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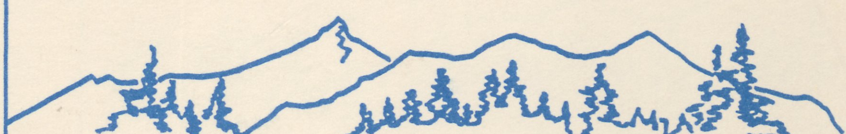

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AFFECTS OF FARMLAND CASH LEASING RATES ON CROP SELECTIONS OF OWNERS AND TENANTS: A PORTFOLIO ANALYSIS

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Portfolio theory is used to evaluate the affects of cash leasing rates on the cropping decisions of farmland owners and tenants. Differences in crop selection opportunities may prevent tenants from choosing the risk efficient crop portfolio available to land owners. The decision making processes of owners and tenants are virtually identical, but differences in land wealth give tenants lower returns and higher risk exposure on average.

The cash leasing rate per acre of agricultural land is expected to reflect the potential value of land from use in crop production. However, the relationship between cash leasing rates and production returns to land has not received much attention despite its implications concerning the willingness of both owners and tenants to lease land and the selection of crops to be produced on that farmland.

When not satisfied by the returns currently offered by the market, a land owner may consider leasing land out to someone whose risk preference makes them willing to accept the returns available (Apland, Barnes and Justus; Chambers and Phipps). The short-run equilibrium rental rate for farmland was shown by Chambers and Phipps to depend on the distributions of the current farmland stock, entrepreneurial ability, and market prices of crops. This dependence implies that when an owner chooses to lease out land, the tenant differs from that owner in terms of ability and/or price expectations held (Gustafson). However, another hypothesis is that owners and tenants with identical abilities, price expectations and risk attitudes may still make different cropping decisions due to differences in their wealth.

The objective of this study is to evaluate the affects of leasing rates on the cropping decisions of two groups of producers with different initial wealth positions: farmland owners and tenants. Portfolio theory is used to explain the decision environment of each group because it facilitates describing land owners and tenants as investors facing the decision of how to allocate their land (and labor) assets so as to maximize utility. This is the approach taken in the next section to outline cropping opportunities of land owners and tenants. In later sections the affects of leasing rate changes are evaluated and the returns to risk for each group are estimated in an example.

I. A PORTFOLIO MODEL OF CROPPING OPPORTUNITIES

A person deciding whether to produce crops in a particular market must first identify the opportunities available in that market. Those opportunities can be plotted on an expected return-variance (EV) graph to facilitate analysis. This is done for a hypothetical market in Figure 1. The curved line labeled EV represents the opportunity set available to crop producers within some geographic market. Each point on the EV is a crop or portfolio of crops which is efficient in terms of its return/risk relationship. The location and shape of the EV is determined by the data used to calculate expected returns for all portfolios.

If no leasing is possible, for whatever reason, only land owners can produce crops. Each person would choose to produce the portfolio represented by the point on the EV which is tangent to one of their indifference curves. This leads to different crop portfolios being produced by owners with different risk attitudes.

If a risk-free investment exists, borrowing and lending can occur and the opportunity set available to growers is altered. In this study, a risk-free return (R_f) to land is defined as the return from leasing it to others (as suggested by Collins and Barry). Lending land is analogous to investing in a risk-free asset, which has a return of R_f, and is plotted as a point on the vertical axis of an EV graph. Borrowing land implies that a producer chooses to invest more than 100 percent of the amount of land owned in some crop portfolio *i* which is expected to generate returns exceeding the leasing rate.

Land Owner Cropping Opportunities

When leasing is possible, all land owners with the same returns expectations will produce the same crops, although the composition of their selected portfolios will still vary with their risk attitudes. Using the risk-free return, a single optimal risky portfolio and a land owner's cropping opportunities line (COL) can be identified. The COL represents the opportunity set available to land owners in a market (given some returns expectations). It is plotted as a straight line which passes through the point representing the risk-free return and is tangent to the EV. The point of tangency represents the market's "optimal" portfolio, which has expected returns of $E(R_m)$. The portfolio selected by each owner is found at the point of tangency between this linear COL and an indifference curve for that person. The selected portfolio has expected returns of $E(R_i)$.

