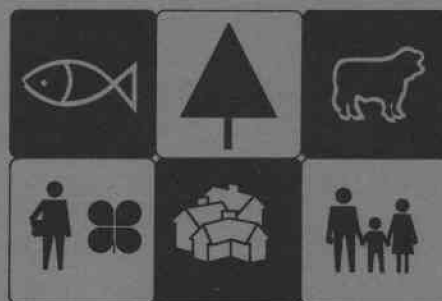# Determining Agricultural Land Rents:

# A Case Study of Malheur County

Special Report 415
August 1974

OREGON STATE UNIVERSITY
**EXTENSION**
**SERVICE**

DETERMINING AGRICULTURAL LAND RENTS:
A CASE STUDY OF MALHEUR COUNTY [1]

J. B. Wyckoff, A. Gene Nelson,
James H. Wood and Manning H. Becker [2]

The Oregon Legislature enacted legislation in 1969 permitting use
value assessment of farm land for property tax purposes. Among the alter-
native methods authorized for valuing land for use value was the income
approach. Using cash rents for agricultural lands was specified as a
legitimate means of estimating income for assessment purposes. However,
information on the rental of agricultural land is scarce. The study reported
here is an effort to supply the type of data that is presently lacking.

The specific objectives were to determine: 1) the level and character-
istics of cash agricultural land rentals in Malheur County, 2) the factors
important in explaining variations in cash rentals, and 3) if cash rental
value could be successfully predicted.

Rental agreements for agricultural land in the irrigated areas of
Malheur County were studied during the summer of 1973. The specific area
sampled was located in the Snake River Valley of Oregon, extending from
Weiser, Idaho, through Ontario, Vale, Nyssa and to the Adrian, Oregon, area.
A list of all identifiable rented parcels in the area was assembled and the
locations of the rental parcels were specified by section, township and range
coordinates. The total area was then divided into subareas based upon

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distinctions of soil type, topography, canal service and customary areas in common usage in the valley.[3/] From six to eight rentals were then randomly selected in each of the subareas and constituted the sample to be surveyed. An alternative list was also drawn to be used when the renter of the originally selected parcel could not be contacted. The distribution of the parcels included in the study is shown in Figure 1.

A questionnaire was devised and applied by personal interview.[4/] Information concerning the rental arrangements on 107 parcels of land was obtained by the interviewers. Sixty-five of these rentals were on a cash rent basis, while 42 were crop-share rentals. These two classifications were analyzed separately.

## Cash Rental Analysis

Of the 65 questionnaires completed for cash rented parcels, 11 were eliminated because of incomplete information or because they were judged to be unrepresentative of the area in general. The remaining 54 were subjected to the analysis reported here. The cash rent paid for each of the rented parcels was reported for 1972. These rents were then adjusted to provide for comparability.

First, the annual charge for buildings located on parcels was calculated at 10 percent of the current value of these buildings as estimated by the renters and deducted from the rent. Second, all cash rents were adjusted to a uniform payment date of November 1, assuming an annual interest rate of 8 percent. Third, the annual rents were calculated on a per-acre basis for the number of productive acres in the parcel. That is, the annual rent for the parcel was divided by the number of acres of productive land. Waste

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[3/] Joe Hobson (Malheur County Board of Review), Ray Novotny (Malheur County Extension Agent), and Kenneth Sanders (Malheur County Assessor's Land Appraiser) helped in identifying these subareas.

[4/] The questionnaire was designed by Manning H. Becker and A. Gene Nelson of the Department of Agricultural Economics, Oregon State University. Jim Wood and Terry Nelson conducted the interviews.

# SAMPLE DISTRIBUTION
## MALHEUR RENTDATA STUDY

CASH RENT PARCEL ■

CROP RENT PARCEL ▢
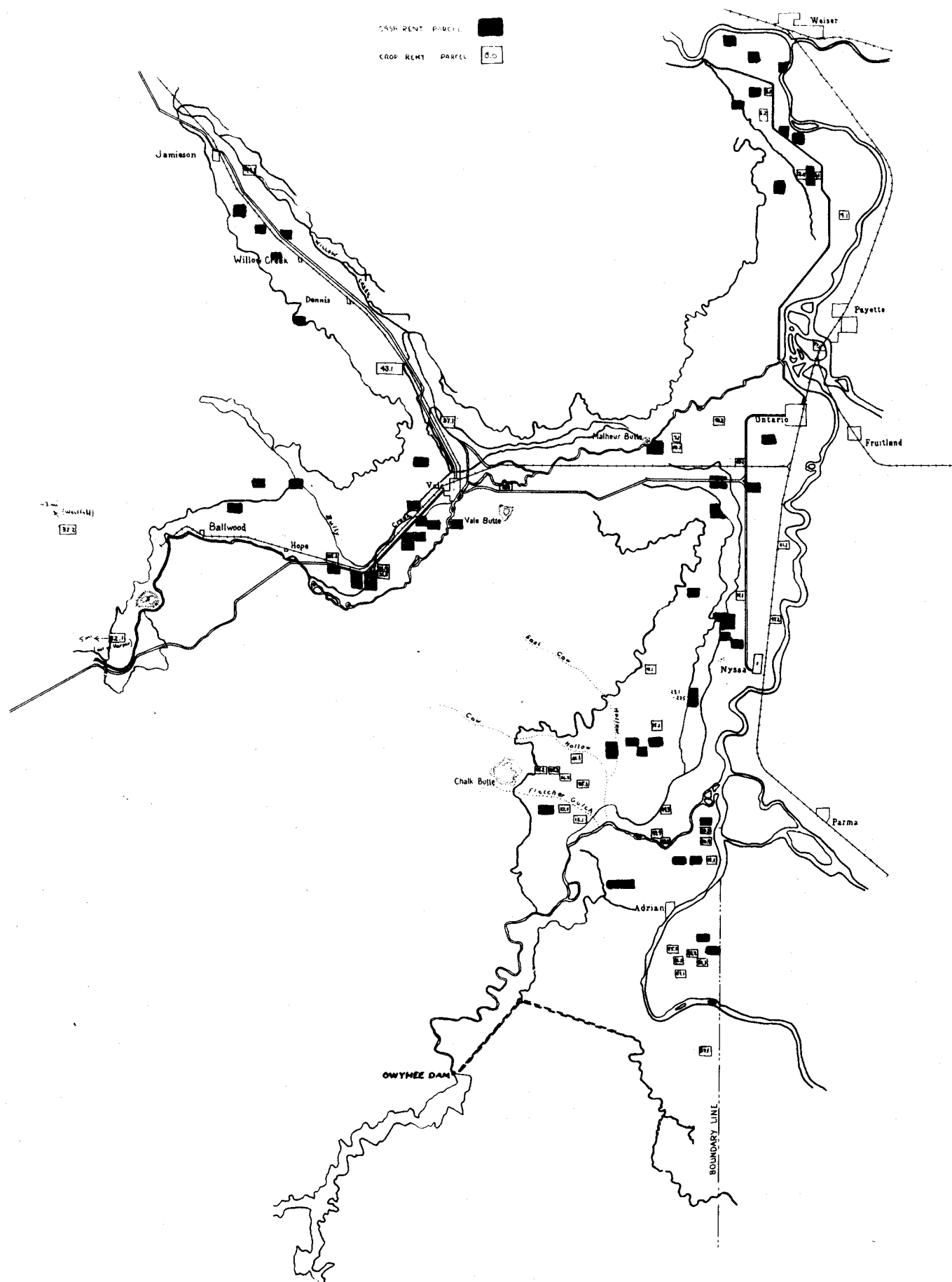
land or land otherwise not useable was excluded in the calculation of the
average per acre rent.

The average adjusted cash rent per acre for the sample was $58.60.
However, there was a great deal of variability in the adjusted rental rates,
which ranged from $18.50 to $105.00 per acre, Figure 2.

While the study was designed to identify the factors which would help
explain the variability in cash rents, data was collected on numerous factors
that proved to have no explanatory effect.  In most cases, these variables
were consistent and showed little variance.  They included:  1) property tax
payments--almost always paid for by the landlord; 2) the operation and
maintenance cost of irrigation--generally paid for by the landlord; 3) excess
water used in irrigation--generally paid for by the renter; 4) irrigation
labor--paid for by the renter; 5) fertilizer used in the operation--always
paid for by the renter, as was seed, chemical sprays, machinery repair, and
many other factors included in the production of the crop.  Major ditch
repair also usually was the responsibility of the landlord.

The basic responsibilities for maintaining fences, buildings, and other
improvements were mixed but did not contribute to the explanation of the
variation in cash rents.  Other factors, such as the tenant's rating of the
productivity of the rental parcel, the restrictions built into the lease
relative to crops that could or could not be planted on the land, the possi-
bility of the supply of irrigation water being interrupted during the growing
season, and problems with leveling and other miscellaneous factors, also did
not contribute to the explanation of the variability of the cash rents.  These
types of problems generally occurred on less than 10 percent of the sampled
parcels.

## Factors Influencing Cash Rents

The statistical technique of regression analysis was used to identify
and estimate the relationship between the cash rents and factors which ex-
plain the level of these cash rents.  The set of factors finally selected
for this estimating equation accounted for 75 percent of the variation in

Figure 2.    Summary of Variable "Adjusted Cash Rent"

