of corn field shelled, X_5 is positively correlated with acres cropped, X_1 in all the groups except the groups TQG and LQG which are negatively correlated by relatively smaller magnitudes. The positive relations are economically meaningful to assume that the higher the acres cropped, the greater the percent of acres field shelled for we have observed that farmers are increasingly shifting from mechanical harvesting to field shelling. The reasons for obtaining negative values of correlation coefficients in the case of TQG and LQG groups may be due, among other causes, to random chances.

The quantity of grain sold at harvest, X_{20} is positively correlated with acres cropped, X_1 in all the groups except the group FQG, and the magnitudes of the coefficients in the case of groups SQG and TQG are relatively small. Positive relations suggest that the grain producers increased or decreased the quantity of grain sold at harvest as the cropped acreage increased or decreased respectively. The magnitudes of the correlation coefficient in groups LQG and CQG are relatively larger, and it makes economic sense to assume that grain producers with a higher probability to buy dryers are selling larger portions of grain at harvest for they do not own dryers on the farm at present.

The age of the respondent, X_2 is positively correlated with land ownership, X_3 in all the groups except in group LQG. The higher age of the farmer to be positively correlated, stems from the reason that after a long period of farming, chances are high to own most of the lands being cropped. However, the magnitude of the relationship is not appreciable except in group TQG, in which producers indicated the probability of 51-75 percent to buy grain dryers within the next five years. Fairly high inverse relations between these variables in the case of group LQG suggests that some of the young and beginning farmers could expand scale of operation by renting land with high intentions to buy dryers within the next five years. The correlation matrices are presented in Tables 6.8 through 6.13.

While comparing the simple correlation coefficients computed for the entire population irrespective of its classification into groups and the simple correlation coefficients computed from within dispersion matrix to each of the six groups, the direction and signs appear to be almost

Table 6.8. Correlation matrix for zero probability group (NPG)

	X_1	X_2	X_3	X_4	X_5	X_{16}	X_{17}	X_{18}	X_{20}
X_1	1.00								
X_2	-0.18	1.00							
X_3	-0.39	0.26	1.00						
X_4	0.20	0.13	-0.14	1.00					
X_5	0.32	-0.19	-0.11	0.23	1.00				
X_{16}	-0.03	0.06	-0.01	0.06	0.06	1.00			
X_{17}	0.03	0.03	-0.03	0.11	0.01	0.23	1.00		
X_{18}	0.10	-0.06	-0.07	0.10	0.17	0.44	0.45	1.00	
X_{20}	0.36	-0.01	-0.12	0.21	0.14	-0.04	0.06	0.04	1.00

Table 6.9. Correlation matrix for probability 1-25 percent group (FQG)

	X_1	X_2	X_3	X_4	X_5	X_{16}	X_{17}	X_{18}	X_{20}
X_1	1.00								
X_2	-0.05	1.00							
X_3	-0.26	0.28	1.00						
X_4	0.07	0.14	-0.23	1.00					
X_5	0.22	0.23	0.01	0.25	1.00				
X_{16}	0.01	0.18	-0.18	0.27	-0.01	1.00			
X_{17}	0.12	-0.04	-0.001	0.06	-0.10	0.29	1.00		
X_{18}	0.18	-0.22	-0.41	0.10	0.23	0.29	0.27	1.00	
X_{20}	-0.10	0.15	-0.18	0.31	0.31	0.20	0.04	0.10	1.00

Table 6.10. Correlation matrix for probability 26-50 percent group (SQG)

	X_1	X_2	X_3	X_4	X_5	X_{16}	X_{17}	X_{18}	X_{20}
X_1	1.00								
X_2	-0.08	1.00							
X_4	-0.26	0.18	1.00						
X_5	0.09	0.11	-0.24	1.00					
X_6	0.40	0.02	-0.35	0.17	1.00				
X_{23}	0.07	0.15	-0.06	0.06	0.02	1.00			
X_{24}	0.06	0.11	0.04	0.16	-0.09	0.16	1.00		
X_{25}	0.06	0.04	-0.13	0.23	-0.06	0.33	0.47	1.00	
X_{27}	0.07	0.24	-0.12	0.14	0.26	0.14	0.09	0.14	1.00

Table 6.11. Correlation matrix for probability 51-75 percent group (TQG)

	X_1	X_2	X_3	X_4	X_5	X_{16}	X_{17}	X_{18}	X_{20}
X_1	1.00								
X_2	0.17	1.00							
X_4	-0.19	0.51	1.00						
X_5	-0.06	0.27	-0.10	1.00					
X_6	-0.19	0.28	-0.02	0.19	1.00				
X_{23}	-0.15	-0.06	-0.04	-0.24	0.29	1.00			
X_{24}	0.01	0.13	0.00	-0.22	0.12	0.18	1.00		
X_{25}	0.07	-0.04	-0.18	0.15	0.22	0.55	0.49	1.00	
X_{27}	0.02	0.11	-0.18	-0.13	0.35	0.35	0.35	0.17	1.00

Table 6.12. Correlation matrix for probability 76-99 percent group (LQG)

	X_1	X_2	X_3	X_4	X_5	X_{16}	X_{17}	X_{18}	X_{20}
X_1	1.00								
X_2	-0.09	1.00							
X_3	0.14	-0.67	1.00						
X_4	0.42	-0.41	0.09	1.00					
X_5	-0.22	-0.52	0.18	0.27	1.00				
X_{16}	0.07	-0.09	-0.26	-0.35	0.13	1.00			
X_{17}	-0.60	-0.17	0.30	0.09	0.52	-0.26	1.00		
X_{18}	0.59	0.19	-0.40	0.73	-0.29	-0.26	-0.40	1.00	
X_{20}	0.70	0.28	-0.34	0.62	-0.01	-0.22	-0.34	0.84	1.00

Table 6.13. Correlation matrix for 100 percent probability group (CPG)

	X_1	X_2	X_3	X_4	X_5	X_{16}	X_{17}	X_{18}	X_{20}
X_1	1.00								
X_2	-0.002	1.00							
X_3	-0.31	0.06	1.00						
X_4	0.15	0.09	-0.28	1.00					
X_5	0.31	0.06	-0.10	0.13	1.00				
X_{16}	0.06	-0.08	0.18	-0.04	0.32	1.00			
X_{17}	-0.14	0.02	-0.11	-0.13	0.24	-0.06	1.00		
X_{18}	-0.02	0.04	0.23	-0.03	0.39	0.49	0.27	1.00	
X_{20}	0.42	0.07	-0.13	0.26	0.21	-0.05	-0.18	-0.06	1.00

consistent as seen in Table 6.14. But the magnitudes of the coefficients are variable as there are variations in magnitudes in elements of simple correlation matrices of between groups.

Test of homogeneity

The null hypothesis is that NPG, FQG, SQG, TQG, LQG, and CPG have identical means and within group dispersions. The computed determinants of within group dispersion matrices ($|C_k|$) and pooled within dispersion matrix ($|C|$) as well as the rank of dispersion matrices are given below:

Group name	Rank of dispersion matrix	Natural log of the determinant of the dispersion matrix
NPG	9	$|C_1| = 22.8413$
FQG	9	$|C_2| = 20.0206$
SQG	9	$|C_3| = 21.5697$
TQG	9	$|C_4| = 17.1180$
LQG	6[1]	$|C_5| = 13.0118$
CPG	9	$|C_6| = 20.6384$
Pooled	9	$|C| = 22.7041$

[1]The dispersion matrix of LQG is not of full rank, the log of determinant of the matrix is based on SSCP matrix with variables, X_{17}, X_{18} and X_{20} deleted.

Table 6.14. Correlation matrix for all probability groups pooled

	X_1	X_2	X_3	X_4	X_5	X_{16}	X_{17}	X_{18}	X_{20}
X_1	1.00								
X_2	-0.16	1.00							
X_3	-0.37	0.26	1.00						
X_4	0.17	0.11	-0.16	1.00					
X_5	0.32	-0.05	-0.14	0.22	1.00				
X_{16}	0.02	0.04	-0.03	0.06	0.07	1.00			
X_{17}	0.03	0.03	-0.02	0.10	0.01	0.21	1.00		
X_{18}	0.11	-0.06	-0.10	0.12	0.16	0.43	0.43	1.00	
X_{20}	0.30	0.01	-0.11	0.20	0.15	-0.01	0.05	0.05	1.00

The test statistic $-2\rho \ln \ell$ is distributed approximately as χ^2 with degree of freedom equal to $\cdot 5(K-1)p(p+1)$ where

$$\rho = 1.0 - \{ \sum_{u=1}^{n_k} \frac{1}{n_k - 1} - \frac{1}{850} \} \frac{2(9)^2 + 3(6) - 1}{6(9+1)(6-1)} \quad (6.53)$$

$$\ell = \prod_{k=1}^{K} \{ \frac{|C_{ijk}|}{22.7041} \}^{\frac{1}{2} n_k} \quad (6.54)$$

$$d.f. = \cdot 5[(6-1) 9 (9+1)] \quad (6.55)$$

$K = 6$, number of groups

$p = 9$, number of variables

$n = 856$, number of observations of all groups combined

n_k = number of observations in the kth group, where $k = 1, 2, \ldots, 6$

k_1 = 611 observations (NPG)

k_2 = 56 observations (FQG)

k_3 = 110 observations (SQG)

k_4 = 22 observations (TQG)

k_5 = 7 observations (LQG)

k_6 = 22 observations (CPG)

The computed χ^2 value is 437.6831 with 225 degrees of freedom. The null hypothesis, H is rejected at 0.0001 level of significance. The rejection of null hypothesis suggests that significant differences exist between group means and between group dispersions. Thus the necessity to test H_1 and H_2 doesn't arise.

Generalized distance and classification results

The pairwise squared generalized distances are computed by the formula given by $D''^2(k/j)$

where

$$D''^2(k/j) = (\overline{X}_k-\overline{X}_j)'A_k(\overline{X}_k-\overline{X}_j) + \text{Ln}\ |C_k| - \text{Ln}\ p_k \qquad (6.56)$$

$(\overline{X}_k-\overline{X}_j)$ = matrix of deviations from the kth sample centroid

A_k = determinants of kth within group dispersion matrix

p_k = prior probability of kth group.

Generalized squared distance:

			To			
From	NPG	FQG	SQG	TQG	LQG	CPG
NPG	23.5156	24.2218	24.0386	24.3001	25.4897	24.4135
FQG	26.2787	25.4745	25.6868	26.5951	28.0394	26.4819
SQG	26.1622	25.7935	25.6733	26.5800	27.6352	26.1686
TQG	27.2462	31.8375	33.4673	24.4405	37.1214	31.4996
LQG	41.6466	29.4692	31.7583	22.6245	30.5561	
CPG	27.5305	27.5596	27.2392	27.8185	29.7768	26.3189

By observation of the values of elements of the above generalized squared distance matrix, we find that the values of the diagonal elements that correspond to the respective groups have the smallest distance compared to the values of the off-diagonal elements. This suggests that the observations assigned to each group based on their prior probabilities are largely clustered around their respective group means. Since the smallest distance from their group centroids only implies an average distance for all the observations of a group, does not rule out the possibility that some members of that group could show greater resemblance with other groups. Therefore, we need to investigate the generalized squared distance of each observation to the various groups.

<u>Classification results for each observation</u>

The formula used in computing individual generalized squared distance is the same as that is given in Equation (6.52). The dispersion matrices of within groups and their determinants are the same that were used in the preceding section. However, we use the matrix of deviations of individual observed values from his group centroid values. The decision rule is to assign the individual to that group for which his generalized distance value is the smallest. The classification results for each observation giving generalized distance are listed in Appendix C.

Probability of group membership

The probability of group membership is computed for each of the observations by the formula given in Equation (6.48). The value $p(H_k/X_i)$ is often referred to as posterior probability. In the Appendix, the posterior probability for each observation is given under the respective values of generalized squared distance.

Summary of classification performance

The summary of classification performance based on minimum generalized squared distance is given below in tabular form.

Classification Performance:

From	NPG	FQG	SQG	TQG	LQG	CPG
NPG	491	20	20	18	49	5
FQG	30	16	2	0	7	1
SQG	69	5	14	2	14	6
TQG	13	0	0	7	2	0
LQG	1	0	0	0	6	0
CPG	35	1	0	0	6	8

The diagonal values of the classification performance table indicate those observations that are classified into their respective original groups. The off-diagonal values explain the misclassified cases. We notice unexpectedly a large number of misclassifications in all the groups except the first group, NPG.

The major reason for a large number of misclassifications may be due to a large value of prior probability assumed by the group, NPG. As explained before, $-2 \ln p_k$ component in the generalized squared distance function in Equation (6.41) will take a smaller value if the value of p_k is larger. The effect of prior probability can only be offset by stronger effects of dissimilarity in terms of X_i measures. Because of low prior probabilities assumed by FQG, SQG, TQG, LQG, and CPG, a large number of observations of these groups are misclassified into NPG, of which the prior probability is 0.71.

The second important reason for a significant number of misclassifications may be due to error in measurement. The relevant question in the questionnaire states: "What is the probability that any grain drying equipment will be purchased for your farm within the next five years? Indicate probability in percent where 100% is a definite decision to purchase a dryer and 0% is a definite decision not to purchase a dryer". The word 'probability' in a mathematical sense may not be properly comprehended by all the panel members. Therefore, the responses given by at least some members may not reflect their true intentions, hence the measured characteristics could not distinguish them correctly.

The third reason for a large number of misclassifications may be due to missing variables. There may be other characteristics that could improve our ability to distinguish the groups more correctly. Variables such as cost of drying at the elevators, profit variation, and amount of debt outstanding might give more insight into the grain producers' intentions of dryer purchase.

CHAPTER VII. SUMMARY AND RECOMMENDATIONS

Summary

During the past decade harvesting methods in the U.S. have changed rapidly from the use of conventional mechanical pickers to field shelling. The introduction of field shelling has in turn stimulated a series of related technological adjustments in the production, harvesting, drying, storing, and marketing of grains. These changes affect the farmers' decision processes as well as the structure of the firms that provide supply and services for agricultural operations.

This study based on the sampling data obtained from an Iowa farm panel of 1200 farmers selected on a random basis investigates the interrelationships among various farm characteristics and related variables that influence the grain producers' decision processes in the several stages of farm operations. The study approaches the problem in three parts, each contributing to unique results. Part I deals as a descriptive analysis with farm characteristics that determine the demand for additional storage and drying facilities as well as the choice of market outlets for selling grain. Part II employs the linear multiple regression technique in quantifying the variables that affect the choice of grain marketing channels. In Part III, linear multivariate discriminant analysis and classification techniques are used in identifying the factors that determine the ownership of a grain dryer on the farm as well as the probability of buying a dryer within the next five years.

Part I

Farm and farmer characteristics According to the survey conducted by the Agricultural Marketing Research, Inc., Des Moines, there were 120,000 farms in Iowa in 1971. The farms were divided into nine strata according to farm size and a panel of 1200 members was formed based on random sampling procedures. The analysis in this study is based on sampling data for 856 respondents (71 percent response rate).

Based on the stratified sampling estimate, average size of the farm was 306.3 acres. The largest acreage group, accounting for 24.2 percent of the total farms belonged to the farm size group, 260-379 acres. Average age of Iowa grain producers was 47 years. The study reveals that, by and large, the larger the acreage cropped the younger is the farm operator. However, no significant difference is found in average years of farming between various farm size groups. The average level of education is estimated to be 11.8 years for the state. An interesting characteristic is that farmers of larger acreage groups had relatively higher levels of education.

Land ownership and type of farm In Iowa, 39.37 percent of the farmers surveyed owned all the land they operated. The other 60.63 percent of the farmers were either part-owners or rented all the land they farmed. Only 26.5 percent of the farmers surveyed were cash-grain farmers (i.e., more than 50% of the total revenue derived from each grain), 49.4 percent were livestock farmers, and the remaining 24.1 percent of the farmers belonged to other categories which include dairy, poultry, fruits and vegetables, or general.

Harvesting method Iowa farmers have rapidly shifted from picking ear corn and the use of crib storage to field shelling with the necessary grain conditioning and bin storage. In 1971, 61.8 percent of the corn harvested by the respondents was field shelled. A strata-wise estimate shows that farmers belonging to the acreage group of 800-1100 acres reported to have field shelled 92.3 percent of their total harvest compared to only 43 percent in the case of producers in the 1-99 acre group. This indicates a strong increase in field shelling as the size of the farm increased which substantiates the hypothesis that ability to handle greater acreage is a factor for shifting from mechanical harvesting of ear corn to field shelling.

Storage Of the total storage facilities owned by the respondents in 1971, 50.3 percent were suitable for shelled corn with the remainder being ear corn storage. This suggests an inadequacy of storage capacity for shelled corn since 61.8 percent of the corn harvested by respondents was field shelled. Only 71.4 percent of the farmers surveyed reported that the present storage capacity is adequate. An extrapolation of survey data to the state indicate that 33,852 farmers are planning for additional storage space on farms to the extent of 284 million bushels capacity during the next five years.

Drying of grain The survey data shows that 35 percent of the respondents owned drying equipment on the farm. Strata-wise analysis indicates that the percentage of farmers owning dryers ranged from 0.9 percent for the farm acreage group of 1-99 acres to 80 percent for the farm acreage group of 1100 acres and over. Economies of scale, among other factors, suggest that some minimum size of corn volume is necessary to justify purchasing a grain dryer.

With regard to the probability of purchasing grain dryers within the next five years, 71.4 percent of the responding farmers indicated that they would not buy a dryer. Only 5.8 percent of the respondents expressed 100 percent probability of purchasing a grain dryer. The remaining 22.8

percent indicated probabilities of purchasing a grain dryer ranging from 1 to 99 percent. An extension of this estimate to the state, 8300 farmers of Iowa would buy grain dryers with 100 percent probability. 81,753 farmers would not buy dryers within the next five years.

Grain sales Country elevators are the major outlets for respondents' grain. Country elevators' share in the total grain sales to all marketing outlets combined, accounted for 79 percent. The other 21 percent is shared by terminal and sub-terminal elevators, other farmers, truckers, and grain processors and feed dealers. Of the total grain sales, 45.2 percent constituted the 'grains sales at harvest'. The other 54.8 percent of the grain sales originated from on-farm and off-farm storage.

Local elevator services Of all farmers responding, 76.8 percent thought elevators collected reasonable drying charges, while 95.7 percent believed elevator employees were friendly, helpful, and personal. Storage capacity in local elevators was adequate according to 75.4 percent of the respondents and 96.7 percent stated that elevators provided needed services. The farmers' responses indicated that 88.1 percent of them felt the local elevators had fair prices, grades and discounts. Because of these favorable services offered by the local elevators, a large amount of grains was sold to them by the respondents.

Part II

Grain producers in Iowa have many alternative marketing outlets to choose for marketing their grain. The major grains produced and marketed are corn, soybeans, and oats. The leading marketing outlets are country elevators, terminal and subterminal elevators, other farmers, and grain processors and feed dealers. One of the objectives of the study was to identify the significant variables that determine the choice of market outlets for grain sale. The analysis renders 12 models (three kinds of grain x four market outlets), where percent of each grain sold to each of the market outlets is considered as the dependent variable. The independent variables considered are: X_1 - acres cropped, X_2 - operators age, X_3 - land ownership, X_6 - corn field shelled, X_7 - corn fed to livestock, X_8 - shelled corn storage capacity, X_9 - ear corn storage capacity, X_{12} - number of price checks for corn, X_{13} - number of price checks for soybeans, X_{14} - high prices of great importance, X_{15} - convenience of great importance, and X_{19} - adequacy of elevator services.

The explanatory variables under consideration explained only a fair amount of variations in the dependent variables of only two models - percent of corn sold to country elevators and percent of soybeans sold to country elevators. They did not explain any appreciable amount of variation in the rest of the models. However, the regression coefficients of some of these variables are statistically significant at various levels under consideration. The details of the results are exhibited in Tables 5.2 through 5.13.

The greater unexplained variations in the dependent variables of the ten models may be attributed to the following reasons: (1) as explained in the preceding section, 79 percent of the total grain sales went to country elevators and only a small portion of the total sales was shared by the other three marketing outlets; (2) there may be other variables not in the models that might better explain the variation in the dependent variables; (3) another form of relationship might be better suited; and (4) it is possible the grain producers are making a random decision in the choice of market outlets.

Part III

This part deals with two models. Model I is designed to explain the variables that determine the ownership of grain dryer on the farm. In this case, the farmers' response formed a binary choice - they own dryer on the farm or they don't own a dryer. The problem is to find whether the farmers not owning dryers (NOD) significantly differ from the farmers owning dryers (DOF) on the basis of given variables that are assumed to influence the dryer owning decisions. Model II is to explain the variables that determine the probability of purchase of grain dryers within the next five years. Since the probabilities were given by the respondents ranging from 0 (implying no purchase) to 100 (implying definite purchase), farmers were grouped into six convenient classes: (1) 0 probability group (NPG), (2) 1-25 percent probability group (FQG), (3) 26-50 percent probability group (SQG), (4) 51-75 percent probability group (TQG), (5) 76-99 percent probability group (LQG), (6) 100 percent probability group (CPG).

Model I In Model I, the variables considered are: cropped acres, operator's age, land ownership, corn field shelled, shelled corn storage capacity, drying charges at elevator, adequacy of storage capacity at elevator, needed services provided by elevator, total elevator services, and quantity of grain sold at harvest. There were 65 percent of the total respondents who did not own a dryer on the farm, and the remaining 35 percent of them did own dryers. The test of homogeneity of within group dispersion matrices using χ^2 test criteria indicates that the means and variances between NDO and DOF groups significantly differ. On computation of Mahalanobis' pairwise generalized squared distance between groups, it is found that the respondents who were assigned to the NDO and DOF groups based on their prior probabilities are large clustered around their respective group means. However, on investigation into individual generalized squared distances between groups, the findings indicate that about 10 percent of the members of the NDO group and 40 percent of the members of the DOF group are misclassified. The reasons for a significant number of misclassifications in the DOF group arise from (1) the fact of a large amount of prior probability assumed by the NDO group, and (2) possible errors in measurement.

Model II In Model II, variables considered are: acres cropped, operator's age, land ownership, type of farm, percent of corn field shelled, drying charges at the elevator, adequacy of storage facility at the elevator, needed services provided by the elevator, and grains sold at harvest. Of the total 856 respondents 611 farmers did not want to buy a dryer within the next five years (NPG class). Thus the prior probability attached to this single group is very large, 71 percent.

On the test of homogeneity, it is found that the means and variances of the six groups are significantly different from each other. However, the generalized distance and classification results show a large number of misclassifications in all the groups but NPG. Because of low prior probabilities assumed by FQG, SQG, TQG, LQG, and CPG, a large number of observations of these groups are misclassified into NPG of which the prior probability is 0.71.

The other reasons for misclassifications may be due to errors in measurement. It may be difficult on the part of farmers to predict future decisions to purchase a grain dryer and to translate their intentions in terms of probability. The third reason for the large number of cases of misclassification may be due to missing variables. Variables, such as, cost of drying at elevators, profit variations, amount of debt-outstanding might give some more insights into the grain producers' intentions of dryer purchase within the next five years.

Recommendations

With abundant potential to increase agricultural output, Iowa farmers have a greater role to play in meeting the world food needs. Continuing research both in production techniques and in agribusiness is of paramount importance in the wake of rapidly changing technology in harvesting, drying, and transportation methods.

Research should be directed toward identifying the problems faced by farmers of various farm size. Today farmers are more sensitive to the world situations. International demand and supply situations of food grains should be considered while analyzing the farm problems of Iowa. Agricultural problems of a state can no longer be studied in isolation.

There is a need for extending the analysis to cover additional variables, such as, transportation situation, cost conditions of various harvesting, storing, and drying equipment and their relative uses as opposed to the charges of country elevators. Researchers should also consider the probable changes in demand for agricultural products as well as cost conditions of producing grains in the foreseeable future while analyzing the present situation of agribusiness.

Ear corn is mostly used for feeding livestock while the shelled corn is used for commercial purposes. A shift from ear corn harvesting to field shelling necessarily requires artificial drying. Since fuel is used as a major source of energy for drying grains, in light of the present energy crisis, it may be desirable to study if the increasing cost of fuel would have effects on the shift of harvesting methods as well as the on-farm use of corn by producers.

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APPENDIX A. GRAIN PRODUCERS' SURVEY QUESTIONNAIRE

IMPORTANT

Deadline for Completion
April 21, 1972

Merit Points for Completion ________

Code No. __________

Merit Points earned to date ___________

AGRICULTURE MARKET RESEARCH, INC.
P.O. BOX 3736
DES MOINES, IOWA 50322

Dear Farm Panel Members:

The following study deals with your grain production and marketing practices. Most of the questions can be answered quite easily from memory.

Please note that the completion deadline is April 21, 1972, and that you will receive 70 Merit Points for completion.

With Spring fast-approaching we are all looking forward to another excellent planting season, similar we hope to the one we experienced last year.

Sincerely,

Glenn H. Sullivan
Vice-President

GRAIN PRODUCER SURVEY

1. Please show the acres and approximate bushels of grain harvested on your farm in 1971. Use the last two columns to indicate what was done with the grain.

	Acres Harvested	Bushels Harvested	Bushels Stored On-farm	Bushels Stored Off-farm
a. Corn				
Mechanical picker				
Combine or picker sheller				
b. Soybeans				
c. Wheat				
d. Other (specify)				

2. About what percent of the total corn harvested in 1971 do you expect to feed to livestock on your farm? ______%

3. Please indicate the present bushel capacity of the grain storage units on the farm or farms that you operate.

Kind of Storage	Capacity (write in bushels)	Is Present Capacity Adequate? Yes	No	If no, how much storage space will be added on this farm during the next five years?
a. Metal bins				
b. Converted cribs				
c. Silo (used for shelled corn)				
d. Ear corn crib				
e. Other _______				

4. Was any of the grain produced on your farm in 1971 dried artificially?
Yes_____No_____. If yes, complete the following table.

Grain	Bushels Dried On-farm	At Elevator	At Other
Corn			
Soybeans			
Other			

5. Do you have grain drying equipment on your farm? Yes__; No___. If yes:
   (a) Indicate the kind of dryer by checking the appropriate blanks below:
   ____(1) continuous flow
   ____(2) bin (layer or batch)
   ____(3) batch
   (4) bin with electric heat
   (5) aeration only (no heater)
   (6) other________________
   (b) If you checked 1, 2, or 3 above, indicate the approximate number of bushels you could dry per hour, reducing moisture from 20% to 15%. _____by/hr. for 5 points.

6. If corn from your farm was dried at the elevator in 1971 even though you had on-farm drying equipment, indicate the reasons by checking the appropriate item in the following list:
   ____(a) insufficient drying capacity on the farm.
   ____(b) insufficient labor to operate drying and harvesting equipment at the same time.
   ____(c) the corn was being delivered to the elevator for sale or storage.
   ____(d) other (explain) ____________________________

7. What is the probability that any grain drying equipment will be purchased for your farm within the next five years? Indicate probability in percent where 100% is a definite decision to purchase a dryer and 0% is a definite decision not to purchase a dryer. _________%

8. What portion of the grain sold off the farm you operate is moved by:

   (a) truck ____% (b) tractor-wagon ____% (c) Other_________ _____%

9. If you own a truck (or trucks) in which you might haul grain, what is the size of each as measured by licensed capacity and empty weight?

Truck	Licensed capacity (in tons)	Empty Weight (in tons)
No. 1		
No. 2		
No. 3		

10. How many acres of grain (specialty crops, seed corn, etc.) did you have under contract in 1971?

Write in Kind of Grain	Acres	Name of Contracting Firm	Location of Delivery Point

11. Do you prefer to market your grain through a cooperative ______; independent ________; line elevator________; no preference ____. Why? ______________________________

12. Have you ever used the futures market to hedge your grain? Yes_____ No______

    If any grain is hedged now, indicate the kind of grain and bushels hedged.
    Grain_________bu. hedged Grain_____bu. hedged

13. For each type of outlet (see code at right) through which you sold grain in 1971, indicate the bushels of each grain and the time of delivery to the buyer. Include all grain delivered for sale in 1971 even though some of the grain was produced in a previous year. Consider all grain (including CCC stored corn) sold at the time it is delivered to the buyer.

Code for Col. 2
A=country elevator
B=other farmers
C=truckers
D=terminal or sub-terminal elevator
E=grain processor
F=feed dealer
G=other____________

Write in Code Letter

Kind of Grain	Sold to Whom	Location of Delivery Point (city, etc.)	No. of miles from your farm to the delivery point	Bushels sold at Harvest	Bu. sold from Storage On-farm	Bu. sold from Storage Off-farm
Corn						
Soybeans						
Wheat						
Other:						

14. With how many firms do you normally check prices before selling your: corn___; soybeans____; wheat______.

15. Is it possible for you to obtain premiums of any kind for your grain by using any of the following marketing practices?

Marketing Practices	Yes	No	If yes-kind/amt of prem.
a) Selling in large volume			
b) Dealing with terminal elevator			
c) Dealing with processor			
d) Dealing with local elevator			
e) Providing uniform quality			
f) Delivering to purchaser			
g) Selling at harvest			
h) Selling direct to another farmer			
i) Other (specify)______			

16. Please check the statements below that best describe your local elevator.

Favorable

a. ___Reasonable drying charges
b. ___Friendly helpful, personnel
c. ___Fair prices, grades & discounts
d. ___Grain handling ability satisfactory
e. ___Storage capacity adequate
f. ___Grain unloading efficient--no time wasted
g. ___Modern, up-to-date facility
h. ___Pays for grain within reasonable time
i. ___Provide needed services (such as drying, storage, etc.)
j. ___Pays premium on large lot
k. ___Provides credit for purchases (fertilizer, feed, etc.)
l. ___Has farm supplies available (seed, fertilizer, etc.)

