How Will New Farmers Control Farmland

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ABSTRACT

The U.S. will soon see many farmers retire and younger farmers taking their place. These younger farmers would prefer to purchase the land rather than rent because of the advantages associated with ownership. However, these farmers need to determine how many acres they need to rent in order to support their purchased land and still provide funds for family living. The model developed here is applied to a typical farm in the Midwest. The results indicate that cash rent is a key element of the model.

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The typical farmer in the United States is nearly 55 years of age with 26 percent of the farm population age 65 and older (1997 Agricultural Census data). This group of farmers also controls 27 percent of the farmland. Many of these farmers will soon be retiring and letting younger farmers expand or start farming. This means that control over much of the farmland will soon change. The group of farmers under age 35 currently controls less than six percent of the farmland. When retirement occurs among the older farmers, this young group is likely to assume control over much of the retiring farmland.

A question arises about how these younger farmers will control the farmland of the retiring farmers. Most farmers would prefer to purchase the land they are farming because ownership gives them more control over how the land is farmed and the changes they can make to the land. Farmers do not have to worry about losing control of the land after a few years and can therefore make long-term farm decisions knowing their acreage base will remain stable. In addition, ownership provides the opportunity for capital appreciation which is where a major portion of returns occur. Once the financing for a property is in place, a farmer does not have to worry about the yearly payments changing over the life of the loan.

The biggest disadvantage to purchasing is the cash flow requirements. In addition to interest payments, the farmer must usually make some type of principal payment. In most situations, the combination of principal and interest are higher than the cash rent on similar property. This combination of principal and interest is often high enough to prevent the land from cash flowing. In other words, the profits do not pay for both principal and interest.

Renting, by contrast, usually generates a positive cash flow but lacks the other advantages provided by purchasing. A tenant has less control over property use and changes to the property. Yearly rental payments can easily increase and the farmer has no guarantee he or she will have any long-term control for farming the property. Renting may be less desirable from a control perspective, but it does allow a younger farmer to control more acres of farmland than would be possible through an outright purchase.

The problem for young farmers is to determine how many acres they need to rent in order to support their purchased acres and to provide money for family living. Beginning farmers are often limited by either the total acres they can farm or their initial equity requirements. In this paper, the initial equity requirement is used as a constraint.

The model developed here will be applied to a typical farm in the Midwest (Kentucky) to determine farm size and the percentage of rented acres. A corn-soybean rotation will be used for the analysis with price, cost, and yield estimates based on Kentucky Farm Business Analysis (KFBM) data. Sensitivity analysis will be used to test the robustness of the results.

MODEL

Farmers want to minimize the rented acres needed to support purchased property and to provide family living income.

(1) Minimize AC_R

Subject to:

(2) $s + c = AC_R$

(3) $S + C = AC_P$

(4) $AC_P \cdot LP \leq \dfrac{Equity}{DP\_rate}$

(5) $P_S \cdot (S + s) + P_C \cdot (C + c) - (AC_R \cdot CR) \geq Pmt\left(R, \dfrac{Equity}{DP\_rate}, YR\right) + FL$

(6) $S + s = C + c$

(7) $S = C$

(8) $AC_P,\ AC_R \geq 0$

Here, the rented acres devoted to corn and soybeans are represented by *c* and *s*, respectively. The total number of rented acres is AC_R, which is defined in equation (2). Similarly, the purchased acres used for corn and soybean production are represented by C and S, respectively. Equation (3) defines the total purchased acres, AC_P.

Equation (4) is a constraint specifying that the amount paid for land must be less than or equal to the funds available for purchase. Here *LP* is the

land price per acre, Equity is the availability farmer equity for land purchase, and *DP_rate* is the down payment percentage required by the lender. The model assumes that farmers are just beginning and will purchase all the land they can with their available equity.

Equation (5) is the constraint requiring that corn and soybean returns less the cash rent paid be greater than family living expenses plus the principal and interest payments on purchased land. The *Pmt* function returns the level payment each year to cover interest and principal while family living is represented by *FL*. The P_S and P_C terms are the returns over variable costs for soybeans and corn respectively, less any land expenses. *CR* represents the cash rent paid per acre.

