Analyzing the Relationship Between Institutional Investment and Agricultural Land Prices Using a Hedonic Land Value Model

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Abstract

We used parcel-level agricultural land transaction data from Mississippi between 2019 and 2023 to examine the relationship between institutional investors and farmland value using the hedonic pricing model. Buyers were classified as individual and non-individual buyers, with non-individual buyers further categorized into institutional investors, agricultural entity buyers, and others using their NAICS codes. Our data indicate a growing presence of non-individual buyers, particularly institutional investors, in the Mississippi farmland market. Regression results from the hedonic pricing model show that non-individual buyers, on average, pay significantly more than individual buyers, with institutional investors paying the highest premium among all buyer types.

Keywords: Farmland, Institutional Investors, Buyer Types, Landownership
JEL Code: Q14, Q15, Q18

INTRODUCTION

The United States' total land area is nearly 2.3 billion acres, and 52% of the total land area is used for agricultural purposes. Of the total agricultural land area, two-thirds is devoted to grazing areas (grassland pasture and range, cropland pasture, and grazed forests), representing 35% of all land area in the United States (Lubowski et al., 2006). Agriculture contributes to production, which translates into higher employment and improved standards of living. According to the USDA (2024), the agricultural sector contributes roughly $1.537 trillion to the United States' economy when including food and related industries such as agribusiness, food processing, retail, and exports. In Mississippi, the agricultural sector represents roughly 14% of the state's economy and employs about 17.5% of the state's workforce (Newton & Henderson, 2014). About 35% of the total land area of Mississippi is utilized for various agricultural purposes, highlighting the significance of agricultural land in the state.

Agriculture is a very capital-intensive sector of the U.S. economy. Agricultural productivity is largely influenced by the value of land, which plays a significant role in the finances of farmers. According to Nickerson et al. (2012), farm real estate accounts for more than 80% of the total value of all farm assets and serves as the primary source of collateral in production loans. This makes farmland prices a key determinant of farm financial health (Briggeman et al., 2009). Therefore, any change in the value of farm real estate will have a substantial impact on the wealth of farm owners.

The value of agricultural land not only serves as collateral for production loans, but it also influences global food security. Agricultural land is essential for food production. Its value often determines land use decisions, influencing the ability to meet local and global food demand. According to Stephens et al. (2018), agricultural land provides the largest share of food supplies and ensures an essential number of ecosystem services (for example, providing food, fuel, and fiber). Specifically, agricultural land contributes directly or indirectly to approximately 90% of food calories and 80% of protein and fats (livestock production) according to Cassidy et al. (2013) and Steinfeld et al. (2007), respectively. This suggests the importance of the value of agricultural land as it can directly influence global food production, limit the supply of food, and induce global food insecurity. Nonetheless, Lubowski et al. (2006) report that cropland had a decreasing trend

from 1945 to 2002, while special-use land (rural transportation uses, national and state parks, wilderness and wildlife areas, national defense and industrial areas, and farmsteads and farm roads) and urban areas have an increasing trend. This indicates that more cropland is lost to urbanization, thereby reducing the availability of agricultural land for agricultural production.

In recognition of the vital role played by agricultural land, government agencies and policymakers have implemented federal policies such as the Farm Bill, wetlands and water protection, and taxation and incentives such as conservation easements, which reduce tax liability for farmers preserving land for agricultural use, and other state-level zoning policies. These policies seek to influence the supply of agricultural land, thereby influencing food production.

Farm real estate values have increased dramatically since the late 1960s. Food price hikes in 2007 and 2008, combined with the global financial crisis, sparked financial investors' interest in agricultural sectors around the globe (Clapp & Isakson, 2018; Fairbairn, 2014). While there have been some years when farmland values have slightly decreased in the most recent few decades, the value of farmland has seen a relatively higher surge in different parts of the world (Burns et al., 2018; Ifft & Kuethe, 2011). Farmland investments are increasingly perceived as a less risky method to store wealth, generate steady income flows, and attain capital gains (Magnan & Sunley, 2017; Visser, 2017). The increasing growth of investors' interest in agriculture is believed to increase the demand for agricultural land, and is sometimes seen as a potential threat to family-managed farming, as they may price local farms out of the market and gain control of food production and farmland stewardship (Brady et al., 2017; Lawley, 2018).