Unfavorable

m. ___Drying charges too high
n. ___Personnel not friendly or helpful
o. ___Unfair prices, grades and discounts
p. ___Poor grain handling ability
q. ___Storage capacity inadequate
r. ___Frequent waiting lines for unloading grain
s. ___Old fashioned, out-of-date facility
t. ___Undue delay in paying for grain
u. ___Services are inadequate
v. ___Discounts small lots
w. ___Management poorly qualified
x. ___Limits moisture levels at which corn may be delivered
y. ___Refuses to take small lots
z. ___Has failed to pay for purchased grain

17a. What are the most important factors in your decision as to choice of grain marketing outlet? Please check in the following table the degree of importance of each factor.

Factors Influencing the Choice of Outlet	Degree of Importance			
	Great	Some	Little	No
a. Loyalty to the firm or manager				
b. Lenient grading practices				
c. Higher prices				
d. Farm supplies available (feed, fertilizer, etc.)				
e. Convenience				
f. Firm provides credit for purchases				
g. Other				

17b. Please rank the three most important factors in their order of importance by writing the letter of the most important beside the number 1 below, etc.

1st______ 2nd______ 3rd_______

18. During the past decade there have been many changes in production and marketing practices, including increased volume, direct selling, by-passing local markets, fewer marketing firms, etc. What significant changes in your production and marketing practices do you anticipate during the next five years.

APPENDIX B. CLASSIFICATION RESULTS FOR DISCRIMINANT ANALYSIS MODEL I - OWNERSHIP OF GRAIN DRYER ON THE FARM

Table B1. Classification results for each observation giving generalized squared distance and posterior probability of membership

Obs.	From	To	NDO	DOF
1	NDO	NDO	37.63 (0.54)	38.02 (0.45)
2	DOF	DOF	39.26 (0.03)	32.83 (0.96)
3	DOF	DOF	62.80 (0.00)	33.94 (1.00)
4	NDO	NDO	30.68 (0.98)	38.75 (0.01)
5	NDO	NDO	29.68 (0.92)	34.71 (0.07)
6	NDO	NDO	27.86 (0.99)	38.54 (0.00)
7	NDO	NDO	29.63 (0.99)	40.82 (0.00)
8	NDO	NDO	36.26 (0.97)	43.78 (0.02)
9	NDO	NDO	31.26 (0.70)	33.03 (0.29)
10	NDO	NDO	28.63 (0.99)	38.26 (0.00)
11	DOF	DOF	40.61 (0.02)	33.57 (0.97)
12	DOF	NDO	34.98 (0.55)	35.44 (0.44)
13	NDO	NDO	32.82 (0.77)	35.28 (0.22)
14	NDO	DOF	38.77 (0.05)	33.26 (0.94)
15	NDO	NDO	32.18 (0.59)	32.96 (0.40)
16	DOF	DOF	67.50 (0.00)	37.75 (1.00)
17	NDO	DOF	41.18 (0.34)	39.88 (0.65)
18	DOF	NDO	32.67 (0.79)	35.33 (0.20)
19	NDO	NDO	36.21 (0.78)	38.81 (0.21)
20	NDO	NDO	38.24 (0.79)	40.92 (0.20)
21	NDO	NDO	30.80 (0.88)	34.80 (0.11)
22	NDO	NDO	36.65 (0.66)	38.01 (0.33)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
23	NDO	NDO	29.65	36.24
			(0.96)	(0.03)
24	NDO	NDO	28.88	40.76
			(0.99)	(0.00)
25	DOF	NDO	36.87	38.39
			(0.68)	(0.31)
26	NDO	NDO	36.15	37.81
			(0.69)	(0.30)
27	NDO	NDO	31.55	36.55
			(0.92)	(0.07)
28	NDO	NDO	30.29	31.74
			(0.67)	(0.32)
29	NDO	NDO	29.70	33.69
			(0.88)	(0.11)
30	NDO	NDO	32.43	38.71
			(0.95)	(0.04)
31	NDO	NDO	31.87	39.18
			(0.97)	(0.02)
32	NDO	NDO	26.83	35.78
			(0.98)	(0.01)
33	NDO	NDO	27.45	33.41
			(0.95)	(0.04)
34	NDO	DOF	34.13	34.09
			(0.49)	(0.50)
35	DOF	NDO	35.03	37.25
			(0.75)	(0.24)
36	DOF	DOF	42.39	36.56
			(0.05)	(0.94)
37	DOF	NDO	30.80	32.91
			(0.74)	(0.25)
38	DOF	DOF	35.72	32.82
			(0.18)	(0.81)
39	NDO	DOF	47.14	46.59
			(0.43)	(0.56)
40	DOF	DOF	36.47	36.00
			(0.44)	(0.55)
41	NDO	NDO	31.59	37.51
			(09.5)	(0.04)
42	DOF	DOF	38.71	33.29
			(0.06)	(0.93)
43	NDO	NDO	29.74	35.56
			(0.94)	(0.05)
44	NDO	NDO	27.54	32.00
			(0.90)	(0.09)
45	DOF	NDO	31.55	32.30
			(0.59)	(0.40)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
46	NDO	NDO	29.62 (0.99)	40.32 (0.00)
47	NDO	NDO	30.20 (0.98)	38.32 (0.01)
48	NDO	NDO	30.98 (0.87)	34.89 (0.12)
49	NDO	NDO	36.61 (0.87)	40.54 (0.12)
50	NDO	NDO	30.93 (0.99)	42.23 (0.00)
51	DOF	DOF	44.33 (0.02)	37.04 (0.97)
52	NDO	NDO	31.33 (0.89)	35.65 (0.10)
53	DOF	DOF	36.37 (0.30)	34.76 (0.69)
54	NDO	NDO	39.53 (0.98)	47.78 (0.01)
55	NDO	NDO	30.20 (0.84)	33.63 (0.15)
56	NDO	DOF	36.33 (0.14)	32.76 (0.85)
57	NDO	NDO	29.73 (0.93)	35.22 (0.06)
58	NDO	NDO	30.57 (0.74)	32.75 (0.25)
59	NDO	NDO	41.55 (0.93)	46.95 (0.06)
60	NDO	DOF	33.75 (0.24)	31.52 (0.75)
61	NDO	NDO	31.14 (0.99)	40.39 (0.00)
62	DOF	DOF	44.22 (0.02)	36.90 (0.97)
63	DOF	NDO	30.20 (0.97)	37.74 (0.02)
64	DOF	DOF	41.38 (0.01)	32.30 (0.98)
65	NDO	NDO	36.09 (0.89)	40.44 (0.10)
66	NDO	NDO	33.14 (0.99)	48.73 (0.00)
67	DOF	NDO	30.69 (0.63)	31.79 (0.36)
68	NDO	NDO	30.27 (0.81)	33.24 (0.18)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
69	NDO	NDO	30.06 (0.97)	37.35 (0.02)
70	NDO	NDO	28.94 (0.93)	34.22 (0.06)
71	NDO	NDO	34.16 (0.99)	43.62 (0.00)
72	NDO	NDO	27.99 (0.98)	36.68 (0.01)
73	NDO	DOF	35.44 (0.48)	35.35 (0.51)
74	NDO	NDO	28.69 (0.93)	34.17 (0.06)
75	DOF	NDO	31.34 (0.78)	33.89 (0.21)
76	DOF	NDO	34.29 (0.52)	34.49 (0.47)
77	NDO	NDO	29.39 (0.99)	40.41 (0.00)
78	NDO	NDO	34.12 (0.82)	37.16 (0.17)
79	DOF	NDO	30.94 (0.77)	33.36 (0.22)
80	NDO	DOF	34.58 (0.46)	34.32 (0.53)
81	NDO	NDO	33.68 (0.93)	39.14 (0.06)
82	DOF	DOF	90.15 (0.00)	45.46 (1.00)
83	DOF	DOF	65.34 (0.00)	36.07 (1.00)
84	NDO	NDO	34.31 (0.98)	42.45 (0.01)
85	NDO	NDO	30.46 (0.99)	41.54 (0.00)
86	NDO	NDO	29.92 (0.96)	36.33 (0.03)
87	NDO	NDO	29.25 (0.98)	37.07 (0.01)
88	NDO	NDO	30.38 (0.98)	39.29 (0.01)
89	DOF	DOF	37.64 (0.24)	35.41 (0.75)
90	NDO	NDO	29.54 (0.94)	35.34 (0.05)
91	DOF	NDO	31.07 (0.69)	32.68 (0.30)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
92	NDO	NDO	29.63 (0.98)	38.31 (0.01)
93	NDO	NDO	37.83 (0.82)	40.89 (0.17)
94	NDO	NDO	33.19 (0.81)	36.17 (0.18)
95	NDO	NDO	29.45 (0.96)	36.18 (0.03)
96	DOF	NDO	30.72 (0.69)	32.37 (0.30)
97	NDO	NDO	32.25 (0.98)	41.00 (0.01)
98	DOF	DOF	49.61 (0.00)	34.05 (0.99)
99	NDO	NDO	32.55 (0.86)	36.27 (0.13)
100	NDO	NDO	29.72 (0.93)	35.00 (0.06)
101	DOF	DOF	41.89 (0.10)	37.61 (0.89)
102	NDO	NDO	36.13 (0.89)	40.35 (0.10)
103	NDO	NDO	33.83 (0.96)	40.74 (0.03)
104	NDO	NDO	31.21 (0.73)	33.26 (0.26)
105	NDO	NDO	28.51 (0.99)	41.16 (0.00)
106	NDO	NDO	36.04 (0.98)	44.87 (0.01)
107	NDO	NDO	33.68 (0.80)	36.48 (0.19)
108	NDO	NDO	34.35 (0.98)	42.15 (0.01)
109	NDO	NDO	32.81 (0.88)	36.90 (0.11)
110	NDO	NDO	31.47 (0.93)	36.68 (0.06)
111	NDO	NDO	35.09 (0.68)	36.60 (0.31)
112	NDO	NDO	26.75 (0.99)	39.68 (0.00)
113	DOF	NDO	33.90 (0.50)	33.90 (0.49)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
114	DOF	DOF	31.37 (0.44)	30.97 (0.55)
115	DOF	DOF	33.56 (0.40)	32.76 (0.59)
116	NDO	NDO	347.35 (1.00)	405.01 (0.00)
117	NDO	NDO	32.17 (0.95)	38.11 (0.04)
118	NDO	NDO	32.21 (0.75)	34.48 (0.24)
119	DOF	NDO	28.75 (0.94)	34.58 (0.05)
120	NDO	NDO	31.82 (0.87)	35.65 (0.12)
121	DOF	NDO	34.01 (0.75)	36.25 (0.24)
122	NDO	NDO	30.74 (0.78)	33.32 (0.21)
123	NDO	NDO	31.12 (0.99)	41.63 (0.00)
124	NDO	NDO	33.16 (0.59)	33.97 (0.40)
125	NDO	DOF	41.94 (0.14)	38.36 (0.85)
126	DOF	NDO	57.10 (0.97)	64.11 (0.02)
127	NDO	NDO	28.69 (0.92)	33.59 (0.07)
128	DOF	DOF	37.83 (0.15)	34.49 (0.84)
129	DOF	NDO	38.18 (0.96)	44.98 (0.03)
130	NDO	NDO	33.78 (0.84)	37.16 (0.15)
131	NDO	NDO	39.81 (0.97)	46.91 (0.02)
132	NDO	NDO	29.58 (0.98)	37.66 (0.01)
133	DOF	DOF	35.24 (0.49)	35.17 (0.50)
134	DOF	NDO	27.96 (0.87)	31.83 (0.12)
135	DOF	NDO	27.14 (0.91)	31.92 (0.08)
136	NDO	NDO	27.27 (0.99)	38.21 (0.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
137	DOF	NDO	35.30	32.75
			(0.21)	(0.78)
138	NDO	NDO	34.74	36.50
			(0.70)	(0.29)
139	NDO	NDO	33.65	43.22
			(0.99)	(0.00)
140	DOF	DOF	51.93	34.97
			(0.00)	(0.99)
141	DOF	NDO	36.51	39.22
			(0.79)	(0.20)
142	NDO	NDO	33.31	39.62
			(0.95)	(0.04)
143	NDO	NDO	28.66	42.59
			(0.99)	(0.00)
144	DOF	DOF	44.84	37.12
			(0.02)	(0.97)
145	DOF	DOF	41.30	38.14
			(0.17)	(0.82)
146	NDO	NDO	29.91	40.74
			(0.99)	(0.00)
147	DOF	DOF	64.55	38.36
			(0.00)	(1.00)
148	DOF	NDO	31.83	34.94
			(0.82)	(0.17)
149	NDO	DOF	40.05	38.50
			(0.31)	(0.68)
150	NDO	NDO	29.58	36.89
			(0.97)	(0.02)
151	NDO	NDO	35.15	42.50
			(0.97)	(0.02)
152	NDO	NDO	29.26	33.75
			(0.90)	(0.09)
153	NDO	DOF	35.64	35.43
			(0.47)	(0.52)
154	DOF	DOF	38.88	31.16
			(0.02)	(0.97)
155	DOF	DOF	34.13	31.91
			(0.24)	(0.75)
156	NDO	NDO	29.40	38.85
			(0.99)	(0.00)
157	DOF	DOF	46.35	35.84
			(0.00)	(0.99)
158	NDO	NDO	28.34	41.65
			(0.99)	(0.00)
159	NDO	DOF	40.29	39.11
			(0.35)	(0.64)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
160	NDO	NDO	32.83 (0.73)	34.92 (0.26)
161	DOF	DOF	71.93 (0.00)	39.88 (1.00)
162	DOF	DOF	34.99 (0.31)	33.43 (0.68)
163	NDO	DOF	38.46 (0.23)	36.13 (0.76)
164	NDO	NDO	26.75 (0.95)	32.86 (0.04)
165	NDO	NDO	34.45 (0.64)	35.66 (0.35)
166	NDO	NDO	30.63 (0.98)	38.80 (0.01)
167	NDO	NDO	30.19 (0.99)	41.39 (0.00)
168	NDO	NDO	29.03 (0.99)	38.31 (0.00)
169	NDO	NDO	32.08 (0.75)	34.30 (0.24)
170	NDO	NDO	30.00 (0.96)	36.93 (0.03)
171	NDO	NDO	30.31 (0.93)	35.56 (0.06)
172	NDO	NDO	31.50 (0.97)	38.79 (0.02)
173	DOF	DOF	39.82 (0.22)	37.33 (0.77)
174	NDO	DOF	37.09 (0.20)	34.36 (0.79)
175	NDO	NDO	30.01 (0.99)	40.60 (0.00)
176	NDO	NDO	31.71 (0.97)	39.17 (0.02)
177	DOF	DOF	84.85 (0.00)	46.49 (1.00
178	NDO	DOF	36.93 (0.24)	34.62 (0.76)
179	NDO	DOF	41.46 (0.06)	36.28 (0.93)
180	DOF	DOF	41.05 (0.23)	38.74 (0.76)
181	DOF	NDO	30.43 (0.90)	34.91 (0.09)
182	DOF	NDO	37.16 (0.95)	43.50 (0.04)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
183	NDO	NDO	32.12 (0.97)	39.27 (0.02)
184	NDO	NDO	35.87 (0.98)	44.85 (0.01)
185	DOF	DOF	265.34 (0.00)	54.31 (1.00)
186	NDO	NDO	32.77 (0.98)	40.90 (0.01)
187	NDO	NDO	30.26 (0.98)	38.62 (0.01)
188	NDO	NDO	35.58 (0.96)	42.49 (0.03)
189	DOF	DOF	44.37 (0.00)	33.79 (0.99)
190	NDO	NDO	32.11 (0.80)	35.01 (0.19)
191	NDO	NDO	31.92 (0.81)	34.86 (0.18)
192	NDO	NDO	28.39 (0.98)	36.32 (0.01)
193	DOF	DOF	36.96 (0.12)	33.15 (0.87)
194	NDO	NDO	32.33 (0.96)	38.73 (0.03)
195	NDO	DOF	37.76 (0.33)	36.40 (0.66)
196	NDO	NDO	32.27 (0.99)	44.16 (0.00)
197	DOF	NDO	33.73 (0.82)	36.79 (0.17)
198	NDO	NDO	30.55 (0.71)	32.43 (0.28)
199	NDO	NDO	31.67 (0.76)	33.98 (0.23)
200	NDO	NDO	30.30 (0.95)	36.29 (0.04)
201	NDO	NDO	29.76 (0.73)	31.75 (0.27)
202	NDO	NDO	30.79 (0.79)	33.55 (0.20)
203	NDO	NDO	34.98 (0.99)	49.00 (0.00)
204	NDO	DOF	51.92 (0.04)	45.88 (0.95)
205	NDO	NDO	32.15 (0.76)	34.55 (0.23)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
206	DOF	DOF	37.12 (0.26	35.11 (0.73
207	DOF	DOF	42.66 (0.01)	33.78 (0.98)
208	DOF	DOF	36.22 (0.25)	34.12 (0.74)
209	DOF	NDO	31.95 (0.82)	35.10 (0.17)
210	NDO	NDO	38.91 (0.89)	43.24 (0.10)
211	DOF	DOF	46.15 (0.00)	34.97 (0.99)
212	DOF	DOF	44.32 (0.05)	38.70 (0.94)
213	DOF	DOF	50.43 (0.00)	36.25 (0.99)
214	DOF	NDO	28.40 (0.88)	32.56 (0.11)
215	NDO	NDO	32.36 (0.98)	41.28 (0.01)
216	DOF	NDO	29.23 (0.98)	38.30 (0.01)
217	NDO	NDO	29.70 (0.78)	32.35 (0.21)
218	NDO	DOF	58.02 (0.04)	52.05 (0.95)
219	DOF	NDO	30.30 (0.89)	34.54 (0.10)
220	NDO	NDO	39.34 (0.60)	40.19 (0.39)
221	NDO	DOF	49.58 (0.00)	37.74 (0.99)
222	DOF	NDO	27.39 (0.88)	31.57 (0.11)
223	NDO	NDO	30.12 (0.99)	41.15 (0.00)
224	NDO	NDO	38.86 (0.98)	48.00 (0.01)
225	NDO	DOF	38.39 (0.22)	35.87 (0.77)
226	NDO	NDO	30.22 (0.75)	32.49 (0.24)
227	NDO	NDO	30.19 (0.83)	33.45 (0.16)
228	DOF	DOF	48.00 (0.01)	40.20 (0.98)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
229	NDO	NDO	28.06 (0.88)	32.12 (0.11)
230	NDO	NDO	42.03 (0.90)	46.59 (0.09)
231	DOF	NDO	29.23 (0.97)	36.51 (0.02)
232	DOF	NDO	41.31 (0.98)	49.91 (0.01)
233	NDO	NDO	40.95 (0.87)	44.88 (0.12)
234	NDO	NDO	27.76 (0.99)	38.47 (0.00)
235	NDO	NDO	29.37 (0.99)	40.65 (0.00)
236	DOF	DOF	44.47 (0.02)	37.36 (0.97)
237	DOF	DOF	37.81 (0.19)	34.93 (0.80)
238	DOF	NDO	31.37 (0.98)	40.26 (0.01)
239	DOF	NDO	32.43 (0.72)	34.33 (0.27)
240	NDO	NDO	30.73 (0.99)	41.53 (0.00)
241	DOF	DOF	42.38 (0.00)	32.25 (0.99)
242	DOF	DOF	51.08 (0.00)	38.55 (0.99)
243	DOF	DOF	36.56 (0.29)	34.80 (0.70)
244	DOF	DOF	67.90 (0.00)	37.32 (1.00)
245	DOF	NDO	35.81 (0.78)	38.35 (0.21)
246	NDO	NDO	27.44 (0.99)	38.60 (0.00)
247	DOF	NDO	35.58 (0.72)	37.48 (0.27)
248	NDO	NDO	31.64 (0.99)	42.67 (.00)
249	DOF	DOF	41.34 (0.01)	33.45 (0.98)
250	DOF	NDO	37.56 (0.59)	38.34 (0.40)
251	NDO	NDO	27.80 (0.89)	32.04 (0.10)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
252	NDO	NDO	34.04 (0.68)	35.59 (0.31)
253	DOF	NDO	31.95 (0.59)	32.68 (0.40)
254	NDO	NDO	27.46 (0.86)	31.10 (0.13)
255	NDO	NDO	32.36 (0.91)	37.03 (0.08)
256	NDO	DOF	50.24 (0.01)	41.49 (0.98)
257	DOF	DOF	79.94 (0.00)	36.91 (1.00)
258	DOF	NDO	35.19 (0.57)	35.76 (0.42)
259	NDO	NDO	38.74 (0.92)	43.85 (0.07)
260	NDO	NDO	36.41 (0.97)	43.54 (0.02)
261	DOF	DOF	40.13 (0.10)	35.91 (0.89)
262	NDO	NDO	28.58 (0.99)	40.85 (0.00)
263	DOF	DOF	31.64 (0.43)	31.12 (0.56)
264	NDO	NDO	35.24 (0.68)	36.84 (0.31)
265	NDO	DOF	35.27 (0.19)	32.42 (0.80)
266	NDO	DOF	37.32 (0.25)	35.21 (0.74)
267	DOF	NDO	30.30 (0.83)	33.51 (0.16)
268	NDO	NDO	32.33 (0.88)	36.36 (0.11)
269	DOF	NDO	38.22 (0.57)	38.84 (0.42)
270	NDO	DOF	39.05 (0.34)	37.76 (0.65)
271	DOF	NDO	35.95 (0.76)	38.30 (0.23)
272	DOF	NDO	31.72 (0.72)	33.70 (0.27)
273	DOF	DOF	49.54 (0.00)	37.24 (0.99)
274	DOF	DOF	143.77 (0.00)	54.87 (1.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
275	NDO	DOF	34.25 (0.35)	33.04 (0.64)
276	NDO	NDO	31.50 (0.99)	42.15 (0.00)
277	NDO	NDO	31.57 (0.76)	33.89 (0.23)
278	NDO	DOF	38.99 (0.18)	36.01 (0.81)
279	NDO	NDO	34.63 (0.99)	44.32 (0.00)
280	NDO	NDO	27.19 (0.95)	33.51 (0.04)
281	DOF	NDO	39.27 (0.85)	42.84 (0.14)
282	NDO	NDO	30.68 (0.99)	43.37 (0.00)
283	DOF	DOF	52.27 (0.03)	45.65 (0.96)
284	DOF	NDO	31.58 (0.92)	36.71 (0.07)
285	NDO	NDO	32.44 (0.77)	34.96 (.022)
286	NDO	NDO	30.88 (0.98)	38.76 (0.01)
287	DOF	DOF	44.46 (0.02)	36.96 (0.97)
288	DOF	DOF	34.72 (0.26)	32.71 (0.73)
289	NDO	NDO	32.52 (0.95)	38.55 (0.04)
290	DOF	DOF	51.86 (0.00)	39.65 (0.99)
291	NDO	NDO	34.30 (0.90)	38.71 (0.09)
292	NDO	NDO	28.29 (0.97)	36.06 (0.02)
293	NDO	NDO	35.12 (0.98)	43.98 (0.01)
294	NDO	NDO	33.67 (0.78)	36.25 (0.21)
295	DOF	DOF	316.72 (0.00)	81.35 (1.00)
296	NDO	NDO	26.74 (0.95)	32.74 (0.04)
297	DOF	DOF	146.49 (0.00)	44.49 (1.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
298	NDO	NDO	28.97	40.67
			(0.99)	(0.00)
299	DOF	NDO	32.91	33.31
			(0.55)	(0.44)
300	NDO	NDO	31.90	36.47
			(0.90)	(0.09)
301	NDO	NDO	31.54	33.03
			(0.67)	(0.32)
302	NDO	NDO	35.61	46.34
			(0.99)	(0.00)
303	NDO	NDO	30.61	40.31
			(0.99)	(0.00)
304	DOF	DOF	37.77	33.60
			(0.11)	(0.88)
305	DOF	DOF	34.99	33.14
			(0.28)	(0.71)
306	DOF	DOF	42.63	36.11
			(0.03)	(0.96)
307	NDO	NDO	32.09	38.57
			(0.96)	(0.03)
308	DOF	DOF	37.54	35.95
			(0.31)	(0.68)
309	DOF	DOF	36.27	33.45
			(0.19)	(0.80)
310	DOF	NDO	30.07	32.35
			(0.75)	(0.24)
311	NDO	NDO	32.38	40.87
			(0.98)	(0.01)
312	NDO	NDO	30.24	38.33
			(0.98)	(0.01)
313	NDO	NDO	27.24	37.84
			(0.99)	(0.00)
314	NDO	NDO	34.48	34.88
			(0.54)	(0.45)
315	DOF	NDO	36.89	44.13
			(0.97)	(0.02)
316	DOF	NDO	31.33	37.59
			(0.95)	(0.04)
317	NDO	NDO	38.42	40.91
			(0.77)	(0.22)
318	NDO	NDO	33.59	40.97
			(0.97)	(0.02)
319	NDO	NDO	31.13	34.77
			(0.86)	(0.13)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
320	DOF	DOF	58.74	33.47
			(0.00)	(1.00
321	NDO	NDO	34.96	38.89
			(0.87)	(0.12)
322	DOF	DOF	40.35	35.50
			(0.08)	(0.91)
323	NDO	NDO	31.15	41.81
			(0.99)	(0.00)
324	NDO	NDO	36.65	47.02
			(0.99)	(0.00)
325	NDO	NDO	27.74	39.57
			(0.99)	(0.00)
326	DOF	DOF	38.09	34.50
			(0.14)	(0.85)
327	NDO	NDO	30.30	32.24
			(0.72)	(0.27)
328	DOF	NDO	28.79	37.99
			(0.99)	(0.00)
329	NDO	NDO	30.28	42.64
			(0.99)	(0.00)
330	NDO	NDO	37.72	37.86
			(0.51)	(0.48)
331	NDO	NDO	28.80	37.98
			(0.99)	(0.01)
332	NDO	NDO	51.07	60.99
			(0.99)	(0.00)
333	NDO	NDO	29.67	39.06
			(0.99)	(0.00)
334	DOF	DOF	38.73	36.34
			(0.23)	(0.76)
335	DOF	DOF	39.23	31.24
			(0.01)	(0.98)
336	DOF	DOF	42.39	35.21
			(0.02)	(0.97)
337	DOF	NDO	29.83	32.59
			(0.79)	(0.20)
338	NDO	NDO	32.08	38.72
			(0.96)	(0.03)
339	NDO	NDO	27.45	34.85
			(0.97)	(0.02)
340	DOF	NDO	33.56	36.44
			(0.80)	(0.19)
341	NDO	NDO	31.84	42.48
			(0.99)	(0.00)
342	NDO	NDO	32.00	36.49
			(0.90)	(0.09)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
343	NDO	NDO	31.20 (0.99)	41.79 (0.00)
344	DOF	NDO	31.12 (0.69)	32.77 (0.30)
345	NDO	NDO	29.50 (0.99)	43.86 (0.00)
346	NDO	NDO	32.17 (0.90)	36.68 (0.09)
347	NDO	NDO	33.06 (0.99)	44.34 (0.00)
348	NDO	NDO	27.63 (0.92)	32.63 (0.07)
349	DOF	DOF	48.41 (0.00)	37.39 (0.99)
350	NDO	NDO	31.21 (0.99)	42.34 (0.00)
351	DOF	DOF	51.02 (0.00)	37.85 (0.99)
352	NDO	NDO	27.30 (0.99)	37.63 (0.00)
353	NDO	NDO	30.55 (0.99)	40.57 (0.00)
354	DOF	DOF	36.68 (0.23)	34.28 (0.76)
355	NDO	NDO	30.36 (0.99)	44.63 (0.00)
356	NDO	DOF	38.71 (0.10)	34.39 (0.89)
357	DOF	NDO	34.30 (0.71)	36.17 (0.28)
358	DOF	DOF	62.87 (0.00)	33.83 (1.00)
359	DOF	DOF	38.07 (0.07)	33.03 (0.92)
360	DOF	DOF	37.75 (0.30)	36.13 (0.69)
361	DOF	NDO	34.80 (0.97)	42.28 (0.02)
362	DOF	DOF	41.28 (0.07)	36.28 (0.92)
363	NDO	NDO	30.71 (0.89)	34.92 (0.10)
364	NDO	NDO	30.65 (0.79)	33.32 (0.20)
365	NDO	NDO	29.16 (0.00)	42.77 (0.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
366	NDO	NDO	30.34	38.82
			(0.98)	(0.01)
367	DOF	NDO	29.63	33.37
			(0.86)	(0.13)
368	NDO	NDO	32.43	41.44
			(0.98)	(0.01)
369	DOF	NDO	33.39	33.91
			(0.56)	(0.43)
370	NDO	NDO	33.07	35.23
			(0.74)	(0.25)
371	DOF	DOF	35.99	34.08
			(0.27)	(0.72)
372	NDO	NDO	28.67	41.23
			(0.99)	(0.00)
373	NDO	DOF	41.07	32.52
			(0.01)	(0.98)
374	DOF	NDO	29.03	31.84
			(0.80)	(0.19)
375	NDO	NDO	30.00	40.33
			(0.99)	(0.00)
376	NDO	NDO	29.89	36.59
			(0.96)	(0.03)
377	NDO	NDO	35.02	43.63
			(0.98)	(0.01)
378	DOF	NDO	35.96	47.46
			(0.99)	(0.00)
379	NDO	NDO	28.86	33.81
			(0.92)	(0.07)
380	DOF	NDO	32.49	33.84
			(0.66)	(0.33)
381	DOF	NDO	34.74	36.13
			(0.66)	(0.33)
382	NDO	NDO	29.08	43.45
			(0.99)	(0.00)
383	DOF	DOF	1295.71	168.02
			(0.00)	(1.00)
384	DOF	NDO	29.18	30.98
			(0.71)	(0.28)
385	NDO	NDO	27.80	36.55
			(0.98)	(0.01)
386	NDO	NDO	28.34	33.46
			(0.92)	(0.07)
387	NDO	DOF	47.15	38.12
			(0.01)	(0.98)
388	DOF	NDO	29.89	32.34
			(0.77)	(0.22)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
389	DOF	DOF	50.95	36.37
			(0.00)	(0.99)
390	DOF	DOF	95.86	48.41
			(0.00)	(1.00)
391	NDO	NDO	30.22	36.93
			(0.96)	(0.03)
392	NDO	NDO	30.09	40.39
			(0.99)	(0.00)
393	NDO	NDO	36.35	37.00
			(0.58)	(0.41)
394	NDO	NDO	30.01	32.36
			(0.76)	(0.23)
395	NDO	NDO	28.84	34.28
			(0.93)	(0.06)
396	NDO	NDO	28.15	37.94
			(0.99)	(0.00)
397	DOF	DOF	42.03	34.99
			(0.02)	(0.97)
398	NDO	NDO	30.41	39.27
			(0.98)	(0.01)
399	NDO	NDO	29.85	39.11
			(0.99)	(0.00)
400	DOF	DOF	54.98	36.20
			(0.00)	(0.99)
401	NDO	NDO	29.86	38.35
			(0.98)	(0.01)
402	DOF	NDO	27.57	33.14
			(0.94)	(0.05)
403	NDO	DOF	54.45	37.44
			(0.00)	(0.99)
404	NDO	NDO	31.68	39.36
			(0.97)	(0.02)
405	NDO	NDO	28.50	41.25
			(0.99)	(0.00)
406	NDO	NDO	31.21	32.13
			(0.61)	(0.38)
407	NDO	NDO	36.41	37.21
			(0.59)	(0.40)
408	NDO	NDO	27.08	40.45
			(0.99)	(0.00)
409	DOF	DOF	36.71	32.52
			(0.10)	(0.89)
410	DOF	DOF	37.66	36.99
			(0.41)	(0.58)
411	NDO	NDO	32.08	45.33
			(0.99)	(0.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
412	NDO	NDO	35.79 (0.89)	40.12 (0.10)
413	NDO	NDO	35.59 (0.90)	40.13 (0.09)
414	DOF	NDO	34.29 (0.67)	35.78 (0.32)
415	DOF	NDO	32.94 (0.84)	36.29 (0.15)
416	NDO	NDO	32.77 (0.76)	35.17 (0.23)
417	NDO	NDO	29.93 (0.99)	41.32 (0.00)
418	NDO	NDO	28.86 (0.99)	40.70 (0.00)
419	DOF	DOF	34.69 (0.22)	32.22 (0.77)
420	NDO	NDO	29.69 (0.99)	40.03 (0.00)
421	DOF	DOF	43.42 (0.06)	38.04 (0.93)
422	DOF	NDO	32.38 (0.72)	34.30 (0.27)
423	DOF	NDO	36.37 (0.75)	38.65 (0.24)
424	NDO	NDO	29.74 (0.85)	33.28 (0.14)
425	NDO	NDO	27.80 (0.97)	35.29 (0.02)
426	NDO	NDO	33.41 (0.61)	34.37 (0.38)
427	NDO	NDO	36.49 (0.99)	46.30 (0.00)
428	NDO	NDO	29.61 (0.98)	37.94 (0.01)
429	NDO	NDO	33.02 (0.88)	37.04 (0.11)
430	NDO	NDO	26.75 (0.96)	33.30 (0.03)
431	DOF	DOF	66.23 (0.00)	39.86 (1.00)
432	NDO	NDO	38.77 (0.58)	39.48 (0.41)
433	DOF	DOF	45.64 (0.00)	32.62 (0.99)
434	NDO	NDO	34.79 (0.99)	49.28 (0.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
435	NDO	NDO	31.68 (0.94)	37.22 (0.05)
436	NDO	NDO	33.71 (0.98)	42.82 (0.01)
437	DOF	DOF	36.89 (0.18)	33.98 (0.81)
438	NDO	NDO	34.30 (0.72)	36.23 (0.27)
439	DOF	NDO	32.92 (0.86)	36.67 (0.13)
440	DOF	DOF	39.16 (0.09)	34.73 (0.90)
441	NDO	NDO	28.52 (0.94)	34.19 (0.05)
442	NDO	NDO	29.50 (0.90)	34.01 (0.09)
443	DOF	DOF	42.34 (0.01)	33.60 (0.98)
444	NDO	NDO	34.49 (0.99)	44.23 (0.00)
445	NDO	NDO	31.32 (0.99)	42.71 (0.00)
446	NDO	NDO	36.06 (0.54)	36.45 (.45
447	NDO	NDO	29.93 (0.98)	38.36 (0.01)
448	DOF	NDO	29.56 (0.98	38.47 (0.01)
449	DOF	DOF	42.16 (0.02)	34.45 (0.97)
450	DOF	DOF	44.45 (0.01)	36.30 (0.98)
451	DOF	DOF	36.15 (0.41)	35.48 (0.58)
452	DOF	DOF	39.43 (0.02)	32.15 (0.97)
453	DOF	DOF	36.23 (0.20)	33.55 (0.79)
454	NDO	DOF	89.46 (0.00)	38.79 (1.00)
455	NDO	NDO	28.11 (0.98)	36.91 (0.01)
456	DOF	DOF	41.81 (0.02)	34.66 (0.97)
457	DOF	NDO	28.90 (0.96)	35.74 (0.03)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
458	NDO	NDO	28.99 (0.99)	41.02 (0.00)
459	NDO	NDO	30.50 (0.96)	36.92 (0.03)
460	DOF	NDO	32.76 (0.77)	35.21 (0.22)
461	NDO	NDO	28.79 (0.82)	31.83 (0.17)
462	DOF	NDO	32.75 (0.89)	37.07 (0.10)
463	NDO	NDO	42.38 (0.99)	51.96 (0.00)
464	NDO	NDO	29.57 (0.88)	33.65 (0.11)
465	NDO	NDO	42.00 (0.92)	46.97 (0.07)
466	NDO	DOF	44.60 (0.06)	39.32 (0.93)
467	NDO	DOF	35.33 (0.44)	34.92 (0.55)
468	NDO	NDO	28.79 (0.99)	41.06 (0.00)
469	NDO	NDO	36.90 (0.83)	40.08 (0.16)
470	DOF	NDO	33.63 (0.54)	33.99 (0.45)
471	NDO	NDO	46.95 (0.99)	60.08 (0.00)
472	NDO	NDO	27.97 (0.99)	38.16 (0.00)
473	DOF	DOF	39.65 (0.11)	35.49 (0.88)
474	NDO	NDO	30.78 (0.99)	42.69 (0.00)
475	NDO	NDO	34.46 (0.61)	35.42 (0.38)
476	NDO	NDO	29.36 (0.95)	35.58 (0.94)
477	NDO	NDO	30.00 (0.99)	41.24 (0.00)
478	NDO	NDO	30.50 (0.99)	41.83 (0.00)
479	DOF	DOF	36.34 (0.29)	34.57 (0.70)
480	NDO	NDO	35.79 (0.99)	45.66 (0.00
481	DOF	NDO	34.20 (0.61)	35.17 (0.38)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
482	DOF	DOF	34.23 (0.21)	31.65 (0.78)
483	DOF	DOF	84.89 (0.00)	41.81 (1.00)
484	DOF	DOF	36.20 (0.37)	35.21 (0.62)
485	NDO	NDO	30.48 (0.93)	35.66 (0.06)
486	NDO	NDO	29.65 (0.93)	34.97 (0.06)
487	NDO	NDO	29.71 (0.99)	38.96 (0.00)
488	NDO	NDO	36.09 (0.98)	44.02 (0.01)
489	NDO	NDO	28.90 (0.93)	34.36 (0.06)
490	NDO	NDO	39.10 (0.95)	45.01 (0.04)
491	DOF	DOF	46.70 (0.00)	33.11 (0.99)
492	NDO	NDO	34.42 (0.99)	44.86 (0.00)
493	NDO	NDO	34.00 (0.99)	48.39 (0.00)
494	DOF	DOF	86.13 (0.00)	40.56 (1.00)
495	DOF	DOF	42.44 (0.37)	41.46 (0.62)
496	DOF	NDO	39.86 (0.51)	39.95 (0.48)
497	NDO	NDO	34.54 (0.81)	37.55 (0.18)
498	NDO	NDO	32.31 (0.65)	33.64 (0.34)
499	DOF	DOF	55.90 (0.02)	48.53 (0.97)
500	NDO	NDO	35.66 (0.74)	37.85 (0.25)
501	NDO	NDO	33.70 (0.93)	39.12 (0.06)
502	NDO	NDO	33.93 (0.98)	41.99 (0.01)
503	DOF	DOF	35.74 (0.18)	32.84 (0.81)
504	NDO	NDO	26.75 (0.99)	36.89 (0.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
505	NDO	DOF	50.86 (0.02)	43.66 (0.97)
506	NDO	NDO	32.52 (0.77)	34.94 (0.22)
507	NDO	NDO	30.27 (0.82)	33.43 (0.17)
508	NDO	NDO	29.95 (0.90)	34.39 (0.09)
509	DOF	DOF	38.26 (0.45)	37.90 (0.54)
510	NDO	NDO	28.04 (0.99)	37.85 (0.00)
511	NDO	NDO	21.15 (0.99)	41.35 (0.00)
512	NDO	NDO	35.93 (0.57)	36.56 (0.42)
513	NDO	NDO	36.11 (0.91)	40.78 (0.08)
514	NDO	NDO	32.22 (0.53)	32.49 (0.46)
515	NDO	NDO	38.22 (0.51)	38.32 (0.48)
516	NDO	NDO	35.37 (0.76)	37.77 (0.23)
517	DOF	DOF	56.21 (0.00)	37.61 (0.99)
518	NDO	NDO	27.76 (0.93)	33.04 (0.06)
519	DOF	DOF	49.43 (0.43)	48.89 (0.56)
520	NDO	NDO	34.85 (0.88)	39.01 (0.11)
521	NDO	NDO	27.37 (0.99)	40.01 (0.00)
522	NDO	NDO	32.53 (0.97)	39.54 (0.02)
523	DOF	NDO	36.62 (0.63	37.71 (0.36)
524	DOF	NDO	34.42 (0.96)	41.00 (0.03)
525	DOF	DOF	44.80 (0.00)	32.59 (0.99)
526	NDO	NDO	32.41 (0.73)	34.47 (0.26)
527	NDO	NDO	33.21 (0.57)	33.81 (0.42)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
528	NDO	NDO	27.96 (0.84)	31.42 (0.15)
529	NDO	NDO	30.79 (0.88)	34.86 (0.11)
530	NDO	NDO	32.21 (0.86)	35.95 (0.13)
531	NDO	NDO	27.40 (0.94)	33.04 (0.05)
532	DOF	NDO	35.00 (0.60)	35.86 (0.39)
533	NDO	NDO	34.43 (0.97)	41.71 (0.02)
534	NDO	NDO	28.11 (0.92)	33.03 (0.07)
535	NDO	NDO	29.01 (0.99)	40.68 (0.00)
536	NDO	NDO	27.28 (0.99)	36.73 (0.00)
537	NDO	NDO	38.58 (0.76)	40.98 (0.23)
538	NDO	NDO	33.89 (0.66)	35.28 (0.33)
539	DOF	NDO	30.21 (0.71)	32.00 (0.28)
540	NDO	NDO	29.67 (0.99)	43.98 (0.00)
541	DOF	DOF	42.21 (0.30)	40.55 (0.69)
542	NDO	NDO	32.28 (0.99)	44.14 (0.00)
543	DOF	NDO	31.10 (0.73)	33.09 (0.26)
544	NDO	NDO	39.66 (0.83)	42.95 (0.16)
545	DOF	NDO	30.17 (0.77)	32.70 (0.22)
546	DOF	DOF	53.02 (0.00)	37.04 (0.99)
547	NDO	DOF	42.46 (0.19)	39.68 (0.80)
548	NDO	NDO	29.25 (0.97)	36.49 (0.02)
549	DOF	NDO	32.90 (0.55)	33.30 (0.44)
550	NDO	DOF	36.93 (0.47)	36.70 (0.52)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
551	NDO	NDO	31.90 (0.97)	38.94 (0.02)
552	DOF	DOF	39.00 (0.13)	35.28 (0.86)
553	NDO	NDO	29.31 (0.95)	35.25 (0.04)
554	NDO	NDO	31.12 (0.98)	39.54 (0.01)
555	NDO	NDO	26.83 (0.91)	31.53 (0.08)
556	NDO	NDO	32.43 (0.99)	42.90 (0.00)
557	DOF	DOF	33.91 (0.46)	33.62 (0.53)
558	DOF	DOF	38.23 (0.10)	33.99 (0.89)
559	DOF	DOF	59.70 (0.00)	44.73 (0.99)
560	NDO	NDO	36.04 (0.99)	49.41 (0.00)
561	NDO	DOF	32.49 (0.31)	30.91 (0.68)
562	NDO	NDO	36.40 (0.95)	42.43 (0.04)
563	DOF	NDO	30.60 (0.67)	32.03 (0.32)
564	DOF	DOF	41.43 (0.17)	38.32 (0.82)
565	DOF	NDO	36.72 (0.96)	43.49 (0.03)
566	DOF	DOF	36.60 (0.06)	31.33 (0.93)
567	NDO	NDO	31.60 (0.99)	41.11 (0.00)
568	DOF	DOF	52.47 (0.00)	35.87 (0.99)
569	DOF	DOF	59.76 (0.00)	33.90 (1.00)
570	DOF	DOF	36.47 (0.20)	33.75 (0.79)
571	DOF	DOF	45.55 (0.00)	35.84 (0.99)
572	NDO	NDO	27.20 (0.99)	40.22 (0.00)
573	NDO	NDO	31.20 (0.85)	34.68 (0.14)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
574	NDO	NDO	30.58 (0.99)	42.13 (0.00)
575	DOF	DOF	38.45 (0.02)	31.44 (0.97)
576	NDO	NDO	30.83 (0.60)	31.68 (0.39)
577	DOF	DOF	38.38 (0.07)	33.33 (0.92)
578	DOF	NDO	38.12 (0.79)	40.83 (0.20)
579	NDO	NDO	33.14 (0.66)	34.49 (0.33)
580	NDO	DOF	37.59 (0.10)	33.25 (0.89)
581	NDO	DOF	34.08 (0.49)	34.05 (0.50)
582	NDO	NDO	164.35 (1.00)	199.38 (0.00)
583	DOF	DOF	112.70 (0.00)	37.16 (1.00)
584	NDO	DOF	37.36 (0.43)	36.83 (0.56)
585	NDO	NDO	35.23 (0.97)	42.44 (0.02)
586	DOF	DOF	57.05 (0.00)	35.01 (1.00)
587	NDO	NDO	31.73 (0.89)	36.12 (0.10)
588	NDO	NDO	34.11 (0.99)	46.38 (0.00)
589	NDO	NDO	31.29 (0.99)	42.64 (0.00)
590	NDO	NDO	29.80 (0.98)	38.14 (0.01)
591	NDO	NDO	36.62 (0.58)	37.29 (0.41)
592	DOF	DOF	39.05 (0.02)	31.57 (0.97)
593	DOF	NDO	32.99 (0.71)	34.84 (0.28)
594	DOF	DOF	36.21 (0.06)	30.98 (0.93)
595	DOF	NDO	33.60 (0.50)	33.68 (0.49)
596	NDO	NDO	27.74 (0.97)	35.40 (0.02)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
597	NDO	NDO	30.85	39.50
			(0.98)	(0.01)
598	NDO	NDO	31.01	40.74
			(0.99)	(0.00)
599	NDO	NDO	31.55	40.65
			(0.98)	(0.01)
600	NDO	NDO	29.91	41.41
			(0.99)	(0.00)
601	DOF	NDO	29.47	33.56
			(0.88)	(0.11)
602	NDO	NDO	30.09	37.28
			(0.97)	(0.02)
603	NDO	NDO	32.96	44.56
			(0.99)	(0.00)
604	NDO	NDO	29.17	42.08
			(0.99)	(0.00)
605	NDO	NDO	33.94	36.71
			(0.79)	(0.20)
606	DOF	NDO	33.14	33.16
			(0.50)	(0.49)
607	NDO	NDO	30.81	39.08
			(0.98)	(0.01)
608	NDO	NDO	33.53	40.35
			(0.96)	(0.03)
609	NDO	NDO	32.27	43.03
			(0.99)	(0.00)
610	DOF	NDO	29.84	34.17
			(0.89)	(0.10)
611	NDO	NDO	30.80	41.53
			(0.99)	(0.00)
612	NDO	NDO	33.65	38.90
			(0.93)	(0.06)
613	NDO	NDO	36.01	41.71
			(0.94)	(0.05)
614	NDO	NDO	30.64	33.47
			(0.80)	(0.19)
615	NDO	NDO	30.03	35.67
			(0.94)	(0.05)
616	NDO	NDO	34.27	40.03
			(0.94)	(0.05)
617	NDO	NDO	35.06	41.24
			(0.95)	(0.04)
618	NDO	NDO	29.68	36.99
			(0.97)	(0.02)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
619	DOF	NDO	29.87 (0.82)	32.92 (0.17)
620	NDO	NDO	32.64 (0.67)	34.14 (0.32)
621	NDO	NDO	35.49 (0.93)	40.98 (0.06)
622	NDO	NDO	42.35 (0.76)	44.43 (0.23)
623	NDO	NDO	29.75 (0.76)	32.13 (0.23)
624	NDO	NDO	35.24 (0.71)	37.05 (0.28)
625	NDO	NDO	31.90 (0.94)	37.44 (0.05)
626	NDO	NDO	31.83 (0.79)	34.57 (.020)
627	DOF	NDO	30.71 (0.73)	32.76 (0.26)
628	NDO	NDO	31.01 (0.99)	40.28 (0.00)
629	DOF	DOF	49.66 (0.01)	40.61 (0.98)
630	DOF	NDO	35.27 (0.70)	37.02 (0.29)
631	NDO	NDO	26.64 (0.99)	38.66 (0.00)
632	NDO	NDO	35.81 (0.85)	39.40 (0.14)
633	NDO	NDO	31.57 (0.94)	37.35 (0.05)
634	NDO	NDO	30.04 (0.98)	37.85 (0.01)
635	NDO	NDO	28.42 (0.99)	40.66 (0.00)
636	DOF	DOF	47.26 (0.17)	44.15 (0.82)
637	NDO	NDO	36.61 (0.93)	40.97 (0.06)
638	NDO	NDO	32.61 (0.99)	43.71 (0.00)
639	NDO	NDO	30.66	34.83
640	DOF	DOF	54.54 (0.03	47.80 (0.96)
641	DOF	DOF	37.45 (0.24)	35.21 (0.75)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
642	NDO	NDO	34.10 (0.71)	35.91 (0.28)
643	NDO	NDO	30.83 (0.99)	40.71 (0.00)
644	NDO	NDO	34.99 (0.96)	41.58 (0.03)
645	NDO	NDO	28.12 (0.97)	35.87 (0.02)
646	NDO	NDO	28.20 (0.99)	38.82 (0.00)
647	NDO	NDO	34.42 (0.99)	44.58 (0.00)
648	DOF	DOF	43.18 (0.42)	42.59 (0.57)
649	NDO	NDO	28.12 (0.99)	37.55 (0.00)
650	NDO	NDO	31.16 (0.96)	37.71 (0.03)
651	DOF	NDO	38.65 (0.66)	40.01 (0.33)
652	DOF	NDO	30.26 (0.80)	33.14 (0.19)
653	NDO	NDO	29.39 (0.98)	37.77 (0.01)
654	NDO	NDO	27.52 (0.95)	33.77 (0.04)
655	DOF	DOF	38.65 (0.48)	38.57 (0.51)
656	NDO	NDO	36.14 (0.63)	37.29 (0.36)
657	NDO	NDO	31.70 (0.93)	37.05 (0.06)
658	DOF	NDO	31.99 (0.54)	32.34 (0.45)
659	NDO	NDO	27.39 (0.99)	40.29 (0.00)
660	NDO	NDO	28.85 (0.99)	42.86 (0.00)
661	NDO	NDO	30.80 (0.99)	42.85 (0.00)
662	DOF	DOF	82.93 (0.00)	38.17 (1.00)
663	NDO	NDO	37.37 (0.99)	48.41 (0.00)
664	NDO	NDO	28.95 (0.90)	33.35 (0.10)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
665	DOF	NDO	32.61 (0.55)	33.06 (0.44)
666	NDO	NDO	30.93 (0.96)	37.43 (0.03)
667	NDO	NDO	29.35 (0.94)	35.21 (0.05)
668	NDO	NDO	28.12 (0.99)	39.61 (0.00)
669	NDO	NDO	31.635 (0.94)	37.48 (0.05)
670	NDO	NDO	30.14 (0.98)	38.22 (0.01)
671	NDO	NDO	33.35 (0.68)	34.87 (0.31)
672	DOF	DOF	42.79 (0.02)	35.79 (0.97)
673	NDO	NDO	30.86 (0.76)	33.19 (0.23)
674	NDO	DOF	47.26 (0.20)	44.49 (0.79)
675	DOF	DOF	42.58 (0.09)	38.13 (0.90)
676	DOF	NDO	32.81 (0.55)	33.29 (0.44)
677	DOF	DOF	129.55 (0.00)	37.27 (1.00)
678	NDO	NDO	31.35 (0.76)	33.68 (0.23)
679	DOF	DOF	36.48 (0.27)	34.56 (0.72)
680	NDO	NDO	32.03 (0.88)	36.16 (0.11)
681	DOF	DOF	36.72 (0.07)	31.83 (0.92)
682	DOF	NDO	29.68 (0.98)	38.28 (0.01)
683	NDO	NDO	29.99 (0.95)	35.89 (0.04)
684	NDO	NDO	37.30 (0.97)	45.06 (0.02)
685	NDO	NDO	27.87 (0.97)	34.83 (0.02)
686	NDO	NDO	40.50 (0.53)	40.81 (0.46)
687	DOF	DOF	41.09 (0.05)	34.37 (0.94)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
688	NDO	NDO	29.63 (0.80)	32.42 (0.19)
689	NDO	NDO	29.74 (0.91)	34.61 (0.08)
690	NDO	NDO	31.57 (0.74)	33.68 (0.25)
691	NDO	NDO	46.87 (0.94)	52.45 (0.05)
692	NDO	NDO	27.39 (0.99)	39.05 (.000)
693	NDO	NDO	35.52 (0.97)	42.86 (0.02)
694	NDO	NDO	28.69 (0.96)	35.29 (0.03)
695	DOF	DOF	35.57 (0.24)	33.27 (0.75)
696	NDO	NDO	36.78 (0.54)	37.12 (0.45)
697	DOF	DOF	44.10 (0.00)	34.32 (0.99)
698	NDO	NDO	35.28 (0.98)	43.24 (0.01)
699	DOF	NDO	28.94 (0.97)	36.15 (0.02)
700	DOF	DOF	191.00 (0.00)	150.66 (1.00)
701	NDO	NDO	39.63 (0.87)	43.44 (0.12)
702	DOF	DOF	36.06 (0.49)	36.04 (0.50)
703	NDO	DOF	40.86 (0.28)	39.04 (0.71)
704	NDO	NDO	28.04 (0.99)	40.25 (0.00)
705	DOF	NDO	29.32 (0.98)	37.33 (0.01)
706	NDO	NDO	30.10 (0.98)	38.67 (0.01)
707	NDO	NDO	35.07 (0.80)	37.86 (0.19)
708	NDO	NDO	34.37 (0.91)	39.23 (0.08)
709	NDO	NDO	31.71 (0.98)	40.59 (0.01)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
710	NDO	NDO	31.73 (0.81)	34.63 (0.19)
711	NDO	NDO	32.18 (0.99)	43.94 (0.00)
712	NDO	NDO	31.03 (0.90)	35.58 (0.09)
713	NDO	DOF	38.44 (0.25)	36.26 (0.74)
714	NDO	NDO	31.96 (0.98)	39.97 (0.01)
715	NDO	NDO	32.03 (0.99)	41.42 (.00)
716	NDO	NDO	33.33 (0.86)	37.05 (0.13)
717	DOF	DOF	48.23 (0.00)	33.82 (0.99)
718	NDO	NDO	33.60 (0.99)	43.05 (0.00)
719	NDO	NDO	29.15 (0.99)	39.71 (0.00)
720	NDO	NDO	27.41 (0.99)	41.18 (0.00)
721	NDO	NDO	27.34 (0.97)	34.61 (0.02)
722	NDO	NDO	31.55 (0.72)	33.44 (0.27)
723	NDO	DOF	61.55 (0.00)	38.10 (1.00)
724	NDO	NDO	34.27 (0.99)	44.26 (0.00)
725	NDO	NDO	39.98 (0.98)	48.94 (0.01)
726	DOF	NDO	29.93 (0.81)	32.83 (0.18)
727	NDO	NDO	32.73 (0.99)	44.92 (0.00)
728	NDO	DOF	60.08 (0.00)	43.57 (0.99)
729	NDO	NDO	29.32 (0.99)	38.68 (0.00)
730	NDO	NDO	32.44 (0.87)	36.40 (0.12)
731	NDO	NDO	34.86 (0.96)	41.56 (0.03)
732	NDO	DOF	44.45 (0.06)	39.21 (0.93)