Number of Observations:        54

Mean:                          $58.60/acre

Median:                        $58.50/acre

Maximum:                       $105.00/acre

Minimum:                       $18.50/acre



Dollars per Acre
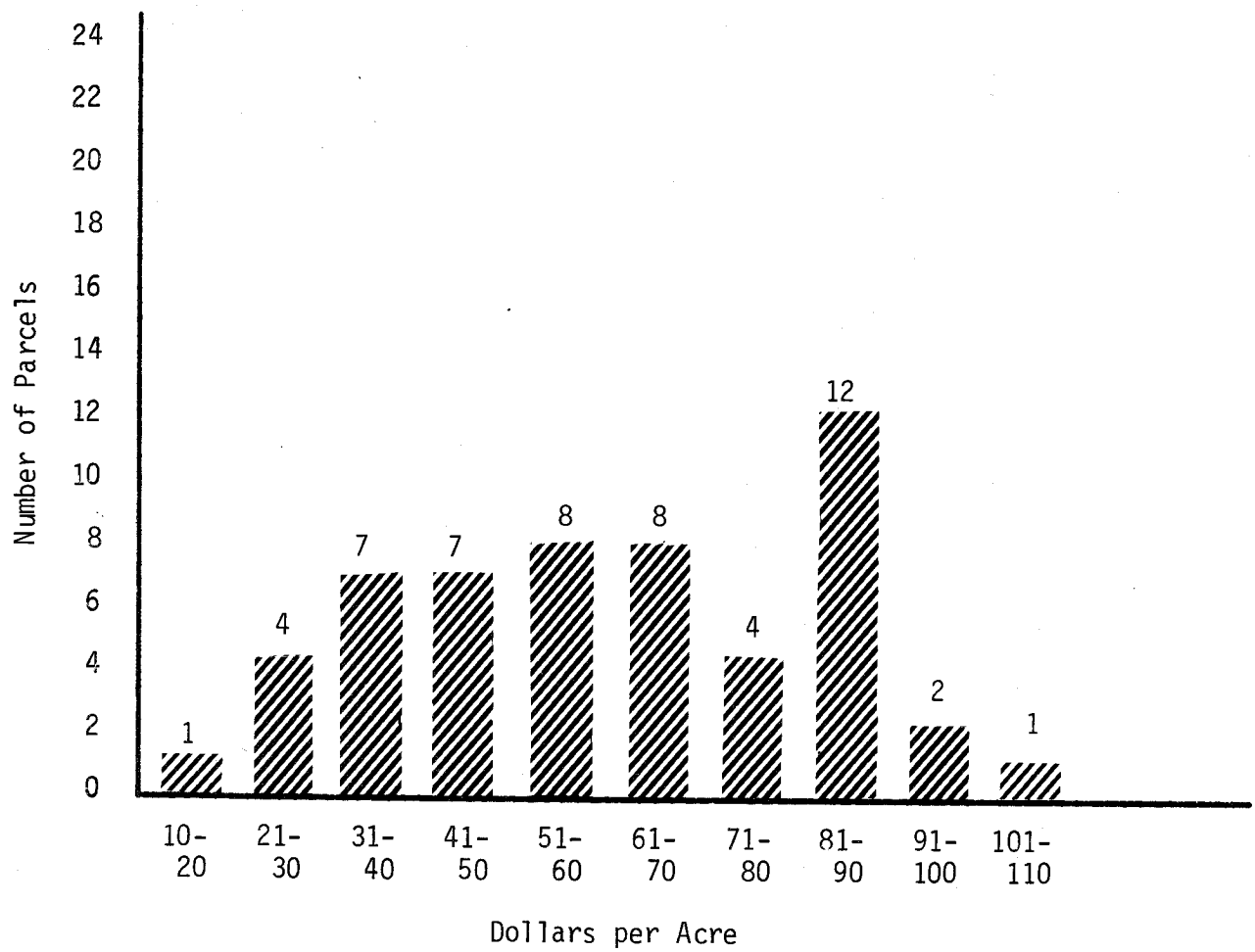
the adjusted cash rental rates. Each factor is described separately and its impact on the variation in cash rents indicated.

Acres of productive land in the parcel.[5] It would be generally expected that as the size of the parcel increases, the cash rent per acre would decrease. The reasoning is that the smaller parcels can be fitted into a larger number of farming operations. Thus, there are more tenants in the market for these smaller parcels, bidding up the rents for these units compared to parcels with more acreage.

The average acreage of the cash rented parcels was 69.3, with a range from 4 to 312 acres. The median, or middle observation, was 60 acres. The frequency distribution of parcel acreage is found in Figure 3.

The regression analysis showed, as expected, that with all other factors held constant at their means or average value, a one-acre increase in the size of the parcel would decrease the cash rental rate by four cents. This small influence precludes confidently stating that there is a relationship.

Total land operated by tenant. Only two of the cash renters did not own cropland. Further, the typical tenant rented two parcels from other landowners. It was reasoned that tenants farming larger acreages would not be willing to pay as high a rent per acre. Because of the larger size of their operation, they would have achieved more of the economies of size available, and additional land would not be worth as much to them. Also, larger operators may have achieved that size by being better farmers, more aggressive and better informed. This puts them in a stronger position to negotiate lower rental rates.

The average amount farmed for the sample tenants was 444 acres, ranging from a low of 60 acres to a high of 1,880 acres. The median of 372 indicates a predominance of smaller operations, Figure 4.

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[5]  Wasteland associated with the parcel was removed in specifying size.

Figure 3.         Summary of Variable "Land in Parcel"

Number of Observations:        54

Mean:                          69.3 acres

Median:                        60.0 acres

Maximum:                      312.00 acres
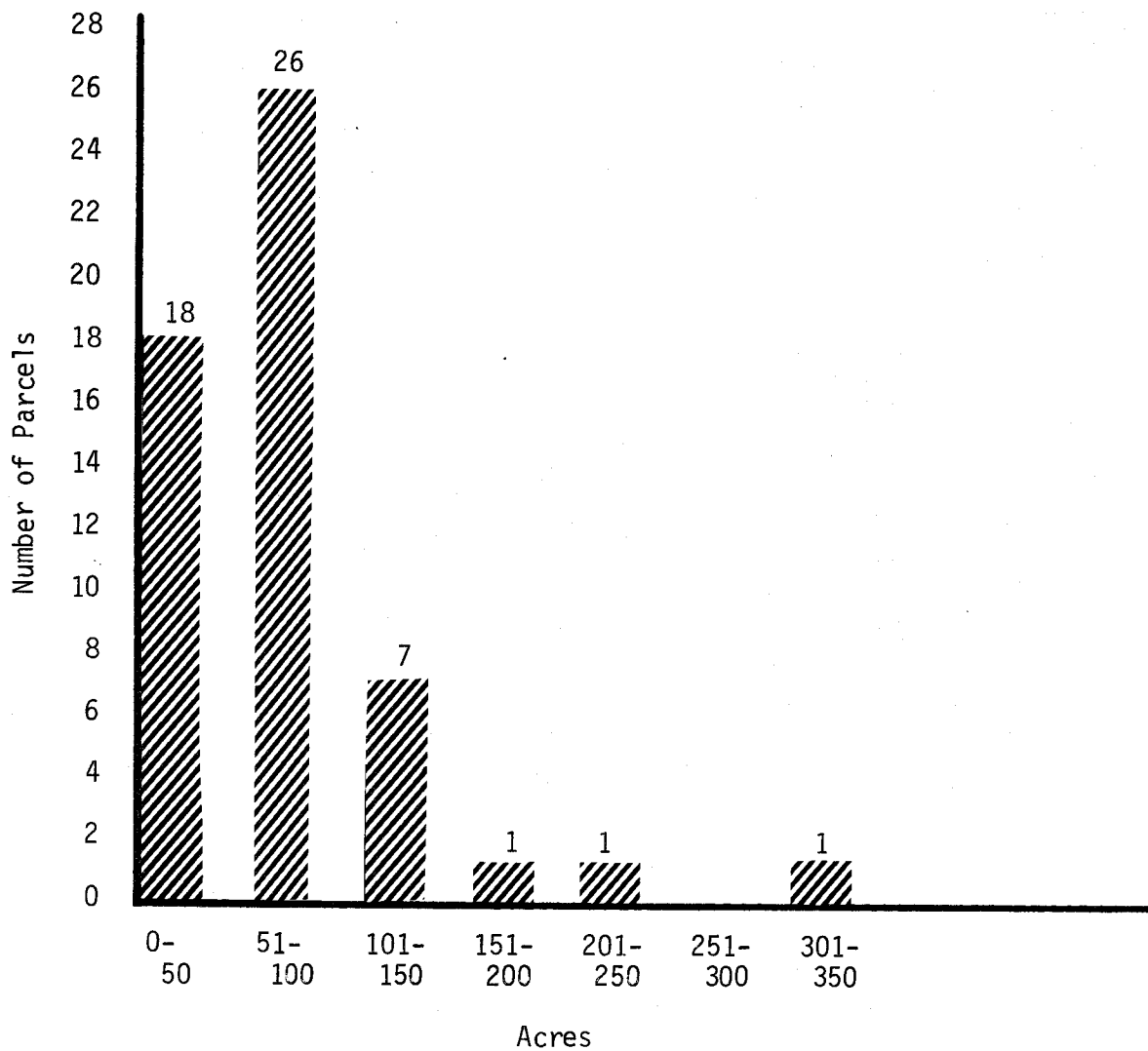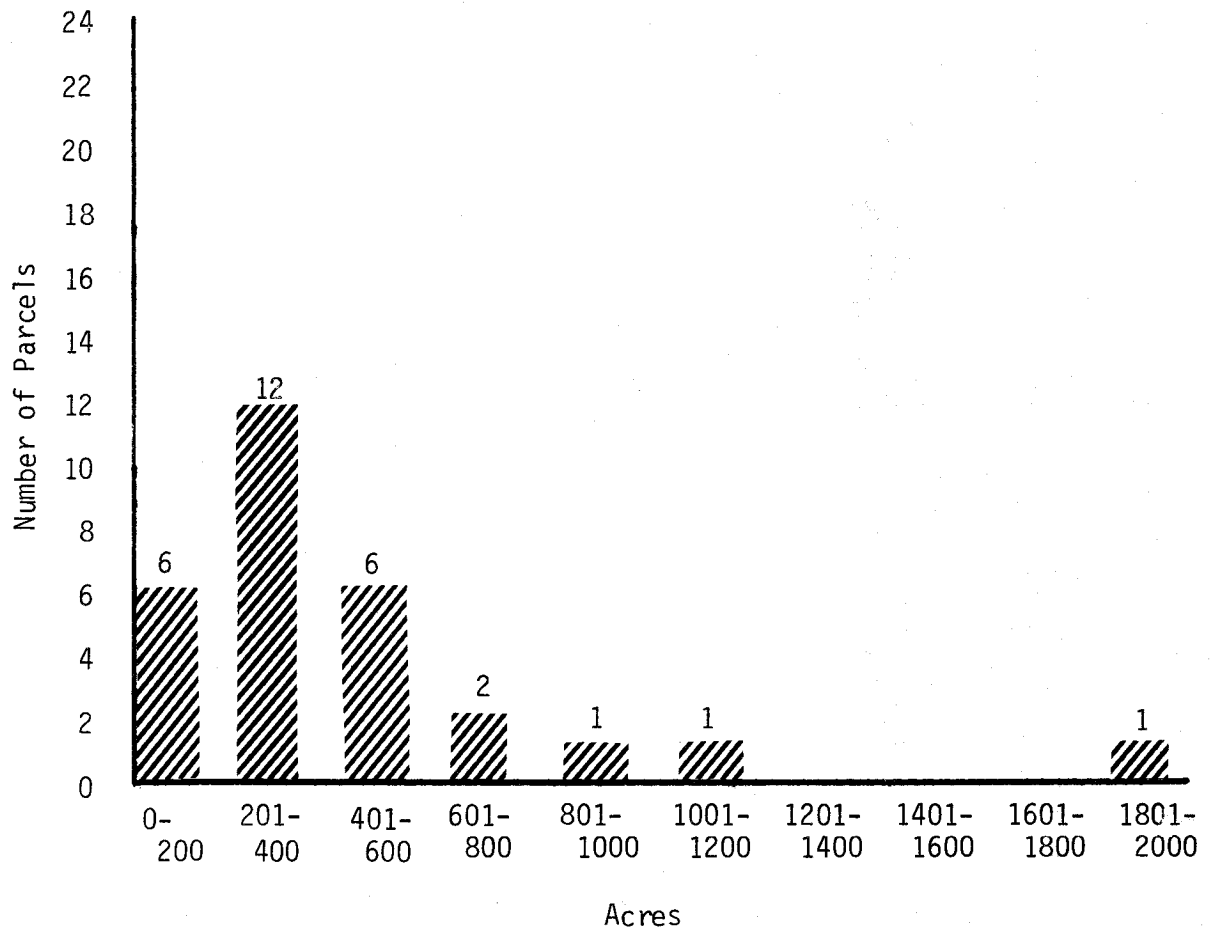
Minimum:                        4.0 acres

Figure 4.    Summary of Variable "Total Land Operated"

| | |
|---|---|
| Number of Observations: | 29 |
| Mean: | 444 acres |
| Median: | 372 acres |
| Maximum: | 1,880 acres |
| Minimum: | 60 acres |

The findings of the regression analysis were consistent with expectations. Cash rents were negatively related to the size of farm operated by the tenant. The estimated relationship, a one-cent decrease in cash rent per acre for each additional acre of total land operated by the tenant, was found to be significant at the five percent level. Thus, there is only a five percent risk of error in accepting the conclusion that this factor is negatively related to cash rents.

