Title - Determining Farmers Ability to Pay Cash Rental Rates

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Abstract:

The recent drop in gross income from lower commodity prices has not lowered cash rental rates. Farmers may continue paying current cash rents because of machinery considerations and because of their expectations about future prices. Kentucky farm-level data is used to examine net income under various lease arrangements.

Determining Farmers Ability to Pay Cash Rental Rates

Introduction

For the last several years, farmers have faced low grain prices. These lower prices have been partly offset by loan deficiency payments (LDP) and other government payments. However, the gross per acre income from growing corn, soybeans, or wheat is still relatively low. In spite of this reduction in gross income, there is little evidence that farmers have paid less in cash rents or switched to share leasing.

This paper examines why farmers are willing to pay current levels of cash rents and why share leasing has not increased. Part of the reason may be based on planning horizons. Economists tend to look at decisions on a yearly basis while farmers may be planning for five years or more. Many of the fixed expenses for growing crops are equipment related. Owned tractors, combines, and planting equipment often have low marginal variable cost per acre. Therefore farmers may be willing to pay relatively large cash rents just to maintain or increase their acreage base and help spread out the fixed costs.

Data and Methods

Data from the Kentucky Farm Business Analysis Program (KFBM) are used to provide detailed information about the costs and returns from growing corn, soybeans, and wheat. This data set divides operating expenses into 20 different categories. Expenses such as fertilizer, pesticide, and seed cost are totally variable. Other expenses such as machinery depreciation are fixed but still need to be considered. Data from the KFBM program also provide information about how these fixed costs vary by farm size. KFBM, Kentucky Agricultural Statistics, and other state data are used to provide yield and grain price histories for the various crops. Government payments such as LDPs that vary by production are added back into the grain price. Infor-

mation about cash rents for crop land is provided from farm surveys of county agricultural agents in western Kentucky.

The model developed here examines how various share lease arrangements and current cash leases affect net income. The share leases examined include a one-third, two-third cost share arrangement where revenue is split one-third to the landlord and two-thirds to the tenant. Seed, fertilizer, and chemical costs are split similarly. The tenant is responsible for the machinery and labor costs necessary to produce the crop. The landlord bears land related costs including taxes and liming. The other two share leases are crop share arrangements where the landlord shares in the revenue but not the expenses. In this paper, a one-third and a one-fourth crop share arrangement are examined. These are labeled as Clear 1/3 or Clear 1/4 in the figures.

Whole farm analysis is performed by using corn and soybean budgets (Tables 1 and 2) to analyze a typical grain farm in western Kentucky. Based on KFBM data, a typical grain farm is 1600 acres is size and consists of 60 percent soybeans and 40 percent corn. The soybean and corn budgets are combined in a 60/40 ratio to keep the analysis on a per acre basis. Variable costs are assumed to not be affected by farm size while the fixed costs do vary by farm size. Yield and price histories of corn and soybeans in western Kentucky from the past five years are used to examine gross income variability. Costs estimates from 1998 are then subtracted from each of these five years of gross income to examine returns over variable costs and returns over fixed plus variable costs. A single year's cost numbers are used because costs are much are much less variable than revenue and also because farmers will use the most recent estimates of costs to project net income into the future.

Four different farm sizes are used in this analysis. Besides the 1600 acre typical grain farm, an 800 acre, a 2,400 acre, and a 3,200 acre farm are examined. Examining different farm

sizes is necessary because fixed costs vary by farm size. Research from the University of Kentucky examining depreciation and farm size shows that larger farms typically make more efficient use of equipment. Figure 1 shows how the depreciation on a per acre basis decreases as farm sizes increases. Also, the variability decreases with an increase in farm size. Farmers likely are using more efficient and larger equipment as their operations become bigger. The decrease in variability suggests that it is much easier to properly size equipment to a farm as the number of acres increases. A regression of depreciation by farm size gives the following expression:

[1] $ Depr/Ac = 33.05 - (0.00284 * acres).

The five year yield and price history is combined with the crop budgets to produce a return over variable costs and a return over variable plus fixed costs for each leasing arrangement and for each farm size. The coefficient of variation is used as a risk measure when examining each lease arrangement.

