Introduction

Historically the United States and Idaho's economy have been driven by utilization of land for agricultural production. Consequently, the value of most rural land was dependent on its usefulness in the production of food and fiber. However, during this past century rural land use has expanded to include a variety of activities. In recent years U.S. population increases were accompanied by migration to less urbanized areas, evidenced by population increases in states such as Colorado, Utah and Idaho (10 to 15 percent from 1990 to 1995) (United States Census 1996). As populations and income increased in such areas they brought increased demands for land based amenities and increased competition for ownership of rural land. Such changes can result in substantial conversion of land from agricultural uses to non-agricultural uses (McLeod 12). Moreover with this conversion, there also comes a change in the individuals interested in land values. Traditionally the individuals concerned with agricultural land values included farmers, landlords, lenders, and professional appraisers. However the groups of individuals interested in land values have grown to comprise a wider variety of individuals such as local and state policymakers, and decision-makers, investment companies, corporations, and individual speculators (Reynolds 1665).

The land use changes and pressures that traditional agricultural land is now facing impact the market for that land. These changes and pressures primarily affect two groups of people. The first consists of those individuals who possess a vested interest in agricultural land. For these individuals, the land is often a major component of their financial portfolio, and as with any portfolio asset, the investor's ultimate goal is to attain a positive return over time. To effectively evaluate the value of land's contribution to a

portfolio, investors need to be informed of not only the existing land price, but also of current and potential pressures that are being exerted on the price. The second group of people who are affected by changes and pressure in land markets are public policy makers who make decisions about development land use, and land taxes. If land use changes and other pressures can be separated from agricultural factors that affect land values, and can be measured, then these measures can be used to identify, and maybe quantify, these complex and often subtle pressures, maybe well before actual land use changes occur. Such information about the pressures impacting land values would be very useful to the people who have significant interests in such matters.

The purpose of this study is to develop and test procedures and information to help public and private decision-makers evaluate pressures on agricultural land from non-agricultural sources.

Literature review

The majority of literature examined attempts to measure impacts of various factors, including non-agricultural hedonic factors, on land values. McLeod et al. employed GIS information in a hedonic model to measure the impact of recreational and scenic amenities on agricultural land values in western Wyoming. The results of this study indicate that agricultural land values in Wyoming are determined by environmental amenities, which include scenic view, elk habitat, and fishery productivity; as well as by agricultural production attributes. Thus the price that a prospective buyer would be willing to pay for agricultural land is a function of the agricultural output prices, non-land input prices, production skill and site characteristics.

Taylor presented further documentation of the importance of non-agricultural attributes on the value of agricultural land in his 1991 Ph.D. dissertation. In this study Taylor analyzed various characteristics that affected land prices in northeastern Colorado where non-agricultural demand for agricultural land is very miniscule if it exists at all.

Although these studies indicate the importance of non-agricultural hedonic factors on land values, they generally used econometric (regression) procedures to evaluate effects of specific hedonic factors. Consequently results document effects of specific factors in specific situations. Unfortunately these studies can only address specific factors which are included in the specified model. They do not address the total pressure of the total set of non-agricultural factors that influence land values. Generally results of such studies cannot be generalized to other areas and situations. Moreover, the majority of public and private sector individuals interested in agricultural land values and non-agricultural pressures on such values lack the expertise to construct and interpret such models.

Researchers at the University of Idaho (Nelson, et al.) tried to address these issues in a study of farmland values in a commercially irrigated agricultural area in South Central Idaho. This area, commonly referred to as the Magic Valley, is approximately 6,500 square miles. The area is experiencing some development pressure, but the economic base is still primarily agricultural. The authors developed simplified regression models for localized areas. The models were "no intercept" models in which total value of agricultural parcels sold was analyzed as a function of number of acres of irrigated cropland and time. Generally, resulting regression coefficients of the independent variables were significant at the 95 percent confidence level and calculated R^2 terms were

0.85 or higher. Using the results of the regressions and agricultural net returns, capitalization rates (net returns / land value) and income multipliers (1 / capitalization rate) were then calculated. The authors found that capitalization rates and income multipliers could be used effectively to quantify and compare general non-agricultural pressure on farmland values across different areas in the Magic Valley.

Methods and Procedures

In this study, an effort was made to extend the general procedures tested in the South Central Idaho study (Nelson, et al.) to Canyon County, a smaller area in western Idaho that is under very substantial development pressure associated with the rapid growth of the City of Boise. Canyon County, located in the southwest portion of Idaho, is approximately thirty miles long by twenty-five miles wide and covers six hundred square miles. The Snake River runs through the southwestern part of the county, and when combined with an extensive canal system provides an ample water supply for agricultural irrigation. The climate and soil in Canyon County are well suited for a number of agricultural enterprises. Some of the more prevalent commodities produced include alfalfa, barley, corn, beans, oats, potatoes, sugarbeets, wheat, livestock, fruit and a variety of other more specialized crops.