Table Bl (Continued)

Obs.	From	To	NDO	DOF
733	NDO	DOF	34.08 (0.36)	32.96 (0.63)
734	NDO	NDO	35.41 (0.98)	43.98 (0.01)
735	NDO	NDO	30.93 (0.80)	33.76 (0.19)
736	NDO	NDO	28.64 (0.96)	35.31 (0.03)
737	NDO	NDO	28.59 (0.99)	41.47 (0.00)
738	NDO	NDO	34.66 (0.98)	42.86 (0.01)
739	DOF	DOF	49.55 (0.00)	35.76 (0.99)
740	NDO	NDO	30.50 (0.73)	32.53 (0.26)
741	DOF	DOF	52.25 (0.00)	32.73 (0.99)
742	NDO	NDO	31.39 (0.99)	41.33 (0.00)
743	DOF	DOF	34.74 (0.28)	32.91 (0.71)
744	NDO	DOF	51.06 (0.02)	43.92 (0.97)
745	NDO	NDO	32.36 (0.97)	39.55 (0.02)
746	NDO	NDO	37.07 (0.99)	47.08 (0.00)
747	DOF	NDO	28.75 (0.90)	33.31 (0.09)
748	NDO	NDO	29.21 (0.96)	35.63 (0.03)
749	NDO	NDO	37.02 (0.98)	45.00 (0.01)
750	DOF	DOF	39.40 (0.06)	34.13 (0.93)
751	DOF	DOF	56.37 (0.00)	39.46 (0.99)
752	NDO	NDO	30.47 (0.91)	35.33 (0.08)
753	NDO	NDO	28.42 (0.91)	33.05 (0.08)
754	DOF	DOF	38.92 (0.25)	36.78 (0.74)
755	NDO	NDO	29.47 (0.83)	32.65 (0.16)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
756	NDO	NDO	31.66 (0.98)	40.50 (0.01)
757	DOF	NDO	34.48 (0.59)	35.21 (0.40)
758	NDO	NDO	30.61 (0.99)	40.30 (0.00)
759	NDO	NDO	33.23 (0.51)	33.33 (0.48)
760	NDO	NDO	30.36 (0.97)	37.82 (0.02)
761	NDO	NDO	27.71 (0.98)	35.93 (0.01)
762	DOF	NDO	33.93 (0.99)	44.24 (0.00)
763	OF	NDO	35.67 (0.81)	38.57 (0.19)
764	NDO	NDO	27.91 (0.89)	32.12 (0.10)
765	DOF	DOF	39.76 (0.37)	38.72 (0.62)
766	DOF	NDO	31.05 (0.60)	31.88 (0.39)
767	DOF	DOF	263.91 (0.00)	121.30 (1.00)
768	NDO	NDO	28.26 (0.92)	33.19 (0.07)
769	NDO	NDO	28.88 (0.80)	31.74 (0.19)
770	NDO	NDO	29.81 (0.93)	35.28 (0.06)
771	NDO	DOF	43.84 (0.07)	38.80 (0.92)
772	NDO	NDO	36.40 (0.99)	49.11 (0.00)
773	NDO	NDO	31.46 (0.75)	33.74 (0.24)
774	DOF	NDO	33.51 (0.96)	40.20 (0.03)
775	NDO	NDO	29.77 (0.98)	37.94 (0.01)
776	DOF	DOF	89.64 (0.00)	35.22 (1.00)
777	NDO	NDO	31.35 (0.90)	35.79 (0.09)
778	DOF	DOF	54.83 (0.18)	51.92 (0.81)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
779	NDO	DOF	33.91 (0.92)	38.97 (0.07)
780	NDO	NDO	30.82 (0.92)	35.90 (0.07)
781	DOF	NDO	34.71 (0.62)	35.77 (0.37)
782	DOF	NDO	32.15 (0.63)	33.23 (0.36)
783	NDO	DOF	84.36 (0.00)	52.95 (1.00)
784	NDO	NDO	29.08 (0.99)	39.69 (0.00)
785	NDO	NDO	30.15 (0.81)	33.14 (0.18)
786	NDO	NDO	30.90 (0.99)	42.96 (0.00)
787	DOF	DOF	47.25 (0.00)	33.67 (0.99)
788	DOF	DOF	41.49 (0.01)	32.65 (0.98)
789	DOF	DOF	36.45 (0.31)	34.92 (0.68)
790	NDO	NDO	33.32 (0.99)	44.77 (0.00)
791	DOF	DOF	63.59 (0.00)	39.06 (1.00)
792	NDO	NDO	34.09 (0.97)	41.49 (0.02)
793	DOF	DOF	101.89 (0.00)	48.13 (1.00
794	DOF	DOF	39.91 (0.02)	32.88 (0.97)
795	DOF	DOF	38.80 (0.34)	37.54 (0.65)
796	DOF	DOF	38.62 (0.30)	37.01 (0.69)
797	NDO	NDO	30.52 (0.99)	41.17 (0.00)
798	NDO	NDO	42.20 (0.97)	49.41 (0.02)
799	NDO	NDO	38.60 (0.98)	47.14 (0.01)
800	NDO	NDO	29.19 (0.92)	34.36 (0.07)
801	NDO	NDO	27.93 (0.99)	39.05 (0.00)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
802	NDO	DOF	30.48	36.50
			(0.95)	(0.04)
803	DOF	NDO	31.98	34.06
			(0.73)	(0.26)
804	NDO	NDO	31.90	30.06
			(0.98)	(0.01)
805	NDO	NDO	29.04	39.94
			(0.99)	(0.00)
806	NDO	DOF	36.02	34.61
			(0.33)	(0.66)
807	NDO	NDO	29.87	40.02
			(0.99)	(0.00)
808	DOF	NDO	30.08	31.89
			(0.71)	(0.28)
809	NDO	NDO	34.11	47.82
			(0.99)	(0.00)
810	DOF	DOF	43.92	32.56
			(0.00)	(0.99)
811	NDO	NDO	33 07	43.20
			(0.99)	(0.00)
812	DOF	DOF	56.27	32.56
			(0.00)	(1.00)
813	DOF	NDO	30.87	32.81
			(0.72)	(0.27)
814	DOF	NDO	33.35	34.70
			(0.66)	(0.33)
815	NDO	NDO	34.15	37.28
			(0.82)	(0.17)
816	DO	NDO	34.85	44.74
			(0.99)	(0.00)
817	NDO	NDO	32.16	37.21
			(0.92)	(0.07)
818	NDO	NDO	28.18	35.71
			(0.97)	(0.02)
819	NDO	NDO	32.91	36.13
			(0.83)	(0.16)
820	NDO	NDO	29.51	39.46
			(0.99)	(0.00)
821	DOF	NDO	35.02	36.81
			(0.07)	(0.29)
822	DOF	DOF	40.93	33.60
			(0.02)	(0.97)
823	NDO	NDO	29.62	38.04
			(0.98)	(0.01)
824	NDO	NDO	29.68	32.77
			(0.82)	(0.17)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
825	DOF	DOF	45.58 (0.07)	40.41 (0.92)
826	NDO	NDO	29.88 (0.91)	34.58 (0.08)
827	DOF	DOF	39.25 (0.32)	37.83 (0.67)
828	NDO	NDO	23.36 (0.99)	37.91 (0.00)
829	NDO	NDO	30.87 (0.87)	34.80 (0.12)
830	NDO	NDO	26.76 (0.98)	35.74 (0.01)
831	DOF	DOF	36.26 (0.48)	36.15 (0.51)
832	NDO	NDO	34.86 (0.87)	38.70 (0.12)
833	NDO	NDO	34.88 (0.97)	42.40 (0.02)
834	NDO	NDO	29.17 (0.99)	42.08 (0.00)
835	NDO	NDO	30.33 (0.98)	38.41 (0.01)
836	NDO	NDO	29.06 (0.97)	36.28 (0.02)
837	NDO	NDO	29.32 (0.99)	38.98 (0.00)
838	NDO	NDO	32.71 (0.97)	40.14 (0.02)
839	NDO	DOF	41.54 (0.10)	37.28 (0.89)
840	DNO	DNO	31.13 (0.97)	38.82 (0.02)
841	DNO	DNO	27.51 (0.97)	34.48 (0.02)
842	DOF	DOF	40.25 (0.37)	39.19 (0.62)
843	DNO	DNO	26.58 (0.97)	33.80 (0.02)
844	DNO	DOF	35.84 (0.45)	35.45 (0.54)
845	DNO	DNO	31.90 (0.95)	37.97 (0.04)
846	DOF	DOF	36.96 (0.43)	36.41 (0.56)
847	DNO	DNO	28.20 (0.86)	31.92 (0.13)