Results

Figures 2, 3, 4, and 5 show how much the farmer earns over fixed and variable costs for each lease type and for each farm size. These returns over fixed and variable costs are the returns to the labor and management of the operator. The "Own" category in each figure is what a farmer earns when he or she owns the land instead of renting. Returns to owning would also be a return to capital and land as well as labor and management. Notice that these figures are very similar, the effect of farm size is merely to scale the lines upward or downward. The change in fixed costs from 800 acres to 3,200 acres results in a reduction of fixed costs by $6.82 per acre. This change in fixed costs affects all the leases the same. Figure 6 shows the return over variable costs for each lease type and year. Because variable costs are assumed to not be affected by farm size, this figure applies to all farm sizes.

Table 3 presents the mean returns and the coefficient of variation for the five years examined. The leases examined and presented in the figures are listed under the "farmer" subsection. These are the mean returns the tenant could expect. The four items under the "landlord" subsection lists the mean returns a landlord could expect with each lease type. Both the return over variable costs and the return over variable plus fixed costs is presented. The table also lists the coefficient of variation which is used as a measure of risk.

Cash renting and crop share leasing with the landlord receiving a clear one-third of the crop produces the most income variability for the tenant. These coefficient of variations are much greater than the other lease types. As expected, the cost share lease where both tenant and landlord share in expenses and revenue results in less risk to the tenant. Somewhat surprising is the variability in cash rents received by the landlord. The cash rent coefficient of variation is slightly larger than the coefficient of variation for gross revenue. Cash rents for landlord have nearly the same income variability as the other types of leases.

Despite low crop prices the last several years, farmers were able to cover all costs for most of the leases when examined over a five year period. The only exception is the clear one-third crop share lease. Cash renting resulted in farmers earning a $1.30 per acre per year to cover their own management and labor. Farmers would make the most under a one-third, two-third cost share lease. Figure 7 indicates that there appears to be a delay before cash rents start to match the decrease in gross revenue. This figure is based on using 1994 results as a baseline. Notice that rent increases follow upturns in revenue fairly quickly but are slower to decrease.

Discussion

Tenant farmers with cash rents have still covered all their costs based on a five year analysis. If prices continue at low levels, then cash rents should start to come down. However,

farmers may be expecting prices to rebound and pay more than what a one-year analysis suggests they should. Based on 1998 results alone, cash rents appeared too large. With low prices in 1998, farmers would only earned enough to cover all costs if cash rents were $67 lower. Because government payments were added into the grain prices, the payments appear to be capitalized back into land rents.

Another factor helping to explain persistent levels of cash rents is equipment and building commitments. When farmers purchase machinery, buildings, and grain bins necessary for a given crop acreage, they have committed to expensing those machines and buildings over a given number of years. Whether they use the equipment to its fullest potential or not, the equipment still incurs depreciation expenses. Therefore, farmers may base rent decisions on their ability to cover variable costs only. Over a longer planning horizon, farmers have time to readjust their equipment needs. Cash rents should then fall as farmers plan to cover all costs and not just variable costs.

Improvements in machinery and new farming technologies may also cause high cash rents to persist. When farmers replace their equipment they may find new equipment is more efficient allowing them to cover more acres. Farmers may mistakenly think that if they can cover fixed costs on their current acreage, any new acreage only has to cover variable costs.

Farm size may also explain some of the cash rents being paid. As shown in the analysis, larger farms have less depreciation per acre than smaller farms. However, this advantage can only explain some of the high cash rents. On average, expanding farm size by 100 acres only allows a tenant to reduce long-term fixed costs by $0.28 per acre. Farmers however, may misinterpret this savings. As an example, a 1,600 acre farm may be looking to cash rent an additional 100 acres. This additional 100 acres would only reduce fixed costs by $0.28 per acre in the long run. How-

ever, when applied to the entire 1,700 acres, fixed costs are reduced $483 in total (i.e., $0.28/ac * 1700 ac). If farmers believe they can apply this entire savings to the 100 acres, then they might be willing to bid an extra $5.00 per acre. In addition, some farmers might think their efficiencies are even large by expanding thus leading to even larger cash rent bids.

Cash rents will always be an important topic for most farmers. Farmers in Kentucky lease 70 percent of their farmland and pay cash rents for nearly half of their leased land. Farmers, therefore, need to know how their income and expenses are affected by cash rent decisions.

Table 1.