Despite concerns over the increasing interest from institutional investors, there has been relatively little research examining the role of institutional investors in farmland transactions, mostly due to the lack of data. To our knowledge, there has been no study that examined the relationship between the farmland price paid by different buyers from different industries. This study's objective is to fill the gap by assessing the relationship between institutional investors and agricultural land value in the state of Mississippi. While it is widely accepted that current and future returns produced by agricultural land as well as potential market appreciation explain a significant amount of the changes in agricultural land value, an increase in demand for agricultural land in the State due to investors' interest could be a potential factor influencing the value of agricultural land. Based on

proprietary data on Mississippi farmland sales transactions between 2019 and 2023, we examine the price paid by institutional investors for Mississippi agricultural land. Institutional investors, whom we define as non-individual and non-family-based entities, including corporations, non-agricultural limited partnerships and limited liability companies, trust funds, and real-estate developers, may leverage high capital to improve farmland and boost agricultural productivity by leasing the approved land to farmers or acquiring farmland to capitalize on future price increases or repurpose the land for other uses. We control for parcel-specific characteristics such as acreage size, improved amount on farmland, land use types, as well as county control variables including population, per capita personal income, and the number of lenders. Our preliminary results show that non-individual buyers pay more per acre than individual buyers. Specifically, institutional buyers pay more than non-individual agricultural buyers but less than other buyer types (i.e., Non-institution and non-agricultural buyers).

This study on the relationship between institutional investors and agricultural land will inform farmers, investors, landowners, and policymakers on land acquisition and inform researchers about the marginal contribution of institutional investors to the value of agricultural land in Mississippi.

LITERATURE REVIEW

This section reviews theoretical and empirical literature on the determinants of agricultural land value, methods, and findings. This section is categorized into an overview of agricultural land value research, specifically, determinants of agricultural land value spanning empirical review and a conceptual review of methods utilized in the literature. The determinants of agricultural land value are reviewed in terms of land attributes (wet depth, water availability, land/soil productivity, parcel size, and farm type), geographic and location characteristics (population, location, urban influence/ nearness to city, and zoning) and financial and economic factors (net farm income, credit availability, and interest rate). This chapter also reviews literature on farmland investment.