Table B1 (Continued)

Obs.	From	To	NDO	DOF
848	DNO	DNO	32.47 (0.97)	39.81 (0.02)
849	DOF	DNO	34.53 (0.66)	35.92 (0.33)
850	DNO	DNO	34.15 (0.99)	43.50 (0.00)
851	DOF	DNO	38.66 (0.98)	46.66 (0.01)
852	DOF	DOF	38.92 (0.26)	36.87 (0.73)
853	DOF	DOF	54.77 (0.00)	35.76 (0.99)
854	DNO	DNO	33.40 (0.97)	40.48 (0.02)
855	DOF	DOF	35.34 (0.13)	31.66 (0.86)
856	DNO	DNO	38.71 (0.80)	41.55 (0.19)

APPENDIX C. CLASSIFICATION RESULTS FOR DISCRIMINANT ANALYSIS MODEL II - PROBABILITY OF GRAIN DRYER PURCHASES BY GRAIN PRODUCERS WITHIN THE NEXT FIVE YEARS

Table C1. Classification results for each observation giving generalized squared distance and posterior probability of membership

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
1	NPG	TQG	33.15	39.06	37.06	48.00	32.03	49.85
			(0.34)	(0.01)	(0.04)	(0.00)	(0.59)	(0.00)
2	SQG	NPG	30.76	38.24	33.45	90.01	36.40	34.36
			(0.66)	(0.01)	(0.17)	(0.00)	(0.03)	(0.10)
3	NPG	FQG	31.18	30.88	32.11	67.43	57.70	32.29
			(0.29)	(0.34)	(0.18)	(0.00)	(0.00)	(0.17)
4	SQG	NPG	31.28	35.16	33.04	73.54	143.36	46.05
			(0.64)	(0.09)	(0.26)	(0.00)	(0.00)	(0.00)
5	FQG	NPG	29.77	32.32	32.92	37.18	47.58	36.03
			(0.64)	(0.18)	(0.13)	(0.01)	(0.00)	(0.02)
6	SQG	NPG	28.58	32.32	30.19	34.35	113.01	41.83
			(0.60)	(0.09)	(0.26)	(0.03)	(0.00)	(0.00)
7	NPG	NPG	28.56	31.71	31.98	33.18	46.72	39.14
			(0.67)	(0.13)	(0.12)	(0.06)	(0.00)	(0.00)
8	SQG	NPG	36.96	37.35	39.48	93.22	103.93	45.26
			(0.47)	(0.38)	(0.13)	(0.00)	(0.00)	(0.00)
9	CPG	NPG	30.37	35.03	37.12	35.52	112.24	33.18
			(0.68)	(0.06)	(0.02)	(0.05)	(0.00)	(0.16)
10	TQG	NPG	27.56	30.95	31.30	31.52	42.96	38.07
			(0.67)	(0.12)	(0.10)	(0.09)	(0.00)	(0.00)
11	NPG	NPG	31.97	33.47	34.83	58.26	96.20	34.66
			(0.50)	(0.24)	(0.12)	(0.00)	(0.00)	(0.13)
12	NPG	NPG	29.19	33.64	33.78	35.21	51.58	43.51
			(0.79)	(0.08)	(0.08)	(0.03)	(0.00)	(0.00)
13	NPG	NPG	31.15	36.49	38.52	83.81	275.95	40.60
			(0.90)	(0.06)	(0.02)	(0.00)	(0.00)	(0.00)
14	NPG	NPG	29.80	34.24	34.18	34.35	45.24	32.08
			(0.60)	(0.06)	(0.06)	(0.06)	(0.00)	(0.19)
15	CPG	NPG	29.58	32.86	35.53	41.14	84.45	33.16
			(0.70)	(0.13)	(0.03)	(0.00)	(0.00)	(0.11)
16	NPG	NPG	30.26	34.13	34.28	36.24	53.89	33.95
			(0.67)	(0.09)	(0.09)	(0.03)	(0.00)	(0.10)
17	SQG	LQG	36.67	35.43	36.72	66.68	29.50	43.19
			(0.02)	(0.04)	(0.02)	(0.00)	(0.90)	(0.00)
18	NPG	NPG	29.10	33.37	34.87	37.66	50.31	33.71
			(0.77)	(0.09)	(0.04)	(0.01)	(0.00)	(0.07)
19	NPG	NPG	33.26	44.16	37.32	41.33	42.13	45.76
			(0.85)	(0.00)	(0.11)	(0.01)	(0.01)	(0.00)
20	NPG	NPG	34.43	62.31	47.29	97.81	45.47	42.97
			(0.98)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
21	NPG	NPG	29.90	35.39	35.40	83.01	266.43	39.09
			(0.87)	(0.05)	(0.05)	(0.00)	(0.00)	(0.00)
22	SQG	LQG	35.07	44.04	35.18	40.29	32.08	41.27
			(0.15)	(0.00)	(0.14)	(0.01)	(0.68)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
23	NPG	NPG	30.01	32.20	31.22	73.06	116.47	42.31
			(0.53)	(0.17)	(0.28)	(0.00)	(0.00)	(0.00)
24	SQG	NPG	27.76	32.00	32.34	32.03	57.14	39.33
			(0.74)	(0.08)	(0.07)	(0.08)	(0.00)	(0.00)
25	NPG	NPG	30.45	34.75	33.17	31.22	69.06	36.20
			(0.47)	(0.05)	(0.12)	(0.32)	(0.00)	(0.02)
26	NPG	NPG	34.05	38.94	38.54	37.84	165.94	51.52
			(0.74)	(0.06)	(0.07)	(0.11)	(0.00)	(0.00)
27	CPG	LQG	30.37	40.09	36.23	31.73	25.91	35.29
			(0.09)	(0.00)	(0.00)	(0.04)	(0.84)	(0.00)
28	NPG	NPG	27.75	31.66	31.33	29.62	38.84	29.84
			(0.48)	(0.06)	(0.08)	(0.19)	(0.00)	(0.17)
29	NPG	NPG	29.65	31.55	33.40	41.83	30.96	34.59
			(0.46)	(0.18)	(0.07)	(0.00)	(0.24)	(0.03)
30	NPG	NPG	31.01	41.78	37.43	43.72	128.07	37.32
			(0.91)	(0.00)	(0.03)	(0.00)	(0.00)	(0.03)
31	NPG	LQG	31.54	40.49	37.73	36.37	30.07	36.87
			(0.30)	(0.00)	(0.01)	(0.02)	(0.63)	(0.02)
32	NPG	NPG	27.74	34.05	31.53	33.10	173.31	39.12
			(0.79)	(0.03)	(0.11)	(0.05)	(0.00)	(0.00)
33	NPG	LQG	27.28	34.48	32.04	30.61	24.54	33.90
			(0.18)	(0.00)	(0.01)	(0.03)	(0.74)	(0.00)
34	SQG	NPG	31.23	34.98	33.19	44.79	43.79	32.84
			(0.50)	(0.07)	(0.18)	(0.00)	(0.00)	(0.22)
35	CPG	NPG	32.36	36.10	35.98	40.70	68.16	37.34
			(0.70)	(0.10)	(0.11)	(0.01)	(0.00)	(0.05)
36	NPG	NPG	34.09	37.56	38.08	113.85	51.98	51.43
			(0.76)	(0.13)	(0.10)	(0.00)	(0.00)	(0.00)
37	NPG	NPG	29.06	32.14	30.82	70.49	119.22	35.00
			(0.59)	(0.12)	(0.24)	(0.00)	(0.00)	(0.03)
38	CPG	CPG	32.41	32.23	31.15	45.41	59.23	30.38
			(0.14)	(0.16)	(0.27)	(0.00)	(0.00)	(0.41)
39	SQG	SQG	37.52	37.62	35.51	50.23	45.04	42.76
			(0.20)	(0.19)	(0.57)	(0.00)	(0.00)	(0.01)
40	NPG	NPG	33.18	37.39	42.87	51.91	92.71	42.19
			(0.87)	(0.10)	(0.00)	(0.00)	(0.00)	(0.00)
41	NPG	NPG	29.67	32.93	32.15	37.78	33.97	39.88
			(0.61)	(0.12)	(0.17)	(0.01)	(0.07)	(0.00)
42	NPG	LQG	31.31	34.61	34.15	31.24	30.42	35.61
			(0.24)	(0.04)	(0.05)	(0.25)	(0.37)	(0.02)
43	NPG	LQG	29.79	33.92	33 30	28.74	52.73	36.01
			(0.32)	(0.04)	(0.05)	(0.55)	(0.00)	(0.01)
44	NPG	NPG	27.90	32.21	32.14	31.70	123.22	32.86
			(0.68)	(0.07)	(0.08)	(0.10)	(0.00)	(0.05)
45	NPG	LQG	30.49	34.04	30.88	70.43	29.24	32.89
			(0.24)	(0.04)	(0.19)	(0.00)	(0.44)	(0.07)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
46	NPG	LQG	28.32	34.37	34.35	33.22	27.57	35.69
			(0.37)	(0.01)	(0.01)	(0.03)	(0.54)	(0.00)
47	SQG	SQG	31.02	32.48	30.91	42.05	59.58	41.79
			(0.39)	(0.18)	(0.41)	(0.00)	(0.00)	(0.00)
48	SQG	NPG	30.79	31.04	32.10	35.82	82.80	35.66
			(0.38)	(0.34)	(0.20)	(0.03)	(0.00)	(0.03)
49	CPG	NPG	34.51	74.29	46.72	59.29	40.95	41.09
			(0.92)	(0.00)	(0.00)	(0.00)	(0.03)	(0.03)
50	NPG	NPG	31.57	35.06	35.21	37.69	166.83	47.76
			(0.72)	(0.12)	(0.11)	(0.03)	(0.00)	(0.00)
51	NPG	NPG	33.95	67.22	47.05	124.20	48.31	42.78
			(0.98)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
52	NPG	NPG	31.71	35.96	33.36	58.52	101.31	34.21
			(0.54)	(0.06)	(0.23)	(0.00)	(0.00)	(0.15)
53	NPG	NPG	32.72	38.29	41.10	41.71	84.38	37.24
			(0.83)	(0.05)	(0.01)	(0.00)	(0.00)	(0.08)
54	NPG	NPG	33.96	77.92	49.44	83.10	46.29	49.84
			(0.99)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
55	CPG	LQG	29.52	32.98	31.90	29.67	29.25	31.59
			(0.25)	(0.04)	(0.07)	(0.23)	(0.29)	(0.09)
56	NPG	FQG	29.41	28.69	29.26	96.98	42.36	32.84
			(0.27)	(0.38)	(0.29)	(0.00)	(0.00)	(0.04)
57	SQG	NPG	29.72	35.58	32.57	87.14	234.58	40.00
			(0.76)	(0.04)	(0.18)	(0.00)	(0.00)	(0.00)
58	NPG	NPG	29.58	33.66	32.92	75.32	108.12	32.51
			(0.64)	(0.08)	(0.12)	(0.00)	(0.00)	(0.14)
59	NPG	NPG	35.29	43.62	39.32	46.98	85.47	39.06
			(0.76)	(0.01)	(0.10)	(0.00)	(0.00)	(0.11)
60	NPG	NPG	29.20	30.28	30.49	32.81	38.66	31.59
			(0.38)	(0.22)	(0.20)	(0.06)	(0.00)	(0.11)
61	NPG	NPG	31.55	33.20	34.77	39.60	43.30	35.27
			(0.60)	(0.26)	(0.12)	(0.01)	(0.00)	(0.00)
62	SQG	NPG	33.38	37.58	41.00	71.50	230.45	38.31
			(0.81)	(0.09)	(0.01)	(0.00)	(0.00)	(0.06)
63	NPG	NPG	30.93	31.38	32.85	31.00	46.21	40.44
			(0.31)	(0.24)	(0.12)	(0.30)	(0.00)	(0.00)
64	NPG	LQG	30.27	34.28	31.98	66.48	29.38	32.52
			(0.29)	(0.03)	(0.12)	(0.00)	(0.45)	(0.09)
65	FQG	LQG	30.73	32.86	32.68	42.50	29.87	36.85
			(0.30)	(0.10)	(0.11)	(0.00)	(0.46)	(0.01)
66	NPG	NPG	31.86	43.02	40.35	55.15	195.60	48.12
			(0.98)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
67	CPG	NPG	29.79	31.56	31.74	31.99	41.17	31.83
			(0.40)	(0.16)	(0.15)	(0.13)	(0.00)	(0.14)
68	NPG	NPG	30.08	36.79	34.69	36.59	33.86	31.77
			(0.57)	(0.01)	(0.05)	(0.02)	(0.08)	(0.24)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
69	NPG	NPG	30.68	33.39	31.81	40.21	33.24	38.81
			(0.47)	(0.12)	(0.26)	(0.00)	(0.12)	(0.00)
70	FQG	NPG	28.16	32.06	31.38	35.92	34.49	38.24
			(0.70)	(0.10)	(0.14)	(0.01)	(0.02)	(0.00)
71	NPG	NPG	34.76	40.42	41.12	52.41	80.27	49.73
			(0.90)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)
72	NPG	NPG	29.36	29.67	31.62	30.80	41.41	41.09
			(0.37)	(0.32)	(0.12)	(0.18)	(0.00)	(0.00)
73	CPG	CPG	30.68	35.31	34.97	35.23	48.70	32.22
			(0.56)	(0.05)	(0.06)	(0.05)	(0.00)	(0.25)
74	SQG	NPG	29.58	30.01	31.34	30.28	54.79	35.54
			(0.33)	(0.27)	(0.13)	(0.23)	(0.00)	(0.01)
75	NPG	LQG	30.85	33.01	30.63	75.30	25.67	34.04
			(0.06)	(0.02)	(0.07)	(0.00)	(0.83)	(0.01)
76	NPG	LQG	30.97	34.45	34.71	47.86	30.65	35.28
			(0.38)	(0.06)	(0.05)	(0.00)	(0.44)	(0.04)
77	NPG	LQG	28.21	35.07	35.37	34.11	25.54	36.10
			(0.20)	(0.00)	(0.00)	(0.00)	(0.77)	(0.00)
78	NPG	NPG	30.92	40.89	35.16	36.19	36.64	43.44
			(0.79)	(0.00)	(0.09)	(0.05)	(0.04)	(0.00)
79	NPG	NPG	30.11	35.12	38.18	34.76	140.65	33.86
			(0.74)	(0.06)	(0.01)	(0.07)	(0.00)	(0.11)
80	NPG	NPG	31.91	32.80	35.62	41.36	48.10	42.10
			(0.55)	(0.35)	(0.08)	(0.00)	(0.00)	(0.00)
81	SQG	FQG	35.64	31.88	33.43	115.20	37.55	45.96
			(0.09)	(0.59)	(0.27)	(0.00)	(0.03)	(0.00)
82	NPG	NPG	40.49	45.27	43.73	127.94	48.42	57.51
			(0.76)	(0.07)	(0.15)	(0.00)	(0.01)	(0.00)
83	CPG	CPG	40.13	43.24	36.59	122.65	74.74	32.97
			(0.02)	(0.00)	(0.13)	(0.00)	(0.00)	(0.83)
84	NPG	NPG	31.10	41.24	36.36	50.05	35.68	40.35
			(0.84)	(0.00)	(0.06)	(0.00)	(0.08)	(0.00)
85	NPG	NPG	31.45	34.50	34.37	37.00	148.28	45.94
			(0.66)	(0.14)	(0.15)	(0.04)	(0.00)	(0.00)
86	CPG	LQG	28.28	36.83	33.14	34.56	27.92	35.91
			(0.42)	(0.00)	(0.03)	(0.01)	(0.50)	(0.00)
87	NPG	NPG	29.05	35.16	31.40	36.45	51.84	38.42
			(0.71)	(0.03)	(0.22)	(0.01)	(0.00)	(0.00)
88	NPG	NPG	31.12	34.75	31.90	40.55	36.31	41.53
			(0.51)	(0.08)	(0.35)	(0.00)	(0.03)	(0.00)
89	NPG	NPG	31.77	34.64	40.53	49.08	61.87	40.55
			(0.79)	(0.18)	(0.00)	(0.00)	(0.00)	(0.00)
90	NPG	NPG	29.73	33.83	32.47	86.51	237.90	39.25
			(0.71)	(0.09)	(0.18)	(0.00)	(0.00)	(0.00)
91	NPG	NPG	29.47	33.62	34.61	36.52	52.69	34.15
			(0.75)	(0.09)	(0.05)	(0.02)	(0.00)	(0.07)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
92	NPG	NPG	30.18	34.67	31.49	38.01	42.36	40.42
			(0.60)	(0.06)	(0.31)	(0.01)	(0.00)	(0.00)
93	NPG	LQG	32.42	33.16	34.34	32.43	31.66	39.94
			(0.21)	(0.15)	(0.08)	(0.21)	(0.32)	(0.00)
94	TQG	NPG	28.09	30.91	30.56	29.87	45.70	31.12
			(0.46)	(0.11)	(0.13)	(0.18)	(0.00)	(0.10)
95	FQG	LQG	30.33	31.76	33.14	43.41	29.27	37.21
			(0.28)	(0.14)	(0.07)	(0.00)	(0.48)	(0.00)
96	NPG	NPG	28.73	32.43	31.76	32.23	33.30	29.82
			(0.44)	(0.07)	(0.09)	(0.07)	(0.04)	(0.26)
97	NPG	NPG	31.20	36.68	37.85	33.29	32.32	39.03
			(0.48)	(0.03)	(0.01)	(0.17)	(0.27)	(0.00)
98	CPG	NPG	29.79	33.67	33.16	78.75	102.96	33.08
			(0.65)	(0.09)	(0.12)	(0.00)	(0.00)	(0.12)
99	FQG	LQG	31.41	33.61	30.91	66.65	27.23	34.92
			(0.09)	(0.03)	(0.11)	(0.00)	(0.74)	(0.01)
100	SQG	LQG	29.64	36.18	33 97	35.72	27.74	34.55
			(0.25)	(0.00)	(0.02)	(0.01)	(0.66)	(0.02)
101	SQG	NPG	34.62	38.80	35.03	105.33	63.12	41.51
			(0.50)	(0.06)	(0.41)	(0.00)	(0.00)	(0.01)
102	SQG	SQG	37.85	35.37	35.27	87.72	38.91	39.64
			(0.10)	(0.38)	(0.39)	(0.00)	(0.06)	(0.04)
103	NPG	NPG	33.01	36.74	36.08	36.02	45.50	42.41
			(0.62)	(0.09)	(0.13)	(0.13)	(0.00)	(0.00)
104	NPG	NPG	30.28	32.63	33.20	35.44	45.30	33.58
			(0.55)	(0.17)	(0.12)	(0.04)	(0.00)	(0.10)
105	NPG	NPG	28.38	35.64	31.76	36.52	196.55	43.55
			(0.81)	(0.02)	(0.15)	(0.01)	(0.00)	(0.00)
106	NPG	NPG	35.86	38.70	36.52	45.01	87.72	46.52
			(0.50)	(0.12)	(0.36)	(0.00)	(0.00)	(0.00)
107	NPG	NPG	30.39	36.65	38.78	34.11	160.12	34.46
			(0.72)	(0.05)	(0.01)	(0.11)	(0.00)	(0.09)
108	NPG	TQG	34.56	33.84	35.24	33.71	59.65	44.24
			(0.21)	(0.30)	(0.15)	(0.32)	(0.00)	(0.00)
109	SQG	NPG	32.81	47.32	36.55	68.54	168.09	41.84
			(0.85)	(0.00)	(0.13)	(0.00)	(0.00)	(0.00)
110	SQG	NPG	29.00	40.88	33.40	32.76	30.94	36.86
			(0.60)	(0.00)	(0.06)	(0.09)	(0.22)	(0.01)
111	NPG	NPG	33.98	39.30	40.65	57.25	50.46	37.34
			(0.77)	(0.05)	(0.02)	(0.00)	(0.00)	(0.14)
112	FQG	NPG	27.86	33.60	33.40	35.61	92.89	40.23
			(0.87)	(0.04)	(0.05)	(0.01)	(0.00)	(0.00)
113	NPG	NPG	31.08	44.76	35.10	36.73	35.28	42.13
			(0.75)	(0.00)	(0.10)	(0.04)	(0.09)	(0.00)
114	NPG	NPG	28.82	29.17	29.43	95.27	47.79	31.15
			(0.34)	(0.29)	(0.25)	(0.00)	(0.00)	(0.10)
115	CPG	NPG	30.37	33.70	35.71	47.46	62.66	33.59
			(0.68)	(0.12)	(0.04)	(0.00)	(0.00)	(0.13)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
116	NPG	LQG	281.86	2533.04	1162.42	1950.34	251.62	695.06
			(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)
117	NPG	NPG	31.28	39.40	37.17	42.61	212.10	37.41
			(0.89)	(0.01)	(0.04)	(0.00)	(0.00)	(0.04)
118	NPG	NPG	31.61	35.99	37.71	38.86	107.79	33.88
			(0.66)	(0.07)	(0.03)	(0.01)	(0.00)	(0.21)
119	TQG	NPG	27.81	29.73	30.48	30.17	45.31	35.93
			(0.50)	(0.09)	(0.13)	(0.15)	(0.00)	(0.00)
120	SQG	NPG	31.70	34.65	34.33	51.83	45.23	35.62
			(0.61)	(0.13)	(0.16)	(0.00)	(0.00)	(0.08)
121	NPG	NPG	28.35	33.88	33.18	28.99	35.34	33.58
			(0.50)	(0.03)	(0.04)	(0.36)	(0.01)	(0.03)
122	CPG	NPG	30.01	32.53	31.61	86.89	59.07	32.53
			(0.49)	(0.14)	(0.22)	(0.00)	(0.00)	(0.14)
123	NPG	NPG	27.82	33.15	33.29	33.05	72.42	40.27
			(0.82	(0.05)	(0.05)	(0.06)	(0.00)	(0.00)
124	NPG	NPG	31.49	33.70	32.87	66.01	138.06	34.28
			(0.48)	(0.15)	(0.24)	(0.00)	(0.00)	(0.11)
125	NPG	NPG	37.66	42.42	42.95	117.45	101.84	53.72
			(0.85)	(0.07)	(0.06)	(0.00)	(0.00)	(0.00)
126	NPG	NPG	49.76	204.50	98.71	217.00	174.19	81.14
			(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
127	NPG	NPG	27.88	32.67	33.50	32.36	82.24	41.45
			(0.79)	(0.07)	(0.04)	(0.08)	(0.00)	(0.00)
128	SQG	CPG	33.76	33.60	33.47	88.86	47.14	33.10
			(0.21)	(0.23)	(0.24)	(0.00)	(0.00)	(0.30)
129	SQG	NPG	35.80	41.17	37.48	57.42	37.97	42.00
			(0.53)	(0.03)	(0.22)	(0.00)	(0.17)	(0.02)
130	NPG	NPG	33.62	40.80	36.03	68.60	227.94	39.03
			(0.71)	(0.01)	(0.21)	(0.00)	(0.00)	(0.04)
131	FQG	NPG	38.86	40.15	44.90	127.17	107.13	58.35
			(0.63)	(0.33)	(0.03)	(0.00)	(0.00)	(0.00)
132	NPG	LQG	29.87	35.45	33.37	39.13	28.04	39.01
			(0.26)	(0.01)	(0.04)	(0.00)	(0.66)	(0.00)
133	FQG	NPG	30.58	35.71	38.64	33.87	180.65	36.11
			(0.74)	(0.05)	(0.01)	(0.14)	(0.00)	(0.04)
134	NPG	NPG	28.19	29.83	29.26	72.78	95.19	34.22
			(0.48)	(0.21)	(0.28)	(0.00)	(0.00)	(0.02)
135	NPG	NPG	27.80	31.60	31.22	30.02	45.67	30.82
			(0.53)	(0.07)	(0.09)	(0.17)	(0.00)	(0.11)
136	NPG	NPG	28.12	33.76	30.79	34.42	160.10	42.26
			(0.73)	(0.04)	(0.19)	(0.03)	(0.00)	(0.00)
137	NPG	NPG	29.58	33.00	35.67	41.49	82.42	33.15
			(0.71)	(0.12)	(0.03)	(0.00)	(0.00)	(0.11)
138	FQG	FQG	33.88	33.53	34.20	59.37	91.05	35.16
			(0.28)	(0.33)	(0.23)	(0.00)	(0.00)	(0.14)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
139	NPG	LQG	32.29	37.75	37.05	59.32	29.23	41.15
			(0.17)	(0.01)	(0.01)	(0.00)	(0.79)	(0.00)
140	NPG	CPG	36.21	36.51	36.00	42.87	113.83	33.91
			(0.16)	(0.13)	(0.17)	(0.00)	(0.00)	(0.51)
141	NPG	TQG	34.83	33.67	34.83	31.59	42.11	42.31
			(0.11)	(0.20)	(0.11)	(0.56)	(0.00)	(0.00)
142	NPG	NPG	32.27	36.42	38.14	35.92	40.63	39.53
			(0.72)	(0.09)	(0.03)	(0.11)	(0.01)	(0.01)
143	NPG	NPG	28.17	34.90	34.47	37.34	104.73	41.46
			(0.91)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)
144	FQG	NPG	36.73	38.19	38.47	111.23	190.44	43.69
			(0.51)	(0.24)	(0.21)	(0.00)	(0.00)	(0.01)
145	NPG	CPG	34.72	37.32	35.85	36.62	76.00	32.84
			(0.20)	(0.05)	(0.11)	(0.08)	(0.00)	(0.53)
146	NPG	NPG	29.13	32.46	32.43	34.52	64.56	39.31
			(0.68)	(0.13)	(0.13)	(0.04)	(0.00)	(0.00)
147	NPG	NPG	31.47	38.86	34.91	72.75	41.23	41.74
			(0.82)	(0.02)	(0.14)	(0.00)	(0.00)	(0.00)
148	NPG	NPG	28.33	36.45	30.87	30.87	44.25	37.21
			(0.62)	(0.01)	(0.17)	(0.17)	(0.00)	(0.00)
149	NPG	NPG	34.05	38.63	41.49	65.34	104.06	42.64
			(0.87)	(0.08)	(0.02)	(0.00)	(0.00)	(0.01)
150	NPG	NPG	29.52	32.52	32.72	31.09	31.66	38.76
			(0.44)	(0.09)	(0.09)	(0.20)	(0.15)	(0.00)
151	NPG	TQG	30.86	34.72	34.45	29.28	44.45	37.51
			(0.28)	(0.04)	(0.04)	(0.61)	(0.00)	(0.01)
152	NPG	NPG	29.57	30.08	30.93	28.46	29.46	34.01
			(0.19)	(0.14)	(0.09)	(0.33)	(0.20)	(0.02)
153	NPG	NPG	33.27	34.01	36.44	42.33	52.31	43.85
			(0.52)	(0.36)	(0.10)	(0.00)	(0.00)	(0.00)
154	SQG	CPG	31.78	32.38	32.02	32.96	44.13	31.16
			(0.22)	(0.16)	(0.19)	(0.12)	(0.00)	(0.29)
155	SQG	NPG	29.54	38.33	31.67	33.70	55.44	39.96
			(0.67)	(0.00)	(0.23)	(0.08)	(0.00)	(0.00)
156	NPG	NPG	30.72	32.84	31.34	39.31	81.82	42.69
			(0.47)	(0.16)	(0.35)	(0.00)	(0.00)	(0.00)
157	NPG	NPG	33.48	38.26	36.08	36.75	36.38	38.58
			(0.53)	(0.04)	(0.14)	(0.10)	(0.12)	(0.04)
158	NPG	NPG	27.79	33.56	33.52	34.36	83.72	40.47
			(0.08)	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)
159	NPG	NPG	30.47	33.85	32.02	73.60	129.67	42.18
			(0.60)	(0.11)	(0.27)	(0.00)	(0.00)	(0.00)
160	NPG	NPG	31.73	36.60	38.82	80.87	296.18	39.52
			(0.87)	(0.07)	(0.02)	(0.00)	(0.00)	(0.01)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
161	NPG	CPG	46.41	43.27	41.12	53.99	179.33	38.07
			(0.01)	(0.05)	(0.16)	(0.00)	(0.00)	(0.76)
162	NPG	NPG	32.09	37.07	37.55	86.13	84.88	40.17
			(0.85)	(0.07)	(0.05)	(0.00)	(0.00)	(0.01)
163	NPG	CPG	33.40	33.76	32.20	48.67	66.66	30.67
			(0.13)	(0.11)	(0.24)	(0.00)	(0.00)	(0.51)
164	NPG	NPG	27.46	31.57	31.38	31.39	136.38	33.44
			(0.68)	(0.08)	(0.09)	(0.09)	(0.00)	(0.03)
165	SQG	NPG	32.94	37.45	40.53	56.42	81.18	40.64
			(0.87)	(0.09)	(0.01)	(0.00)	(0.00)	(0.01)
166	NPG	NPG	31.56	34.07	32.59	75.41	129.22	44.87
			(0.53)	(0.15)	(0.31)	(0.00)	(0.00)	(0.00)
167	NPG	NPG	29.31	34.02	33.28	37.29	44.96	39.71
			(0.79)	(0.07)	(0.10)	(0.01)	(0.00)	(0.00)
168	NPG	LQG	28.16	34.55	34.66	33.82	26.36	35.75
			(0.27)	(0.01)	(0.01)	(0.01)	(0.67)	(0.00)
169	NPG	NPG	31.97	37.89	36.35	36.04	82.77	33.53
			(0.57)	(0.02)	(0.06)	(0.07)	(0.00)	(0.26)
170	SQG	NPG	28.19	33.47	34.02	33.88	98.37	41.52
			(0.84)	(0.06)	(0.04)	(0.04)	(0.00)	(0.00)
171	NPG	NPG	29.18	33.76	34.58	32.47	81.29	42.43
			(0.73)	(0.07)	(0.04)	(0.14)	(0.00)	(0.00)
172	NPG	NPG	28.70	28.75	30.94	29.87	32.18	41.33
			(0.32)	(0.32)	(0.10)	(0.18)	(0.05)	(0.00)
173	NPG	NPG	31.24	37.82	35.11	36.70	35.20	33.17
			(0.56)	(0.02)	(0.08)	(0.03)	(0.07)	(0.21)
174	NPG	NPG	33.15	37.45	38.42	96.93	65.32	41.35
			(0.83)	(0.09)	(0.05)	(0.00)	(0.00)	(0.01)
175	NPG	NPG	30.23	42.01	34.36	43.45	104.12	42.00
			(0.88)	(0.00)	(0.11)	(0.00)	(0.00)	(0.00)
176	NPG	NPG	32.35	36.19	35.63	60.56	32.68	39.25
			(0.45)	(0.06)	(0.08)	(0.00)	(0.38)	(0.01)
177	FQG	FQG	33.83	30.70	33.42	39.60	47.39	44.70
			(0.14)	(0.67)	(0.17)	(0.00)	(0.00)	(0.00)
178	NPG	NPG	31.91	41.45	36.38	38.61	43.45	43.88
			(0.86)	(0.00)	(0.09)	(0.03)	(0.00)	(0.00)
179	NPG	FQG	37.19	34.22	34.38	45.62	151.26	36.52
			(0.09)	(0.40)	(0.37)	(0.00)	(0.00)	(0.12)
180	NPG	NPG	38.02	39.61	40.00	51.29	53.66	48.81
			(0.54)	(0.24)	(0.20)	(0.00)	(0.00)	(0.00)
181	NPG	NPG	29.60	31.89	32.21	29.75	39.97	35.91
			(0.38)	(0.12)	(0.10)	(0.36)	(0.00)	(0.01)
182	NPG	NPG	36.53	42.22	39.59	61.68	138.03	46.71
			(0.78)	(0.04)	(0.16)	(0.00)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
183	NPG	NPG	31.94 (0.48)	33.84 (0.18)	33.57 (0.21)	35.66 (0.07)	38.25 (0.02)	40.07 (0.00)
184	NPG	NPG	34.20 (0.94)	44.20 (0.00)	41.23 (0.02)	61.75 (0.00)	104.67 (0.00)	41.58 (0.02)
185	CPG	CPG	56.72 (0.00)	48.57 (0.00)	41.80 (0.25)	90.77 (0.00)	206.07 (0.00)	39.72 (0.73)
186	FQG	FQG	32.06 (0.23)	31.25 (0.35)	33.37 (0.12)	31.68 (0.28)	46.87 (0.00)	43.06 (0.00)
187	NPG	NPG	30.17 (0.51)	35.62 (0.03)	30.67 (0.40)	34.84 (0.04)	97.25 (0.00)	45.15 (0.00)
188	LQG	LQG	32.25 (0.08)	33.86 (0.03)	33.53 (0.04)	39.46 (0.00)	27.76 (0.82)	41.28 (0.00)
189	CPG	CPG	35.122 (0.16)	34.705 (0.19)	33.92 (0.29)	97.43 (0.00)	47.94 (0.00)	33.56 (0.34)
190	SQG	LQG	31.22 (0.30)	37.33 (0.01)	34.24 (0.06)	33.43 (0.10)	30.58 (0.42)	33.62 (0.09)
191	SQG	NPG	31.80 (0.45)	36.57 (0.04)	34.71 (0.10)	33.03 (0.24)	77.83 (0.00)	33.90 (0.15)
192	NPG	NPG	28.65 (0.74)	34.66 (0.03)	31.44 (0.18)	35.33 (0.02)	50.16 (0.00)	36.72 (0.01)
193	CPG	NPG	28.63 (0.65)	37.71 (0.00)	31.17 (0.18)	31.67 (0.14)	47.12 (0.00)	37.78 (0.00)
194	NPG	NPG	31.97 (0.50)	33.77 (0.20)	33.02 (0.29)	82.95 (0.00)	79.75 (0.00)	46.67 (0.00)
195	SQG	LQG	34.98 (0.18)	34.84 (0.19)	35.86 (0.12)	72.62 (0.00)	33.05 (0.48)	42.51 (0.00)
196	NPG	NPG	31.20 (0.86)	40.13 (0.01)	35.26 (0.11)	42.93 (0.00)	186.87 (0.00)	40.52 (0.00)
197	NPG	NPG	33.73 (0.65)	37.39 (0.10)	37.22 (0.11)	57.88 (0.00)	43.13 (0.00)	37.21 (0.11)
198	NPG	NPG	28.12 (0.76)	32.08 (0.10)	32.40 (0.09)	34.40 (0.03)	46.45 (0.00)	41.83 (0.00)
199	NPG	SQG	31.45 (0.39)	35.43 (0.05)	31.26 (0.43)	58.04 (0.00)	39.45 (0.00)	33.93 (0.11)
200	NPG	NPG	30.35 (0.88)	37.50 (0.02)	35.22 (0.07)	45.46 (0.00)	95.24 (0.00)	38.96 (0.01)
201	NPG	FQG	29.29 (0.30)	28.98 (0.35)	29.25 (0.30)	95.75 (0.00)	45.20 (0.00)	33.17 (0.04)
202	NPG	NPG	31.05 (0.31)	35.25 (0.03)	31.29 (0.28)	61.53 (0.00)	31.43 (0.26)	33.52 (0.09)
203	NPG	NPG	32.32 (0.91)	43.08 (0.00)	37.49 (0.06)	57.36 (0.00)	94.32 (0.00)	40.74 (0.01)
204	FQG	FQG	44.44 (0.02)	37.96 (0.56)	38.61 (0.40)	52.79 (0.00)	87.48 (0.00)	49.39 (0.00)
205	SQG	NPG	27.49 (0.51)	33.85 (0.02)	30.73 (0.10)	28.38 (0.33)	39.91 (0.00)	33.77 (0.02)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
206	NPG	NPG	33.08	41.56	39.90	64.09	172.73	41.48
			(0.94)	(0.01)	(0.03)	(0.00)	(0.00)	(0.01)
207	SQG	LQG	31.02	34.63	32.31	72.51	26.18	33.47
			(0.07)	(0.01)	(0.03)	(0.00)	(0.85)	(0.02)
208	NPG	NPG	32.91	35.34	36.57	56.32	125.20	36.39
			(0.61)	(0.18)	(0.09)	(0.00)	(0.00)	(0.10)
209	NPG	NPG	28.51	37.01	31.81	31.21	36.41	38.28
			(0.67)	(0.00)	(0.12)	(0.17)	(0.01)	(0.00)
210	NPG	SQG	37.47	36.70	36.60	80.39	39.97	42.44
			(0.22)	(0.33)	(0.35)	(0.00)	(0.06)	(0.01)
211	NPG	NPG	29.96	39.81	33.43	33.12	33.79	42.47
			(0.64)	(0.00)	(0.11)	(0.13)	(0.09)	(0.00)
212	SQG	SQG	36.91	38.32	36.07	72.71	61.10	36.47
			(0.23)	(0.11)	(0.35)	(0.00)	(0.00)	(0.29)
213	SQG	SQG	37.16	43.59	36.58	136.44	113.58	38.09
			(0.33)	(0.01)	(0.44)	(0.00)	(0.00)	(0.20)
214	NPG	LQG	28.37	33.96	32.48	33.37	26.92	31.05
			(0.27)	(0.01)	(0.03)	(0.02)	(0.57)	(0.07)
215	NPG	NPG	33.44	35.04	37.07	45.90	167.53	51.96
			(0.61)	(0.27)	(0.10)	(0.00)	(0.00)	(0.00)
216	FQG	NPG	29.70	36.64	31.59	38.90	44.86	40.92
			(0.69)	(0.02)	(0.27)	(0.00)	(0.00)	(0.00)
217	CPG	NPG	29.37	34.45	33.28	33.26	35.82	30.86
			(0.53)	(0.04)	(0.07)	(0.07)	(0.02)	(0.25)
218	NPG	SQG	47.32	44.70	43.57	57.70	239.44	47.81
			(0.08)	(0.30)	(0.54)	(0.00)	(0.00)	(0.06)
219	NPG	NPG	30.07	35.98	35.73	81.04	280.17	39.76
			(0.89)	(0.04)	(0.05)	(0.00)	(0.00)	(0.00)
220	NPG	NPG	37.82	58.64	45.24	77.28	43.78	44.51
			(0.90)	(0.00)	(0.02)	(0.00)	(0.04)	(0.03)
221	NPG	NPG	36.98	39.92	38.15	43.67	78.83	39.42
			(0.47)	(0.10)	(0.26)	(0.01)	(0.00)	(0.13)
222	NPG	NPG	27.66	30.78	31.46	33.69	99.69	32.30
			(0.66)	(0.13)	(0.09)	(0.03)	(0.00)	(0.06
223	NPG	NPG	29.59	37.37	32.22	39.72	75.46	39.75
			(0.76)	(0.01)	(0.20)	(0.00)	(0.00)	(0.00)
224	NPG	NPG	37.31	50.36	47.87	52.68	46.31	48.91
			(0.97)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
225	NPG	NPG	32.02	35.05	33.34	38.54	48.38	34.37
			(0.47)	(0.10)	(0.24)	(0.01)	(0.00)	(0.14)
226	NPG	NPG	28.88	37.63	31.82	30.20	29.40	38.17
			(0.39)	(0.00)	(0.09)	(0.20)	(0.30)	(0.00)
227	NPG	NPG	29.32	33.06	32.48	36.22	41.01	40.47
			(0.71)	(0.11)	(0.14)	(0.02)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
228	CPG	CPG	39.91	70.65	44.98	69.21	75.84	36.53
			(0.15)	(0.00)	(0.01)	(0.00)	(0.00)	(0.83)
229	NPG	NPG	28.15	30.54	30.87	29.78	37.81	31.67
			(0.45)	(0.13)	(0.11)	(0.20)	(0.00)	(0.07)
230	NPG	LQG	38.43	40.31	41.49	119.43	34.53	45.94
			(0.11)	(0.04)	(0.02)	(0.00)	(0.81)	(0.00)
231	NPG	NPG	30.00	35.91	32.49	85.62	243.79	42.89
			(0.74)	(0.03)	(0.21)	(0.00)	(0.00)	(0.00)
232	NPG	NPG	36.71	39.28	39.45	113.97	79.90	55.46
			(0.65)	(0.18)	(0.16)	(0.00)	(0.00)	(0.00)
233	NPG	NPG	37.35	89.26	57.47	136.09	74.15	45.22
			(0.98)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
234	NPG	NPG	28.84	31.92	32.10	33.71	49.75	39.23
			(0.66)	(0.14)	(0.13)	(0.05)	(0.00)	(0.00)
235	NPG	NPG	28.23	31.61	31.96	32.53	47.00	39.07
			(0.68)	(0.12)	(0.10)	(0.07)	(0.00)	(0.00)
236	NPG	NPG	35.32	44.31	37.33	42.44	69.89	47.52
			(0.71)	(0.00)	(0.26)	(0.02)	(0.00)	(0.00)
237	NPG	NPG	31.76	38.23	36.56	37.89	32.67	33.45
			(0.44)	(0.01)	(0.04)	(0.02)	(0.28)	(0.19)
238	NPG	TQG	30.15	34.71	33.51	29.14	38.85	36.31
			(0.33)	(0.03)	(0.06)	(0.55)	(0.00)	(0.01)
239	NPG	NPG	30.85	34.10	36.03	99.39	190.74	37.94
			(0.76)	(0.15)	(0.05)	(0.00)	(0.00)	(0.02)
240	NPG	NPG	30.57	33.81	34.84	36.22	63.73	44.87
			(0.72)	(0.14)	(0.08)	(0.04)	(0.00)	(0.00)
241	NPG	NPG	30.02	33.99	34.51	39.58	45.36	47.31
			(0.79)	(0.10)	(0.08)	(0.00)	(0.00)	(0.00)
242	NPG	NPG	37.47	40.69	42.65	40.90	159.89	40.18
			(0.58)	(0.11)	(0.04)	(0.10)	(0.00)	(0.15)
243	NPG	NPG	29.54	40.25	32.05	34.39	54.77	40.07
			(0.72)	(0.00)	(0.20)	(0.06)	(0.00)	(0.00)
244	NPG	SQG	40.29	43.97	37.48	126.43	97.29	43.66
			(0.18)	(0.02)	(0.75)	(0.00)	(0.00)	(0.03)
245	TQG	NPG	32.33	37.89	39.80	37.84	124.77	51.98
			(0.86)	(0.05)	(0.02)	(0.05)	(0.00)	(0.00)
246	SQG	NPG	27.58	33.34	33.36	33.83	86.54	40.00
			(0.86)	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)
247	NPG	NPG	30.56	34.48	34.26	34.26	41.06	33.58
			(0.59)	(0.08)	(0.09)	(0.09)	(0.00)	(0.13)
248	NPG	NPG	31.06	37.44	33.33	39.02	139.84	38.14
			(0.70)	(0.02)	(0.22)	(0.01)	(0.00)	(0.02)
249	NPG	NPG	30.46	45.74	35.44	80.42	89.92	36.58
			(0.88)	(0.00)	(0.07)	(0.00)	(0.00)	(0.04)