For example, in Figure 1 the COL existing for land owners when leasing rates are the value R_{f1} is the line labeled "1", which is tangent to the EV at point *A*. If an owner's indifference curve is tangent to line 1 at point *A*, all of that person's land should be "invested" in the crops comprising the optimal portfolio represented by that point. If the indifference curve is tangent at some point to the left of *A*, the person will invest some land in producing portfolio *A* and the remaining land in the risk-free asset (by leasing that land out). Points on the COL to the right of *A* require an investment in portfolio *A* involving all of an owner's land and some land leased in. Thus, all land used for crop production by owners sharing the expectations represented by the EV will be planted to the same portfolio of crops in the same relative proportions. The only difference in composition of portfolios between owners will be the relative proportions of land leased in or out.

A landowner's profit function for holding his selected portfolio over a future period can be specified as

$$E(R_i) = [E(R_m)X_m] + (R_f X_f) - C \quad (1)$$

where R_i is net profit (returns) from selected crop portfolio *i*, E is the expectations operator, R_m is gross returns from the market's optimal crop portfolio, R_f is risk-free returns from cash leasing out land, X_m is the proportion (or total number of units) of land planted in the market portfolio, X_f is the proportion (or total number of units) of land leased out (or leased in if negative), and C is total fixed costs incurred in owning a parcel of land, expressed in per acre (or total dollar) terms. If X_m and X_f are expressed in terms of proportions (acres), they must sum to one (the total acres owned). The variance of returns for a portfolio held by a landowner is

$$\sigma^2_i = X_i^2[\sigma^2_m] \quad (2)$$

where σ^2_i and σ^2_m are the variance in expected returns of the selected and optimal portfolios, respectively. The variance of the profit model is the variance of expected returns to the optimal portfolio component only because all other factors are known with certainty and, therefore, have zero variance.

In portfolio theory, utility maximization is assumed to be the objective. Therefore, the focus of decision making is the certainty equivalent of $E(R_i)$, which Freund shows is

$$E(U_i) = E(R_i) - (\tau/2)(\sigma^2_i) \quad (3)$$

where U is utility and τ is a risk-aversion parameter (equalling the slope of the indifference curve at the tangency point) which is positive for risk-averse hedgers. The first-order conditions for equation 3 gives the utility-maximizing portfolio composition,

$$X_m = \frac{E(R_m)}{\tau\sigma^2_m}, \quad (4)$$

remembering that the proportion of land leased out (X_f in equation 1) is $1-X_m$.

Tenant Cropping Opportunities

Differences in initial wealth positions of owners and tenants alter the COL available to tenants and, therefore, the resulting cropping decisions. Tenants have no land to lend, therefore they can only borrow land. This means that the COL available to tenants is a combination of the linear COL for owners and the curved EV. In Figure 1, for example, if line 1 is the COL for owners, the COL for tenants would be the segment of line 1 from point *A* to the right, plus the segment of the EV from points *A* to *M*.

A tenant would select a crop portfolio in the same manner as owners: the point of tangency between the COL and a person's indifference curve identifies the portfolio to be produced, if the prospective tenant chooses to undertake a lease. If the tangency point is at point *A* or to the right on line 1, the tenant will produce the same crops as an owner with similar risk preferences: the optimal portfolio for that market. On the other hand, if a tenant's indifference curve is tangent to the COL somewhere to the left of point *A*, they will be on the EV, which is less risk efficient than points on line 1 to the left. Also, portfolios on the EV to the left of *A* are unique combinations of crops, not combinations of portfolio *A* and leased land as is the case for points to the left of *A* on line 1. This means that tenants and owners selecting portfolios to the left of *A* will be producing different crops.

A tenant's profit function for holding his selected portfolio over some future period can be specified as

$$E(R_t) = [E(R_i)X_i] + [-X_i(R_f)] \quad (5)$$

where $E(R_t)$ is the expected net return to the tenant from selected portfolio *i*. For tenants, if the two X_i's are expressed in terms of portfolio proportions (acres), they must sum to zero[1] (the total number of acres leased in) because no land wealth is held initially. The variance of returns for a portfolio held by a tenant is $X_i^2[\sigma^2_i]$.

[1] When expressed as proportions, the weightings X_i and $-X_i$ must be 1 and -1, since all land is leased in and invested in the single portfolio R_i.

The focus of decision making by a utility-maximizing tenant is the certainty equivalent of $E(R_t)$, which is expressed like equation 3. This means that tenants have a utility-maximizing portfolio composition,

$$X_i = \frac{E(R_i)-R_f}{\tau\sigma^2_i}, \qquad (6)$$

that is similar to that in equation 4 for owners (except that the optimal market portfolio is no longer the focus and expected net, rather than gross, returns are used).