ConventionalCorn

	Amount	Unit	Price	Total
GROSS RETURNS PER ACRE				
Corn	128	bu	$2.31	$295.68
VARIABLE COSTS PER ACRE				
Fertilizer		acre		$59.62
Pesticides				
-Herbicides		acre		31.90
-Insecticides		acre		0.00
Seed		acre		29.11
Drying & Storage		acre		5.06
Utilities		acre		3.24
Machine Repair		acre		17.31
Cash Land Rent		acre		0.00
Machine Hire		acre		5.62
Fuel & Oil		acre		6.74
Transportation and Other	128	bu	0	0.00
Light Vehicle		acre		0.49
Hired Labor		acre		16.94
Miscellaneous		acre		3.40
Crop Insurance		acre		0.00
Interest on Variable Costs (1/2 year	$179.44	dollars	4.50%	8.07
TOTAL VARIABLE COSTS		per Acre		$187.51
		per Bushel		$1.46
RETURN ABOVE VARIABLE COSTS		per Acre		$108.17
		per Bushel		$0.85
FIXED COSTS PER ACRE				
Building Repair and Rent		acre		$3.60
Insurance		acre		6.75
Depreciation				
-Machinery		acre		22.27
-Buildings		acre		4.67
TOTAL FIXED COSTS		per Acre		$37.29
		per Bushel		$0.29
TOTAL COSTS		per Acre		$224.80
		per Bushel		$1.76
RETURN TO OPERATOR LABOR, LAND, CAPITAL, AND MANAGEMENT		per Acre		$70.88
		per Bushel		$0.55
Less Operator Labor	4.5	hrs	$7.00	$31.50
RETURN TO LAND, CAPITAL, AND MANAGEMENT		per Acre		$39.38
		per Bushel		$0.31

Table 2.

Soybeans

	Amount	Unit	Price	Total
GROSS RETURNS PER ACRE				
Corn	34	bu	$5.72	$194.48
VARIABLE COSTS PER ACRE				
Fertilizer		acre		$16.34
Pesticides				
-Herbicides		acre		35.58
-Insecticides		acre		0.00
Seed		acre		24.27
Drying & Storage		acre		1.81
Utilities		acre		2.80
Machine Repair		acre		15.33
Cash Land Rent		acre		0.00
Machine Hire		acre		5.66
Fuel & Oil		acre		6.03
Transportation and Other	34	bu	0	0.00
Light Vehicle		acre		0.55
Hired Labor		acre		14.70
Miscellaneous		acre		3.42
Crop Insurance		acre		0.00
Interest on Variable Costs (1/2 year	$126.49	dollars	4.50%	5.69
TOTAL VARIABLE COSTS		per Acre		$132.18
		per Bushel		$3.89
RETURN ABOVE VARIABLE COSTS		per Acre		$62.30
		per Bushel		$1.83
FIXED COSTS PER ACRE				
Building Repair and Rent		acre		$3.02
Insurance		acre		3.51
Depreciation				
-Machinery		acre		17.47
-Buildings		acre		3.07
TOTAL FIXED COSTS		per Acre		$27.07
		per Bushel		$0.80
TOTAL COSTS		per Acre		$159.25
		per Bushel		$4.68
RETURN TO OPERATOR LABOR, LAND, CAPITAL, AND MANAGEMENT		per Acre		$35.23
		per Bushel		$1.04
Less Operator Labor	4.0	hrs	$7.00	$28.00
RETURN TO LAND, CAPITAL, AND MANAGEMENT		per Acre		$7.23
		per Bushel		$0.21

Table 3.

Mean Returns and Coefficient of Variations for 1600 Acre Farm
(last 5 years - per Acre)

	Returns over Fixed and Variable costs	Returns over Variable costs only	C.V.
Gross Revenue	264.59		0.18
Farmer			
Own	77.30	110.28	0.43
Cash rent	1.30	34.28	1.41
1/3, 2/3 Split	20.73	53.70	0.58
Clear 1/3	-12.66	20.32	1.53
Clear 1/4	11.15	44.13	0.80
Landlord			
Rent	76.00		0.21
1/3, 2/3 Split	56.31		0.28
Clear 1/3	87.31		0.18
Clear 1/4	66.15		0.18