Table C1 (Continued

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
250	NPG	NPG	35.81	44.73	41.92	50.03	132.06	39.15
			(0.80)	(0.00)	(0.03)	(0.00)	(0.00)	(0.15)
251	NPG	NPG	28.10	30.48	30.65	29.39	40.85	31.36
			(0.43)	(0.13)	(0.12)	(0.22)	(0.00)	(0.08)
252	NPG	NPG	32.95	37.70	39.52	46.29	74.83	35.90
			(0.73)	(0.06)	(0.02)	(0.00)	(0.00)	(0.16)
253	NPG	NPG	30.49	35.23	34.98	34.76	38.98	33.64
			(0.64)	(0.06)	(0.06)	(0.07)	(0.00)	(0.13)
254	SQG	NPG	27.63	29.95	29.85	29.55	37.73	29.73
			(0.42)	(0.13)	(0.13)	(0.16)	(0.00)	(0.14)
255	FQG	NPG	29.52	30.47	30.43	81.44	74.97	32.36
			(0.40)	(0.24)	(0.25)	(0.00)	(0.00)	(0.09)
256	NPG	NPG	30.01	32.25	30.29	37.59	75.96	42.73
			(0.45)	(0.14)	(0.39)	(0.01)	(0.00)	(0.00)
257	NPG	NPG	32.48	36.30	36.69	41.63	78.43	33.62
			(0.54)	(0.08)	(0.06)	(0.00)	(0.00)	(0.30)
258	SQG	NPG	31.57	44.70	34.89	38.56	42.15	33.37
			(0.61)	(0.00)	(0.11)	(0.01)	(0.00)	(0.24)
259	NPG	NPG	32.89	42.51	40.18	69.49	170.87	47.38
			(0.96)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
260	FQG	NPG	36.79	37.57	41.00	91.82	99.22	46.04
			(0.55)	(0.37)	(0.06)	(0.00)	(0.00)	(0.00)
261	NPG	NPG	32.83	51.61	41.26	108.58	66.54	42.15
			(0.97)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
262	NPG	NPG	27.64	32.46	32.65	32.93	69.64	39.56
			(0.80)	(0.07)	(0.06)	(0.05)	(0.00)	(0.00)
263	NPG	NPG	28.84	30.29	30.58	86.71	67.52	31.06
			(0.44)	(0.21)	(0.18)	(0.00)	(0.00)	(0.14)
264	NPG	NPG	31.34	36.13	36.36	37.39	69.91	48.26
			(0.81)	(0.07)	(0.06)	(0.03)	(0.00)	(0.00)
265	SQG	LQG	29.90	35.02	31.98	31.50	29.84	33.11
			(0.32)	(0.02)	(0.11)	(0.14)	(0.33)	(0.06)
266	NPG	NPG	33.26	38.95	39.64	46.26	60.27	38.15
			(0.84)	(0.04)	(0.03)	(0.00)	(0.00)	(0.07)
267	NPG	NPG	29.98	34.33	34.29	42.97	66.36	33.59
			(0.71)	(0.08)	(0.08)	(0.00)	(0.00)	(0.11)
268	NPG	NPG	30.62	33.72	33.36	40.41	60.15	35.54
			(0.64)	(0.13)	(0.16)	(0.00)	(0.00)	(0.05)
269	NPG	NPG	35.52	62.16	45.91	75.57	67.93	46.72
			(0.99)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
270	NPG	NPG	34.26	41.64	40.34	60.05	129.12	40.40
			(0.89)	(0.02)	(0.04)	(0.00)	(0.00)	(0.04)
271	TQG	TQG	32.57	31.94	33.46	29.87	35.19	40.61
			(0.14)	(0.19)	(0.08)	(0.53)	(0.03)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
272	NPG	NPG	30.44	34.03	33.17	32.25	45.66	31.75
			(0.42)	(0.07)	(0.10)	(0.17)	(0.00)	(0.22)
273	NPG	NPG	35.92	37.01	36.62	85.01	40.11	38.04
			(0.36)	(0.21)	(0.25)	(0.00)	(0.04)	(0.12)
274	NPG	NPG	32.19	33.88	34.85	35.15	35.58	40.44
			(0.47)	(0.20)	(0.12)	(0.10)	(0.08)	(0.00)
275	NPG	NPG	31.00	34.88	38.31	41.36	51.30	36.34
			(0.80)	(0.11)	(0.02)	(0.00)	(0.00)	(0.05)
276	NPG	NPG	31.76	38.80	35.10	52.65	72.38	38.89
			(0.80)	(0.02)	(0.15)	(0.00)	(0.00)	(0.02)
277	NPG	NPG	30.48	34.91	34.06	74.52	115.14	33.00
			(0.64)	(0.07)	(0.10)	(0.00)	(0.00)	(0.18)
278	NPG	NPG	29.51	32.87	31.17	72.12	124.55	37.10
			(0.60)	(0.11)	(0.26)	(0.00)	(0.00)	(0.01)
279	NPG	NPG	31.12	40.83	38.43	53.54	53.23	39.58
			(0.95)	(0.00)	(0.02)	(0.00)	(0.00)	(0.01)
280	SQG	NPG	27.68	29.33	30.23	29.18	36.92	34.48
			(0.44)	(0.19)	(0.12)	(0.21)	(0.00)	(0.01)
281	NPG	NPG	38.02	38.44	42.63	133.03	264.04	61.05
			(0.52)	(0.42)	(0.05)	(0.00)	(0.00)	(0.00)
282	NPG	NPG	31.46	39.27	38.06	39.06	130.62	48.85
			(0.92)	(0.01)	(0.03)	(0.02)	(0.00)	(0.00)
283	LQG	LQG	46.81	52.16	49.25	207.83	27.76	64.63
			(0.00)	(0.00)	(0.00)	(0.00)	(0.99)	(0.00)
284	NPG	NPG	30.04	38.84	36.35	40.02	104.64	35.46
			(0.88)	(0.01)	(0.03)	(0.00)	(0.00)	(0.05)
285	TQG	TQG	32.09	40.89	34.74	31.36	63.30	35.67
			(0.34)	(0.00)	(0.09)	(0.50)	(0.00)	(0.05)
286	SQG	FQG	31.54	31.21	31.73	86.08	68.69	44.79
			(0.32)	(0.38)	(0.29)	(0.00)	(0.00)	(0.00)
287	NPG	SQG	37.24	37.70	35.14	56.93	64.28	45.61
			(0.21)	(0.17)	(0.61)	(0.00)	(0.00)	(0.00)
288	NPG	NPG	30.95	34.04	37.87	44.56	37.74	36.89
			(0.75)	(0.15)	(0.02)	(0.00)	(0.02)	(0.03)
289	SQG	NPG	27.00	29.80	30.15	30.30	41.70	33.24
			(0.59)	(0.14)	(0.12)	(0.11)	(0.00)	(0.02)
290	FQG	NPG	37.69	41.06	39.03	76.71	41.98	51.40
			(0.55)	(0.10)	(0.28)	(0.00)	(0.06)	(0.00)
291	NPG	NPG	30.87	32.23	33.21	34.15	38.40	43.78
			(0.49)	(0.24)	(0.15)	(0.09)	(0.01)	(0.00)
292	NPG	NPG	28.77	36.11	33.47	35.34	224.74	39.07
			(0.85)	(0.02)	(0.08)	(0.03)	(0.00)	(0.00)
293	NPG	NPG	33.25	43.16	35.24	82.56	289.56	54.79
			(0.72)	(0.00)	(0.26)	(0.00)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
294	SQG	NPG	27.25	34.00	30.76	27.82	31.40	33.69
			(0.47)	(0.01)	(0.08)	(0.35)	(0.05)	(0.01)
295	SQG	SQG	129.84	105.46	76.56	255.11	476.88	79.25
			(0.00)	(0.00)	(0.79)	(0.00)	(0.00)	(0.20)
296	NPG	NPG	27.40	31.25	31.02	32.85	52.01	33.75
			(0.70)	(0.10)	(0.11)	(0.04)	(0.00)	(0.02)
297	SQG	SQG	39.05	49.66	35.18	59.54	76.26	41.56
			(0.12)	(0.00)	(0.84)	(0.00)	(0.00)	(0.03)
298	NPG	NPG	27.94	31.71	32.04	32.35	53.65	39.06
			(0.71)	(0.10)	(0.09)	(0.07)	(0.00)	(0.00)
299	NPG	CPG	30.65	32.65	31.81	40.71	47.92	29.85
			(0.29)	(0.10)	(0.16)	(0.00)	(0.00)	(0.43)
300	NPG	NPG	32.08	34.47	33.72	50.58	47.38	37.33
			(0.55)	(0.16)	(0.24)	(0.00)	(0.00)	(0.03)
301	TQG	LQG	29.77	31.87	31.73	29.42	28.46	32.60
			(0.19)	(0.06)	(0.07)	(0.23)	(0.37)	(0.04)
302	NPG	NPG	34.35	41.68	39.91	89.08	182.93	54.04
			(0.91)	(0.02)	(0.05)	(0.00)	(0.00)	(0.00)
303	NPG	TQG	29.50	34.04	34.64	28.81	42.19	36.36
			(0.38)	(0.03)	(0.02)	(0.53)	(0.00)	(0.01)
304	SQG	NPG	31.36	39.31	35.20	57.48	51.01	33.96
			(0.69)	(0.01)	(0.10)	(0.00)	(0.00)	(0.18)
305	NPG	FQG	31.66	31.52	32.05	74.04	54.18	31.55
			(0.25)	(0.27)	(0.20)	(0.00)	(0.00)	(0.26)
306	NPG	NPG	30.71	38.69	34.60	34.95	44.64	39.45
			(0.77)	(0.01)	(0.11)	(0.09)	(0.00)	(0.00)
307	NPG	NPG	32.23	42.10	34.05	54.77	62.50	39.77
			(0.69)	(0.00)	(0.28)	(0.00)	(0.00)	(0.01)
308	NPG	NPG	33.85	45.83	38.23	39.61	38.14	40.04
			(0.75)	(0.00)	(0.08)	(0.04)	(0.08)	(0.03)
309	NPG	NPG	32.01	33.99	33.34	56.26	107.49	33.87
			(0.43)	(0.16)	(0.22)	(0.00)	(0.00)	(0.17)
310	FQG	FQG	29.87	29.17	29.64	35.32	38.22	32.11
			(0.25)	(0.35)	(0.28)	(0.01)	(0.00)	(0.08)
311	SQG	NPG	32.66	45.90	34.64	64.01	160.75	45.34
			(0.72)	(0.00)	(0.27)	(0.00)	(0.00)	(0.00)
312	NPG	NPG	28.77	37.34	34.27	39.05	32.51	35.81
			(0.78)	(0.01)	(0.05)	(0.00)	(0.12)	(0.02)
313	NPG	NPG	28.22	32.89	30.38	33.92	136.81	41.90
			(0.66)	(0.06)	(0.22)	(0.03)	(0.00)	(0.00)
314	NPG	NPG	32.34	37.26	39.49	39.90	86.18	35.61
			(0.75)	(0.06)	(0.02)	(0.01)	(0.00)	(0.14)
315	FQG	LQG	34.28	34.87	34.83	47.36	31.26	43.64
			(0.14)	(0.06)	(0.11)	(0.00)	(0.67)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
316	CPG	NPG	28.86	39.92	32.97	91.98	50.88	35.35
			(0.85)	(0.00)	(0.10)	(0.00)	(0.00)	(0.03)
317	SQG	NPG	31.15	35.38	34.59	41.71	38.09	42.82
			(0.74)	(0.09)	(0.13)	(0.00)	(0.02)	(0.00)
318	NPG	LQG	33.09	38.12	38.30	49.38	27.10	41.31
			(0.04)	(0.00)	(0.00)	(0.00)	(0.94)	(0.00)
319	NPG	NPG	31.99	32.01	32.08	84.81	69.23	36.92
			(0.32)	(0.32)	(0.31)	(0.00)	(0.00)	(0.02)
320	NPG	NPG	30.18	35.31	32.05	65.51	40.63	32.08
			(0.53)	(0.04)	(0.21)	(0.00)	(0.00)	(0.20)
321	NPG	NPG	33.94	37.09	36.85	94.46	79.14	43.26
			(0.68)	(0.14)	(0.16)	(0.00)	(0.00)	(0.00)
322	NPG	NPG	32.75	35.28	37.66	51.74	35.09	40.47
			(0.58)	(0.16)	(0.05)	(0.00)	(0.18)	(0.01)
323	NPG	NPG	31.55	38.57	34.95	50.72	64.17	38.84
			(0.80)	(0.02)	(0.14)	(0.00)	(0.00)	(0.02)
324	NPG	NPG	35.15	40.83	42.24	54.93	85.12	52.16
			(0.91)	(0.05)	(0.02)	(0.00)	(0.00)	(0.00)
325	NPG	NPG	28.38	34.80	31.39	35.79	185.55	42.64
			(0.78)	(0.03)	(0.16)	(0.01)	(0.00)	(0.00)
326	FQG	SQG	33.91	33.84	33.70	85.61	34.70	34.62
			(0.22)	(0.22)	(0.24)	(0.00)	(0.14)	(0.15)
327	CPG	NPG	28.30	32.38	32.04	31.38	33.10	30.36
			(0.51)	(0.06)	(0.07)	(0.11)	(0.04)	(0.18)
328	NPG	NPG	29.28	36.23	36.14	38.31	127.12	43.33
			(0.92)	(0.02)	(0.03)	(0.01)	(0.00)	(0.00)
329	NPG	NPG	30.62	39.69	38.56	44.46	151.61	45.83
			(0.96)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
330	SQG	LQG	34.51	40.16	34.92	92.17	29.41	40.88
			(0.06)	(0.00)	(0.05)	(0.00)	(0.87)	(0.00)
331	NPG	NPG	29.13	34.12	33.42	41.49	77.25	42.99
			(0.83)	(0.06)	(0.09)	(0.00)	(0.00)	(0.00)
332	SQG	NPG	43.28	114.52	62.68	78.78	87.49	61.84
			(0.99)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
333	NPG	NPG	29.31	34.03	33.31	40.56	73.97	44.28
			(0.81)	(0.07)	(0.10)	(0.00)	(0.00)	(0.00)
334	NPG	NPG	32.92	64.98	45.97	107.64	34.35	42.51
			(0.66)	(0.00)	(0.00)	(0.00)	(0.32)	(0.00)
335	NPG	NPG	29.73	36.82	31.62	33.39	62.78	36.78
			(0.62)	(0.01)	(0.24)	(0.09)	(0.00)	(0.01)
336	FQG	SQG	34.19	35.32	33.44	113.01	66.12	37.31
			(0.30)	(0.17)	(0.44)	(0.00)	(0.00)	(0.06)
337	NPG	NPG	29.81	33.91	33.22	31.74	55.28	31.36
			(0.46)	(0.05)	(0.08)	(0.17)	(0.00)	(0.21)