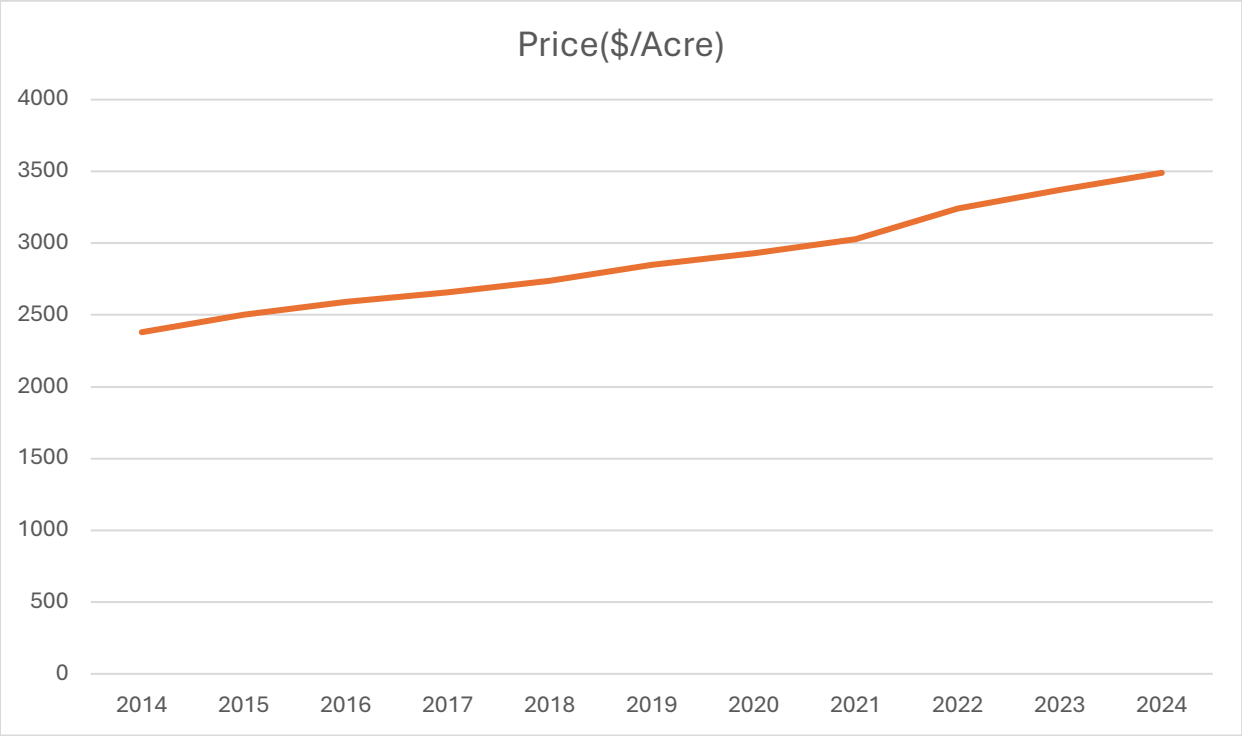
Agricultural Land Value in Mississippi

Mississippi is known for engaging in various farming activities, and agriculture is an important part of the state's economy. The nature of farmland in Mississippi varies depending on the region of the state with the state's Delta region having the most desirable and fertile soil making it ideal

for growing crops such as corn, soybeans, wheat, potatoes, and cotton, translating into higher farmland values. Land in the northeast and central regions of Mississippi is potentially influenced by a mixture of agricultural and urban factors, while the southern region of the state is generally lower in value which may be due to less intensive agricultural use and greater forested areas (Gregory et al., 2020).

According to the USDA (2024), farmland values in Mississippi have been steadily increasing over the years with average farmland values increasing by 46.6% since 2014 as can be seen in Figure 2.1 below. Many studies on farmland values have associated the recent increase in land values to factors such as slope, wet depth, water availability, land productivity, parcel size, farm type, geographic and location attributes, population, government payments and economic and financial factors such as net farm income, credit availability and property tax rate (Gregory et al., 2020; Huang et al., 2006; Lawley, 2018; Sant'Anna et al., 2021).

Figure 1: Average farmland values in Mississippi, 2014-2024



Source: USDA Land Values summary, created by author

Agricultural land, which refers to land primarily used for the cultivation of crops, rearing livestock, or other agricultural purposes, is a critical resource for food production, economic development, and environmental sustainability. The upward trend in agricultural land prices makes it imperative to fully assess the contributing factors for policy purposes. Higher agricultural land prices can pose challenges to new and small-scale farmers due to high upfront costs, potentially limiting the profitability of many farmers.

Borchers et al. (2014) argue that nonagricultural attributes of farmland also contribute to its market value. Studies have assessed land prices mostly using the hedonic price model (Huang et al., 2006; Hanson et al., 2018; Wasson et al., 2013), hedonic and spatial error model (Gregory et al., 2020), correlation and Ordinary Least Squares (OLS) regression (Stewart & Libby, 1998; Rajan & Ramcharan, 2015), panel data estimation and fixed effects model (Devadoss & Manchu, 2007), and entropy-based information approach (Salois et al., 2012). These methods help identify the degree to which the various parcel attributes contribute to the value of the parcel.

Land Attributes

Characteristics of land, ranging from slope, wet depth, water availability, land/soil productivity, parcel size, to what the land is being used for, play an important role in its price as demonstrated by the following studies. A study by Gregory et al. (2020) has identified wet depth and water availability to have a significant positive impact on cropland prices, whereas slope has a negative and positive relationship, respectively.