Distance to tenant's headquarters. The one-way distance between the tenant's farm headquarters and the parcel was obtained in the survey. It would be generally expected that the further the tenant had to travel to the parcel, the less he would be willing to pay to rent it. The mean distance between the tenant's headquarters and the parcel was 2.2 miles, ranging from less than 1 mile to 18 miles. For the total sample the median was one mile, Figure 5.

The findings of the regression analysis for this variable were different than expected. The distance to the tenant's headquarters was found to be positively related to the rental rate. For each 1 mile increase in distance, the rental rate per acre increased by 91 cents. This result was statistically significant at the 10 percent level.

An alternative rationale is that renters were only willing to travel further for rental parcels if those parcels were highly productive or had other unique characteristics of particular value. A check with renters verified this reasoning.

Length of current lease contract. The interviewees were asked how many total years the current lease has been and will be in effect. The average duration was 2.9 years, ranging from a minimum of 1 to a maximum of 10 years. The median was 3 years, Figure 6.

It would be generally expected that a longer term lease would command a higher rent per acre than one with a shorter term. The tenant would be willing to pay the higher price for the greater security offered and the

Figure 5.    Summary of Variable "Distance to Headquarters"

Number of Observations:      54

Mean:                        2.2 miles

Median:                      1.0 miles

Maximum:                     18.0 miles

Minimum:                     0.0 miles

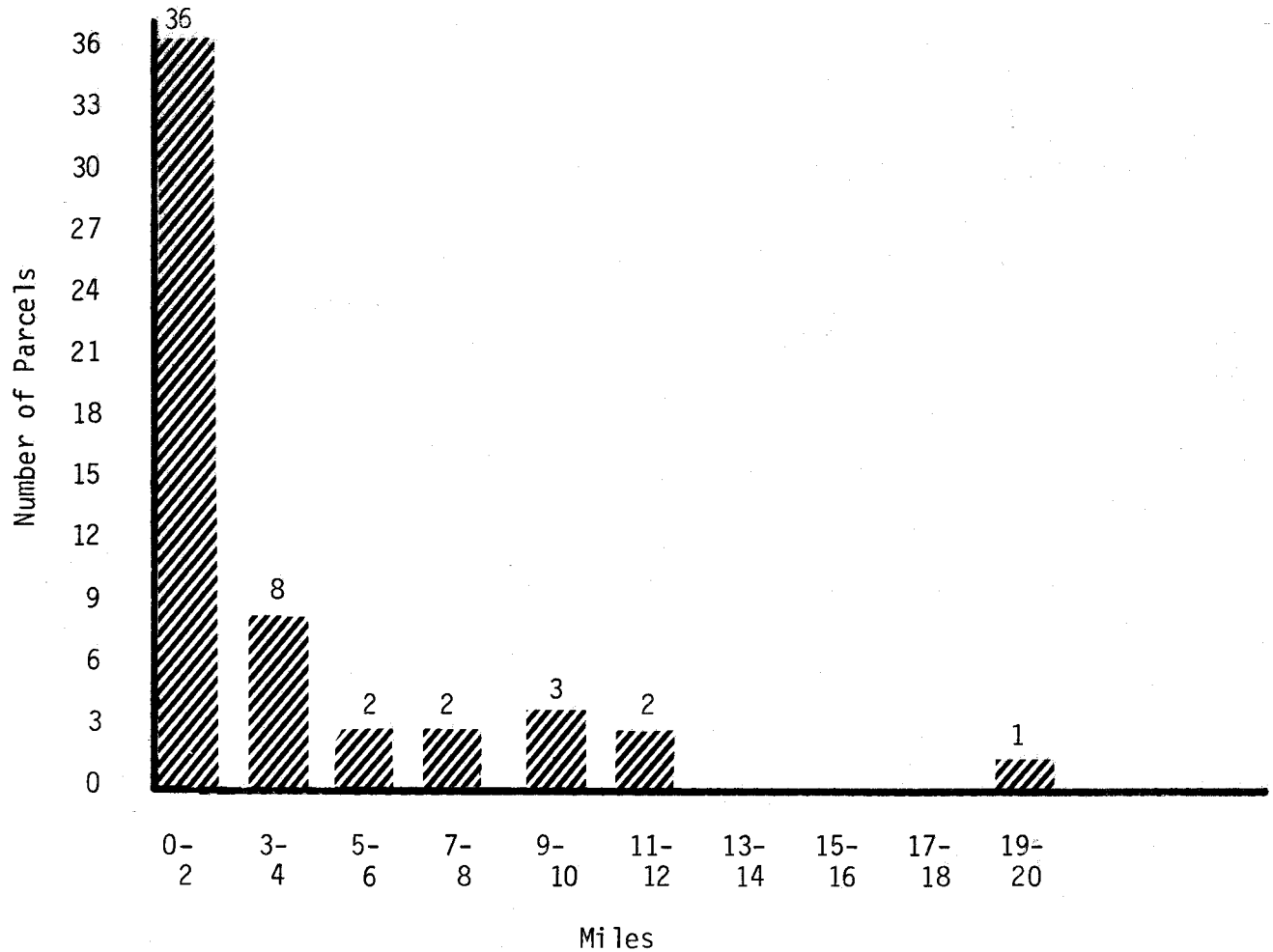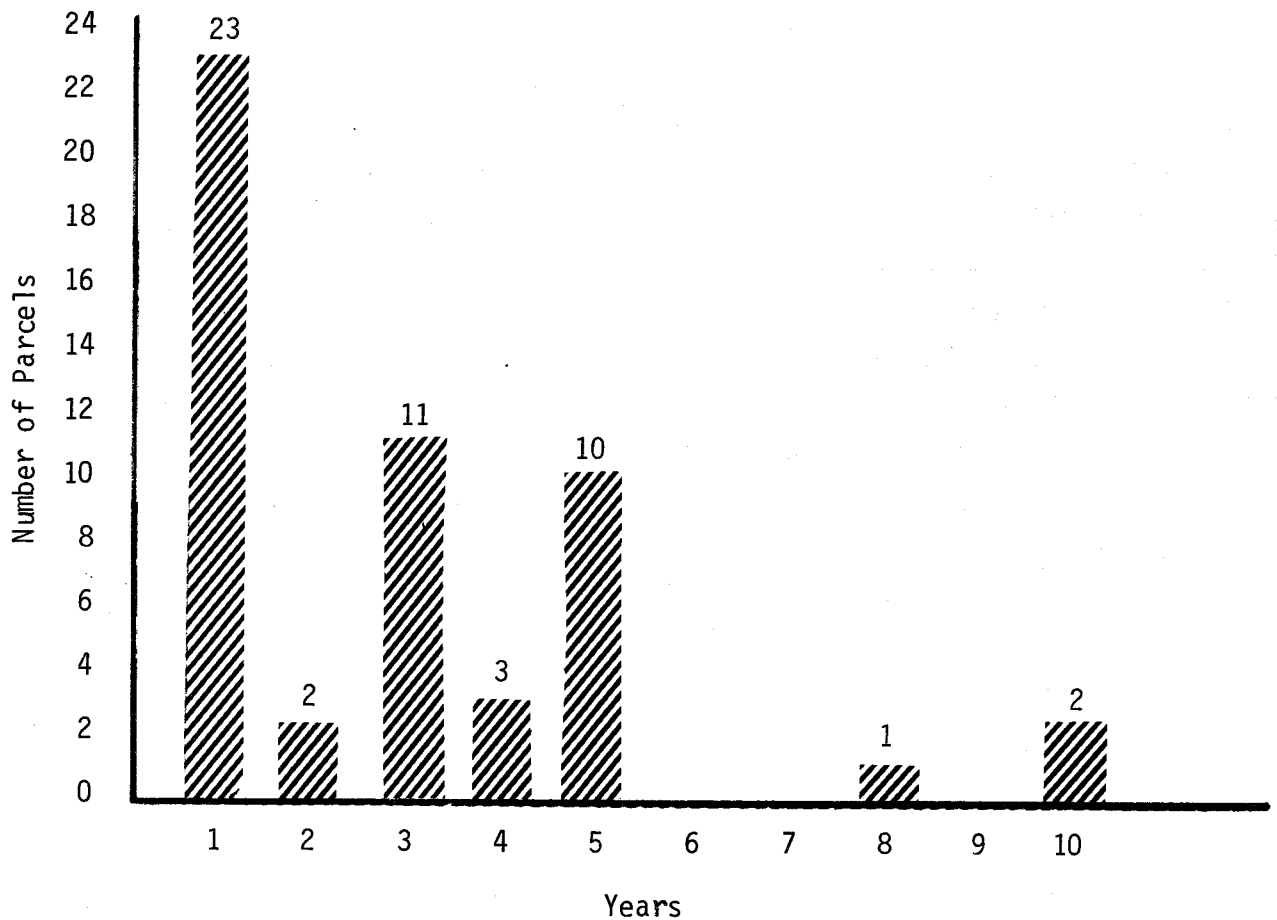Figure 6.   Summary of Variable "Length of Lease Contract"

Number of Observations:      54

Mean:                        2.9 years

Median:                      3.0 years

Maximum:                     10.0 years

Minimum:                     1.0 year

land owner would require a higher price to cover the risk that land values will increase during the term of the lease, increasing his cost of ownership.

The regression analysis could not identify a significant relationship for this variable and it was not included in the final regression equation.

Years current lease has been in effect. Because of the general infla- tion in land prices, it was thought that the point in time that the lease was negotiated could affect the rental rate paid in 1972 (the time of this study). On the average, the sample leases had been in effect for two years. However, for over half of the parcels, the new lease had been drawn only the previous year. The maximum duration of the current leases was ten years, Figure 7.

Again, no significant relationship could be discerned for this variable using regression techniques. Therefore, this factor was dropped from further consideration.