II. EFFECTS OF LEASING RATE CHANGES

In this section, the affects of leasing rate changes on cropping decisions are discussed for land owners and tenants. To illustrate the affects of wealth, the remaining discussion will take the case of an owner and a tenant with the same expectations concerning gross returns and with identical risk attitudes. It is hypothesized that leasing rates affect cropping decisions both directly and indirectly through other factors, as described below.

Direct Affects of Leasing Rate Changes

The first question to be addressed is what direct affects do changes in leasing rates have on cropping decisions of owners and tenants? To begin it is assumed that a land owner and tenant each face a leasing rate of R_{f1}, making line 1 the relevant COL in Figure 1. The indifference curve I_1 reflects the risk attitudes of both people. Since I_1 is tangent to line 1 at point *1*, the land owner and tenant would both select the same portfolio. Portfolio *1* requires that the land owner use all of his land and some additional land leased in for production of the crops in portfolio *A* (the optimal portfolio). The tenant would also produce the crops in portfolio *A*. (For now it is assumed that the tenant is able to lease in the amount of acreage necessary to achieve the returns at point *1*.)

If leasing rates increase to R_{f2}, cropping decisions of the owner change significantly. Line 2 in Figure 1 becomes the relevant COL for owners and it is tangent to the EV at point *B*. The owner's utility is increased, as indicated by the move from indifference curve I_1 to I_2. The new selected portfolio for the owner is at point *2*. Portfolio *2* requires that the land owner use only part of his land for production of the crops in portfolio *B* (the new optimal portfolio), with the remaining acreage being leased out. The composition of portfolio *B* is clearly more risky than that of portfolio *A*. Hence, owners respond to increases in leasing rates by producing more risky crops, but they produce on fewer acres. As plotted, the difference between portfolios *1* and *2* is a slight reduction in expected returns and a large reduction in risk levels, resulting in an increase in the certainty equivalent (plotted at the intersection of the relevant indifference curve and the vertical axis).

The tenant will also change cropping plans. If leasing rates increase to R_{f2}, the tenant's COL becomes the combination of Line 2 in Figure 1 from point *B* to the right and the EV to the left of *B*. The tenant's utility is decreased, as indicated by the move from indifference curve I_1 to I_T (which is tangent to the EV at point *T*). The new selected portfolio for the tenant is at point *T*. The composition of portfolio *T* is clearly more risky than that of portfolio *A* although less risky than portfolio *B*. As plotted, the difference between selected portfolios *1* and *T* is a reduction in both expected returns and risk levels, resulting in a decrease in the certainty equivalent.

Another difference between the new selected portfolios of the land owner and tenant is in their degrees of risk efficiency. Since the two decision makers are assumed to have identical risk preferences, the tenant would also choose portfolio *2* if he could, but he is unable to do so because it requires leasing out land which he does not have. Due to differences in their wealth, production efforts of the two people generate different portfolios: the owner produces crops in the optimal (risk efficient) portfolio and the tenant produces the less efficient portfolio *T*.

If leasing rates increase further to R_{f3}, cropping decisions of the owner change again. Line 3 in Figure 1 becomes the relevant COL for owners and it is tangent to the EV at point *C*. The owner's utility is increased further, as indicated by the move from indifference curve I_2 to I_3. The new selected portfolio for the owner is at point *3*. Portfolio *3* requires that the owner lease out all of his land. The composition of the optimal portfolio, *C*, is more risky than that of portfolio *B* and, considering the owner's risk preferences, *C* is too risky to produce given current leasing rates. As plotted, the difference between selected portfolios *2* and *3* is a slight increase in expected returns and a large reduction in risk levels, increasing the owner's certainty equivalent.

The tenant will also cease production with leasing rates at this level. If leasing rates are R_{f3}, the tenant's COL becomes the combination of Line 3 in Figure 1 from point *C* to the right and the EV to the left of *C*. The selected portfolio for the tenant would remain at point *T*, but this is irrelevant because as plotted the expected gross return on portfolio *T* is less than the leasing rate, making production irrational.

Affects of Risk Attitudes

For the land owner, being more or less risk averse would not change the risk efficiency of his selected portfolios. Land owners are always able to select a portfolio on the linear COL involving some combination of the optimal portfolio and leasing (if leasing is possible). As is evident from equation 4, a more (less) risk averse owner would lease out a higher (lower) proportion of land than described earlier. Increasing values of τ reduce the proportion of land used in production, thereby raising the amount to be leased out.