Parcel Size

Research on the relationship between parcel size and agricultural land value has produced mixed findings. Many studies have examined the effect of parcel size on farmland prices across the United States. For example, Borchers et al. (2014) conducted a nationwide study using 2010 data from the United States Department of Agriculture's National Agricultural Statistical Service (USDA-NASS). They found that tract size negatively impacted per-acre cropland prices, with agricultural returns explaining a portion of the variation in these values. Similarly, Huang et al. (2006), using county-level cross-sectional data from Illinois between 1979 and 1999, found that farm size was negatively associated with per-acre farmland prices.

In contrast, Gregory et al., (2020) studied cropland values in Mississippi using transactional data from 2015 to 2017 and found a positive relationship between parcel size and cropland prices. They attributed this to the fact that larger parcels can achieve a more efficient scale of production compared to smaller ones. However, the study also posits that the price per acre may be negatively associated with parcel size, given that large parcels tend to have fewer potential buyers, benefit from bulk rate discounts, and incur lower transaction costs compared to smaller parcels, leading sellers to accept lower prices per acre.

Land Productivity

The relationship between agricultural land prices and land productivity has been a key topic in agricultural economics. Land productivity, often measured by crop yield potential, and soil quality, which includes factors such as fertility, texture, and drainage capacity, significantly influence land valuation. Several studies have explored these dynamics, emphasizing the role of economic and environmental variables in determining land prices. High-yielding land is more attractive to investors and farmers, leading to higher prices. Similarly, Hanson et al., (2018) find that soil quality is strongly correlated with farmland prices, as superior soils reduce input costs and increase yields.

Huang et al., (2006) extend this discussion by considering regional variations in soil productivity, measuring soil productivity using Soil Productivity Ratings (SPR) from Illinois Farm Business Farm Management Association which rates soil from 0-100. They demonstrate that while high-productivity land commands a premium in most cases, the effect can be moderated by market conditions, such as commodity prices and policy interventions like subsidies. Additionally, Hanson et al., (2018) found soil productivity to be significant and positive in determining farmland prices.

Farmer buyers of land are shown to value land attributes related to the agricultural productivity of the land more (Vyn & Shang, 2021). This suggests that land productivity is invariably associated with net farm income or farm returns, which have been generally estimated to be positively related with farmland value (Salois et al., 2012). Non-agricultural income sources such as wildlife recreation (hunting, fishing and wildlife watching) have positive impacts on farmland values (Henderson & Moore, 2006), similar to personal income (Huang et al., 2006) and county income per capita (Gregory et al., 2020).

Cluster and Farm Type

Studies have shown that the price per acre of agricultural land can be influenced by the cluster of farmlands and the type of farm. Eagle et al., (2014) measured cluster index as the product of proportion of parcel boundaries that border other farmland and the total amount of farmland connected to the parcel. Alternatively, Huang et al., (2006) measures farm density in relation to swine production as the number of swine farms per square mile. Both studies reported a negative correlation between their measure of farm clustering/density and farmland prices supposing that the more clustered farmlands are in a particular vicinity, the lesser the price.

There is an interplay between land use and farm type which is shaped by land characteristics. These characteristics determine the suitability of different farming systems. Farm types also influence land-use intensity and sustainability (Boke Olén et al., 2021). A Ricardian assumption regarding land use suggests that a landowner is assumed to choose the use that maximizes the value of the land subject to institutional (for example, zoning), cost, technology, and other constraints. In that sense, agricultural land use is most likely strongly related to farm type.

Empirical studies have also demonstrated a strong relationship between farm type and farmland value, as different farm types exhibit various characteristics and thereby different farmland values (Hewson-Fisher et al., 2024). Studies have found a positive relationship between farmland value and various farm types. Farmland used for horse-related purposes (Eagle et al., 2014), pastureland (Ma & Swinton, 2012), forest land (Ma & Swinton, 2012), and fishing (Wasson et al., 2013) are positively associated with farmland value. Eagle et al. (2014) further found that vegetable and cultivated farms are priced lower than horse-related use, likely related to low investment in non-mobile capital.

Geographic and Regional Attributes

Geographic and regional characteristics such as rural-urban/regional influence, location (distance), development potential, number of available banks, and population have been associated with farmland value in empirical literature and theory since farmland is not homogeneous as stipulated by Ricardian theory.