Years parcel farmed by this tenant. The longer the period of tenure, the greater would be the advantage (the lower the risk) to both the tenant and the landowner. The effect on cash rent paid per acre would depend on which party recognizes the greatest benefit. The more experience a tenant has with farming a particular parcel, the better he knows its potential and how to operate it for maximum profit. From the landowner's point of view, the more experience he has with an individual as a tenant, the better he knows his character and his husbandry of the land.

In the sample, the average number of years the parcel has been farmed by the present tenant was 6.5, ranging from 1 to 22 years, with a median of 5 years, Figure 8. While the results of the regression analysis were not conclusive, the tendency indicated that the landlord was willing to rent for less to a longer-term tenant. For each additional year the parcel was farmed by the tenant, the cash rent decreased by 23 cents per acre.

Crops grown on the parcel. The land use or crop rotation patterns for

Figure 7.    Summary of Variable "Years Lease in Effect"

Number of Observations:        54

Mean:                          1.9 years

Median:                        1.0 years

Maximum:                       10.0 years
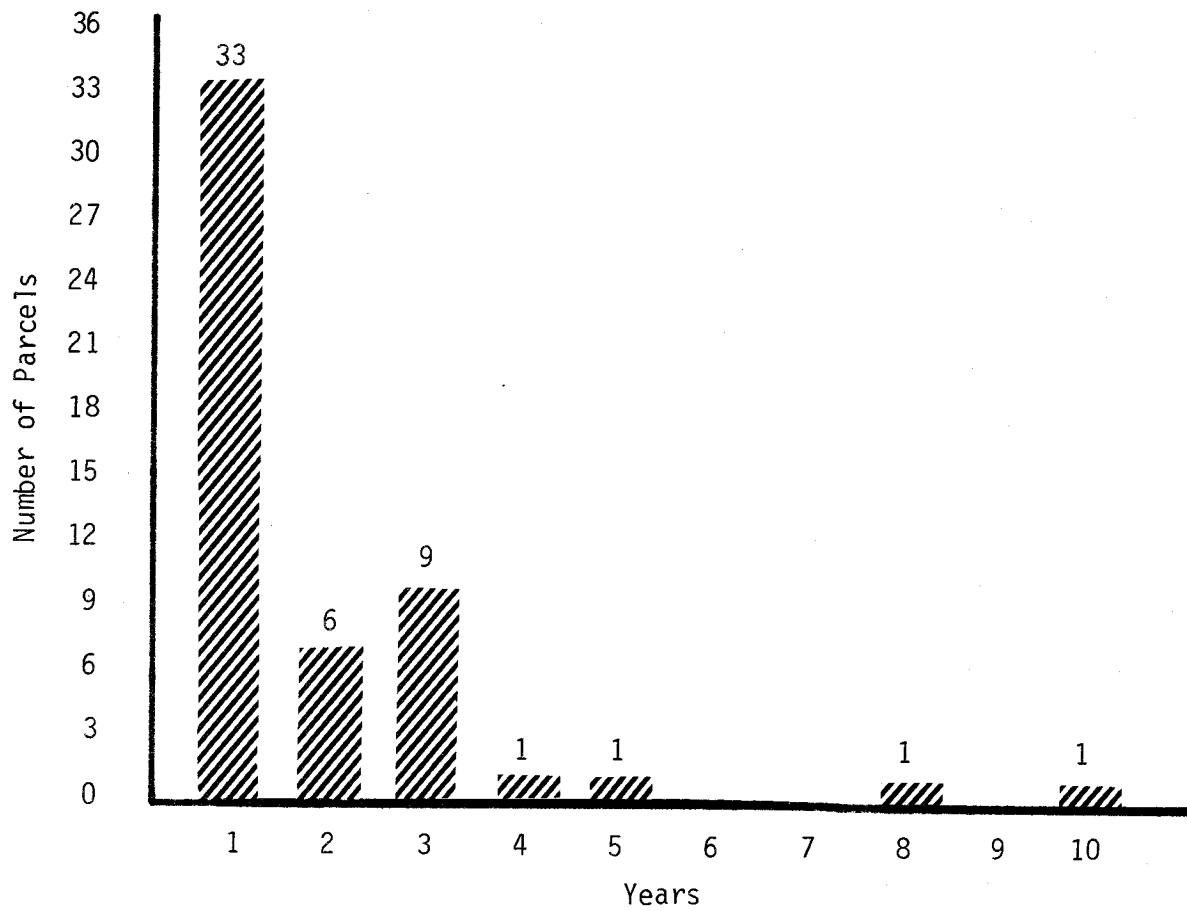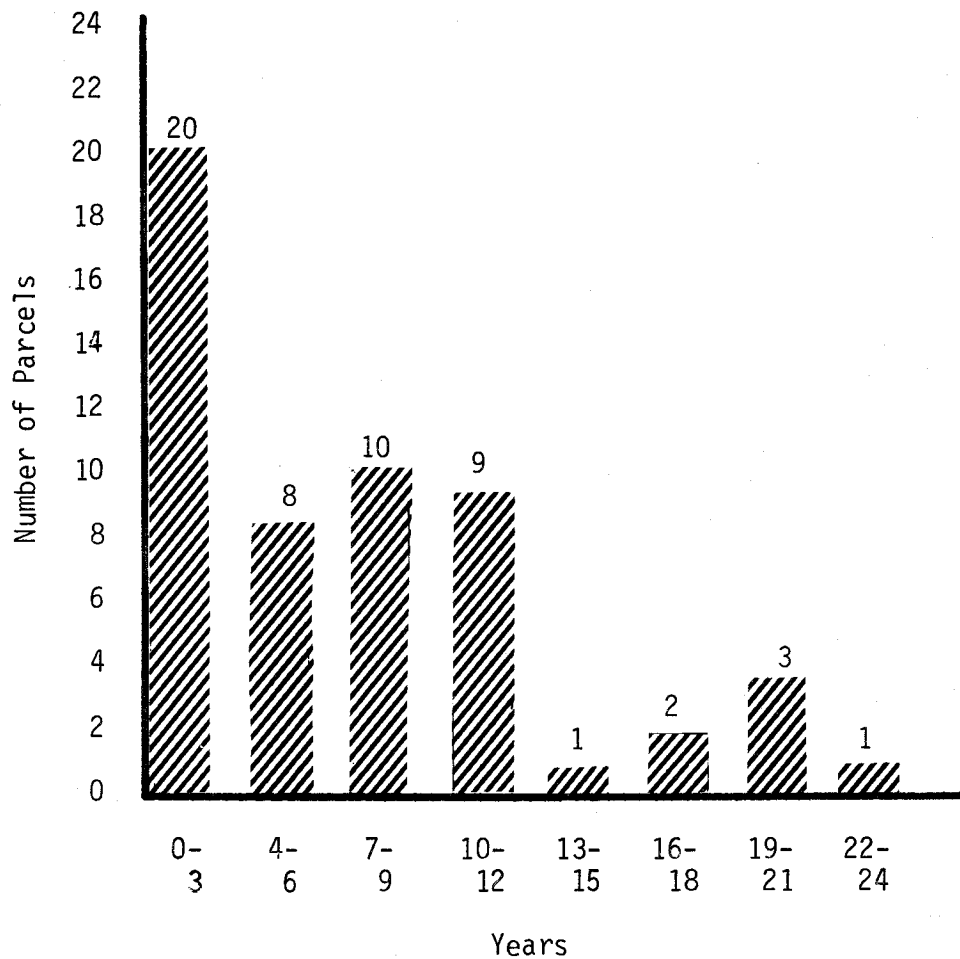
Minimum:                       1.0 years

Figure 8.    Summary of Variable "Years with this Tenant"

| | |
|---|---|
| Number of Observations: | 54 |
| Mean: | 6.5 years |
| Median: | 5.0 years |
| Maximum: | 22.0 years |
| Minimum: | 1.0 years |

the parcels would be expected to have an important impact on the cash rents paid. The crops grown are an indication of the capability of the land in the parcel; land with a capability of producing higher value crops would command a higher cash rent. Also, certain crops have more depleting effects on the soil fertility, and thus, the land owner should demand a higher rent for the production of these crops.

Table 1 indicates the number of parcels which were involved in the production of each of the indicated crops.

Table 1.  Crops Grown on Cash Rented Land, Incidence and Acreages, 1972

| Crops | Percent of Parcels | Mean Acres Grown | Median Acres Grown |
|-------|--------------------|------------------|--------------------|
| Sugar beets | 50 | 29.7 | 25.0 |
| Potatoes | 26 | 41.6[a/] | 23.5 |
| Onions | 24 | 18.2 | 18.0 |
| Sweet corn | 17 | 25.3 | 20.0 |
| Grain | 28 | 21.4 | 18.0 |
| Hay | 22 | 38.8 | 35.0 |
| Alfalfa seed | 13 | 27.1 | 30.5 |
| Silage corn | 26 | 27.1 | 24.5 |
| Pasture | 26 | 35.4 | 33.0 |

[a/] The mean differs markedly from the median due to one observation with 240 acres in potatoes.

The regression analysis indicated that sugar beets, potatoes, onions, sweet corn, and grain were crops that commanded a higher cash rent per acre as compared to other crops such as hay, pasture, alfalfa seed, field corn, etc. Both sugar beets and potatoes commanded a $30 per acre higher rent than the other crops. Onions required the highest premium, $62. Land for sweet corn and grain rented for $25 and $35 per acre more than the other crops not individually identified in the regression equation. All of these rental differentials were significant at the five percent level.

With all other factors held constant at their average values, the regression model indicates that the following per-acre rents would be associated with the specified crops:

| | |
|---|---|
| Onions | $100.30 |
| Grain | 73.10[6] |
| Potatoes | 68.50 |
| Sugar beets | 68.20 |
| Sweet corn | 62.90 |
| All others (average) | 38.40 |

Composite crop yield index. A composite crop yield index was developed for each parcel which expressed the yield of all crops as a percentage of the average. The crop yields reported by the interviewees were indexed, based upon the county averages reported by the Malheur County Extension Service for 1972 and weighted by the portion of the parcel's acreage devoted to each crop. The composite crop yield index for the sample averaged 106, indicating a slightly higher productivity than the county average (100). The range was from a low 53 to a high of 223.[7] The median was an index of 105, Figure 9. The crop yields are shown in Table 2.

The findings were not statistically significant. As would be expected, the yield index was positively related with rental rates. The increase was less than proportional, however. A yield index increase from 80 to 90 increases the cash rent by $1.30, while an increase from 110 to 120 increases the rent by 20 cents. Figure 10 illustrates the relationship where all other factors are held constant at their mean values.

Elevation of the parcel. The location of the parcel in terms of

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[6] Grain as such would not normally demand this high rental rate. However, since it is essential as part of the rotation for high value row crops, it reflects the relatively high value of the total crop rotation.

[7] Both of these were grain operations. The difference in yield of 20 to 134 bushels per acre likely reflects the influence of irrigation.