The data utilized in this study were provided by Farm Credit Services and consists of information on transacted sales. The data include individual tract information on many variables including sale price, total acreage, land use allocations, value of improvements, and net and gross returns (agricultural rents), for the years 1993 through 2000.

A regression model adopted from the Magic Valley study was used to try to explain the Canyon County data. However efforts to develop simplified regression

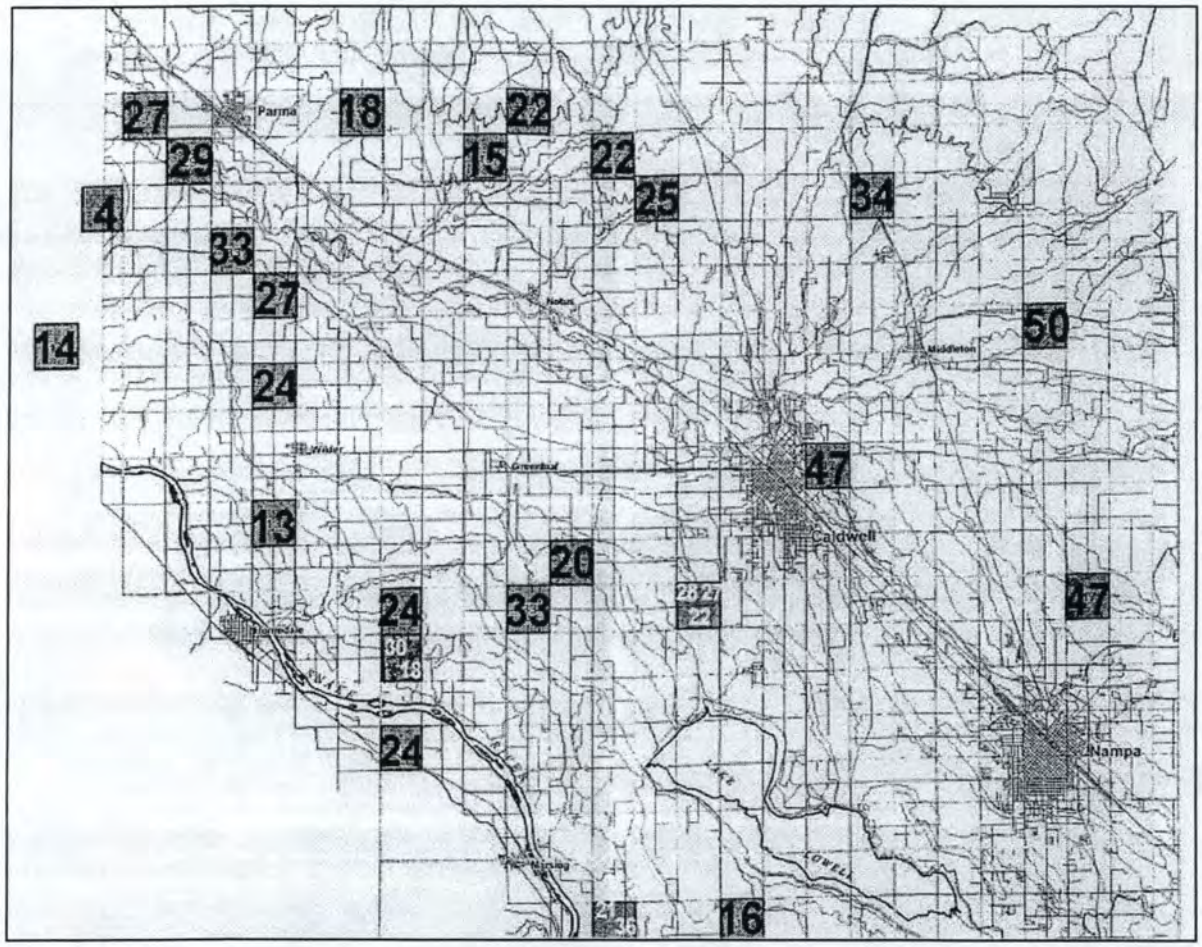
models of farmland values in Canyon County did not work out due to too few observations and lack of capability in defining differentiable agricultural areas within the county. Yet visual inspection of the development situation in the county made it obvious that several local areas were influenced by hedonic factors that could potentially and substantially impact land values. Some of the more prevalent factors include access to Boise and proximity to other communities, access to recreation (especially wildlife), aesthetically appealing sites, etc. To provide information more useful to public and private decision-makers, income multipliers for specific parcels were calculated and plotted on a map of the county.

Results

Individual income multipliers and capitalization rates were developed for each parcel that was sold in the year 1997. By taking the total sale price of the individual parcel net of any improvement value and dividing that number by the number of acres sold, the per acre price of the land was determined. It is important to note that sale prices and number of acres sold were net of any dollars or acres, respectively, associated with improvements (i.e. farmstead acres). Once the per acre price of land was established for each individual parcel the corresponding net return was used to determine individual income multipliers and capitalization rates. Figure 1 presents the individual income multipliers that were calculated for Canyon County in 1997.