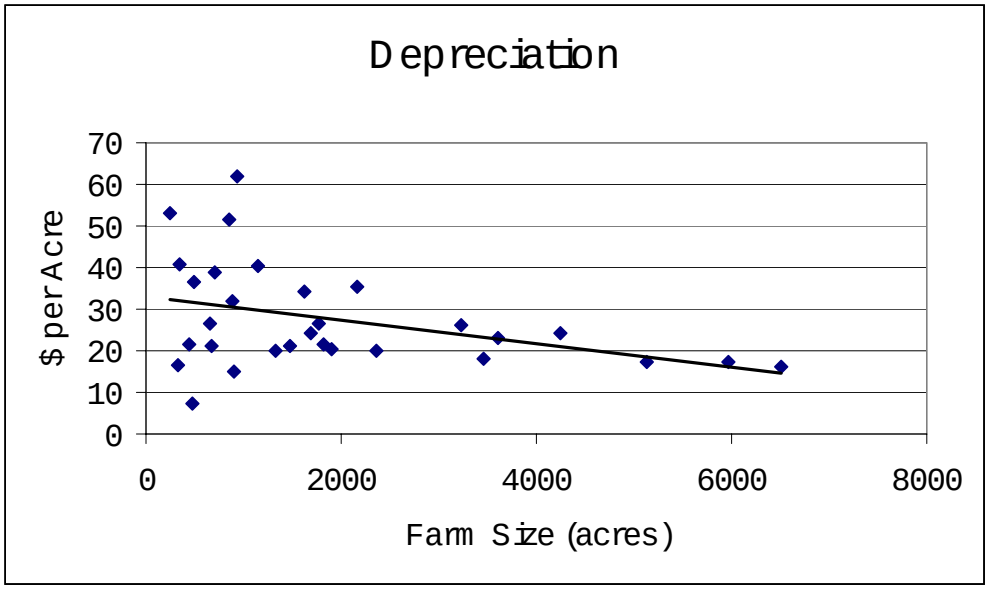


Figure 1.

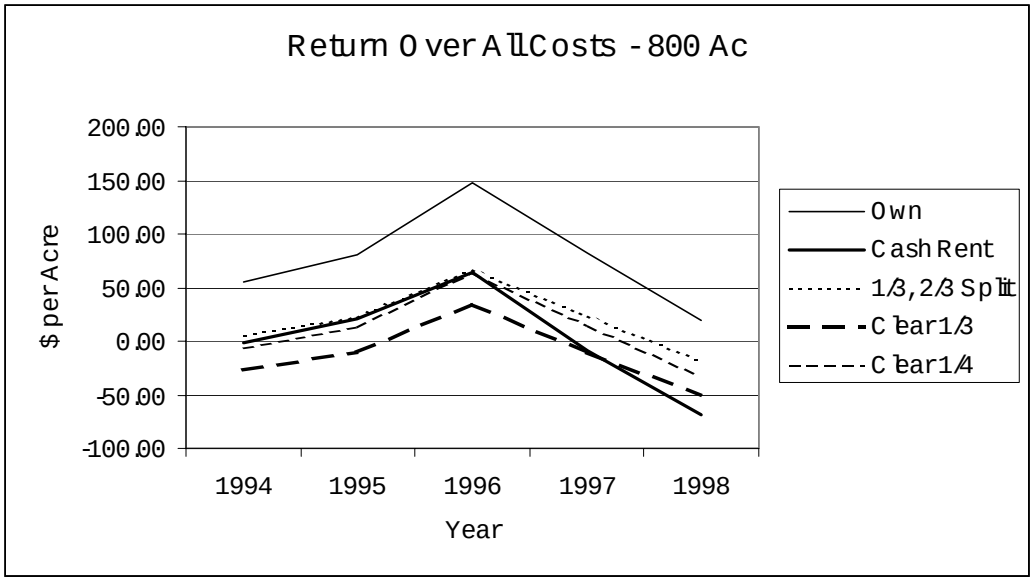


Figure 2.