Table 2.  Crops Grown on Cash Rented Lands, Yields Reported, and County
Average Yields, 1972

| Crops | Units | Mean Yield Reported | Median Yield Reported | County Average Yields[a] |
|-------|-------|---------------------|-----------------------|--------------------------|
| Sugar beets | ton | 25.7 | 26.0 | 24.4 |
| Potatoes | cwt. | 282.3 | 240.0 | 330.0 |
| Onions | cwt. | 541.5 | 550.0 | 525.0 |
| Sweet corn | ton | 6.6 | 7.0 | 6.9 |
| Grain | bu. | 93.3 | 90.0 | 60.0 |
| Hay | ton | 4.0 | 4.0 | 3.8 |
| Alfalfa seed | lb. | 450.0 | 400.0 | 600.0 |
| Silage corn | ton | 23.8 | 25.5 | 20.0[b] |

[a]  Source:  Malheur County Extension Service Crop Summary for 1972.
[b]  Source:  1971 Crop Production Report, Owyhee Project, North Division.

elevation has an important effect in determining the soil type, the length
of the growing season, and the risk of frost damage for many crops.  The
elevation for each parcel was estimated from a topographical map.  The aver-
age elevation for the parcels in this sample was 2,289 feet, with a range
from 2,100 to 2,550 feet, Figure 11.

Findings of the regression analysis were consistent with expectations.
Parcels located at higher elevations were rented at a lower rate per acre.
Each one foot increase in elevation decreased the cash rent per acre by
four cents.  These findings were statistically significant at the five per-
cent level, indicating only a 5 percent chance of error in accepting the
conclusion.

Distance to nearest town.  Economists proposed many years ago that land
rent depends upon its location.  Rent decreases  the farther the land is from
a center of population or town because of the greater transportation costs
and other associated factors.  The straight line distance between each sample
parcel and the nearest of the towns--Adrian, Vale, Nyssa, and Ontario--was

Figure 9. Summary of Variable "Composite Crop Yield Index"

Number of Observations:    54

Mean:                      106    (100 = 1972 county averages)

Median:                    105

Maximum:                   223

Minimum:                   53
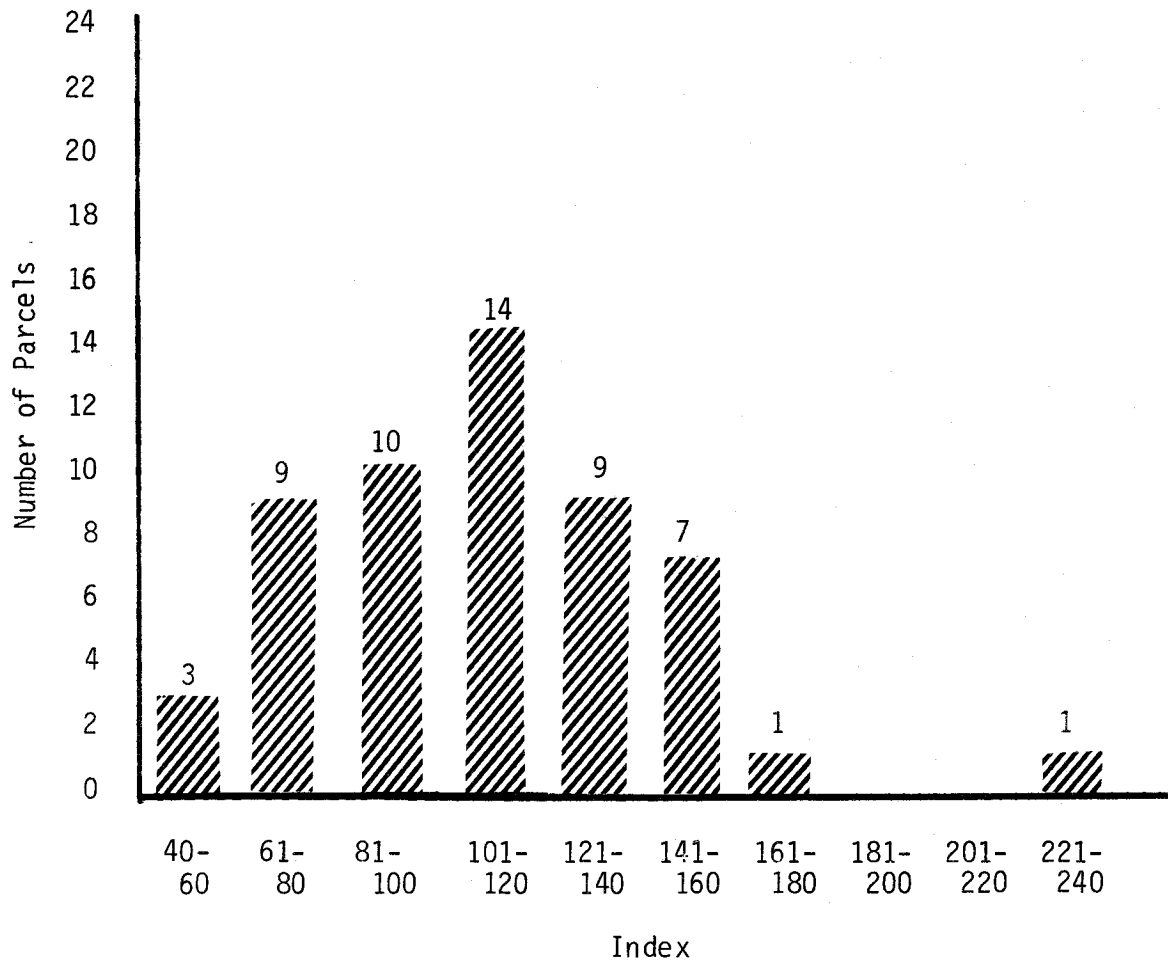
Figure 10. Estimated Relationship Between Crop Yield Index and Cash Rent Paid Per Acre, 1972
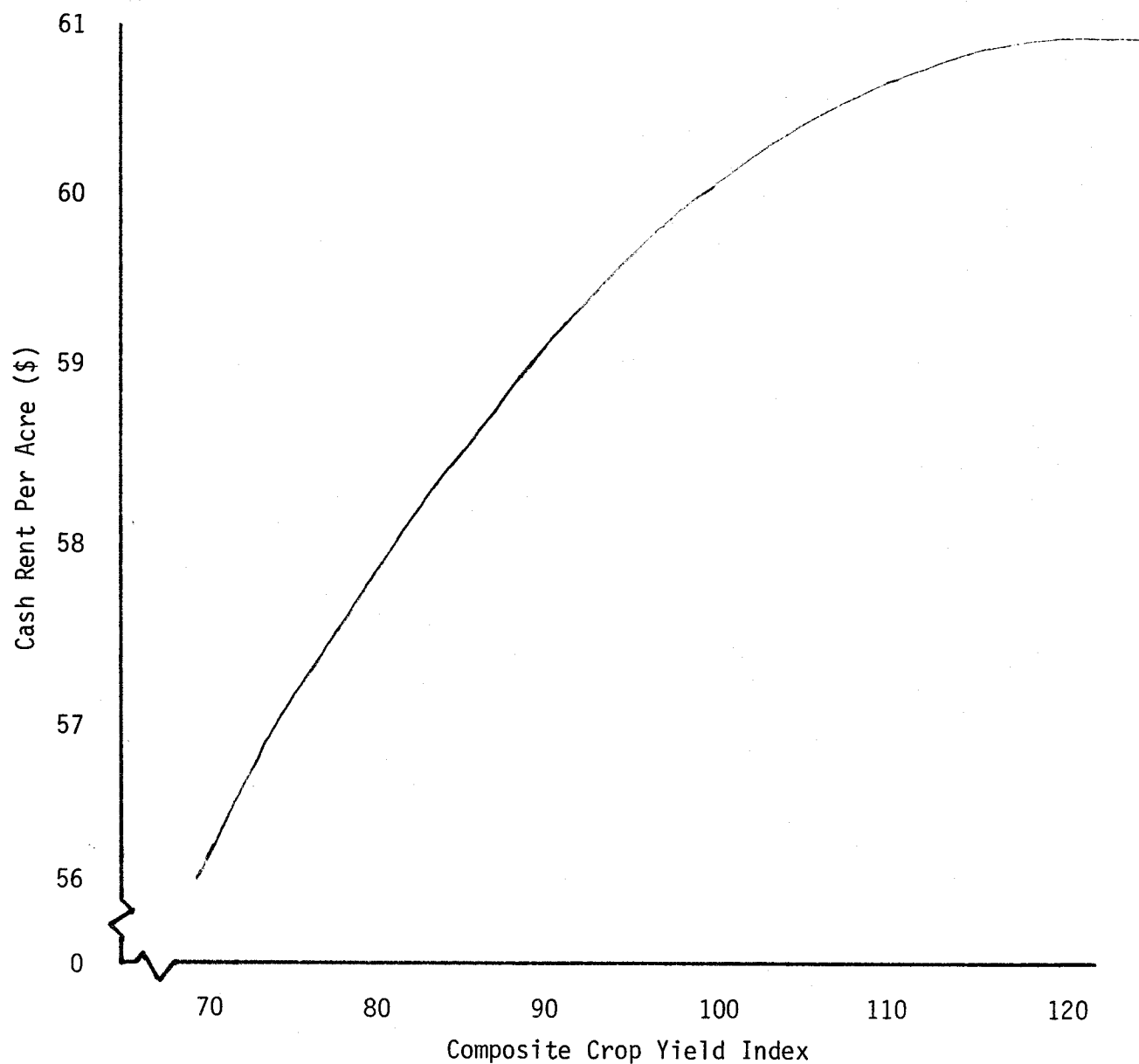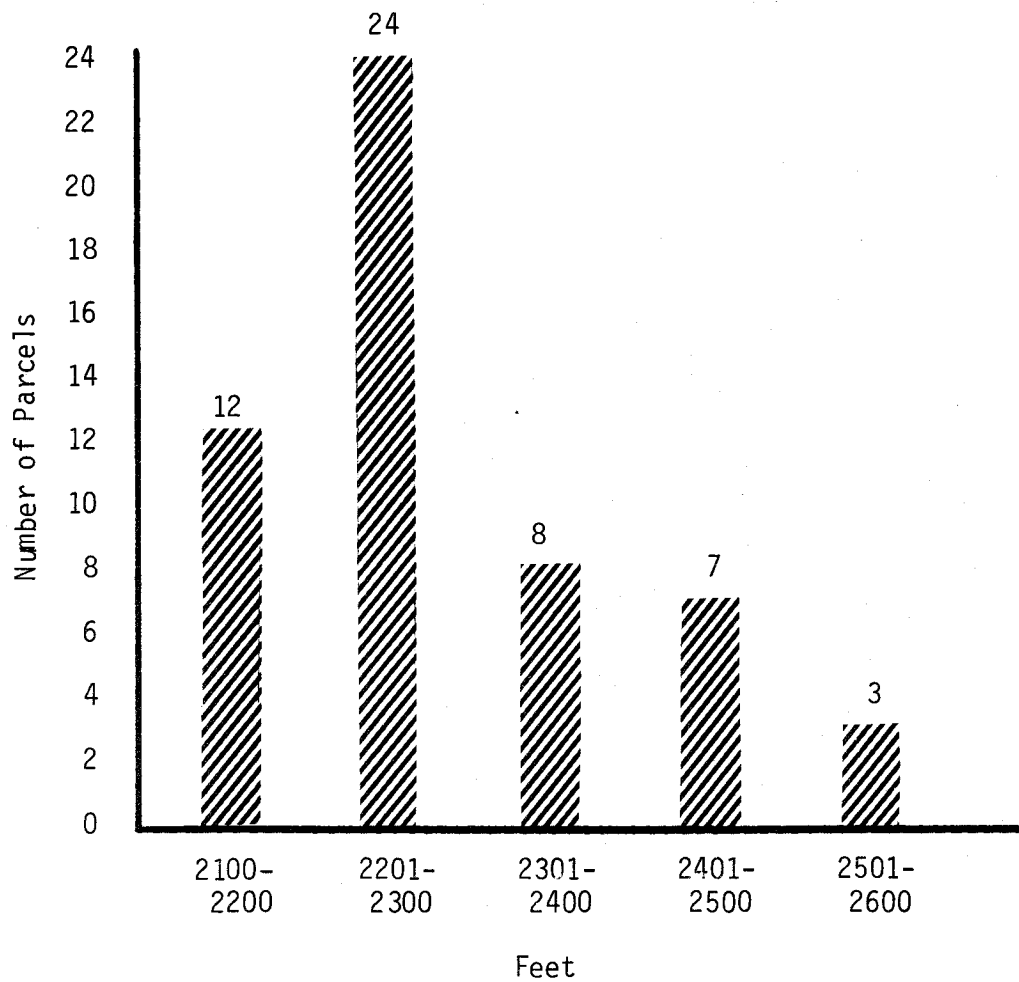
Figure 11.    Summary of Variable "Elevation of Parcel"