Equation (6) and (7) are the constraint equations guaranteeing that a corn-soybean rotation is followed with half of the acres in each crop. Equation (8) guarantees the model will allocate a positive number of acres.

APPLICATION

This model is applied to a typical farm in Kentucky. The model assumes that farmers have $50,000 in equity to use to purchase farmland and that banks require a 20 percent down payment. Therefore, farmer equity combined with bank financing gives $250,000 for land purchases. Interest rates are assumed to be 7 percent and loans are amortized over 30 years. This interest rate is a base of two sources of credit: a minimum interest rate of 4 percent through the beginning farmer loan program of the Farm Service Agency and a rate of 9.5 percent through a commercial lender

Data from the Kentucky Farm Business Management (KFBM) program suggests that farmers can earn $102.20 per acre for soybeans and $106.48 per acre for corn. This is returns over variable costs without including any land costs. Cash rents rose by $2 per acre in 1999 and are currently averaging $65 per acre (Farmweek).

Land prices vary depending upon the estimate. A survey of county agricultural extension agents in Kentucky found land prices to be about $2389 per acre in 2000 while NASS uses an estimate of $1590 per acre. For this study, an estimate of $2000 per acre is used. Family living needs are assumed to be $10,000. This is low but it is assumed that that either the farmer or the

farmer's spouse has an off-farm job. The combination of family living and off-farm employment should thus be high enough to meet family needs and cover some of the fixed farm costs.

Sensitivity analysis is conducted on several of the variables to test the robustness of the model. Here, the interest rate, the cash rental rate, the required family living needs, the available equity, and the land purchase price are all varied. The sensitivity analysis shows how the number of rented acres and the rented acres to purchase acres ratio changes in response to these model changes.

RESULTS

Based on the number used in this analysis, farmers could purchase 125 acres. Farmers would then need to rent 435 acres to support the principal and interest payment on the 125 acres and to provide $10,000 for family living expenses. This gives a ratio of rented to purchased land acres of 3.48. If farmers did not have to provide cash for family living, then only 1.44 acres would need to be rented to support each purchased acre of purchased land.

Farming 560 acres is certainly feasible for most farmers with a corn-soybean rotation. Farmers could increase their family living needs by renting more acres. However, keep in mind this analysis assumes that rented land is profitable. Even though farmers prefer to own, they will probably be constrained more by their current equity situation than anything else. Beginning farmers who are lucky enough to obtain land through inheritance or from gifts are able to obtain funds for family living from a much smaller base of land.

Figure 1 shows how the number of required rented acres to meet family living plus principal and interest payments increases as the interest rate changes. At an interest rate of five percent, only 336 rented acres are needed. When the interest rate reaches nine percent, 541 rented acres are needed. Over the same interest rate changes, the rented acres to purchased acres ratio changes from 2.7 to 4.3.