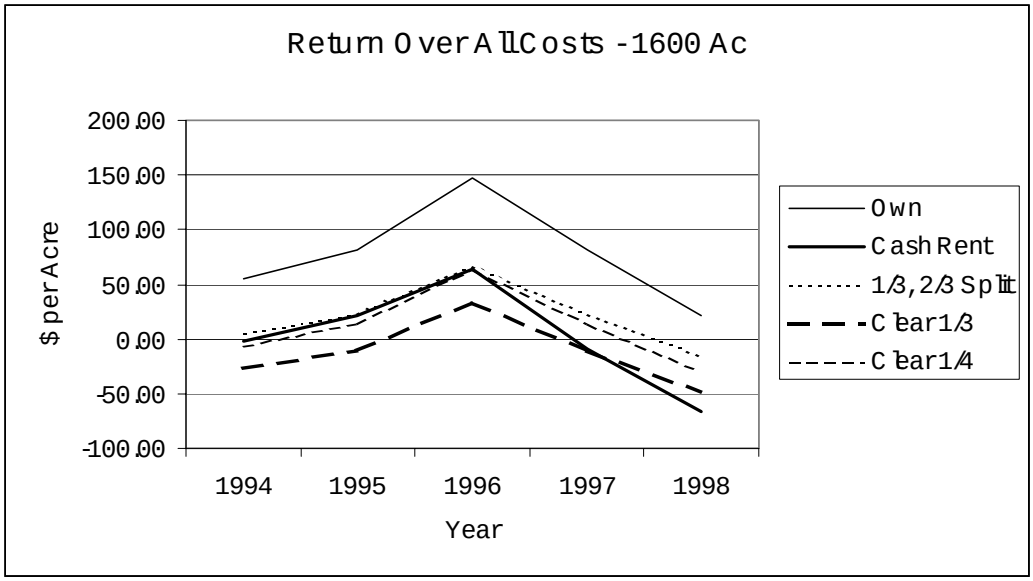


Figure 3.

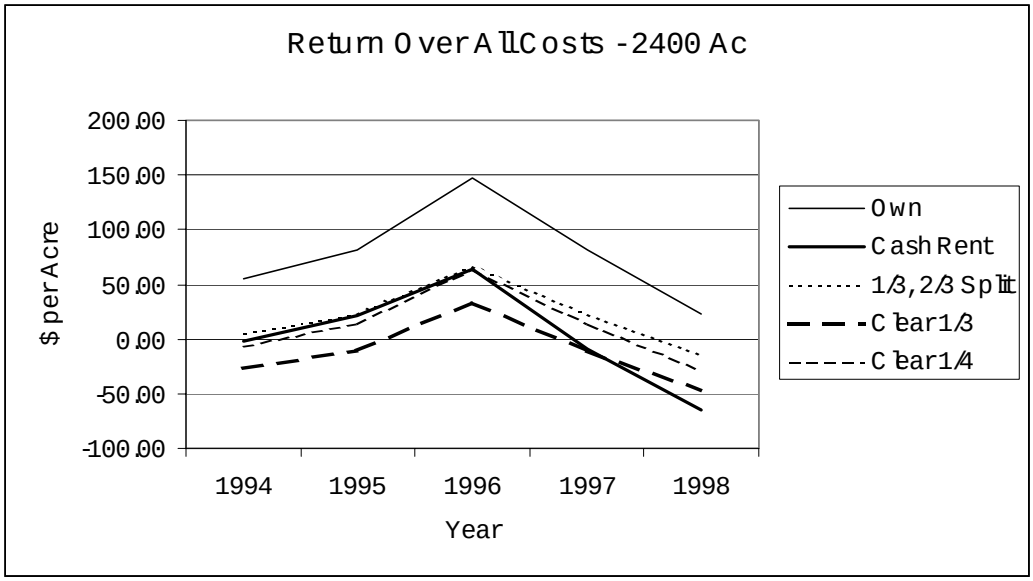


Figure 4.