Across tenants, differences in risk aversion have more significance concerning efficiency of the selected portfolio. Tenants which are more risk averse are more likely to be forced to select a portfolio on the less risk efficient EV segment of the COL. As can be seen by increasing the value of τ in equation 6, the tenant's desired level of returns decrease, indicating that the point of tangency identifying the selected portfolio will move to the left. If it is to the left of the optimal portfolio, the tenant is on the EV segment and suffers an opportunity cost. Tenants which are less risk averse may avoid this problem but face another.

Credit Limit Affects

Tenants which are less risk averse are more likely to select a risk efficient portfolio, but are also more likely to face lender resistance in the form of credit limits due to their higher "risk of ruin". As can be seen by reducing the value of τ in equation 6, the tenant's desired level of returns increase, requiring greater amounts of leased in land. At some point the tenant will not be able to obtain the desired amount of leased land because his lender will not extend sufficient credit to do so.

Credit limits can have a significant affect on portfolio choice and its risk efficiency. This point can be illustrated using the case of an owner and tenant facing a COL like line 1 in Figure 1. Each grower would choose portfolio *1* if possible. If the owner needs to borrow additional funds to lease in land and expand production, he has the equity in his land to serve as collateral. The tenant, however, faces a much greater chance of being unable to borrow the full amount needed because he needs more funds and has no equity in land to serve as collateral, hence, he represents a more risky loan to the lender. If the tenant cannot borrow all the funds needed to produce the desired portfolio, he would find his new selected portfolio by moving to the left along his COL until the credit constraint was no longer binding. For tenants, the lower their credit limits, the more likely they will be forced to select a portfolio on the less efficient EV portion of their COL. Also, it is important to note that *any* movement to the left on the COL due to credit limits reduces both expected and certainty equivalent returns.

Profitability Considerations

The factor of leasing rates, R_f, is part of the profit functions for both owners and tenants, raising the question: Is the "profitability" of leasing rates considered when leasing decisions are made? For owners the answer no. Whether leasing land out or in, leasing rates are irrelevant to the decision; owners will produce on or lease out land based only on the interaction of their COL and risk preferences. This is true even if leasing out land is unprofitable. This result comes directly from equation 4. The only factors affecting the leasing decision of an owner are expected gross returns for the optimal portfolio, the variance of those returns, and the person's risk preference.

For tenants the answer to the question is yes. When leasing land in, gross returns to production represent the gross income received by tenants. These returns generate a net profit or loss when compared with the costs of that land to the tenant - the leasing rates. Therefore, leasing rates are very relevant to the decision about leasing in land. This result comes directly from equation 6. The factors affecting the leasing decision in this case are expected net returns for the selected portfolio, the variance of those returns, and the person's risk preference.

Clearly, the difference between the cases of owners versus tenants facing a leasing decision is that owners focus on the optimal portfolio and tenants focus on the selected portfolio, and leasing rates affect returns of only the latter. This difference between groups is due to the fact that owners must consider their (unavoidable) fixed costs, which tenants do not have and, therefore, do not consider. In other words, owners are concerned about the gross profit from leasing while tenants are concerned about the net profit from leasing.

The Decision to Produce Crops

The discussion above raises the question: At what point do owners and tenants decide to *not* produce? For owners this means leasing out all of their land. For tenants, deciding not to produce is equivalent to deciding not to lease in any land. Despite this difference in perspective, the answer to the question is the same for owners and tenants. Any potential grower will decide to not produce when the certainty equivalent of expected returns from the selected portfolio is less than or equal to the sum of all opportunity costs faced.

Owners are concerned about the gross profits from leasing, making the certainty equivalent of expected gross returns relevant to their production decision. The opportunity costs incurred by owners involve both their land and labor assets. For a land owner, the foregone opportunity of investing land in crop production is the chance to collect cash lease payments, valued at R_f per acre. If a grower invests his own labor in crop production, he foregoes the opportunity to invest it off the farm where it would be valued at the equivalent of *L* (some number of dollars) per acre. Since both leasing out land and working for a wage off the farm are considered to be riskless investments, it is clear why a necessary condition for crop production on the part of a land owner is

$$E(U_i) \geq R_f + L \tag{7}$$

where $E(U_i)$ is the certainty equivalent of expected gross returns to selected portfolio *i* and the factors on the right side are the opportunity costs.