| | |
|---|---|
| Number of Observations: | 54 |
| Mean: | 2,289 feet |
| Median: | 2,270 feet |
| Maximum: | 2,550 feet |
| Minimum: | 2,100 feet |

estimated from a map.

The findings, while not statistically significant, were consistent with the theory. Each one mile increase in the distance to the nearest town decreased the cash rent by 44 cents per acre.

The average distance from the parcel to the nearest town was 6 miles, with a range from 1.1 to 14.9 miles, Figure 12.

## Interpretation and Application of the Results

The set of factors related to cash rents identified in this study explained 75 percent of the variability in cash rents between the sample parcels. These variables and their coefficients are summarized in Table 3. Other variables which could not be quantified in this study do affect the land rental rates as reflected in the 25 percent of the variation that was not explained. Also, there are unique situations regarding a particular parcel, its owner, and its tenant, that can influence the cash rental rate. Such situations need to be considered on their own merits.

The findings of this study are important in that they provide guidelines for adjusting cash rents to a comparable base. The study also provides an indication of the typical land rental arrangement. The average statistics from the sample indicate that the cash rent for productive land, with no buildings, and payment due November 1, was $58.60 in 1972. The median size of parcel was 69 acres of productive land. The tenant operating this parcel farms a total of 444 acres (median). The parcel is located about two miles from the tenant's headquarters and six miles from the nearest town. The length of the current lease contract is three years and it has been in effect two years. The tenant has farmed this parcel for a total of six and one-half years. The elevation of the parcel is 2,290 feet, and crop yields are only slightly above average, Table 4.

The regression analysis provides a means for making adjustments from this typical situation based on the description of the parcel in question.

Figure 12.     Summary of Variable  "Distance to Town"

Number of Observations:        54

Mean:                          6.0 miles

Median:                        5.0 miles

Maximum:                       14.9 miles

Minimum:                       1.1 miles
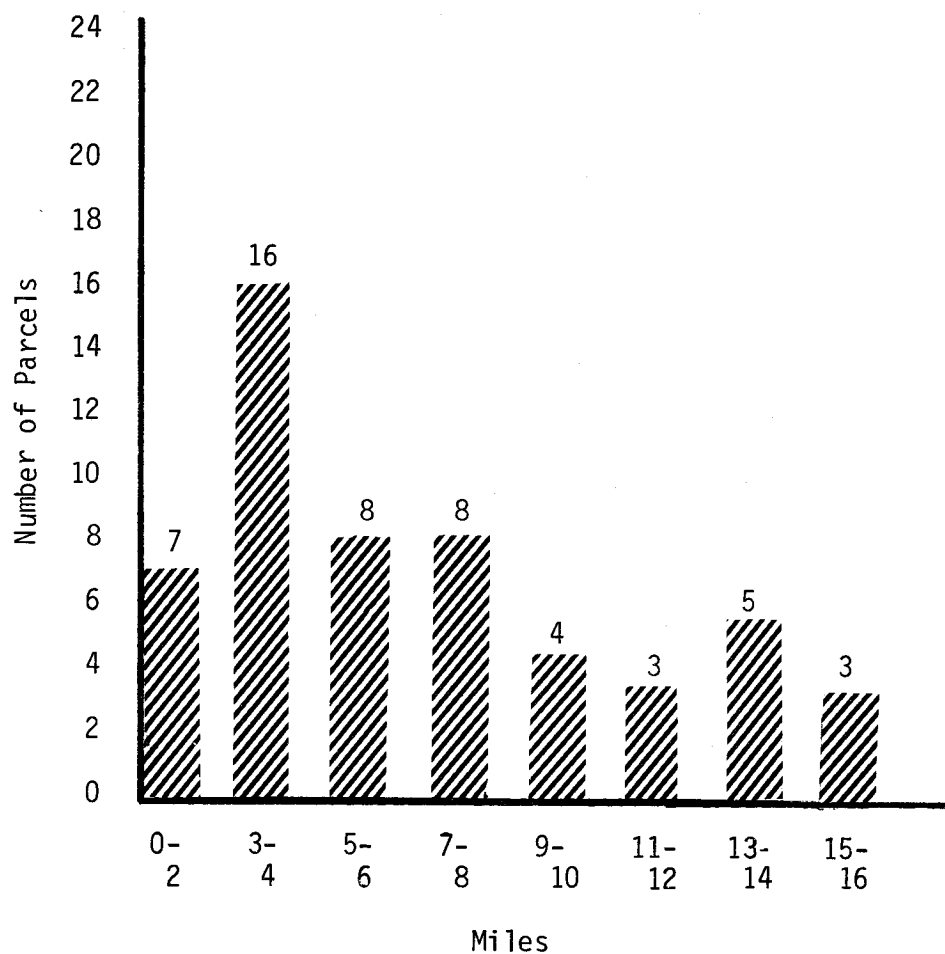
Table 3.  Linear Multiple Regression of Adjusted Cash Rent per Acre on Selected Independent Variables, Malheur County, 1972

| | Variable | Coefficient | T Ratio |
|---|---|---|---|
| 0 | Constant | + 118.60 | 2.27** |
| 3 | Land in parcel (acres) | − 0.0413 | 1.13 |
| 4 | Total land operated by tenant (acres) | − 0.0116 | 1.87** |
| 5 | Distance to tenant's headquarters (miles) | + 0.905 | 1.58* |
| 9 | Years parcel farmed by this tenant | − 0.225 | 0.63 |
| 10 | Percent of land in sugar beets | + 0.298 | 5.10** |
| 12 | Percent of land in potatoes | + 0.301 | 3.58** |
| 14 | Percent of land in onions | + 0.619 | 4.27** |
| 16 | Percent of land in sweet corn | + 0.246 | 2.40** |
| 18 | Percent of land in grain | + 0.347 | 2.49** |
| 38 | Composite crop yield index[a] | + 0.445 | 1.47[a] |
| 40 | Yield index squared[a] | − 0.00185 | 1.48[a] |
| 39 | Elevation of parcel (feet) | − 0.0414 | 2.18** |
| 41 | Distance to nearest town (miles) | − 0.439 | 0.90 |

$$N = 54 \qquad R^2 = 0.754[b]$$

**  Significant at the five percent level.
*   Significant at the ten percent level.
[a]  The correlation coefficient for these two variables was 0.976.  The F value for these two variables when entered together was 1.10, which is not significant at the 10 percent level.
[b]  The F value for the equation equals 9.43, significant at the 1 percent level.

The amount of adjustment per unit change in each variable is indicated in Table 5.  For example, for every acre that a rental parcel exceeds 69.3 acres, the adjusted cash rent would be 4 cents per acre lower.  Similarly, for each acre farmed by the renter exceeding 444 acres, he would pay one cent per acre less for rental land, with the other variables having the effect indicated in Table 5.

Table 4.   Summary of Sample Data for Cash Rented Land, 1972

| | Variable | Mean | Median | Minimum | Maximum |
|---|---|---|---|---|---|
| 1 | Adjusted cash rent ($/acre) | 58.6 | 58.5 | 18.5 | 105.0 |
| 3 | Land in parcel rented (acres) | 69.3 | 60.0 | 4.0 | 312.0 |
| 4 | Total land operated by tenant (acres) | 444 | 372 | 60.0 | 1880.0 |
| 5 | Distance to tenant's headquarters (miles) | 2.2 | 1.0 | 0.0 | 18.0 |
| 7 | Years current lease has been in effect | 1.9 | 1.0 | 1.0 | 10.0 |
| 8 | Length of current lease contract (years) | 2.9 | 3.0 | 1.0 | 10.0 |
| 9 | Years parcel farmed by this tenant | 6.5 | 5.0 | 1.0 | 22.0 |
| 38 | Composite crop yield index | 106.4 | 105.0 | 53.0 | 223.0 |
| 39 | Elevation of parcel (feet) | 2288.7 | 2270.0 | 2100.0 | 2550.0 |
| 41 | Distance to nearest town (miles) | 6.0 | 5.0 | 1.1 | 14.9 |

Table 5.   Effect on Adjusted Cash Rent of Increase in Variables from
Mean Value

| | | Increase in Variable | |
|---|---|---|---|
| Variable | Mean | Decrease cash rent | Increase cash rent |
| Adjusted cash rents  ($/acre) | $ 58.60 | | |
| Land in parcel (acres) | 69.3 | 4¢/acre | |
| Total land (acres) | 444 | 1¢/acre | |
| Distance (miles) | 2.2 | | 91¢/mile |
| Years farmed | 6.5 | 23¢/acre | |
| Percent in: | | | |
| Sugar beets | 21.9 | | 30¢/acre |
| Potatoes | 15.9 | | 30¢/acre |
| Onions | 6.5 | | 62¢/acre |
| Sweet corn | 6.2 | | 25¢/acre |
| Grain | 8.8 | | 35¢/acre |
| Composite crop yield index | 106.4 | | 45¢/index unit |
| Composite crop yield index squared | 11,321.0 | 0.2¢/index unit | |
| Elevation of parcel (feet) | 2,288.7 | 4¢/foot | |
| Distance to town (miles) | 6 | 44¢/mile | |

## Share Rental Characteristics

Interviews were conducted for 42 parcels with share rental agreements. Nine schedules were eliminated because of incomplete data or because of unique characteristics which made them unrepresentative of the area. About half of these agreements were written while the other half were oral contracts.