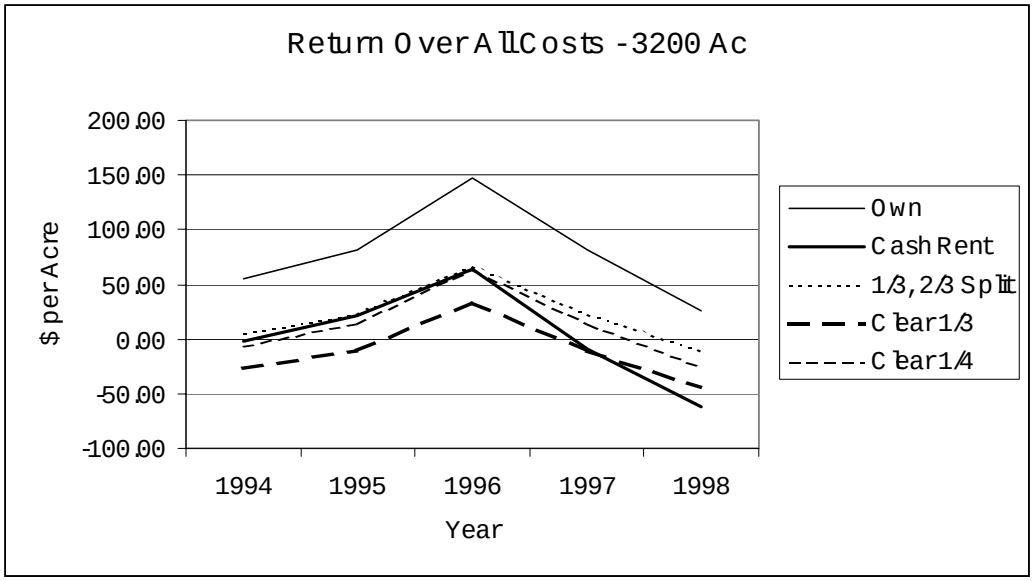
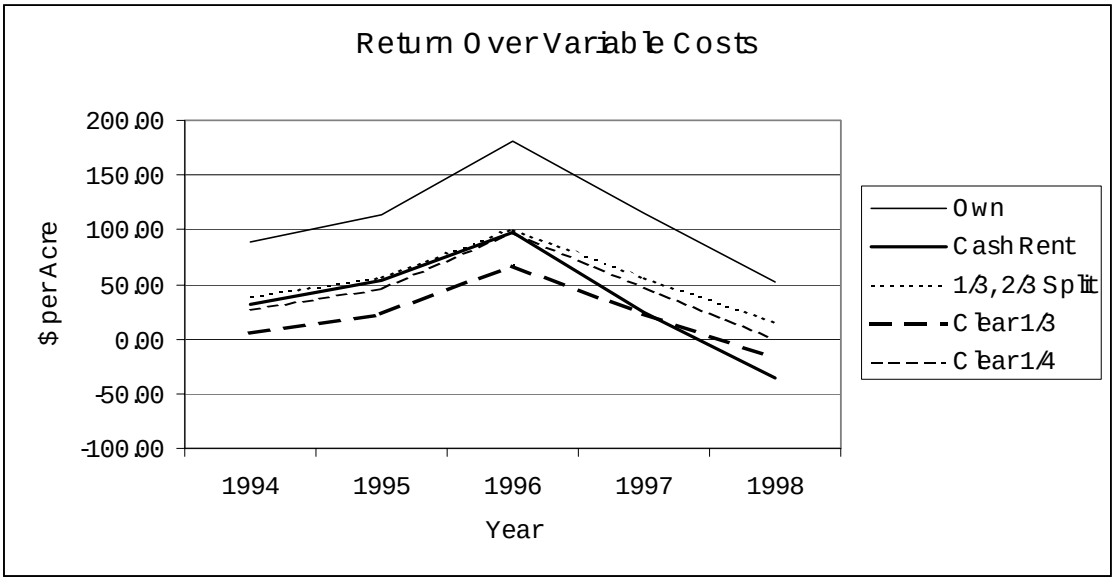


Figure 5.



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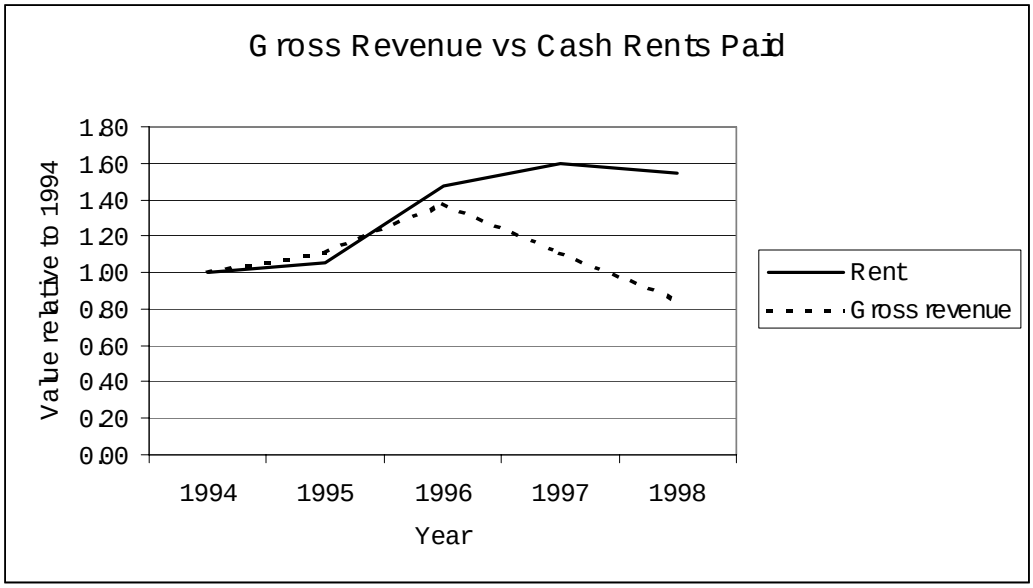
Gross Revenue vs Cash Rents Paid
Value relative to 1994
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1994
1995
1996
1997
1998
Year
Rent
Gross revenue

Figure 7.