Urban influence has been measured differently by different studies, even though studies have generally found a positive association between farmland and urban influence (Cavailhès &

Wavresky, 2003; Livanis et al., 2006). Huang et al. (2006) measured urban influence using the rural-urban continuum code (Beale code) based on the 1990 Census of Population. The study found that ruralness has a significant negative impact on farmland value. Similar results are evidenced in Mississippi by Gregory et al. (2020).

Livanis et al., (2006) on the other hand extended their measure of urban influence by decomposing it into three components: the effect of changes in nonfarm opportunities as captured by the median house value and its determinants, the speculative component of urban pressure as measured by conversion risk, and the effect of urban pressure on net agricultural returns measured by accessibility index. The authors found all three measures to be significant and positively related to farmland value. Guiling et al., (2009) who also found positive effects, further asserts that the size of the urban effect is more influenced by population than the other two factors (distance of the parcel from urban center, and real income of the closest urban area) which was used to measure urban effect on agricultural land value.

Population has been an important variable considered by studies in evaluating farmland prices, speculating that high population may translate into higher demand for agricultural land for several purposes. Many studies have found that population has a highly significant positive impact on farmland values (Devadoss & Manchu, 2007; Huang et al., 2006; Henderson & Moore, 2006). More recent studies also find similar results (Borchers et al., 2014; Hanson et al., 2018). Hanson et al. (2018) further consider two cities in Illinois with different populations and found that the city with the higher population conveys a greater price premium, reinforcing the association between population and farmland value.

The location of parcels relative to urban areas (distance) has been consistently evidenced to be associated with lower farmland prices. The location of a parcel is often measured by distance to the nearest city or distance to a place with a particular population size. A seminal study by Capozza & Helsley (1989) argued that parcels are valued for agricultural use only, given enough distance from an urban area, whereas Guiling et al. (2009) suggest that distance reflects both reduced exurban use value and reduced incremental value from converting to urban use.

Studies have generally found a negative relationship between farmland value and the location of a parcel relative to urban areas, implying that parcels closer to urban areas are valued at higher prices

(Hanson et al., 2018). This inverse relationship is largely due to the declining accessibility and reduced economic activity in peripheral areas (Cavailhès & Wavresky, 2003). Other empirical studies corroborate this finding, indicating that land prices exhibit a negative gradient with respect to distance from urban centers (Stewart & Libby, 1998; Sklenicka et al., 2013). Variations in this relationship arise due to infrastructure improvements, such as highway expansions and transit systems, which can effectively reduce travel times and increase the desirability of suburban land (Glaeser & Kahn, 2004).

Though numerous studies highlight that proximity to urban centers tends to enhance agricultural land values, primarily due to accessibility, economic opportunities, and infrastructure availability, the potential for future development of a parcel can either mitigate or exacerbate the effect of distance on land prices. For instance, Platinga & Miller (2001) emphasize that land designated for potential urban expansion experiences speculative price increases, driven by expectations of future profitability. This is supported by Gabruch & Micheels (2017), who find that previous land value growth rate has positive and significant effects on current land value.

Nonetheless, Brownstone & De Vany (1991) found that zoning restricts the conversion of land development potential from agriculture to residential and industrial uses, thereby reducing the development potential and the land value. Zoning and farmland conservation policies have been explored and found to be negatively related to farmland prices. For instance, Eagle et al. (2014) examine whether the Agricultural Land Reserve (ALR) in British Columbia reduced development pressure and preserved farmland at the urban-rural fringe. The authors found ALR zoning to exert a negative impact on price at all distances on the peninsula. Similarly, Wu et al. (2000) argue that zoning regulations and land-use policies directly affect speculative pricing, where land close to urban fringes with more flexible development possibilities sees significantly higher valuations. Studies have also shown that development constraints, such as environmental regulations or restrictive zoning, can either suppress or inflate land prices by limiting supply or ensuring exclusivity (Saiz, 2010). This is supported by Deaton & Lawley (2022), who surveyed literature on the farmland value determinants and found zoning and agricultural regulatory policies to have varying effects based on the region.