Tenants are concerned about the net profits from leasing, therefore it is the certainty equivalent of expected net returns which is relevant to their production decision. The opportunity costs incurred by tenants involve only their labor assets since they have no land. If a potential tenant invests his labor in crop production, he foregoes the opportunity to invest it off the farm at a return of *L* per acre. Therefore, a necessary condition for crop production on the part of a tenant is $E(U_t) \geq L$, where $E(U_t)$ is the tenant's certainty equivalent of expected net returns to selected portfolio *i* and the single opportunity cost is on the right side. This condition can be rearranged to be expressed as gross returns giving $E(U_i) \geq R_f + L$, which is identical to equation 7. This means that a person facing a particular cropping opportunity would reach the same conclusion about whether or not to produce if they were an owner or tenant.

III. THE RETURNS TO RISK

The theoretical results presented thus far indicate that one aspect of the attractiveness of any cropping opportunity is reflected in the relationship between its returns and its risk. This relationship is expressed by the COL. Unfortunately, the optimal COL can be found in practice only if the EV frontier can be estimated, which requires data and sophisticated software that few potential growers possess. Yet, a simple trial-and-error method is available for ranking cropping opportunities which eliminates the need to derive an EV frontier. It involves calculating the slope coefficient of the COL created by any potential cropping opportunity. Each slope estimate can then serve as an index value which allows ranking of alternate opportunities, as described in this section.

The slope of the COL for land owners,

$$\Omega \equiv \frac{E(R_m)-R_f}{\sigma_m}, \tag{8}$$

is literally the reward for bearing production risk, per unit of such risk, offered by the market. The numerator is gross returns to production of the optimal portfolio in the market minus the opportunity cost of the land asset. The labor opportunity cost does not have to be included because it will not vary across cropping alternatives and, therefore, will not affect the relative rankings of those alternatives.

To measure a tenant's returns to risk in leasing, another index can be calculated,

$$\Gamma \equiv \frac{E(R_i)-R_f}{\sigma_i}, \tag{9}$$

where the numerator is net returns to production of the crop or portfolio being considered. Again, the labor opportunity cost does not have to be included because it will not affect the relative rankings of those alternatives.

The Ω and Γ indexes can be used by owners and tenants in selecting which crops to produce. Both indexes provide a measure of returns to risk for a single crop or portfolio which can be compared directly with values for other crops, facilitating cropping decisions. Opportunities can be ranked from best to worst regarding the return/risk tradeoff expected in each market. Crops with the highest index values offer the best tradeoff, while crops with negative values should not be considered at all. Which crops are chosen depends on the grower's risk preferences, but the indexes can be useful inputs to that decision for all individuals.

An Empirical Example

Returns to risk are calculated here for crops grown in California's Imperial county. Data used include annual observations for every product grown commercially in the county. Average values for yield per acre (Y) and real price per ton (P) are combined with average real cost estimates to calculate average real gross returns per acre for each product. Costs per acre (C), as reported in Extension Service budgets published for each crop in the county, include all variable costs of production. Therefore, for each crop *i* expected average returns per acre at any point in time are $R_i = [(PY)-C]_i$. Returns from the county's market portfolio, R_m, are calculated using profitable crops weighted according to their portion of total acreage of profitable crops in the county.

Returns to risk for crops in Imperial County vary widely, as reported in Table 1. The weighted average value of Ω is expected to reflect the market-wide returns to risk for owners. There are three crops with negative Γ values which only owners or overly optimistic tenants would choose to produce. Anyone producing alfalfa hay or seed or barley on leased land must be expecting returns far above the historical means for those products. Also, these three low returning crops may be part of a selected portfolio because of their diversification effects when combined with more risky crops. On the other hand, all three of these crops may be produced by land owners as part of a rotation aimed at conditioning the soil.

The seven crops with positive values for Γ are easily ranked, but different selections will still be made across growers with different risk preferences. Cantaloupes has the highest value of Γ meaning that it offers the best return/risk tradeoff in the county market. As a result, it may be selected by tenants or owners as part of the preferred portfolio. Yet, decision makers which value returns more heavily than they fear risk may favor adding sugar beets, the risk neutral choice, because it offers the highest mean returns. On the other end of the continuum, highly risk averse growers are more likely to include cotton in their portfolios because it offers the lowest level of risk, as indicated by its standard deviation of returns.