Table Cl (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
338	NPG	NPG	32.92	37.64	37.54	37.70	49.67	39.03
			(0.75)	(0.07)	(0.07)	(0.06)	(0.02)	(0.03)
339	NPG	NPG	28.64	33.74	30.54	37.23	79.04	37.84
			(0.67)	(0.05)	(0.26)	(0.00)	(0.00)	(0.00)
340	NPG	FQG	34.54	34.09	34.11	102.18	51.40	36.49
			(0.25)	(0.32)	(0.32)	(0.00)	(0.00)	(0.09)
341	NPG	NPG	32.03	38.79	35.14	46.08	44.00	39.26
			(0.78)	(0.02)	(0.16)	(0.00)	(0.00)	(0.02)
342	NPG	NPG	31.45	40.57	3.94	70.09	110.92	40.38
			(0.76)	(0.00)	(0.22)	(0.00)	(0.00)	(0.00)
343	NPG	NPG	29.59	37.37	32.22	39.72	75.46	39.75
			(0.76)	(0.01)	(0.20)	(0.00)	(0.00)	(0.00)
344	FQG	NPG	29.61	33.59	36.46	40.42	87.61	33.29
			(0.75)	(0.10)	(0.02)	(0.00)	(0.00)	(0.11)
345	NPG	NPG	28.92	36.88	35.98	40.91	125.20	43.16
			(0.95)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)
346	NPG	FQG	31.33	31.16	32.42	31.92	75.42	37.56
			(0.28)	(0.31)	(0.16)	(0.21)	(0.00)	(0.01)
347	NPG	NPG	31.45	41.75	41.10	48.74	36.93	41.17
			(0.92)	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)
348	TQG	TQG	28.44	30.51	30.39	26.92	32.66	32.81
			(0.24)	(0.08)	(0.09)	(0.52)	(0.02)	(0.02)
349	SQG	CPG	40.19	38.65	34.74	70.52	121.37	33.93
			(0.02)	(0.05)	(0.36)	(0.00)	(0.00)	(0.55)
350	SQG	NPG	31.47	34.45	34.38	36.99	140.96	46.19
			(0.65)	(0.14)	(0.15)	(0.04)	(0.00)	(0.00)
351	NPG	NPG	34.23	39.99	40.50	47.21	59.23	37.32
			(0.76)	(0.04)	(0.03)	(0.00)	(0.00)	(0.16)
352	NPG	NPG	28.21	32.82	30.23	33.63	128.26	42.23
			(0.65)	(0.06)	(0.23)	(0.04)	(0.00)	(0.00)
353	NPG	NPG	31.26	37.06	33.09	36.99	109.18	37.82
			(0.64)	(0.03)	(0.25)	(0.03)	(0.00)	(0.02)
354	NPG	NPG	32.76	42.85	33.95	39.28	72.42	43.79
			(0.62)	(0.00)	(0.34)	(0.02)	(0.00)	(0.00)
355	NPG	NPG	29.61	37.86	36.06	46.02	142.27	43.24
			(0.94)	(0.01)	(0.03)	(0.00)	(0.00)	(0.00)
356	NPG	NPG	30.89	33.34	34.90	39.80	47.06	35.04
			(0.63)	(0.18)	(0.08)	(0.00)	(0.00)	(0.08)
357	NPG	NPG	31.68	39.18	36.67	36.86	85.24	37.26
			(0.80)	(0.01)	(0.06)	(0.06)	(0.00)	(0.04)
358	NPG	NPG	32.52	39.54	33.86	97.07	35.67	42.44
			(0.56)	(0.01)	(0.29)	(0.00)	(0.11)	(0.00)
359	SQG	NPG	31.50	34.53	34.45	42.62	50.46	47.03
			(0.68)	(0.15)	(0.15)	(0.00)	(0.00)	(0.00)
360	NPG	NPG	29.46	37.69	31.63	30.25	38.41	38.13
			(0.48)	(0.00)	(0.16)	(0.32)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
361	NPG	NPG	34.11	46.04	39.65	73.30	403.08	51.26
			(0.93)	(0.00)	(0.05)	(0.00)	(0.00)	(0.00)
362	SQG	LQG	34.30	45.24	34.70	39.20	29.66	42.59
			(0.08)	(0.00)	(0.06)	(0.00)	(0.84)	(0.00)
363	SQG	FQG	31.69	30.06	30.64	107.78	36.03	36.64
			(0.19)	(0.43)	(0.32)	(0.00)	(0.02)	(0.01)
364	NPG	NPG	30.29	37.30	34.48	39.45	31.00	31.73
			(0.42)	(0.01)	(0.05)	(0.00)	(0.29)	(0.20)
365	NPG	NPG	28.60	35.49	35.17	36.16	95.24	42.32
			(0.91)	(0.02)	(0.03)	(0.02)	(0.00)	(0.00)
366	NPG	NPG	29.85	35.31	33.99	44.54	92.46	43.26
			(0.83)	(0.05)	(0.10)	(0.00)	(0.00)	(0.00)
367	NPG	NPG	29.54	31.58	32.07	34.31	48.33	33.59
			(0.53)	(0.19)	(0.15)	(0.04)	(0.00)	(0.07)
368	NPG	NPG	29.31	38.50	36.87	44.61	35.96	37.55
			(0.92)	(0.00)	(0.02)	(0.00)	(0.03)	(0.01)
369	SQG	NPG	29.81	30.17	32.67	38.83	33.00	36.12
			(0.42)	(0.35)	(0.10)	(0.00)	(0.08)	(0.01)
370	NPG	NPG	29.89	37.86	34.81	40.23	30.76	31.96
			(0.47)	(0.00)	(0.04)	(0.00)	(0.30)	(0.16)
371	FQG	NPG	31.69	35.49	38.09	34.26	107.34	34.78
			(0.68)	(0.10)	(0.02)	(0.04)	(0.00)	(0.14)
372	NPG	NPG	28.47	35.58	31.55	36.52	198.44	43.84
			(0.79)	(0.02)	(0.17)	(0.01)	(0.00)	(0.00)
373	NPG	NPG	29.72	37.07	32.32	33.18	52.84	37.93
			(0.67)	(0.01)	(0.18)	(0.11)	(0.00)	(0.01)
374	NPG	NPG	28.73	30.05	30.06	84.69	64.58	30.99
			(0.42)	(0.21)	(0.21)	(0.00)	(0.00)	(0.13)
375	NPG	NPG	30.02	34.95	31.53	38.00	46.87	40.16
			(0.63)	(0.05)	(0.29)	(0.01)	(0.00)	(0.00)
376	NPG	NPG	29.35	30.91	31.61	30.21	37.89	35.94
			(0.40)	(0.18)	(0.13)	(0.26)	(0.00)	(0.01)
377	FQG	LQG	33.41	33.91	35.61	45.89	33.30	46.66
			(0.31)	(0.24)	(0.10)	(0.00)	(0.33)	(0.00)
378	NPG	NPG	34.93	44.03	41.54	86.46	195.39	56.95
			(0.95)	(0.01)	(0.03)	(0.00)	(0.00)	(0.00)
379	NPG	NPG	29.29	31.11	31.93	33.58	40.40	34.79
			(0.53)	(0.21)	(0.14)	(0.06)	(0.00)	(0.03)
380	NPG	NPG	31.53	34.74	33.64	65.30	156.83	35.33
			(0.58)	(0.11)	(0.20)	(0.00)	(0.00)	(0.00)
381	NPG	NPG	32.91	40.25	36.37	58.28	68.79	42.73
			(0.82)	(0.02)	(0.14)	(0.00)	(0.00)	(0.00)
382	NPG	NPG	30.00	39.00	37.81	42.92	133.12	45.31
			(0.96)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
383	CPG	CPG	61.22	120.76	73.51	178.92	228.26	48.32
			(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.99)

Table Cl (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
384	SQG	NPG	28.41	29.58	29.78	82.97	70.91	30.86
			(0.42)	(0.23)	(0.21)	(0.00)	(0.00)	(0.12)
385	NPG	TQG	28.49	33.10	33.80	28.40	32.63	35.43
			(0.42)	(0.04)	(0.02)	(0.44)	(0.05)	(0.01)
386	TQG	NPG	27.33	31.50	31.29	31.08	134.01	33.86
			(0.68)	(0.08)	(0.09)	(0.10)	(0.00)	(0.02)
387	NPG	LQG	33.17	39.35	36.80	54.57	29.87	51.09
			(0.15)	(0.00)	(0.02)	(0.00)	(0.81)	(0.00)
388	NPG	NPG	29.33	33.19	36.01	35.23	115.44	33.33
			(0.73)	(0.10)	(0.02)	(0.03)	(0.00)	(0.09)
389	NPG	FQG	37.45	37.29	39.46	45.80	93.35	39.25
			(0.34)	(0.37)	(0.12)	(0.00)	(0.00)	(0.14)
390	FQG	FQG	38.30	36.10	39.61	163.183	145.488	57.57
			(0.22)	(0.66)	(0.11)	(0.11)	(0.00)	(0.00)
391	NPG	TQG	29.58	34.03	35.42	29.00	37.73	35.70
			(0.39)	(0.04)	(0.02)	(0.52)	(0.00)	(0.01)
392	NPG	NPG	30.91	37.57	33.62	39.56	156.36	38.20
			(0.75)	(0.02)	(0.19)	(0.00)	(0.00)	(0.01)
393	NPG	NPG	34.93	38.56	41.10	114.30	168.47	39.93
			(0.77)	(0.12)	(0.03)	(0.00)	(0.00)	(0.06)
394	NPG	NPG	28.72	31.91	31.47	31.81	39.34	29.53
			(0.42)	(0.08)	(0.10)	(0.09)	(0.00)	(0.28)
395	SQG	NPG	28.14	31.93	31.o7	32.23	62.95	32.90
			(0.62)	(0.09)	(0.13)	(0.08)	(0.00)	(0.05)
396	NPG	NPG	28.98	32.15	30.19	35.22	98.94	41.98
			(0.55)	(0.11)	(0.30)	(0.02)	(0.00)	(0.00)
397	NPG	NPG	33.57	35.30	33.57	107.12	54.07	37.36
			(0.38)	(0.16)	(0.38)	(0.00)	(0.00)	(0.05
398	NPG	LQG	31.61	33.05	34.53	45.58	29.09	40.29
			(0.19)	(0.09)	(0.04)	(0.00)	(0.67)	(0.00)
399	NPG	NPG	29.47	34.25	33.66	40.36	68.51	44.47
			(0.81)	(0.07)	(0.10)	(0.00)	(0.00)	(0.00)
400	CPG	NPG	31.61	33.34	34.15	55.82	107.50	33.81
			(0.49)	(0.20)	(0.13)	(0.00)	(0.00)	(0.16)
401	SQG	NPG	30.37	38.86	32.96	77.51	303.53	45.62
			(0.77)	(0.01)	(0.21)	(0.00)	(0.00)	(0.00)
402	NPG	NPG	28.23	28.97	29.92	31.32	28.65	32.88
			(0.30	(0.21)	(0.13)	(0.06)	(0.25)	(0.03)
403	NPG	NPG	34.21	35.87	36.37	38.18	70.12	46.24
			(0.52)	(0.22)	(0.17)	(0.07)	(0.00)	(0.00)
404	NPG	TQG	31.74	31.40	33.15	31.35	53.43	43.34
			(0.25)	(0.30)	(0.12)	(0.31)	(0.00)	(0.00)
405	NPG	NPG	28.50	35.94	31.84	35.98	186.87	44.49
			(0.80)	(0.01)	(0.15)	(0.01)	(0.00)	(0.00)
406	NPG	LQG	30.01	32.94	30.15	71.55	26.32	33.16
			(0.11)	(0.02)	(0.10)	(0.00)	(0.72)	(0.02)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
407	NPG	NPG	34.59 (0.90)	39.59 (0.07)	44.52 (0.00)	58.02 (0.00)	121.30 (0.00)	43.31 (0.01)
408	NPG	NPG	28.14 (0.91)	34.84 (0.03)	34.45 (0.03)	36.97 (0.01)	102.20 (0.00)	41.45 (0.00)
409	CPG	CPG	30.88 (0.27)	32.81 (0.10)	31.79 (0.17)	42.50 (0.00)	49.70 (0.00)	29.98 (0.43)
410	NPG	NPG	31.54 (0.66)	38.79 (0.01)	33.57 (0.24)	36.17 (0.06)	45.37 (0.00)	39.86 (0.01)
411	NPG	NPG	32.79 (0.87)	38.14 (0.06)	37.89 (0.06)	45.12 (0.00)	268.64 (0.00)	41.41 (0.00)
412	TQG	NPG	34.68 (0.50)	42.51 (0.01)	38.66 (0.06)	36.23 (0.23)	38.21 (0.08)	37.78 (0.10)
413	FQG	FQG	35.09 (0.11)	31.93 (0.57)	33.24 (0.29)	107.26 (0.00)	39.56 (0.01)	47.19 (0.00)
414	NPG	NPG	30.38 (0.83)	35.32 (0.07)	36.16 (0.04)	36.29 (0.04)	62.23 (0.00)	48.39 (0.00)
415	NPG	NPG	31.45 (0.75)	34.89 (0.13)	35.38 (0.10)	86.01 (0.00)	81.85 (0.00)	43.86 (0.00)
416	NPG	NPG	32.38 (0.52)	35.51 (0.11)	34.20 (0.21)	101.00 (0.00)	43.86 (0.00)	34.94 (0.14)
417	NPG	NPG	29.66 (0.88)	39.30 (0.00)	33.87 (0.10)	42.70 (0.00)	258.95 (0.00)	46.11 (0.00)
418	NPG	NPG	27.79 (0.73)	31.87 (0.09)	32.21 (0.08)	32.12 (0.08)	56.14 (0.00)	39.20 (0.00)
419	NPG	NPG	30.51 (0.75)	33.49 (0.16)	37.07 (0.02)	42.12 (0.00)	43.83 (0.00)	36.18 (0.04)
420	NPG	NPG	29.75 (0.68)	36.26 (0.02)	31.91 (0.23)	34.60 (0.06)	152.54 (0.00)	46.02 (0.00)
421	NPG	SQG	39.36 (0.04)	36.29 (0.19)	33.77 (0.67)	161.47 (0.00)	62.26 (0.00)	37.78 (0.09)
422	NPG	NPG	29.68 (0.36)	30.39 (0.25)	31.20 (0.17)	33.42 (0.05)	32.08 (0.11)	34.60 (0.03)
423	CPG	NPG	36.24 (0.54)	41.68 (0.03)	39.16 (0.12)	52.02 (0.00)	43.45 (0.01)	37.56 (0.28)
424	SQG	NPG	29.53 (0.62)	32.26 (0.15)	32.73 (0.12)	36.91 (0.01)	53.94 (0.00)	33.70 (0.07)
425	NPG	NPG	27.40 (0.81)	32.35 (0.06)	32.82 (0.05)	32.45 (0.06)	83.80 (0.00)	39.80 (0.00)
426	NPG	FQG	31.81 (0.17)	30.32 (0.36)	30.43 (0.34)	40.81 (0.00)	49.33 (0.00)	32.74 (0.10)
427	NPG	NPG	35.65 (0.79)	39.18 (0.13)	40.51 (0.06)	48.69 (0.00)	52.76 (0.00)	48.38 (0.00)
428	FQG	NPG	30.57 (0.31)	30.60 (0.31)	32.34 (0.13)	31.22 (0.23)	50.89 (0.00)	42.05 (0.00)
429	LQG	LQG	31.98 (0.09)	37.13 (0.00)	34.19 (0.03)	58.17 (0.00)	27.76 (0.81)	33.72 (0.04)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
430	FQG	NPG	27.60	31.35	31.08	32.83	56.00	34.17
			(0.69)	(0.10)	(0.12)	(0.05)	(0.00)	(0.02)
431	NPG	NPG	37.83	41.96	38.79	156.12	53.98	46.39
			(0.56)	(0.07)	(0.35)	(0.00)	(0.00)	(0.00)
432	NPG	NPG	33.40	34.89	33.91	59.74	36.18	34.14
			(0.31)	(0.14)	(0.24)	(0.00)	(0.07)	(0.21)
433	NPG	NPG	31.37	32.31	33.58	65.28	67.77	33.40
			(0.43)	(0.26)	(0.14)	(0.00)	(0.00)	(0.15)
434	NPG	NPG	33.94	44.59	41.44	63.84	249.98	49.82
			(0.97)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
435	TQG	TQG	32.35	36.88	34.44	30.95	59.27	38.69
			(0.28)	(0.02)	(0.10)	(0.57)	(0.00)	(0.01)
436	NPG	SQG	34.48	37.56	33.82	101.22	206.05	48.83
			(0.38)	(0.08)	(0.53)	(0.00)	(0.00)	(0.00)
437	NPG	NPG	31.33	36.90	35.51	70.83	146.28	34.69
			(0.72)	(0.04)	(0.09)	(0.00)	(0.00)	(0.13)
438	NPG	NPG	32.69	43.08	37.34	65.01	146.11	41.49
			(0.89)	(0.00)	(0.08)	(0.00)	(0.00)	(0.01)
439	FQG	NPG	30.90	48.65	36.63	76.94	108.47	39.33
			(0.93)	(0.00)	(0.05)	(0.00)	(0.00)	(0.01)
440	NPG	NPG	33.84	37.59	37.43	99.56	67.62	41.68
			(0.74)	(0.11)	(0.12)	(0.00)	(0.00)	(0.01)
441	NPG	NPG	29.01	34.19	32.71	31.75	168.08	36.95
			(0.66)	(0.04)	(0.10)	(0.16)	(0.00)	(0.01)
442	NPG	NPG	28.47	31.45	30.43	75.38	97.93	33.97
			(0.60)	(0.13)	(0.22)	(0.00)	(0.00)	(0.03)
443	NPG	CPG	32.55	38.95	34.25	71.98	72.06	32.06
			(0.36)	(0.01)	(0.15)	(0.00)	(0.00)	(0.46)
444	SQG	NPG	33.26	34.45	36.51	44.54	162.38	51.86
			(0.57)	(0.31)	(0.11)	(0.00)	(0.00)	(0.00)
445	NPG	NPG	31.53	35.22	35.18	38.31	191.49	47.16
			(0.73)	(0.11)	(0.11)	(0.02)	(0.00)	(0.00)
446	NPG	NPG	32.37	34.87	35.67	49.67	38.09	37.91
			(0.62)	(0.17)	(0.12)	(0.00)	(0.03)	(0.03)
447	NPG	NPG	30.46	37.85	33.64	77.58	318.34	43.83
			(0.81)	(0.02)	(0.16)	(0.00)	(0.00)	(0.00)
448	NPG	NPG	29.34	34.59	33.68	42.65	81.43	43.42
			(0.84)	(0.06)	(0.09)	(0.00)	(0.00)	(0.00)
449	NPG	NPG	32.79	35.13	36.38	55.97	124.25	36.21
			(0.60)	(0.18)	(0.10)	(0.00)	(0.00)	(0.10)
450	SQG	NPG	35.87	43.15	38.43	69.02	37.53	53.69
			(0.57)	(0.01)	(0.15)	(0.00)	(0.25)	(0.00)
451	NPG	NPG	33.53	38.15	38.84	41.54	64.00	48.54
			(0.84)	(0.08)	(0.05)	(0.01)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
452	NPG	NPG	30.86	40.56	32.21	40.54	80.16	42.68
			(0.65)	(0.00)	(0.33)	(0.00)	(0.00)	(0.00)
453	NPG	NPG	32.38	33.44	35.04	55.11	117.33	35.21
			(0.47)	(0.28)	(0.12)	(0.00)	(0.00)	(0.11)
454	FQG	FQG	29.88	46.17	35.56	94.09	58.53	35.32
			(0.88)	(0.00)	(0.05)	(0.00)	(0.00)	(0.05)
455	NPG	NPG	28.70	32.43	32.48	37.65	66.31	41.84
			(0.75)	(0.11)	(0.11)	(0.00)	(0.00)	(0.00)
456	NPG	NPG	29.65	38.96	34.89	69.73	32.72	34.69
			(0.72)	(0.00)	(0.05)	(0.00)	(0.15)	(0.05)
457	NPG	NPG	28.51	35.22	33.70	34.76	216.90	36.16
			(0.85)	(0.02)	(0.06)	(0.03)	(0.00)	(0.01)
458	NPG	NPG	27.94	32.63	32.93	31.98	60.00	39.93
			(0.76)	(0.07)	(0.06)	(0.10)	(0.00)	(0.00)
459	SQG	NPG	30.50	35.42	32.68	35.31	92.42	34.31
			(0.60)	(0.05)	(0.20)	(0.05)	(0.00)	(0.08)
460	NPG	NPG	31.50	34.29	35.07	47.56	33.44	39.25
			(0.55)	(0.13)	(0.09)	(0.00)	(0.20)	(0.11)
461	CPG	NPG	28.17	33.09	31.30	31.47	30.26	31.23
			(0.48)	(0.04)	(0.10)	(0.09)	(0.17)	(0.10)
462	NPG	NPG	31.31	39.85	37.01	57.87	67.63	37.51
			(0.89)	(0.01)	(0.05)	(0.00)	(0.00)	(0.04)
463	NPG	NPG	38.90	61.56	44.72	77.06	393.38	54.87
			(0.94)	(0.00)	(0.05)	(0.00)	(0.00)	(0.00)
464	NPG	NPG	30.10	33.11	31.46	66.51	152.08	35.45
			(0.55)	(0.12)	(0.28)	(0.00)	(0.00)	(0.03)
465	NPG	NPG	40.21	56.68	48.94	80.33	137.60	51.20
			(0.98)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
466	NPG	NPG	33.76	45.16	38.27	67.69	42.08	37.21
			(0.76)	(0.00)	(0.08)	(0.00)	(0.01)	(0.13)
467	NPG	NPG	31.74	34.68	40.49	48.44	62.84	40.45
			(0.79)	(0.18)	(0.01)	(0.00)	(0.00)	(0.01)
468	NPG	NPG	28.57	34.90	31.55	36.24	190.31	42.40
			(0.77)	(0.03)	(0.17)	(0.01)	(0.00)	(0.00)
469	CPG	LQG	33.29	38.45	38.42	101.65	24.89	39.76
			(0.01)	(0.00)	(0.00)	(0.00)	(0.98)	(0.00)
470	NPG	SQG	32.41	33.18	31.20	85.13	33.33	36.13
			(0.23)	(0.15)	(0.42)	(0.00)	(0.14)	(0.03)
471	NPG	NPG	35.48	85.64	56.99	78.44	91.95	55.73
			(0.99)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
472	NPG	NPG	29.39	32.15	30.11	35.96	86.45	42.43
			(0.50)	(0.12)	(0.35)	(0.01)	(0.00)	(0.00)
473	NPG	NPG	31.311	36.45	38.33	36.03	104.91	50.43
			(0.83)	(0.06)	(0.02)	(0.07)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
474	NPG	NPG	30.34	41.55	34.21	40.78	89.32	42.39
			(0.86)	(0.00)	(0.12)	(0.00)	(0.00)	(0.00)
475	FQG	NPG	33.25	37.48	37.07	40.12	59.46	38.11
			(0.72)	(0.08)	(0.10)	(0.02)	(0.00)	(0.06)
476	LQG	NPG	27.54	34.58	31.08	28.38	27.76	34.32
			(0.35)	(0.01)	(0.06)	(0.23)	(0.32)	(0.01)
477	NPG	NPG	28.73	36.30	35.73	39.41	30.80	36.73
			(0.69)	(0.01)	(0.02)	(0.00)	(0.24)	(0.01)
478	NPG	NPG	29.23	37.20	36.18	42.36	35.29	37.25
			(0.89)	(0.01)	(0.02)	(0.00)	(0.04)	(0.01)
479	FQG	FQG	32.19	31.96	32.50	79.86	47.65	32.22
			(0.25)	(0.28)	(0.21)	(0.00)	(0.00)	(0.24)
480	NPG	NPG	32.36	33.62	35.19	41.82	40.80	45.66
			(0.55)	(0.29)	(0.13)	(0.00)	(0.00)	().00)
481	NPG	NPG	31.02	33.97	34.42	52.14	45.49	34.21
			(0.61)	(0.14)	(0.11)	(0.00)	(0.00)	(0.12)
482	SQG	NPG	29.46	38.91	32.47	32.58	38.87	41.52
			(0.68)	(0.00)	(0.15)	(0.14)	(0.00)	(0.00)
483	FQG	NPG	35.59	39.84	41.66	72.66	87.32	43.07
			(0.83)	(0.10)	(0.04)	(0.00)	(0.00)	(0.02)
484	NPG	NPG	30.27	34.79	34.55	42.61	37.33	47.63
			(0.79)	(0.08)	(0.09)	(0.00)	(0.02)	(0.00)
485	NPG	FQG	29.56	29.25	30.60	31.61	32.49	37.99
			(0.29)	(0.34)	(0.17)	(0.10)	(0.06)	(0.00)
486	NPG	NPG	29.14	34.30	33.35	33.82	118.79	31.99
			(0.65)	(0.04)	(0.07)	(0.06)	(0.00)	(0.15)
487	TQG	NPG	29.79	34.49	30.39	34.22	101.13	44.54
			(0.51)	(0.04)	(0.38)	(0.05)	(0.00)	(0.00)
488	NPG	NPG	30.89	32.88	32.10	78.01	101.73	44.94
			(0.52)	(0.19)	(0.28)	(0.00)	(0.00)	(0.00)
489	SQG	LQG	28.83	35.66	33.25	36.92	25.19	33.63
			(0.13)	(0.00)	(0.01)	(0.00)	(0.83)	(0.01)
490	NPG	LQG	33.23	36.06	36.57	37.93	31.57	42.29
			(0.26)	(0.06)	(0.04)	(0.02)	(0.59)	(0.00)
491	NPG	CPG	33.75	33.84	33.12	39.58	59.25	32.00
			(0.17)	(0.16)	(0.23)	(0.00)	(0.00)	(0.41)
492	NPG	NPG	34.27	51.23	36.92	62.40	186.46	50.21
			(0.00)	(0.00)	(0.21)	(0.00)	(0.00)	(0.00)
493	NPG	NPG	34.82	46.81	43.39	63.93	243.37	52.37
			(0.98)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
494	NPG	NPG	33.850	43.77	35.25	38.65	46.75	44.93
			(0.62)	(0.00)	(0.31)	(0.05)	(0.00)	(0.00)
495	NPG	NPG	39.82	44.83	41.37	40.28	64.76	41.00
			(0.34)	(0.02)	(0.15)	(0.27)	(0.00)	(0.19)
496	SQG	LQG	33.09	61.61	45.73	46.72	33.02	54.42
			(0.49)	(0.00)	(0.00)	(0.00)	(0.50)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
497	NPG	NPG	34.05	40.56	41.78	38.17	279.10	41.14
			(0.82)	(0.03)	(0.01)	(0.10)	(0.00)	(0.02)
498	NPG	LQG	31.71	36.52	34.86	35.40	29.84	32.74
			(0.21)	(0.01)	(0.04)	(0.03)	(0.55)	(0.12)
499	NPG	SQG	49.01	52.32	42.86	48.10	76.05	47.51
			(0.03)	(0.00)	(0.81)	(0.05)	(0.00)	(0.07)
500	SQG	SQG	33.68	39.96	33.47	86.28	64.24	42.48
			(0.46)	(0.02)	(0.51)	(0.00)	(0.00)	(0.00)
501	CPG	NPG	28.93	33.41	32.63	30.19	44.94	30.47
			(0.44)	(0.04)	(0.06)	(0.23)	(0.00)	(0.20)
502	NPG	FQG	35.22	33.23	35.45	43.27	48.42	43.97
			(0.21)	(0.58)	(0.19)	(0.00)	(0.00)	(0.00)
503	NPG	NPG	32.48	37.71	33.94	62.35	37.78	34.33
			(0.49)	(0.03)	(0.23)	(0.00)	(0.03)	(0.19)
504	NPG	NPG	27.70	32.35	30.16	32.87	140.56	39.41
			(0.68)	(0.06)	(0.19)	(0.05)	(0.00)	(0.00)
505	SQG	LQG	32.50	44.08	35.99	51.99	31.93	45.66
			(0.39)	(0.00)	(0.06)	(0.00)	(0.53)	(0.00)
506	NPG	NPG	32.34	38.79	35.65	67.47	190.50	36.07
			(0.72)	(0.02)	(0.13)	(0.00)	(0.00)	(0.11)
507	NPG	NPG	28.45	29.35	29.83	31.84	34.30	31.46
			(0.38)	(0.24)	(0.19)	(0.07)	(0.02)	(0.08)
508	NPG	NPG	30.68	31.65	32.09	31.18	41.74	34.68
			(0.33)	(0.20)	(0.16)	(0.25)	(0.00)	(0.04)
509	NPG	NPG	35.12	40.91	42.04	60.13	48.95	38.53
			(0.78)	(0.04)	(0.02)	(0.00)	(0.00)	(0.14)
510	NPG	NPG	28.64	35.94	35.46	38.35	30.06	36.51
			(0.63)	(0.01)	(0.02)	(0.00)	(0.31)	(0.01)
511	NPG	NPG	29.83	32.28	32.37	35.54	36.20	39.93
			(0.59)	(0.17)	(0.16)	(0.03)	(0.02)	(0.00)
512	NPG	NPG	34.26	37.56	38.46	55.15	155.94	38.51
			(0.69)	(0.13)	(0.08)	(0.00)	(0.00)	(0.08)
513	NPG	NPG	33.64	39.10	38.91	95.30	139.82	51.16
			(0.87)	(0.05)	(0.06)	(0.00)	(0.00)	(0.00)
514	NPG	NPG	29.65	35.59	31.21	58.51	32.43	32.25
			(0.49)	(0.02)	(0.22)	(0.00)	(0.12)	(0.13)
515	NPG	NPG	36.66	40.22	41.17	39.79	41.25	42.33
			(0.67)	(0.00)	(0.07)	(0.14)	(0.06)	(0.03)
516	NPG	NPG	33.76	39.58	39.61	59.13	128.53	39.76
			(0.86)	(0.04)	(0.04)	(0.00)	(0.00)	(0.04)
517	NPG	LQG	33.90	83.83	52.13	106.65	31.79	44.74
			(0.25)	(0.00)	(0.00)	(0.00)	(0.74)	(0.00)
518	NPG	NPG	28.19	33.34	33.43	31.87	165.04	34.85
			(0.74)	(0.05)	(0.05)	(0.11)	(0.00)	(0.02)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
519	NPG	NPG	33.53	42.98	42.02	62.19	61.53	41.59
			(0.96)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)
520	NPG	FQG	34.71	31.47	33.14	105.68	42.56	46.87
			(0.12)	(0.61)	(0.26)	(0.00)	(0.00)	(0.00)
521	NPG	NPG	28.15	34.18	34.15	34.16	81.57	41.19
			(0.86)	(0.04)	(0.04)	(0.04)	(0.00)	(0.00)
522	NPG	NPG	32.44	35.37	34.04	38.46	39.15	39.67
			(0.55)	(0.12)	(0.25)	(0.02)	(0.01)	(0.01)
523	SQG	NPG	32.16	34.20	33.60	36.76	54.20	35.51
			(0.46)	(0.16)	(0.22)	(0.04)	(0.00)	(0.08)
524	FQG	FQG	34.75	32.36	35.68	37.08	75.75	44.44
			(0.19)	(0.62)	(0.11)	(0.05)	(0.00)	(0.00)
525	NPG	NPG	32.15	32.84	33.93	68.83	69.25	33.36
			(0.37)	(0.26)	(0.15)	(0.00)	(0.00)	(0.20)
526	NPG	NPG	31.69	36.37	38.25	39.45	106.11	33.97
			(0.67)	(0.06)	(0.02)	(0.01)	(0.00)	(0.21)
527	NPG	NPG	31.17	39.24	35.27	61.62	50.45	40.14
			(0.86)	(0.01)	(0.11)	(0.00)	(0.00)	(0.00)
528	NPG	NPG	28.30	29.59	28.98	86.38	52.89	32.97
			(0.42)	(0.22)	(0.30)	(0.00)	(0.00)	(0.04)
529	NPG	NPG	30.97	32.05	32.40	36.32	57.77	35.14
			(0.44)	(0.25)	(0.21)	(0.03)	(0.00)	(0.05)
530	CPG	NPG	32.08	34.79	34.24	55.35	121.48	35.47
			(0.56)	(0.14)	(0.19)	(0.00)	(0.00)	(0.10)
531	NPG	NPG	27.73	32.15	32.73	32.29	135.80	32.65
			(0.72)	(0.07)	(0.05)	(0.07)	(0.00)	(0.06)
532	NPG	NPG	31.87	36.66	39.99	36.89	132.71	35.67
			(0.74)	(0.06)	(0.01)	(0.06)	(0.00)	(0.11)
533	TQG	NPG	30.86	31.57	32.94	32.91	38.36	39.46
			(0.40)	(0.28)	(0.14)	(0.14)	(0.00)	(0.00)
534	NPG	NPG	27.22	29.92	30.12	29.01	31.78	30.25
			(0.45)	(0.11)	(0.10)	(0.18)	(0.04)	(0.09)
535	FQG	NPG	27.90	33.61	33.69	33.22	78.71	40.49
			(0184)	(0.04)	(0.04)	(0.05)	(0.00)	(0.00)
536	NPG	NPG	27.92	35.00	32.02	34.92	199.06	39.87
			(0.84)	(0.02)	(0.10)	(0.02)	(0.00)	(0.00)
537	FQG	FQG	37.79	35.12	35.24	83.91	42.23	40.12
			(0.11)	(0.43)	(0.40)	(0.00)	(0.01)	(0.03)
538	TQG	TQG	33.43	36.58	35.42	31.84	31.88	37.44
			(0.16)	(0.03)	(0.06)	(0.36)	(0.35)	(0.02)
539	NPG	FQG	28.82	28.58	28.95	92.40	48.50	32.47
			(0.31)	(0.34)	(0.29)	(0.00)	(0.00)	(0.05)
540	NPG	NPG	29.15	37.16	36.31	40.10	117.88	43.61
			(0.95)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)
541	NPG	LQG	39.08	41.33	43.32	113.11	31.35	48.03
			(0.02)	(0.00)	(0.00)	(0.00)	(0.97)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
542	NPG	NPG	30.33	35.22	35.57	35.62	85.73	45.66
			(0.81)	(0.07)	(0.05)	(0.05)	(0.00)	(0.00)
543	NPG	NPG	28.82	29.57	29.28	80.64	71.38	35.44
			(0.39)	(0.27)	(0.31)	(0.00)	(0.00)	(0.01)
544	NPG	NPG	35.50	51.67	39.77	100.22	136.24	36.23
			(0.55)	(0.00)	(0.06)	(0.00)	(0.00)	(0.38)
545	NPG	NPG	29.90	35.67	34.82	33.17	55.18	31.46
			(0.55)	(0.03)	(0.04)	(0.10)	(0.00)	(0.25)
546	NPG	SQG	36.95	37.10	36.19	99.71	79.34	41.18
			(0.28)	(0.26)	(0.41)	(0.00)	(0.00)	(0.03)
547	SQG	SQG	34.45	33.73	32.68	108.21	71.08	33.96
			(0.16)	(0.23)	(0.39)	(0.00)	(0.00)	(0.20)
548	NPG	NPG	29.63	30.57	31.79	29.73	44.36	37.30
			(0.34)	(0.21)	(0.11)	(0.32)	(0.00)	(0.00)
549	SQG	NPG	30.21	32.05	31.85	106.53	42.10	32.15
			(0.45)	(0.17)	(0.19)	(0.00)	(0.00)	(0.17)
550	FQG	NPG	33.01	34.98	35.10	33.05	47.02	36.77
			(0.35)	(0.13)	(0.12)	(0.34)	(0.00)	(0.05)
551	NPG	NPG	31.57	35.51	35.44	48.02	72.o0	41.93
			(0.77)	(0.10)	(0.11)	(0.00)	(0.00)	(0.00)
552	FQG	LQG	33.93	34.92	35.79	52.68	31.78	39.83
			(0.20)	(0.12)	(0.07)	(0.00)	(0.58)	(0.01)
553	FQG	LQG	28.67	33.39	32.41	32.56	25.92	35.27
			(0.18)	(0.01)	(0.02)	(0.02)	(0.73)	(0.00)
554	NPG	FQG	32.54	31.70	34.37	39.11	42.89	41.66
			(0.33)	(0.51)	(0.13)	(0.01)	(0.00)	(0.00)
555	NPG	NPG	27.57	31.55	31.18	30.28	45.52	30.46
			(0.55)	(0.07)	(0.09)	(0.14)	(0.00)	(0.13)
556	NPG	NPG	30.78	33.33	34.66	37.01	52.99	45.00
			(0.68)	(0.19)	(0.09)	(0.03)	(0.00)	(0.00)
557	SQG	SQG	31.53	34.36	31.18	76.72	40.06	32.53
			(0.32)	(0.07)	(0.39)	(0.00)	(0.00)	(0.19)
558	NPG	NPG	32.45	41.45	33.33	37.79	34.10	41.08
			(0.45)	(0.00)	(0.29)	(0.03)	(0.20)	(0.00)
559	NPG	CPG	48.02	43.90	43.80	56.54	194.22	42.58
			(0.03)	(0.24)	(0.25)	(0.00)	(0.00)	(0.47)
560	NPG	NPG	33.25	41.95	39.56	64.99	220.17	47.47
			(0.94)	(0.01)	(0.04)	(0.00)	(0.00)	(0.00)
561	NPG	NPG	29.65	30.30	30.31	34.70	40.29	30.24
			(0.30)	(0.22)	(0.21)	(0.02)	(0.00)	(0.22)
562	NPG	LQG	34.00	39.15	40.48	95.29	29.06	43.16
			(0.07)	(0.00)	(0.00)	(0.00)	(0.91)	(0.00)
563	NPG	NPG	30.15	35.20	31.68	62.04	30.21	32.06
			(0.34)	(0.02)	(0.16)	(0.00)	(0.33)	(0.13)
564	NPG	NPG	36.73	38.88	37.69	79.68	44.61	37.84
			(0.39)	(0.13)	(0.24)	(0.00)	(0.00)	(0.22)