Figure 1. Varying The Interest rate on Purchased Land

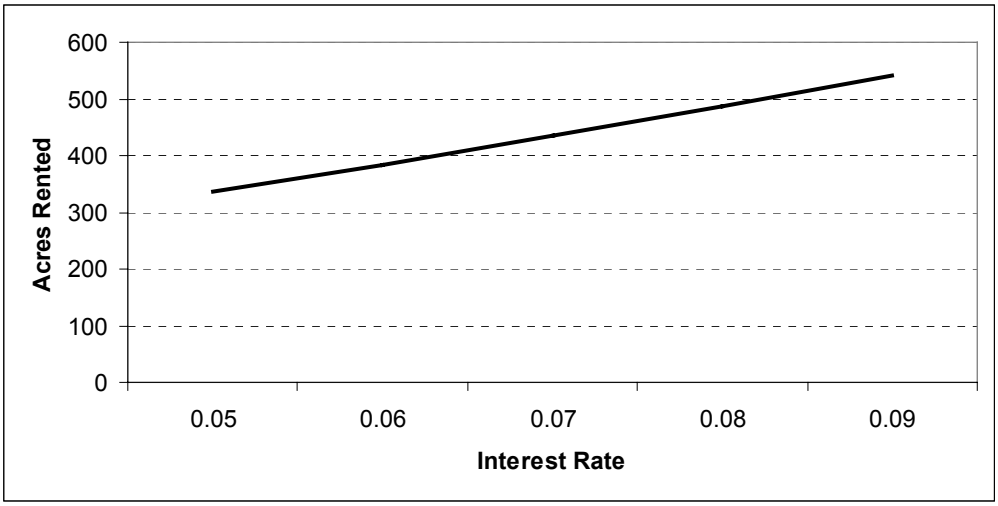
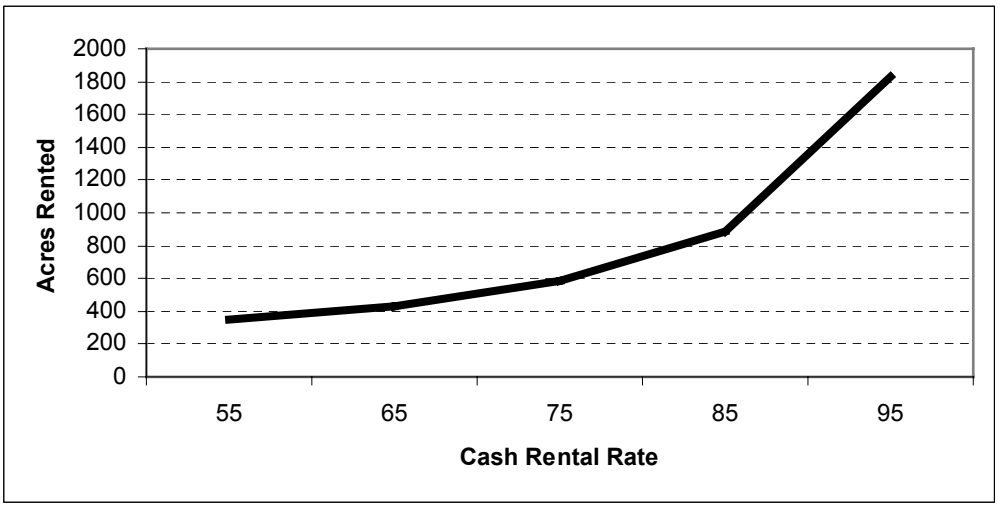


Figure 2 shows how the number of required rented acres to meet family living plus principal and interest payments increases as the cash rental rate changes.

Figure 2. Varying the Cash Rental Rate on Rented Land



At a cash rental price of $55 per acre, only 347 rented acres are needed. However, when the cash rent becomes $95 per acre, then 1,831 rented acres are needed. Over the cash rent prices examined here, the rented acres to purchased acres ratio changes from 2.8 to 14.7. Cash rent would appear to be a very critical component of the model because the required rented acres increases at an increasing rate.

Figure 3 shows how the number of required rented acres to meet family living plus principal and interest payments increases funds required for family living changes.

Figure 3. Varying the Funds Required for Family Living

When only $5,000 is required for family living, then 308 rented acres are needed. However, when family living needs become $25,000, then 817 rented acres are needed. Over the family living needs examined here, the rented acres to purchased acres ratio changes from 2.5 to 6.5. Low family living needs might be a reasonable assumption when off-farm employment is the main source of income. This value becomes higher as off-farm income becomes less.

Figure 4 shows how the number of required rented acres to meet family living plus principal and interest payments increases as the available farmer equity becomes larger. Required rented acres vary from 344 to 706 acres in the figure. At first glance this figure might appear counter intuitive because farmers with larger equity bases are required to rent more land just to meet a minimum level of family living needs. The reason for this upward sloping graph is that purchased land will not cash flow. Thus, farmers are required to rent more land just to cover the principal and interest payments.