The modal (most common) crop-share agreements showed the following relationship for sharing crop production between the tenant and the landlord.

| Crop | Tenant Share % | Landlord Share % |
|------|------|------|
| Sugar beets | 75 | 25 |
| Potatoes | 75 | 25 |
| Onions | 80 | 20 |
| Sweet corn | 67 | 33 |
| Grain | 67 | 33 |
| Hay | 50 | 50 |
| Alfalfa seed | 50 | 50 |

Half of the sample crop-shares were identical with the above pattern. One out of every five had minor differences while 30 percent showed major differences. The variations from the standard crop-shares were almost always in favor of the landlord and involved his taking on additional responsibility on the cost sharing side of the agreement.

The modal agreement on expenses was as follows:

| Expense | Tenant Share % | Landlord Share % |
|---------|------|------|
| Property tax | 0 | 100 |
| O & M water charge | 0 | 100 |
| Excess water | 100[8] | 0 |
| Irrigation labor | 100 | 0 |
| Seed | 100 | 0 |
| Chemical spray | 100 | 0 |
| Machinery expense | 100 | 0 |
| Fertilizer | Proportional to crop share | |
| "Other" expenses | 100 | 0 |

---

[8] This item was tri-modal with almost half of the landlords paying nothing, 30 percent of the landlords paying 100 percent, and 20 percent paying 50 percent of the cost of excess water.

The most frequently observed expenses shared by the landlord in "offsetting" a larger crop-share were seed, chemical spray, excess irrigation water, "other" expenses and irrigation labor, respectively. A summary of the major differences in crop-share and expense agreements is presented in Table 6.

## Non-crop Land

Land that was not farmed was present on one-fourth of the crop-share parcels sampled. In only two cases were specific provisions (in these cases, cash rent) encountered that affected the rental basis. The non-crop land apparently is considered to be of little value by either the landlord or the renter.

## Buildings

Almost half of the share-crop parcels had buildings present as compared to only one-fourth of the cash rent parcels. Because of the more frequent occurrence of buildings and the larger average size of the crop-share rental parcels, it appears that more total farms are rented on crop-shares than for cash rents.

Geographic location apparently played little part in determining whether a parcel was cash or crop-share rented. There was a relatively even distribution of both cases throughout the study area.

## Comparison of Crop-Share and Cash Rentals, 1972

A comparison of the crop yields for crop-share and cash rental parcels revealed few significant differences. Crop-share renters had slightly higher yields for potatoes, hay and alfalfa seed, with little difference indicated for other crops, Table 7. The composite yield index at 115.9 for the crop-share renters was somewhat higher than the 106.4 average for the cash renters.

There was some difference in the frequency with which a given crop

Table 6.  Major Differences from Modal Share Crop Arrangements

| Parcel Number | Crop | Share to Landlord/ Modal Share | Type of Expense | Share to Landlord/ Modal Share | Special Conditions |
|---|---|---|---|---|---|
| | | - % - | | - % - | |
| 12.1 | Potatoes | 50/25 | Excess water | 50/0 | Machinery expense & "other"– |
| | Beets | 50/25 | Irrigation labor | 50/0 | $700 in 1972 |
| | | | Seed | 50/0 | |
| | | | Chemical spray | 50/0 | |
| 26.2 | Potatoes | 50/25 | Excess water | 100/0 | |
| | Corn | 50/33 | Seed | 50/0 | |
| | Grain | 50/33 | Chemical spray | 50/0 | |
| | | | "Other" | 50/0 | |
| 30.3 | Grain | 50/33 | Excess water | 50/0 | |
| 43.1 | Corn | 50/33 | Seed | 50/0 | $20,000 structure, plus 137 |
| | Grain | 50/33 | Chemical spray | 50/0 | acres of pasture |
| 44.1 | Grain | 50/33 | Seed | 50/0 (grain only) | |
| | | | Chemical spray | 100/0 (noxious weeds) | |
| | | | | 50/0 (grain) | |
| 49.3 | Potatoes | 50/25 | Seed | 50/0 | |
| | Beets | 50/25 | Chemical spray | 50/0 | |
| | Corn | 50/33 | "Other" | 1/2 harvest, 1/2 labor/0 | |
| 52.1 | Beets | 50/25 | Seed | 50/0 | 8 acres of pasture |
| | Corn | 50/33 | Chemical spray | 50/0 | |
| | Grain | 50/33 | | | |
| 52.2 | Beets | 50/25 | Seed | 50/0 | |
| | Corn | 50/33 | Chemical spray | 50/0 | |
| | Grain | 50/33 | Excess water | 100/0 | |
| | | | Irrigation labor | 50/0 | |
| 53.1 | Corn | 50/33 | Seed | 50/0 | 10 acres of pasture |
| | Grain | | Chemical spray | 50/0 | |
| 55.1 | Beets | 50/25 | Seed | 50/0 | |
| | Grain | 50/33 | Chemical spray | 50/0 | |

Table 7.  Comparison of Yields for Crops Grown, 1972

| Crop | Unit | Mean Yield by Type of Rental | |
| | | Crop-share | Cash |
|---|---|---|---|
| Sugar Beets | Tons/acre | 26.0 | 25.7 |
| Potatoes | Cwt./acre | 344.2 | 282.3 |
| Onions | Cwt./acre | 554.0 | 541.5 |
| Sweet Corn | Tons/acre | 6.5 | 6.6 |
| Grain | Bu./acre | 88.0 | 93.3 |
| Hay | Tons/acre | 4.8 | 4.0 |
| Alfalfa seed | Lbs./acre | 552.0 | 450.0 |
| Silage Corn | Tons/acre | 22.5 | 23.8 |

appeared on the rented parcels.  Sugar beets, potatoes, grain and alfalfa seed were grown more often on crop-share rental parcels, while onions and silage corn appeared more often on cash rental parcels.

Average acreages in the selected crops when grown showed crop-share renters with larger fields of onions, grain and silage corn, while cash renters had larger hay fields, Table 8.

Comparison of the characteristics of the crop-share rentals and the cash rentals show that some differences exist.  The crop-share parcels are larger, the total land farmed by crop-share renters is less, and lease and farming tenure on the crop-share parcels is longer, and the composite yield index appears to be slightly higher, Table 9.

Estimation of Crop-Share Rental Value

Regression analysis was applied only to the information gathered from the cash rental parcels.  However, since the above comparison does not reveal any significant structural differences between the characteristics of cash rental parcels and crop-share parcels, the regression equation can appropriately be applied in estimating equivalent cash rent values for the typical

Table 8.  Crops Grown and Average Size of Field, 1972

|  | Percent of Parcels | | Mean Acres | |
| Crop | Crop-share | Cash | Crop-share | Cash |
| --- | --- | --- | --- | --- |
| Sugar Beets | 64 | 50 | 52.0 | 29.7 |
| Potatoes | 36 | 26 | 44.0 | 41.6 |
| Onions | 15 | 24 | 28.0 | 18.2 |
| Sweet Corn | 15 | 17 | 58.0 | 25.3 |
| Grain | 85 | 28 | 38.0 | 21.4 |
| Hay | 30 | 22 | 24.1 | 38.8 |
| Alfalfa Seed | 30 | 13 | 27.6 | 27.1 |
| Silage Corn | 15 | 26 | 39.0 | 27.1 |
| Pasture | 21 | 26 | 27.1 | 35.4 |

Table 9.  Summary of Sample Data for Crop-Share and Cash Rentals, 1972

|  | Mean | |
| Variable | Crop-share | Cash |
| --- | --- | --- |
| Land in parcel rented (acres) | 143.2 | 69.3 |
| Total land operated by renter (acres) | 340.7 | 444.0 |
| Distance from tenant's headquarters (miles) | 1.8 | 2.2 |
| Years current lease has been in effect | 4.2 | 1.9 |
| Length of current lease contract (years) | 4.3 | 2.9 |
| Years parcel farmed by this tenant | 10.5 | 6.5 |
| Composite crop yield index | 115.9 | 106.4 |

crop-share parcel.  These estimated values indicate what the cash rent would likely be if the crop-share parcels were leased on a cash basis.  This is presented in Table 10.

Summing the estimated effects (Column VI, Table 10) and adding the net

Table 10. Estimates of Equivalent Crop-Share Rental Value, 1972

| I Variable | II Coefficient | III Crop Share Rent Mean | IV Cash Rent Mean | V Difference in Means (Col. III - Col. IV) | VI Estimated Effect on Mean Rent Value (Col. II x Col. V) |
|---|---|---|---|---|---|
| Acres in rented parcel | -0.0413 | 143.2 | 69.3 | 73.9 | -3.052 |
| Total acres farmed by tenant | -0.0116 | 340.7 | 444.0 | - 103.3 | +1.198 |
| Distance to tenants headquarters (miles) | +0.905 | 1.8 | 2.2 | - 0.4 | -0.362 |
| Years parcel farmed by tenant | -0.225 | 10.5 | 6.5 | 4.0 | -0.900 |
| Percent of land in: | | | | | |
| Sugar Beets | +0.248 | 27.2 | 21.9 | 5.3 | 1.3144 |
| Potatoes | +0.301 | 13.1 | 15.9 | - 2.8 | -0.8428 |
| Onions | +0.619 | 3.5 | 6.5 | - 3.0 | -1.8570 |
| Sweet Corn | +0.246 | 7.2 | 6.2 | 1.0 | 0.2460 |
| Grain | +0.347 | 26.5 | 8.8 | 17.7 | 6.1419 |
| Composite yield index | +0.445 | 115.9 | 106.4 | 9.5 | +4.228 |
| Yield index squared | -0.00185 | 13,432.8 | 11,321.0 | 2,111.8 | -3.907 |
| Elevation of parcel (feet) | -0.0414 | * | 2,288.7 | * | * |
| Distance to town (miles) | -0.439 | * | 6.0 | * | * |
| Total Net Effect | | | | | Σ 2.21 |

* Geographic distribution assumed to be no different than for cash rental parcels.

to the mean adjusted cash rent ($58.60 + $2.21), the equation estimates
that these crop-share parcels would cash rent for an average of $60.81.
While the smaller total acreage farmed by the tenant, the higher percentage
of parcel in sugar beets and grain, and the higher composite yield index
contributed positively to the estimated value of the crop-share rent, the
larger size of parcel, lower percentage of parcel in onions, and the
diminishing rate of increase in the yield function, decreased the estimated
value.