Table Cl (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
565	SQG	NPG	33.35	36.45	38.37	38.61	55.20	40.31
			(0.71)	(0.15)	(0.05)	(0.05)	(0.00)	(0.02)
566	NPG	NPG	29.05	31.11	31.21	81.93	82.29	31.65
			(0.50)	(0.18)	(0.17)	(0.00)	(0.00)	(0.13)
567	NPG	NPG	31.49	37.53	33.86	39.69	156.45	37.99
			(0.70)	(0.03)	(0.21)	(0.01)	(0.00)	(0.02)
568	NPG	NPG	31.92	36.25	38.42	55.30	39.06	39.34
			(0.82)	(0.09)	(0.03)	(0.00)	(0.02)	(0.02)
569	NPG	CPG	36.90	37.13	34.03	43.05	80.83	32.29
			(0.06)	(0.05)	(0.26)	(0.00)	(0.00)	(0.62)
570	NPG	NPG	31.15	41.76	35.96	50.42	62.56	35.14
			(0.81)	(0.00)	(0.07)	(0.00)	(0.00)	(0.11)
571	NPG	NPG	37.00	39.30	40.55	41.46	122.00	37.64
			(0.43)	(0.13)	(0.07)	(0.04)	(0.00)	(0.31)
572	NPG	NPG	27.80	33.53	33.52	34.20	82.43	40.48
			(0.86)	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)
573	NPG	NPG	30.49	33.54	33.07	30.92	41.98	34.82
			(0.41)	(0.08)	(0.11)	(0.33)	(0.00)	(0.04)
574	NPG	NPG	29.30	37.98	37.06	44.11	35.06	37.90
			(0.90)	(0.01)	(0.01)	(0.00)	(0.05)	(0.01)
575	NPG	NPG	30.26	34.53	31.40	84.85	37.74	32.61
			(0.49)	(0.05)	(0.27)	(0.00)	(0.01)	(0.15)
576	TQG	NPG	29.43	32.74	32.35	34.93	42.40	29.89
			(0.43)	(0.08)	(0.10)	(0.02)	(0.00)	(0.34)
577	NPG	NPG	31.82	42.69	33.90	37.65	64.23	42.09
			(0.70)	(0.00)	(0.24)	(0.03)	(0.00)	(0.00)
578	NPG	TQG	36.90	35.43	35.97	34.74	52.44	42.58
			(0.13)	(0.27)	(0.20)	(0.38)	(0.00)	(0.00)
579	NPG	NPG	31.70	42.93	35.73	35.56	40.88	36.12
			(0.71)	(0.00)	(0.09)	(0.10)	(0.00)	(0.07)
580	CPG	NPG	29.09	33.99	33.48	32.53	44.59	30.47
			(0.53)	(0.04)	(0.05)	(0.09)	(0.00)	(0.26)
581	NPG	NPG	30.88	32.93	34.99	45.53	76.36	33.65
			(0.57)	(0.20)	(0.07)	(0.00)	(0.00)	(0.14)
582	NPG	LQG	135.01	1071.16	501.09	866.44	79.28	318.10
			(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)
583	NPG	CPA	42.86	45.85	38.08	117.68	89.84	33.03
			(0.00)	(0.00)	(0.07)	(0.00)	(0.00)	(0.91)
584	NPG	TQG	31.37	34.39	35.56	30.09	63.90	36.62
			(0.30)	(0.06)	(0.03)	(0.57)	(0.00)	(0.02)
585	SQG	NPG	36.34	38.12	36.74	58.15	49.35	43.56
			(0.44)	(0.18)	(0.36)	(0.00)	(0.00)	(0.01)
586	NPG	NPG	34.13	40.04	35.41	54.65	158.03	35.98
			(0.50)	(0.02)	(0.26)	(0.00)	(0.00)	(0.20)
587	FQG	NPG	28.53	30.23	30.02	83.34	69.38	31.73
			(0.47)	(0.20)	(0.22)	(0.00)	(0.00)	(0.09)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
588	NPG	NPG	30.35	35.03	34.45	35.67	83.74	45.43
			(0.80)	(0.07)	(0.06)	(0.05)	(0.00)	(0.00)
589	FQG	NPG	31.57	34.62	34.40	37.10	151.32	45.78
			(0.65)	(0.14)	(0.15)	(0.04)	(0.00)	(0.00)
590	NPG	FQG	31.33	30.45	32.82	31.68	40.97	42.68
			(0.25)	(0.39)	(0.12)	(0.21)	(0.00)	(0.00)
591	NPG	NPG	36.04	40.60	40.90	54.30	115.97	41.75
			(0.80)	(0.08)	(0.07)	(0.00)	(0.00)	(0.04)
592	NPG	NPG	30.23	34.21	32.01	71.91	35.27	32.59
			(0.51)	(0.07)	(0.21)	(0.00)	(0.04)	(0.15)
593	LQG	LQG	32.06	38.88	32.82	37.35	27.76	38.20
			(0.09)	(0.00)	(0.06)	(0.00)	(0.82)	(0.00)
594	NPG	NPG	29.16	36.10	31.12	33.21	61.95	36.35
			(0.63)	(0.01)	(0.23)	(0.08)	(0.00)	(0.01)
595	NPG	NPG	30.07	34.58	36.14	35.11	71.73	48.46
			(0.81)	(0.08)	(0.03)	(0.06)	(0.00)	(0.00)
596	FQG	FQG	29.44	29.39	31.16	29.71	35.10	38.09
			(0.29)	(0.30)	(0.12)	(0.25)	(0.01)	(0.00)
597	SQG	FQG	32.26	31.84	34.52	38.55	45.35	41.32
			(0.38)	(0.47)	(0.12)	(0.01)	(0.00)	(0.00)
598	NPG	NPG	31.62	37.65	33.97	40.09	160.37	38.05
			(0.70)	(0.03)	(0.21)	(0.01)	(0.00)	(0.02)
599	TQG	TQG	29.74	33.56	34.07	28.23	45.23	36.51
			(0.29)	(0.04)	(0.03)	(0.62)	(0.01)	(0.00)
600	NPG	NPG	30.99	35.67	36.23	35.02	74.68	47.58
			(0.76)	(0.07)	(0.05)	(0.10)	(0.00)	(0.00)
601	NPG	NPG	27.69	31.97	31.40	32.29	55.69	31.98
			(0.67)	(0.07)	(0.10)	(0.06)	(0.00)	(0.07)
602	NPG	LQG	30.52	32.54	34.02	43.98	26.03	37.93
			(0.09)	(0.03)	(0.01)	(0.00)	(0.85)	(0.00)
603	NPG	NPG	30.79	37.61	37.19	35.52	84.99	44.47
			(0.85)	(0.02)	(0.03)	(0.08)	(0.00)	(0.00)
604	NPG	NPG	28.34	33.51	33.17	36.47	97.18	39.81
			(0.84)	(0.06)	(0.07)	(0.01)	(0.00)	(0.00)
605	NPG	NPG	32.09	44.46	36.41	41.49	41.16	34.87
			(0.72)	(0.00)	(0.08)	(0.00)	(0.00)	(0.18)
606	NPG	NPG	30.98	35.90	36.77	38.93	88.15	33.73
			(0.70)	(0.06)	(0.03)	(0.01)	(0.00)	(0.17)
607	NPG	TQG	29.44	33.47	33.37	28.27	49.55	35.63
			(0.32)	(0.04)	(0.04)	(0.57)	(0.00)	(0.01)
608	NPG	NPG	31.62	39.66	36.87	56.60	75.74	37.97
			(0.88)	(0.01)	(0.06)	(0.00)	(0.00)	(0.03)
609	NPG	SQG	33.27	37.05	32.96	99.46	199.31	48.82
			(0.43)	(0.06)	(0.50)	(0.00)	(0.00)	(0.00)
610	SQG	NPG	29.66	41.06	31.62	31.08	39.46	33.53
			(0.39)	(0.19)	(0.14)	(0.19)	(0.00)	(0.05)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
611	NPG	NPG	31.55	34.41	34.27	37.04	134.50	45.96
			(0.64)	(0.15)	(0.16)	(0.04)	(0.00)	(0.00)
612	LQG	LQG	31.03	41.42	37.51	36.78	27.76	36.05
			(0.15)	(0.00)	(0.00)	(0.00)	(0.81)	(0.01)
613	NPG	TQG	30.80	34.50	34.48	29.01	48.76	37.59
			(0.26)	(0.04)	(0.04)	(0.64)	(0.00)	(0.00)
614	NPG	LQG	30.09	31.10	33.55	41.15	29.52	36.66
			(0.31)	(0.19)	(0.05)	(0.00)	(0.42)	(0.01)
615	NPG	TQG	30.76	30.92	32.25	29.51	30.34	37.44
			(0.18)	(0.16)	(0.08)	(0.33)	(0.22)	(0.00)
616	NPG	LQG	30.25	38.75	36.25	33.99	24.39	35.29
			(0.05)	(0.00)	(0.00)	(0.00)	(0.93)	(0.00)
617	NPG	NPG	34.20	51.13	39.55	57.41	252.52	44.93
			(0.93)	(0.00)	(0.06)	(0.00)	(0.00)	(0.00)
618	NPG	NPG	29.86	31.43	32.07	31.09	36.78	37.65
			(0.42)	(0.19)	(0.13)	(0.22)	(0.01)	(0.00)
619	NPG	NPG	29.95	35.48	34.48	34.29	66.63	31.95
			(0.60)	(0.03)	(0.06)	(0.06)	(0.00)	(0.22)
620	NPG	NPG	29.79	33.50	32.34	40.67	38.18	30.60
			(0.47)	(0.07)	(0.13)	(0.00)	(0.00)	(0.31)
621	TQG	NPG	33.60	44.86	35.74	35.71	52.52	42.95
			(0.58)	(0.00)	(0.20)	(0.20)	(0.00)	(0.00)
622	NPG	NPG	38.42	39.39	43.90	126.39	287.11	60.41
			(0.59)	(0.36)	(0.03)	(0.00)	(0.00)	(0.00)
623	NPG	LQG	28.97	34.87	33.26	34.61	27.20	30.68
			(0.24)	(0.01)	(0.02)	(0.01)	(0.59)	(0.10)
624	NPG	NPG	30.71	35.82	38.62	33.96	183.26	36.39
			(0.73)	(0.05)	(0.01)	(0.14)	(0.00)	(0.04)
625	NPG	NPG	32.10	32.20	32.30	57.87	91.61	35.43
			(0.32)	(0.31)	(0.29)	(0.00)	(0.00)	(0.06)
626	NPG	NPG	29.10	33.13	32.72	32.06	44.87	30.30
			(0.48)	(0.06)	(0.07)	(0.10)	(0.00)	(0.26)
627	SQG	TQG	30.68	31.16	31.22	29.89	32.86	33.01
			(0.21)	(0.16)	(0.16)	(0.31)	(0.07)	(0.06)
628	NPG	LQG	31.57	36.00	35.91	52.70	25.06	40.56
			(0.03)	(0.00)	(0.00)	(0.00)	(0.95)	(0.00)
629	NPG	NPG	35.39	79.43	51.70	86.46	45.19	47.42
			(0.98)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
630	NPG	NPG	31.04	41.22	35.19	36.26	35.12	43.60
			(0.74)	(0.00)	(0.09)	(0.05)	(0.09)	(0.00)
631	NPG	NPG	27.66	32.29	32.49	32.88	68.10	39.39
			(0.79)	(0.07)	(0.07)	(0.05)	(0.00)	(0.00)
632	NPG	NPG	30.36	48.49	35.62	64.56	43.76	34.30
			(0.82)	(0.00)	(0.05)	(0.00)	(0.00)	(0.11)
633	NPG	NPG	31.27	37.64	33.62	71.30	141.71	45.80
			(0.74)	(0.03)	(0.22)	(0.00)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
634	NPG	LQG	29.93	35.85	34.27	35.50	25.54	39.25
			(0.09)	(0.00)	(0.01)	(0.00)	(0.87)	(0.00)
635	NPG	NPG	28.85	37.37	32.71	38.58	218.28	45.15
			(0.85)	(0.01)	(0.12)	(0.00)	(0.00)	(0.00)
636	NPG	NPG	33.98	36.69	38.63	40.29	62.77	40.85
			(0.69)	(0.17)	(0.06)	(0.02)	(0.00)	(0.02)
637	SQG	NPG	31.07	32.00	31.87	81.93	81.18	44.95
			(0.43)	(0.27)	(0.29)	(0.00)	(0.00)	(0.00)
638	NPG	NPG	31.39	35.33	35.42	37.88	190.86	47.55
			(0.76)	(0.10)	(0.10)	(0.02)	(0.00)	(0.00)
639	SQG	NPG	30.21	45.56	35.65	84.93	74.03	36.46
			(0.90)	(0.00)	(0.05)	(0.00)	(0.00)	(0.03)
640	NPG	NPG	35.82	103.99	63.290	130.14	43.12	48.69
			(0.97)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)
641	NPG	NPG	32.09	39.12	37.17	39.34	34.45	33.71
			(0.52)	(0.01)	(0.04)	(0.01)	(0.16)	(0.23)
642	SQG	CPG	32.35	41.64	34.87	82.86	45.72	31.42
			(0.34)	(0.00)	(0.09)	(0.00)	(0.00)	(0.55)
643	SQG	NPG	30.13	40.93	33.87	40.29	86.29	42.02
			(0.85)	(0.00)	(0.13)	(0.00)	(0.00)	(0.00)
644	NPG	NPG	34.64	36.54	39.12	89.65	302.74	51.39
			(0.66)	(0.25)	(0.07)	(0.00)	(0.00)	(0.00)
645	SQG	NPG	28.85	31.80	29.73	34.12	90.51	39.06
			(0.51)	(0.11)	(0.32)	(0.03)	(0.00)	(0.00)
646	NPG	NPG	28.77	31.77	32.02	33.50	44.70	39.23
			(0.65)	(0.14)	(0.12)	(0.06)	(0.00)	(0.00)
647	SQG	NPG	33.50	50.31	35.77	71.44	132.87	49.43
			(0.75)	(0.00)	(0.24)	(0.00)	(0.00)	(0.00)
648	NPG	NPG	37.51	44.23	42.66	54.12	40.71	51.14
			(0.76)	(0.02)	(0.05)	(0.00)	(0.15)	(0.00)
649	NPG	NPG	27.04	31.57	31.98	31.22	65.96	38.58
			(0.76)	(0.07)	(0.06)	(0.09)	(0.00)	(0.00)
650	NPG	NPG	29.40	38.16	35.06	38.81	33.96	37.04
			(0.83)	(0.01)	(0.04)	(0.00)	(0.08)	(0.01)
651	NPG	NPG	33.09	40.06	40.25	42.83	111.63	38.40
			(0.87)	(0.02)	(0.02)	(0.00)	(0.00)	(0.06)
652	NPG	NPG	29.09	35.50	34.95	36.52	74.35	34.03
			(0.83)	(0.03)	(0.04)	(0.02)	(0.00)	(0.07)
653	CPG	NPG	28.75	36.77	32.77	36.65	72.93	36.39
			(0.83)	(0.01)	(0.11)	(0.01)	(0.00)	(0.01)
654	CPG	NPG	27.44	30.65	29.99	33.13	98.31	34.76
			(0.63)	(0.12)	(0.17)	(0.03)	(0.00)	(0.01)
655	SQG	LQG	37.43	42.96	39.24	118.77	30.21	41.37
			(0.02)	(0.00)	(0.01)	(0.00)	(0.95)	(0.00)
656	NPG	NPG	30.87	35.47	38.65	36.39	112.84	34.78
			(0.75)	(0.07)	(0.01)	(0.04)	(0.00)	(0.10)