Figure 4. Varying Farmer Equity

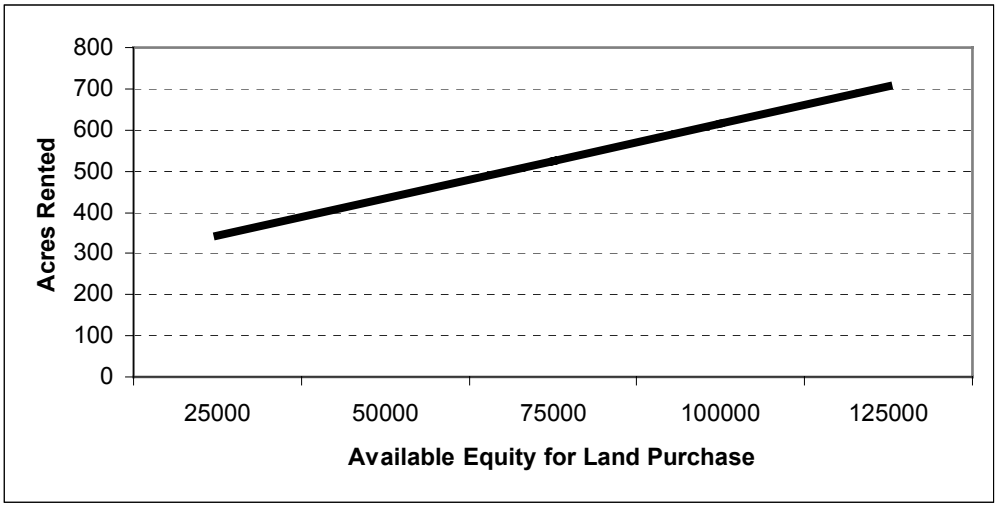
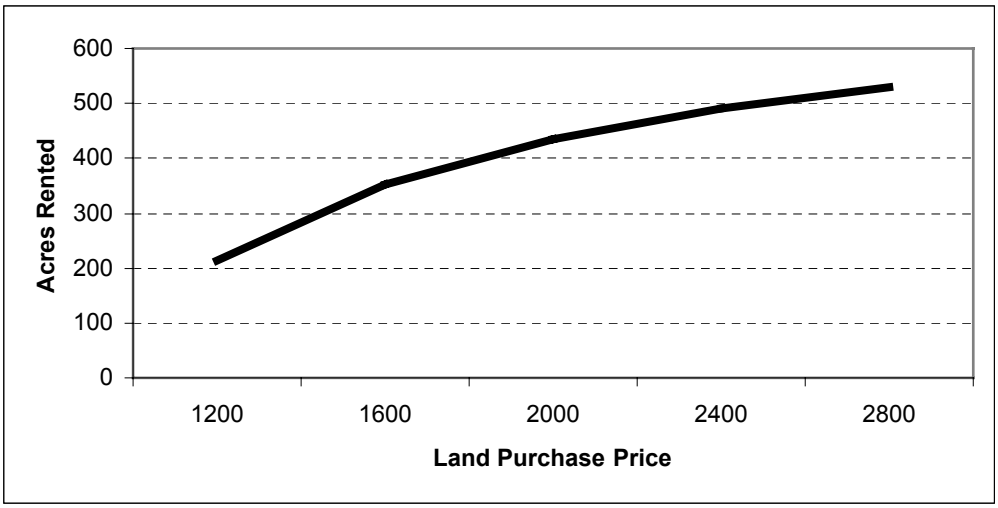


Figure 5 shows how the number of required rented acres to meet family living plus principal and interest payments increases as the land purchase price increases.

Figure 5. Varying Land Purchase Price



Here the required rented acres varies from 214 to 530 acres. Notice that this graph increases but at a decreasing rate. Higher purchase prices mean more money is required for principal and interest payments. But following the reasoning in Figure 4, the higher price means fewer acres can be purchased which helps reduce the requirements for principal and interest.

CONCLUSIONS

This model helps to explain why young farmers rent such a large percentage of their farm acres. Purchased land will just not cash flow and thus must be supported with rented land. As the results demonstrate, variation in the assumptions used can affect the results a great deal. Of particular interest is the cash rental rate. This variable is critical since the rented acreage requirement increases at an increasing rate. Changes in crop prices would affect the model in a similar manner as well.

These results also help show why off-farm employment is used by so many farmers. It takes a very large farm size to provide adequate family living needs unless there are other funds available. Off-farm employment also helps to minimize some of the effects shown during the sensitivity analysis.