The income multipliers that were individually developed offered some insight into the different levels of development pressures experienced in different areas. As presented in Figure 1, the highest level of development pressure (income multipliers of

Figure 1: Income Multipliers for Idaho Canyon County, 1997.
Farmland Transactions Analyzed.



24 Sections containing parcels analyzed. Numbers in sections are income multipliers for parcels analyzed.

40 to 50) occurred in three instances. Two of those cases were located in or very near the Nampa-Caldwell metropolitan area. This is not a surprise, since in recent years, the Boise metropolitan area (including Nampa and Caldwell) has been experiencing rapid growth and expansion. The third parcel that exhibited a high-income multiplier was located approximately six miles north of Nampa. On the map this seems to be a relatively remote region. However, there are several subdivisions in the area surrounding the parcel. So it is in an area where development pressure is high. Income multipliers ranging from 20 to 30, were found in several areas of Canyon County. The first major area of such secondary development pressure is in the southeastern portion of the county. This part of the county contains Lake Lowell, the largest lake in the county. The area surrounding the lake contains a mix of such secondary level income multipliers and some rather low income multipliers (0 to 20). The higher income multipliers on the south end of the lake lie on a ridge that provides landowners with what seems to be an aesthetically valuable view of Lake Lowell and the surrounding wildlife preserve. The lower multipliers correspond with areas of lower elevations that do not provide the owners with a lake view. The second area that demonstrates a large number of parcels undergoing secondary development pressures is to the north and west of Lake Lowell. As seen in Figure 1, these parcels lie in a corridor area which is bordered on the south by the Lake and on the north by the interstate highway that connects Nampa and Caldwell. From a map it may be difficult to determine the cause of this pressure that is being exerted. But visual inspection of the land indicates that this is a growing area of development and rural subdivisions.

Data on farmland sales in the western segment of the county shows a mix of secondary and low income multipliers. The lowest income multiplier that was calculated was located in this area. Much of this area is flat agricultural land with few if any attributes that would make it appealing to developers or individuals looking for upscale homesites (no lakes or streams, no views, relatively poor roads). However, quite a few transacted parcels in this area had mid-level agricultural income multipliers. It was determined on a visit to the area that these parcels are touched or crossed by the Boise River, or are on hills, and are either adjacent to or have views of orchards or vineyards (there are several small wineries in the area). The aesthetic qualities of these parcels are quite evident when observed and in many cases nice houses are built on neighboring parcels.

Conclusions and Implications

Comparative analysis of income multipliers seems to be a reasonable way to identify and measure, at least ordinally, agricultural development pressures on farmland. Such analysis, however, yields no quantifiable measure of the effects of specific (usually hedonic) variables on farmland prices and conversion of farmland to non-agricultural uses.

A strength of such analysis is that it facilitates consideration of the complete set of factors that cause pressures on farmland conversion. However, a clear weakness of such analysis is that it does not facilitate evaluations of the effects of specific conversion causing factors.

The practical applicability of comparative analysis of income multipliers to evaluate farmland conversion pressures can be further tested by replication over time of

the effort documented in this paper (evaluate Canyon County farmland income multipliers over several consecutive years). Such testing is planned.

In addition, the method of analysis could be tested by running hedonic regressions over the same farmland sales data to determine if substantial amounts of the farmland conversion pressures, implied by analysis of income multipliers, can be attributed to specific independent variables.

The estimation of land and its associated value is a complex process that involves a variety of influences. By analyzing the implications that time, agricultural returns and urbanization have on the value of land, investors can make better informed decisions regarding the inclusion of agricultural land in their respective portfolios. However, besides the implications that this study has for investors, such analysis can also be useful to city planners, tax assessors, road builders, appraisers etc, who have interests in determining issues such as base values for farmland and determining what areas surrounding an urban area are experiencing the most developmental pressures.

If income multipliers are reliable measures of development pressures on farmland, they can be utilized to estimate the portions of a parcel's value attributable to agricultural use value and to development pressure. Agricultural use value of a parcel is simply the net agricultural income (net rent) from the parcel multiplied by an income multiplier for a comparable property that is under no development pressure. Then, the proportion of the parcel's value attributable to development pressure is total market value for the parcel minus the calculated agricultural use value. Of course, each of these values is, conceptually, a measure of present value of anticipated net returns (adjusted for risk).

If additional research can further support the validity of analysis of income multipliers to evaluate farmland conversion pressures, application of such multipliers can have much significant use. The concept of income multipliers is simple. However, economists and public and private decision-makers concerned with land values should not assume that conceptual simplicity implies lack of usefulness and applicability.

References

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