Cotton results in Table 1 illustrate why the returns to risk index can be useful in making cropping selections. Of the seven crops offering positive net profits to tenants, cotton is ranked sixth in terms of mean income. This ranking, combined with cotton's low level of risk, may give the impression that only highly risk averse growers should consider this crop. However, cotton's Γ index ranks third in the county market, meaning that cotton may be a valuable portfolio component for both owners and tenants seeking a tradeoff between returns and risk. Without considering the index, this opportunity might have been overlooked.

IV. SUMMARY AND CONCLUSIONS

This study used portfolio theory to evaluate the affects of leasing rates on the cropping decisions of farmland owners and tenants. From simple models of cropping opportunities available to each group it was found that differences in the factors considered when making crop selections do exist. These differences mean that tenants may not be able to choose the same risk efficient crop portfolio which is always available to land owners.

Leasing rates were shown to have direct and indirect effects on cropping decisions of both groups of growers. It was shown that owners respond to increases in leasing rates by producing more risky crops, but they produce on fewer acres. Although tenants will also produce a riskier portfolio, they suffer a loss of utility from leasing rate increases while owners gain. Also, tenants which are more risk averse may suffer further because they are more likely to be forced to select a less risk-efficient portfolio. Credit limits are another factor which may force tenants to select a less efficient portfolio.

The profitability of leasing rates was shown to be irrelevant to owners when deciding whether or not to produce, but it was the major criterion used by tenants making that decision. When facing a leasing decision, owners focus on the optimal portfolio and tenants focus on the selected portfolio, and leasing rates affect returns of only the latter. This difference between groups is due to the fact that owners must consider their (unavoidable) fixed costs, which tenants do not have and, therefore, do not consider.

As a result of these differences in land wealth, owners make cropping decisions based on gross returns to risk, tenants use net returns to risk as the appropriate measure. The formulas used to empirically estimate these two indexes are shown to be nearly the same. Therefore, the decision making processes of owners and tenants are virtually identical, but differences in land wealth will, *ceteris paribus*, generate results that lead on average to lower returns and higher risk exposure for tenants.

REFERENCES

Apland, A., R. Barnes and F Justus, "The Farm Lease: An Analysis of Owner-Tenant and Landlord Preferences Under Risk," American Journal of Agricultural Economics 66(1984): 376-84.

Chambers, R. and T. Phipps, "Accumulation and Rental Behavior in the Market for Farmland," Western Journal of Agricultural Economics 13(1988): 294-306.

Collins, R. and P. Barry, "Risk Analysis With Single-Index Portfolio Models: An Application to Farm Planning," American Journal of Agricultural Economics 68(1986): 152-161.

Ellinger, P. and P. Barry, "The Effects of Tenure Position on Farm Profitability and Solvency: An Application to Illinois Farms," Agricultural Finance Review 47(1987): 106-118.

French, Ben C., "Farm Price Estimation When There Is Bargaining: The Case of Processed Fruit and Vegetables," Western Journal of Agricultural Economics 12(1987): 17-26.

Freund, R., "The Introduction of Risk Into a Programming Model," Econometrica 24(1956): 253-263.

Gustafson, Cole R., "Controlling Farmland in the Red River Valley: A Stochastic Dominance Analysis of Alternative Means," North Central Journal of Agricultural Economics 11(1989): 243-251.

Reed, A. and L. Horel, "Leasing Practices for California Agricultural Properties," Leaflet 2359, Division of Agricultural Sciences, University of California, various issues.

Table 1. Gross Income, Leasing Rates, and Returns to Risk for Crops Grown Profitably in Imperial County ($/ac)

Crop	Gross Income Mean	Gross Income St Dev	Actual Lease	Γ	Ω
Alfalfa hay	88.32	129.99	125	-.285	
Alfalfa seed	91.23	79.77	125	-.425	
Asparagus	159.53	715.41	150	.014	
Barley	73.01	78.32	100	-.346	
Cantaloupes	718.42	555.92	150	1.022	
Carrots	617.92	1138.42	150	.411	
Cotton	354.88	469.68	125	.489	
Onions, dry	469.70	909.80	150	.352	
Oranges	565.91	703.87	150	.591	
Sugar beets	818.74	1535.03	125	.452	
Weighted Market Average* (R_m)	258.99	384.29	129		.338

Note: All amounts are in real 1986 dollars. Crops grown in the county but which had negative mean returns for the data period are not listed here. The means and standard deviations are from time series data from 1958 to 1986. Leasing rates are from Reed and Horel.

* These results are for all products listed, weighted according to each crop's percentage of total acreage.

Figure 1. Cropping Opportunities for Farmland Owners and Tenants