Overall, there appears to be little difference in the rental value of
the average cash and crop-share rent parcels.

Appendix A

Adjusting Cash Rent Estimating Equation


If the cash rent estimating equation is to be useful over time, it must be possible to adjust it to changing conditions. The model was constructed using 1972 data and can be used appropriately to estimate equivalent cash rents on parcels for that year. However, adjustments must be made to account for changing conditions if rents are to be estimated for other years.

Two factors must be considered - the relative change in prices received for crops, and the change in farmers' cost of production. Properly combining these effects will result in estimating a cash rent reflecting the change in the net income position of the renter. The procedure for adjusting the coefficients in the cash rent estimating equation is outlined below.

## Adjustment Procedure

The adjustment procedure will be illustrated (Appendix Table A-1) by changing the coefficients representing 1972 conditions to reflect changes occurring in 1973. The nine crops used (column I) accounted for virtually all of the irrigated cropland in the rental parcels. Thus, they can appropriately represent the total land use in the area.

Specifically:
1) Determine the average prices received for each crop for the base year (1972) and for year to be estimated (1973), columns II and III.

2) Divide prices for year to be estimated (1973) by base year prices (1972), (column III ÷ column II), column IV.

3) Obtain USDA index of prices paid by farmers for base year (1972) and divide by the index for the year to be estimated (1973), column V.

4) Multiply price ratios (column IV) by cost index ratio (column V), adjust to percent by multiplying by 100, column VI.

Table A-I.  Calculated General Adjustment Factor, 1973

| I  Crops | II  1972 Prices | III  1973 Prices | IV  $\frac{1973\ Price}{1972\ Price}$ (III ÷ II) | V  $\frac{1972\ Cost\ Index}{1973\ Cost\ Index}$ *** | VI  Net Change in Crop Prices (IV x V x 100 - 100) | VII  Percent of Total Acres in Crop | VIII  Weighted Change in Crop Prices (VI x VII ÷ 100) |
|---|---|---|---|---|---|---|---|
|  | $ | $ |  |  | % | % | % |
| Sugar beets | 14.60 | 17.80 | 1.22 | 0.86 | 104.92 | 21.9 | 22.98 |
| Potatoes | 1.95 | 1.65 | 0.85 | 0.86 | 73.10 | 15.9 | 11.62 |
| Onions | 4.35 | 4.00 | 0.92 | 0.86 | 79.12 | 6.5 | 5.14 |
| Sweet corn | 6.00 | 6.65 | 1.11 | 0.86 | 95.46 | 6.2 | 5.92 |
| Grain | 1.64 * | 3.21 * | 1.96 | 0.86 | 168.56 | 8.8 | 14.83 |
| Hay | 34.00 | 50.00 | 1.47 | 0.86 | 126.42 | 11.7 | 14.79 |
| Alfalfa seed | 49.10 | 80.00 | 1.63 | 0.86 | 140.18 | 5.2 | 7.29 |
| Silage corn | 8.20 | 12.00 | 1.46 | 0.86 | 125.56 | 10.3 | 12.92 |
| Pasture | -- | -- | 1.46 ** | 0.86 | 125.99 | 13.5 | 17.01 |

Total adjustment                                                                             112.50

*     Average price of wheat, barley, and corn.
**    Average price of hay and silage.
***   USDA Index of Prices Paid by Farmers 1972--131, 1973--153.

5) Determine percent of total acres in each crop, column VII.

6) Multiply net 1973 crop prices (column VI) by percent of total acres in each crop (column VII), and divide by 100 to obtain weighted average 1973 crop prices, column VIII.

Table A-II presents equation adjustments and estimate of 1973 cash rents.

Summing column VI (Table A-II) provides the estimated average cash rent per acre for 1973. Thus, the average cash rent for 1973 ($63.86) was 109 percent of the average 1972 adjusted cash rents ($58.60). This new figure represents the generally higher crop prices' net of the increase in production costs.

Applying the 1973 coefficients to the crop-share rental data gives us the estimated equivalent cash rents presented in Table A-III.

The estimated cash rent equivalent for the crop-share parcels is $70.57, up 16 percent from the $60.81 estimated for 1972. The heavier cropping in the grains, which increased most in price from 1972 to 1973, caused the higher increase (16 percent versus 9 percent) as compared with the cash rents.

If the basic characteristics of all of the irrigated land and the farmers farming it in northeastern Malheur County do not differ significantly from the cash rent sample, the estimating equation could be applied to establish a base level for all irrigated land in the area. Table A-IV presents such an approximation using the North Division of the Owyhee Project to represent the total area.

These calculations indicate that the county average equivalent cash rent value for 1972 was $54.00, 8 percent below the 1972 cash rents, and 13 percent below the crop-share equivalent rents. The lower percentage of cropland in row crops and the slightly lower yield index would tend to indicate a lower equivalent value for the county as a whole (as represented

Table A-II. Estimation of Cash Rents, 1973

| I<br>Variable | II<br>1972<br>Coefficient | III<br>Adjustment<br>Factor | IV<br>1973<br>Coefficient<br>(II x III) | V<br>Mean | VI<br>Estimated<br>Effect<br>(IV x V) |
|---|---|---|---|---|---|
| Constant term ($) | 118.60 | 1.1250 | 133.44 | -- | 133.44 |
| Acres in rented parcel | - 0.0413 | 1.1250 | - 0.0465 | 69.3 | - 3.2225 |
| Total acres farmed by tenant | - 0.0116 | 1.1250 | - 0.0131 | 444.0 | - 5.8164 |
| Distance to tenant's head-<br>quarters (miles) | 0.905 | 1.1250 | 1.0182 | 2.2 | 2.2400 |
| Years parcel farmed by tenant | - 0.225 | 1.1250 | - 0.2531 | 6.5 | - 1.6452 |
| Percent of land in: | | | | | |
| Sugar beets | 0.248 | 1.0492 | 0.2602 | 21.9 | 5.6984 |
| Potatoes | 0.301 | 0.7310 | 0.2200 | 15.9 | 3.4980 |
| Onions | 0.619 | 0.7912 | 0.4898 | 6.5 | 3.1837 |
| Sweet corn | 0.246 | 0.9546 | 0.2351 | 6.2 | 1.4576 |
| Grain | 0.347 | 1.6856 * | 0.5849 | 8.8 | 5.1471 |
| Composite yield index | 0.445 | 1.1250 | 0.5007 | 106.4 | 53.2745 |
| Composite yield index squared | - 0.00185 | 1.1250 | - 0.0021 | 11,321.0 | - 23.7741 |
| Elevation of parcel (feet) | - 0.0414 | 1.1250 | - 0.0466 | 2,288.7 | -106.6534 |
| Distance to town (miles) | - 0.439 | 1.1250 | - 0.4939 | 6.0 | - 2.9634 |
| Estimated rent | | | | | Σ 63.86 |

* Average of wheat, barley, and corn.

Table A-III. Estimates of Equivalent Crop-Share Rental Value, 1973

| I Variable | II 1973 Coefficient | III Crop-Share Means | IV Estimated Effect on Mean Rent Value (II × III) |
|---|---|---|---|
| Constant term ($) | 133.44 | -- | 133.44 |
| Acres in rented parcel | - 0.0465 | 143.2 | - 6.6588 |
| Total acres farmed by tenant | - 0.0131 | 340.7 | - 4.4632 |
| Distance to tenant's head-quarters (miles) | 1.0182 | 1.8 | 1.8328 |
| Years parcel farmed by tenant | - 0.2531 | 10.5 | - 2.6576 |
| Percent of land in: | | | |
| Sugar beets | 0.2602 | 27.2 | 7.0774 |
| Potatoes | 0.2200 | 13.1 | 2.8820 |
| Onions | 0.4898 | 3.5 | 1.7143 |
| Sweet corn | 0.2351 | 7.2 | 1.6927 |
| Grain | 0.5849 | 26.5 | 15.4999 |
| Composite yield index | 0.5007 | 115.9 | 58.0311 |
| Composite yield index squared | - 0.0021 | 13,432.8 | - 28.2089 |
| * Elevation of parcel (feet) | - 0.0466 | 2,288.7 | -106.6534 |
| * Distance to town (miles) | - 0.4939 | 6.0 | - 2.9634 |
| Estimated rent | | | Σ 70.57 |

* Geographic distribution assumed to be no different.

Table A-IV. Estimated Cash Rents, Irrigated Area, Malheur County, 1972 and 1973

| I | II | III | IV | V | VI |
|---|---|---|---|---|---|
| Variable | 1972 Coefficients | 1973 Coefficients | County Means * | Estimated Effect on Mean Rent Value, 1972 (II x IV) | Estimated Effect on Mean Rent Value, 1973 (III x IV) |
| Constant term ($) | 118.60 | 133.44 | 118.6 | 118.60 | 133.44 |
| Acres in rented parcel | - 0.0413 | - 0.0465 | 69.3 | - 2.8621 | - 3.2225 |
| Total acres farmed by tenant | - 0.0116 | - 0.0131 | 444.0 | - 5.1504 | - 5.8164 |
| Distance to tenant's head-quarters | 0.905 | 1.0182 | 2.2 | 1.9910 | 2.2400 |
| Years parcel farmed by tenant | - 0.225 | - 0.2531 | 6.5 | - 1.4625 | - 1.6452 |
| Percent of land in: | | | | | |
| Sugar beets | 0.248 | 0.2602 | 14.9 | 3.6952 | 3.8770 |
| Potatoes | 0.301 | 0.2200 | 6.6 | 1.9866 | 1.4520 |
| Onions | 0.619 | 0.4898 | 4.3 | 2.6617 | 2.1061 |
| Sweet corn | 0.246 | 0.2351 | 2.5 | 0.6150 | 0.5878 |
| Grain | 0.347 | 0.5849 | 15.3 | 5.3091 | 8.9490 |
| Composite yield index | - 0.445 | 0.5007 | 100.0 | 44.5000 | 50.0700 |
| Composite yield index squared | - 0.00185 | - 0.0021 | 10,000.0 | - 18.5000 | - 21.0000 |
| Elevation of parcel (feet) | - 0.0414 | - 0.0466 | 2,288.7 | - 94.7522 | -106.6534 |
| Distance to town (miles) | - 0.439 | - 0.4939 | 6.0 | - 2.6340 | - 2.9634 |
| Estimated rent | | | | Σ 54.00 | Σ 61.42 |

* County data is represented by data from the North Division of the Owyhee Project.

by North Division data).

The estimated equivalent cash rent for the county in 1973 was $61.42. This value was only 4 percent below the 1973 estimated cash rent and 15 percent below the 1973 crop-share equivalent rent estimates. These changing relationships are due to differences in cropping patterns and relative price changes among crops.

Application of the equation to county averages may require some over-simplifying assumptions. Some of these could be removed with better data.

If relative price changes among crops differ and prevail over time, cropping patterns (rotations) may change. Thus, a periodic update would be needed.