Table Cl (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
657	FQG	FQG	33.32	30.68	31.92	105.03	41.40	42.04
			(0.14)	(0.55)	(0.29)	(0.00)	(0.00)	(0.00)
658	NPG	NPG	28.72	30.37	30.52	34.25	30.36	31.48
			(0.38)	(0.16)	(0.15)	(0.02)	(0.16)	(0.09)
659	NPG	NPG	27.79	33.59	33.53	34.56	85.26	40.47
			(0.87)	(0.04)	(0.04)	(0.02)	(0.00)	(0.00)
660	NPG	NPG	28.32	35.34	34.81	38.08	109.20	41.84
			(0.92)	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)
661	NPG	NPG	28.06	33.11	32.82	35.59	75.46	39.45
			(0.83)	(0.06)	(0.07)	(0.01)	(0.00)	(0.00)
662	NPG	SQG	42.25	48.25	36.86	72.68	229.46	45.65
			(0.06)	(0.00)	(0.92)	(0.00)	(0.00)	(0.01)
663	NPG	NPG	29.66	32.35	32.40	34.95	46.49	39.69
			(0.62)	(0.16)	(0.15)	(0.04)	(0.00)	(0.00)
664	NPG	NPG	28.63	32.28	31.47	36.49	35.65	34.44
			(0.66)	(0.10)	(0.16)	(0.01)	(0.01)	(0.03)
665	CPG	NPG	30.87	32.56	32.32	40.22	100.35	34.13
			(0.47)	(0.20)	(0.22)	(0.00)	(0.00)	(0.09)
666	SQG	NPG	28.40	31.49	31.29	34.45	37.41	38.42
			(0.65)	(0.14)	(0.15)	(0.03)	(0.00)	(0.00)
667	NPG	LQG	30.03	31.42	32.87	44.73	25.72	36.04
			(0.09)	(0.04)	(0.02)	(0.00)	(0.82)	(0.00)
668	NPG	NPG	28.65	35.74	31.71	35.22	173.45	44.72
			(0.77)	(0.02)	(0.16)	(0.02)	(0.00)	(0.00)
669	TQG	NPG	30.89	38.07	35.28	33.46	37.02	41.05
			(0.68)	(0.01)	(0.07)	(0.18)	(0.03)	(0.00)
670	NPG	NPG	29.52	34.18	33.97	30.24	34.13	36.23
			(0.49)	(0.04)	(0.05)	(0.34)	(0.04)	(0.01)
671	NPG	NPG	32.20	36.85	40.21	38.32	187.03	37.14
			(0.80)	(0.07)	(0.01)	(0.03)	(0.00)	(0.06)
672	NPG	LQG	33.78	36.71	34.76	78.57	28.22	36.65
			(0.05)	(0.01)	(0.03)	(0.00)	(0.88)	(0.01)
673	NPG	NPG	29.56	33.93	36.78	33.08	149.55	34.09
			(0.70)	(0.07)	(0.01)	(0.12)	(0.00)	(0.07)
674	TQG	TQG	41.66	43.33	43.96	38.69	95.42	41.04
			(0.13)	(0.05)	(0.04)	(0.58)	(0.00)	(0.18)
675	NPG	NPG	34.45	46.25	40.02	53.83	40.09	48.89
			(0.88)	(0.00)	(0.05)	(0.00)	(0.05)	(0.00)
676	FQG	NPG	30.59	31.74	31.99	34.13	73.74	31.18
			(0.33)	(0.18)	(0.16)	(0.05)	(0.00)	(0.24)
677	SQG	CPG	36.56	43.07	34.21	135.88	73.68	33.34
			(0.10)	(0.00)	(0.34)	(0.00)	(0.00)	(0.53)
678	SQG	NPQ	30.91	31.34	32.02	57.46	85.82	32.28
			(0.34)	(0.27)	(0.19)	(0.00)	(0.00)	(0.17)
679	NPG	NPG	33.08	36.80	36.65	106.75	52.97	40.86
			(0.74)	(0.11)	(0.12)	(0.00)	(0.00)	(0.01)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
680	NPG	LQG	29.82	34.83	32.90	35.63	27.58	32.07
			(0.21)	(0.01)	(0.04)	(0.01)	(0.64)	(0.06)
681	SQG	CPG	30.31	32.76	32.26	37.17	46.35	29.99
			(0.34)	(0.10)	(0.13)	(0.01)	(0.00)	(0.40)
682	NPG	NPG	29.50	32.12	32.28	34.98	33.33	39.69
			(0.57)	(0.15)	(0.14)	(0.03)	(0.08)	(0.00)
683	NPG	NPG	30.34	34.60	33.25	30.43	64.17	36.31
			(0.42)	(0.05)	(0.09)	(0.40)	(0.00)	(0.02)
684	LQG	LQG	36.04	37.14	35.93	55.98	27.76	41.68
			(0.01)	(0.00)	(0.01)	(0.00)	(0.95)	(0.00)
685	CPG	LQG	28.58	33.56	32.33	33.44	24.83	35.26
			(0.12)	(0.01)	(0.01)	(0.01)	(0.82)	(0.00)
686	SQG	SQG	38.29	37.39	36.42	99.69	58.16	50.58
			(0.19)	(0.30)	(0.49)	(0.00)	(0.00)	(0.00)
687	NPG	NPG	32.23	47.83	36.25	34.16	58.80	37.30
			(0.62)	(0.00)	(0.08)	(0.23)	(0.00)	(0.04)
688	NPG	NPG	29.42	34.75	34.10	32.67	49.03	30.92
			(0.54)	(0.03)	(0.05)	(0.10)	(0.00)	(0.25)
689	NPG	FQG	30.46	28.98	30.89	33.45	33.12	38.63
			(0.22)	(0.47)	(0.18)	(0.05)	(0.06)	(0.00)
690	NPG	LQG	30.73	35.00	31.57	70.86	25.02	34.23
			(0.05)	(0.00)	(0.03)	(0.00)	(0.89)	(0.00)
691	CPG	NPG	39.22	108.81	64.55	144.87	88.36	45.47
			(0.95)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)
692	NPG	NPG	28.12	34.47	31.06	34.74	169.59	43.05
			(0.76)	(0.03)	(0.17)	(0.02)	(0.00)	(0.00)
693	NPG	NPG	34.99	49.12	37.53	58.28	106.66	44.58
			(0.77)	(0.00)	(0.21)	(0.00)	(0.00)	(0.00)
694	NPG	LQG	28.53	32.03	31.54	31.59	27.61	34.03
			(0.30)	(0.05)	(0.06)	(0.06)	(0.48)	(0.01)
695	NPG	NPG	30.96	34.56	38.35	42.68	43.98	36.69
			(0.79)	(0.13)	(0.01)	(0.00)	(0.00)	(0.04)
696	SQG	SQG	32.18	33.82	31.44	37.29	88.92	39.06
			(0.33)	(0.14)	(0.48)	(0.02)	(0.00)	(0.01)
697	NPG	NPG	31.39	49.48	36.68	65.45	51.35	35.05
			(0.81)	(0.00)	(0.05)	(0.00)	(0.00)	(0.13)
698	SQG	FQG	37.27	34.68	37.77	41.78	89.94	48.14
			(0.18)	(0.65)	(0.14)	(0.01)	(0.00)	(0.00)
699	NPG	NPG	29.20	35.93	32.82	33.57	191.38	40.13
			(0.76)	(0.02)	(0.12)	(0.08)	(0.00)	(0.00)
700	NPG	LQG	136.60	809.18	397.38	664.41	43.01	289.04
			(0.00)	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)
701	CPG	NPG	39.34	40.57	39.46	95.54	44.62	42.88
			(0.36)	(0.19)	(0.34)	(0.00)	(0.02)	(0.06)
702	NPG	NPG	32.01	35.90	38.65	36.61	130.79	35.61
			(0.69)	(0.09)	(0.02)	(0.06)	(0.00)	(0.11)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
703	NPG	LQG	34.91 (0.09)	47.34 (0.00)	35.15 (0.08)	43.69 (0.00)	30.59 (0.81)	44.76 (0.00)
704	NPG	NPG	28.15 (0.74)	34.26 (0.03)	30.91 (0.18)	34.26 (0.03)	159.67 (0.00)	43.19 (0.00)
705	SQG	NPG	30.19 (0.45)	32.05 (0.17)	32.61 (0.13)	31.81 (0.20)	35.76 (0.02)	39.25 (0.00)
706	NPG	NPG	30.25 (0.89)	36.72 (0.03)	35.27 (0.07)	45.96 (0.00)	83.54 (0.00)	45.54 (0.00)
707	NPG	NPG	32.40 (0.94)	39.11 (0.03)	40.69 (0.01)	76.89 (0.00)	335.80 (0.00)	42.95 (0.00)
708	NPG	NPG	30.73 (0.84)	37.48 (0.02)	36.12 (0.05)	58.86 (0.00)	54.90 (0.00)	35.70 (0.07)
709	NPG	NPG	30.61 (0.79)	36.41 (0.04)	34.54 (0.11)	50.83 (0.00)	62.87 (0.00)	35.99 (0.05)
710	SQG	NPG	29.38 (0.61)	32.79 (0.11)	32.52 (0.12)	79.16 (0.00)	94.76 (0.00)	32.31 (0.14)
711	NPG	NPG	32.08 (0.92)	44.51 (0.00)	37.23 (0.07)	47.91 (0.00)	283.48 (0.00)	51.95 (0.00)
712	NPG	NPG	30.90 (0.90)	37.58 (0.03)	36.45 (0.05)	75.56 (0.00)	328.31 (0.00)	39.97 (0.00)
713	NPG	SQG	33.05 (0.14)	31.47 (0.32)	30.78 (0.45)	108.65 (0.00)	51.06 (0.00)	34.40 (0.07)
714	NPG	NPG	30.56 (0.49)	31.89 (0.25)	32.66 (0.17)	34.21 (0.07)	64.56 (0.00)	41.57 (0.00)
715	NPG	NPG	32.58 (0.49)	37.20 (0.04)	32.70 (0.46)	95.06 (0.00)	215.49 (0.00)	48.83 (0.00)
716	NPG	LQG	32.15 (0.21)	36.18 (0.02)	33.90 (0.09)	57.45 (0.00)	30.28 (0.55)	33.43 (0.11)
717	SQG	NPG	31.64 (0.61)	36.08 (0.06)	34.42 (0.15)	61.37 (0.00)	35.81 (0.07)	35.39 (0.09)
718	NPG	NPG	32.62 (0.64)	36.92 (0.07)	34.53 (0.25)	48.10 (0.00)	42.77 (0.00)	39.53 (0.02)
719	NPG	LQG	28.05 (0.29)	33.64 (0.01)	34.16 (0.01)	30.69 (0.07)	26.62 (0.59)	35.35 (0.00)
720	NPG	NPG	28.49 (0.93)	35.81 (0.02)	35.18 (0.03)	38.87 (0.00)	113.83 (0.00)	42.25 (0.00)
721	FQG	NPG	28.28 (0.66)	31.56 (0.12)	31.25 (0.15)	34.87 (0.02)	101.73 (0.00)	34.74 (0.02)
722	FQG	NPG	29.14 (0.35)	30.96 (0.14)	30.93 (0.14)	30.17 (0.21)	35.37 (0.01)	31.35 (0.11)
723	FQG	CPG	45.97 (0.00)	39.97 (0.08)	36.59 (0.45)	65.85 (0.00)	128.91 (0.00)	36.55 (0.46)
724	NPG	NPG	33.37 (0.97)	45.54 (0.00)	43.05 (0.00)	47.66 (0.00)	42.09 (0.01)	43.81 (0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
725	SQG	NPG	32.57	37.61	36.97	40.80	209.60	50.98
			(0.82)	(0.06)	(0.09)	(0.01)	(0.00)	(0.00)
726	NPG	LQG	29.03	37.09	32.81	35.69	28.87	31.79
			(0.39)	(0.00)	(0.05)	(0.01)	(0.42)	(0.09)
727	NPG	NPG	31.55	41.11	35.91	45.86	207.99	41.40
			(0.88)	(0.00)	(0.10)	(0.00)	(0.00)	(0.00)
728	NPG	NPG	30.91	36.08	31.89	35.84	36.47	41.64
			(0.54)	(0.04)	(0.33)	(0.04)	(0.03)	(0.00)
729	NPG	NPG	29.98	35.43	31.70	38.50	54.56	39.90
			(0.66)	(0.04)	(0.28)	(0.00)	(0.00)	(0.00)
730	CPG	NPG	31.10	31.69	31.60	104.07	40.55	33.40
			(0.35)	(0.26)	(0.27)	(0.00)	(0.00)	(0.11)
731	NPG	LQG	33.69	36.11	34.16	48.40	30.69	37.52
			(0.14)	(0.04)	(0.11)	(0.00)	(0.66)	(0.02)
732	NPG	SQG	39.19	34.93	33.63	56.70	93.69	36.74
			(0.03)	(0.29)	(0.55)	(0.00)	(0.00)	(0.11)
733	NPG	NPG	30.46	34.58	37.77	39.40	57.67	35.97
			(0.81)	(0.10)	(0.02)	90.00)	(0.00)	(0.05)
734	NPG	NPG	34.85	40.76	38.25	75.74	47.74	43.24
			(0.79)	(0.04)	(0.14)	(0.00)	(0.00)	(0.01)
735	NPG	TQG	30.81	35.09	33.95	29.86	34.15	32.05
			(0.27)	(0.03)	(0.05)	(0.43)	(0.05)	(0.14)
736	NPG	NPG	28.50	34.81	33.42	33.09	188.43	37.29
			(0.80)	(0.03)	(0.06)	(0.08)	(0.00)	(0.00)
737	NPG	NPG	27.73	33.21	33.27	33.72	78.35	40.21
			(0.84)	(0.05)	(0.05)	(0.04)	(0.00)	(0.00)
738	SQG	LQG	35.07	35.69	34.22	49.26	32.50	45.74
			(0.14)	(0.10)	(0.22)	(0.00)	(0.52)	(0.00)
739	SQG	NPG	34.86	42.67	37.39	109.55	44.21	41.18
			(0.73)	(0.01)	(0.20)	(0.00)	(0.00)	(0.03)
740	NPG	NPG	29.45	32.08	32.78	34.00	46.48	32.82
			(0.57)	(0.15)	(0.10)	(0.05)	(0.00)	(0.10)
741	NPG	NPG	31.77	38.50	33.49	90.14	33.33	41.41
			(0.51)	(0.01)	(0.21)	(0.00)	(0.23)	(0.00)
742	NPG	NPG	31.91	37.35	34.43	47.14	42.68	39.02
			(0.72)	(0.04)	(0.20)	(0.00)	(0.00)	(0.02)
743	NPG	CPG	32.38	31.82	31.23	40.63	53.93	30.63
			(0.15)	(0.20)	(0.27)	(0.00)	(0.00)	(0.36)
744	NPG	SQG	36.96	36.85	34.13	120.87	93.23	37.39
			(0.14)	(0.15)	(0.58)	(0.00)	(0.00)	(0.11)
745	NPG	NPG	31.27	36.73	34.08	42.23	35.55	38.80
			(0.68)	(0.04)	(0.16)	(0.00)	(0.08)	(0.01)
746	NPG	NPG	36.22	48.94	46.51	64.67	90.83	46.28
			(0.98)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
747	NPG	LQG	28.07	34.98	32.00	30.55	26.35	34.35
			(0.25)	(0.00)	(0.03)	(0.07)	(0.61)	(0.01)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
748	NPG	NPG	29.42	35.83	34.02	42.55	86.33	38.00
			(0.86)	(0.03)	(0.08)	(0.00)	(0.00)	(0.01)
749	NPG	NPG	33.83	38.53	38.85	48.08	52.84	46.09
			(0.84)	(0.08)	(0.06)	(0.00)	(0.00)	(0.00)
750	NPG	NPG	32.34	37.48	38.09	87.32	82.83	40.56
			(0.87)	(0.06)	(0.04)	(0.00)	(0.00)	(0.01)
751	NPG	SQG	43.05	42.74	37.73	101.22	100.10	38.12
			(0.03)	(0.04)	(0.50)	(0.00)	(0.00)	(0.41)
752	NPG	FQG	30.69	29.08	30.15	98.71	45.70	39.44
			(0.21)	(0.49)	(0.28)	(0.00)	(0.00)	(0.00)
753	CPG	NPG	28.09	36.09	30.87	28.60	38.21	33.40
			(0.47)	(0.00)	(0.11)	(0.36)	(0.00)	(0.03)
754	NPG	NPG	34.04	42.75	34.14	42.41	41.88	43.20
			(0.49)	(0.00)	(0.47)	(0.00)	(0.00)	(0.00)
755	NPG	NPG	28.98	32.12	31.09	77.18	97.30	33.59
			(0.60)	(0.12)	(0.20)	(0.00)	(0.00)	(0.05)
756	NPG	NPG	30.40	39.82	36.71	47.69	44.02	38.20
			(0.93)	(0.00)	(0.03)	(0.00)	(0.00)	(0.01)
757	NPG	NPG	30.33	31.69	32.04	30.88	40.36	33.80
			(0.34)	(0.17)	(0.14)	(0.26)	(0.00)	(0.06)
758	NPG	TQG	29.26	33.41	33.85	28.22	38.64	36.10
			(0.33)	(0.04)	(0.03)	(0.56)	(0.00)	(0.01)
759	SQG	NPG	29.01	30.96	30.17	77.44	89.88	33.99
			(0.49)	(0.18)	(0.27)	(0.00)	(0.00)	(0.04)
760	CPG	NPG	29.35	34.69	35.97	30.48	30.75	35.99
			(0.45)	(0.03)	(0.01)	(0.25)	(0.22)	(0.01)
761	SQG	NPG	27.46	31.99	29.87	32.18	131.76	38.65
			(0.66)	(0.06)	(0.19)	(0.06)	(0.00)	(0.00)
762	NPG	NPG	33.87	47.20	43.84	51.37	48.84	44.29
			(0.98)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
763	FQG	FQG	34.52	32.49	34.76	40.69	116.37	40.83
			(0.21)	(0.58)	(0.18)	(0.00)	(0.00)	(0.00)
764	CPG	LQG	27.17	34.37	31.54	29.45	25.44	33.91
			(0.25)	(0.00)	(0.02)	(0.08)	(0.61)	(0.00)
765	NPG	CPG	33.59	37.22	34.58	46.00	45.23	32.61
			(0.29)	(0.04)	(0.17)	(0.00)	(0.00)	(0.47)
766	NPG	NPG	28.85	29.83	29.86	93.82	50.39	31.41
			(0.40)	(0.24)	(0.24)	(0.00)	(0.00)	(0.11)
767	NPG	NPG	104.48	685.49	352.66	589.05	196.14	206.78
			(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
768	NPG	NPG	28.77	32.96	32.00	33.43	67.97	32.77
			(0.64)	(0.07)	(0.12)	(0.06)	(0.00)	(0.08)
769	FQG	NPG	27.93	36.02	32.18	31.17	29.25	35.98
			(0.53)	(0.00)	(0.06)	(0.10)	(0.27)	(0.00)
770	SQG	NPG	29.68	35.83	32.51	34.49	52.02	36.77
			(0.71)	(0.03)	(0.17)	(0.06)	(0.00)	(0.02)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
771	NPG	SQG	37.92 (0.20)	37.22 (0.29)	37.00 (0.33)	46.15 (0.00)	115.57 (0.00)	38.49 (0.15)
772	NPG	NPG	35.88 (0.83)	47.34 (0.00)	39.26 (0.15)	64.71 (0.00)	352.07 (0.00)	47.01 (0.00)
773	CPG	FQG	32.02 (0.19)	30.68 (0.37)	31.37 (0.26)	70.06 (0.00)	45.76 (0.00)	32.40 (0.15)
774	CPG	NPG	30.74 (0.74)	35.66 (0.06)	34.34 (0.12)	44.13 (0.00)	39.10 (0.01)	35.95 (0.05)
775	NPG	NPG	29.61 (0.45)	32.79 (0.09)	32.87 (0.08)	31.03 (0.22)	32.08 (0.13)	38.96 (0.00)
776	NPG	NPG	34.37 (0.61)	42.77 (0.00)	35.42 (0.36)	119.12 (0.00)	62.88 (0.00)	41.28 (0.01)
777	TQG	LQG	30.90 (0.24)	49.04 (0.00)	37.38 (0.00)	36.63 (0.01)	28.77 (0.71)	37.38 (0.00)
778	NPG	NPG	40.12 (0.99)	80.98 (0.00)	54.40 (0.00)	109.31 (0.00)	112.16 (0.00)	54.13 (0.00)
779	SQG	NPG	32.26 (0.48)	38.68 (0.01)	33.28 (0.29)	59.62 (0.00)	34.09 (0.19)	41.62 (0.00)
780	NPG	NPG	31.80 (0.47)	34.45 (0.12)	33.70 (0.18)	34.38 (0.12)	35.89 (0.06)	37.30 (0.03)
781	NPG	LQG	30.03 (0.15)	33.60 (0.02)	32.26 (0.04)	44.12 (0.00)	26.77 (0.77)	41.82 (0.00)
782	CPG	NPG	30.60 (0.62)	38.41 (0.01)	33.10 (0.17)	58.68 (0.00)	44.00 (0.00)	32.97 (0.18)
783	NPG	NPG	30.87 (0.75)	35.28 (0.08)	35.96 (0.05)	34.95 (0.09)	71.28 (0.00)	47.24 (0.00)
784	NPG	NPG	29.33 (0.64)	32.14 (0.15)	32.25 (0.14)	34.45 (0.04)	46.41 (0.00)	39.51 (0.00)
785	CPG	NPG	29.71 (0.63)	34.65 (0.05)	34.47 (0.05)	35.54 (0.03)	108.71 (0.00)	31.81 (0.22)
786	NPG	NPG	32.01 (0.81)	38.08 (0.03)	37.95 (0.04)	36.14 (0.10)	92.02 (0.00)	49.75 (0.00)
787	NPG	NPG	31.35 (0.47)	35.13 (0.07)	33.97 (0.12)	34.12 (0.11)	33.81 (0.13)	35.49 (0.06)
788	NPG	NPG	31.52 (0.78)	38.03 (0.03)	34.64 (0.16)	51.81 (0.00)	38.95 (0.01)	46.64 (0.00)
789	NPG	NPG	31.59 (0.75)	34.09 (0.21)	39.89 (0.01)	47.89 (0.00)	54.00 (0.00)	40.20 (0.01)
790	NPG	NPG	31.21 (0.73)	35.25 (0.09)	36.05 (0.06)	35.04 (0.10)	66.45 (0.00)	47.55 (0.00)
791	SQG	SQG	45.16 (0.03)	47.87 (0.00)	38.49 (0.89)	66.46 (0.00)	219.38 (0.00)	43.61 (0.06)
792	NPG	LQG	30.39 (0.08)	37.34 (0.00)	36.87 (0.00)	33.39 (0.01)	25.63 (0.89)	36.90 (0.00)
793	CPG	CPG	68.62 (0.00)	60.66 (0.00)	50.56 (0.10)	87.79 (0.00)	254.31 (0.00)	46.20 (0.89)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
794	NPG	CPG	32.48	35.81	35.06	39.31	72.51	32.21
			(0.37)	(0.07)	(0.10)	(0.01)	(0.00)	(0.43)
795	NPG	LQG	36.00	41.23	38.52	128.10	32.34	40.60
			(0.13)	(0.00)	(0.03)	(0.00)	(0.81)	(0.01)
796	NPG	SQG	34.99	46.51	34.00	47.62	38.97	42.93
			(0.35)	(0.00)	(0.58)	(0.00)	(0.04)	(0.00)
797	NPG	NPG	31.08	39.69	34.85	42.32	180.74	40.18
			(0.84)	(0.01)	(0.12)	(0.00)	(0.00)	(0.00)
798	SQG	SQG	44.26	43.85	40.98	149.25	108.29	56.69
			(0.13)	(0.16)	(0.69)	(0.00)	(0.00)	(0.00)
799	NPG	NPG	36.89	38.24	42.99	116.85	132.91	55.52
			(0.64)	(0.32)	(0.03)	(0.00)	(0.00)	(0.00)
800	NPG	NPG	29.38	31.07	31.75	34.65	44.32	34.92
			(0.53)	(0.22)	(0.16)	(0.03)	(0.00)	(0.03)
801	NPG	NPG	28.85	33.08	30.81	34.79	141.10	41.64
			(0.64)	(0.07)	(0.24)	(0.03)	(0.00)	(0.00)
802	SQG	NPG	28.35	31.04	31.10	33.64	32.93	38.22
			(0.59)	(0.15)	(0.14)	(0.04)	(0.05)	(0.00)
803	NPG	NPG	28.58	36.62	33.46	33.57	30.90	36.09
			(0.65)	(0.01)	(0.05)	(0.05)	(0.20)	(0.01)
804	FQG	FQG	33.44	31.82	34.97	36.47	61.47	42.67
			(0.25)	(0.57)	(0.11)	(0.05)	(0.00)	(0.00)
805	NPG	NPG	29.47	38.63	34.02	39.00	231.42	44.44
			(0.89)	(0.00)	(0.09)	(0.00)	(0.00)	(0.00)
806	SQG	NPG	28.61	30.55	31.05	29.78	37.76	33.32
			(0.42)	(0.16)	(0.12)	(0.23)	(0.00)	(0.04)
807	SQG	NPG	30.70	37.79	33.56	38.37	143.99	38.47
			(0.76)	(0.02)	(0.18)	(0.01)	(0.00)	(0.01)
808	SQG	TQP	28.98	32.85	31.74	27.84	37.87	30.56
			(0.27)	(0.03)	(0.06)	(0.48)	(0.00)	(0.12)
809	NPG	NPG	33.24	41.62	39.44	65.42	220.58	47.29
			(0.94)	(0.01)	(0.04)	(0.00)	(0.00)	(0.00)
810	FQG	NPG	30.49	37.45	33.95	33.54	47.64	37.19
			(0.68)	(0.02)	(0.12)	(0.14)	(0.00)	(0.02)
811	NPG	NPG	31.49	39.16	35.23	50.26	63.38	39.02
			(0.83)	(0.01)	(0.12)	(0.00)	(0.00)	(0.01)
812	NPG	SQG	32.73	35.40	31.98	87.32	56.16	32.71
			(0.26)	(0.07)	(0.39)	(0.00)	(0.00)	(0.27)
813	CPG	NPG	29.40	33.23	35.97	33.93	128.40	33.71
			(0.71)	(0.10)	(0.02)	(0.07)	(0.00)	(0.08)
814	NPG	NPG	32.09	35.18	36.79	52.88	34.02	38.32
			(0.57)	(0.12)	(0.05)	(0.00)	(0.21)	(0.02)
815	NPG	FQG	31.75	29.52	31.33	36.50	39.51	38.96
			(0.18)	(0.56)	(0.22)	(0.01)	(0.00)	(0.00)
816	NPG	NPG	29.25	37.57	36.96	43.49	33.84	37.82
			(0.86)	(0.01)	(0.01)	(0.00)	(0.08)	(0.01)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
817	NPG	NPG	32.72	35.03	34.54	33.45	38.41	35.63
			(0.36)	(0.11)	(0.14)	(0.25)	(0.02)	(0.08)
818	FQG	NPG	29.26	32.32	29.68	37.44	68.83	38.77
			(0.48)	(0.10)	(0.39)	(0.00)	(0.00)	(0.00)
819	TQG	NPG	32.97	37.91	35.82	44.48	53.34	36.23
			(0.65)	(0.05)	(0.15)	(0.00)	(0.00)	(0.12)
820	SQG	NPG	31.11	32.97	31.48	40.55	74.81	43.04
			(0.44)	(0.17)	(0.37)	(0.00)	(0.00)	(0.00)
821	NPG	NPG	30.69	40.38	32.78	32.19	38.57	41.56
			(0.53)	(0.00)	(0.18)	(0.25)	(0.01)	(0.00)
822	FQG	FQG	32.84	32.70	35.60	42.17	84.28	38.39
			(0.41)	(0.44)	(0.10)	(0.00)	(0.00)	(0.02)
823	NPG	FQG	31.74	30.07	32.91	33.04	38.36	43.81
			(0.22)	(0.52)	(0.12)	(0.11)	(0.00)	(0.00)
824	CPG	NPG	29.58	32.37	32.94	36.65	51.17	33.58
			(0.62)	(0.15)	(0.11)	(0.01)	(0.00)	(0.08)
825	NPG	SQG	36.25	42.85	34.58	47.39	133.79	40.29
			(0.28)	(0.01)	(0.66)	(0.00)	(0.00)	(0.03)
826	NPG	NPG	28.82	38.15	33.21	33.98	32.80	34.15
			(0.71)	(0.00)	(0.07)	(0.05)	(0.09)	(0.04)
827	NPG	NPG	31.46	33.66	39.47	48.23	46.73	40.17
			(0.73)	(0.24)	(0.01)	(0.00)	(0.00)	(0.00)
828	NPG	NPG	29.03	35.04	34.48	34.85	31.27	36.08
			(0.65)	(0.03)	(0.04)	(0.03)	(0.21)	(0.01)
829	NPG	NPG	30.17	35.07	35.45	80.20	282.61	38.93
			(0.85)	(0.07)	(0.06)	(0.00)	(0.00)	(0.01)
830	SQG	NPG	27.97	31.43	29.77	33.72	101.43	37.96
			(0.60)	(0.10)	(0.24)	(0.03)	(0.00)	(0.00)
831	NPG	NPG	30.62	34.47	34.30	43.67	40.44	47.42
			(0.76)	(0.11)	(0.12)	(0.00)	(0.00)	(0.00)
832	NPG	TQG	30.36	31.22	32.63	29.95	45.64	39.79
			(0.31)	(0.20)	(0.10)	(0.38)	(0.00)	(0.00)
833	NPG	FQG	33.11	32.48	33.73	34.06	49.70	41.20
			(0.26)	(0.36)	(0.19)	(0.16)	(0.00)	(0.00)
834	NPG	NPG	28.34	33.51	33.17	36.47	97.18	39.81
			(0.84)	(0.06)	(0.07)	(0.01)	(0.00)	(0.00)
835	FQG	NPG	31.05	35.05	33.04	74.94	129.64	46.02
			(0.66)	(0.08)	(0.24)	(0.00)	(0.00)	(0.00)
836	FQG	FQG	30.55	29.76	31.83	31.58	34.94	39.96
			(0.26)	(0.39)	(0.14)	(0.15)	(0.02)	(0.00)
837	NPG	NPG	30.19	34.64	31.47	37.95	41.58	40.45
			(0.60)	(0.06)	(0.31)	(0.01)	(0.00)	(0.00)
838	NPG	NPG	31.54	36.33	36.55	34.49	82.97	45.88
			(0.71)	(0.06)	(0.05)	(0.16)	(0.00)	(0.00)
839	SQG	NPG	31.28	53.36	39.11	100.18	221.59	44.80
			(0.97)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)

Table C1 (Continued)

Obs.	From	To	NPG	FQG	SQG	TQG	LQG	CPG
840	SQG	NPG	31.10	31.46	32.90	31.90	36.95	39.54
			(0.33)	(0.27)	(0.13)	(0.22)	(0.01)	(0.00)
841	FQG	NPG	28.45	29.46	30.81	30.48	33.95	39.65
			(0.42)	(0.25)	(0.13)	(0.15)	(0.02)	(0.00)
842	NPG	NPG	37.16	39.54	43.05	76.56	86.87	44.91
			(0.72)	(0.22)	(0.03)	(0.00)	(0.00)	(0.01)
843	NPG	NPG	27.72	29.55	30.45	30.05	41.38	35.91
			(0.50)	(0.20)	(0.12)	(0.15)	(0.00)	(0.00)
844	NPG	NPG	30.14	34.15	35.64	35.70	64.92	48.09
			(0.79)	(0.10)	(0.05)	(0.04)	(0.00)	(0.00)
845	NPG	NPG	31.84	42.99	37.12	53.20	43.18	37.43
			(0.87)	(0.00)	(0.06)	(0.00)	(0.00)	(0.05)
846	CPG	NPG	34.15	42.40	37.29	58.55	69.77	36.24
			(0.63)	(0.01)	(0.13)	(0.00)	(0.00)	(0.22)
847	TQG	NPG	28.04	31.44	31.25	30.25	35.34	30.51
			(0.49)	(0.08)	(0.09)	(0.16)	(0.01)	(0.14)
848	NPG	NPG	31.60	32.19	33.26	35.38	49.53	40.03
			(0.42)	(0.31)	(0.18)	(0.06)	(0.00)	(0.00)
849	NPG	NPG	30.53	35.57	35.70	38.66	47.06	48.11
			(0.85)	(0.06)	(0.06)	(0.01)	(0.00)	(0.00)
850	NPG	NPG	34.23	46.46	38.06	72.87	401.44	53.74
			(0.86)	(0.00)	(0.12)	(0.00)	(0.00)	(0.00)
851	NPG	NPG	36.59	39.68	38.98	104.31	58.67	46.14
			(0.65)	(0.14)	(0.19)	(0.00)	(0.00)	(0.00)
852	CPG	NPG	33.15	37.62	34.01	71.44	55.79	33.73
			(0.39)	(0.04)	(0.26)	(0.00)	(0.00)	(0.29)
853	NPG	NPG	31.60	40.45	33.85	35.16	61.06	40.09
			(0.65)	(0.00)	(0.21)	(0.11)	(0.00)	(0.00)
854	CPG	NPG	34.20	42.55	37.35	58.41	124.53	39.12
			(0.76)	(0.01)	(0.15)	(0.00)	(0.00)	(0.06)
855	NPG	LQG	29.80	32.40	32.25	30.34	29.74	32.86
			(0.27)	(0.07)	(0.08)	(0.21)	(0.28)	(0.06)
856	NPG	LQG	33.54	50.25	39.60	109.06	37.56	42.30
			(0.83)	(0.00)	(0.04)	(0.00)	(0.11)	(0.01)