Economic and Financial Factors

Other studies have associated economic and financial factors such as interest rates, rental rates, debt-to-asset ratio, and credit and bank availability with rising farmland values.

According to Moss (1997), inflation provides the most information on changes in farmland values at the state level and has no effect at the regional level. A Similar finding is demonstrated by Devadoss & Manchu (2007), who assess macroeconomic variables such as the interest rate, inflation, property taxes, capital gains taxes, and credit availability on land values. They state that the lack of inflationary effects on farmland values could be attributed to the fact that other macroeconomic variables, such as the interest rate, which is highly (negatively) correlated with inflation, an important contributor in determining land values. Property tax and the debt-to-asset ratio were found to have negative effects on farmland values (Devadoss & Manchu, 2007), whereas credit availability exerted a positive influence (Devadoss & Manchu, 2007; Sant'Anna et al., 2021). The study explains that as interest rates increase, returns from financial assets are higher than those from farmland, and investments are shifted from farmland to monetary assets, which decreases farmland values (Devadoss & Manchu, 2007). On the contrary, Awokuse & Duke (2006) find no effect of inflation on farmland values in Kansas.

Both Devadoss & Manchu (2007) and Rajan & Ramcharan (2015) found credit availability to have a positive influence on farmland prices. The same findings have recently been corroborated by (Sant'Anna et al., 2021). Rajan and Ramcharan (2015) extend their analysis to the number of banks available and found that to is positively related to farmland prices. They further argue that regions with greater credit availability during a commodity price boom experienced depressed land prices and reduced credit accessibility in the decades following the bust, likely due to farm loan losses leading to the failure of banks that had financed farmers, thereby reshaping the banking market structure over time.

Farmland values are estimated to be more responsive to changes in market returns than in government payments, but both are important positive drivers of farmland values (Vyn et al., 2012). Devadoss & Manchu (2007), however, found an insignificant positive effect of government payments on farmland value, stating that when government payments are small relative to net farm income, they tend to have only a small and insignificant effect. They also indicated that regions

that tend to be more sensitive to changes in the return on agricultural assets also rely more heavily on government payments.

Buyer Type and Farmland Investment

A study by Vyn & Shang (2021) assessed the extent to which buyer type can affect the value of farmland. The study finds that nonfarmer buyers have paid higher prices for farmland, but only in near-urban areas. This implies that the higher prices paid by nonfarmers may be attributable to the bid-rent theory, as nonfarmers may be bidding more than farmers for farmland in near-urban areas due to higher expected returns from future urban use of the land. Studies that have extended this assessment by considering non-farm investors defined as entities and individuals who buy farmland for financial benefit and found that investors paid more for farmland on average (Magnan & Sunley, 2017).

The effect of the increasing number of non-agricultural investors on farmland values explains the importance of the asset in investment portfolios, as farmland is consistently shown to be a good hedge against inflation and enhances portfolio performance (Noland et al., 2011). Several studies have also highlighted the long-term profitability of farmland investments due to its potential for stable returns, inflation hedging, and diversification benefits. According to Painter (2000), farmland exhibits low price volatility compared to traditional asset classes such as equities and bonds, making it an attractive option for risk-averse investors. He further evidenced that more and more farmland is being leased from individual owners by large farm operators who use more of their capital to invest in machinery and equipment (new technologies) or have purchased farmland as an investment. The study suggests that a continuation of this trend will lead to an increasing number of nonfarmers who own farmland. While this may have positive or negative consequences on agricultural productivity, Desmarais et al., (2017) and Magnan, (2015) suggest that new, non-agricultural landlords—who seek high returns on investment—are viewed as posing risks to local goals of sustainable soil management, rural employment and vitality, and environmental sustainability. Additionally, farmland returns are often positively correlated with inflation, providing a hedge against currency devaluation (Livanis et al., 2006).

Curtiss et al. (2021), who assessed agricultural and non-agricultural buyers' willingness to pay (WTP) for selected plots and site characteristics of farmland in the Czech Republic, found evidence

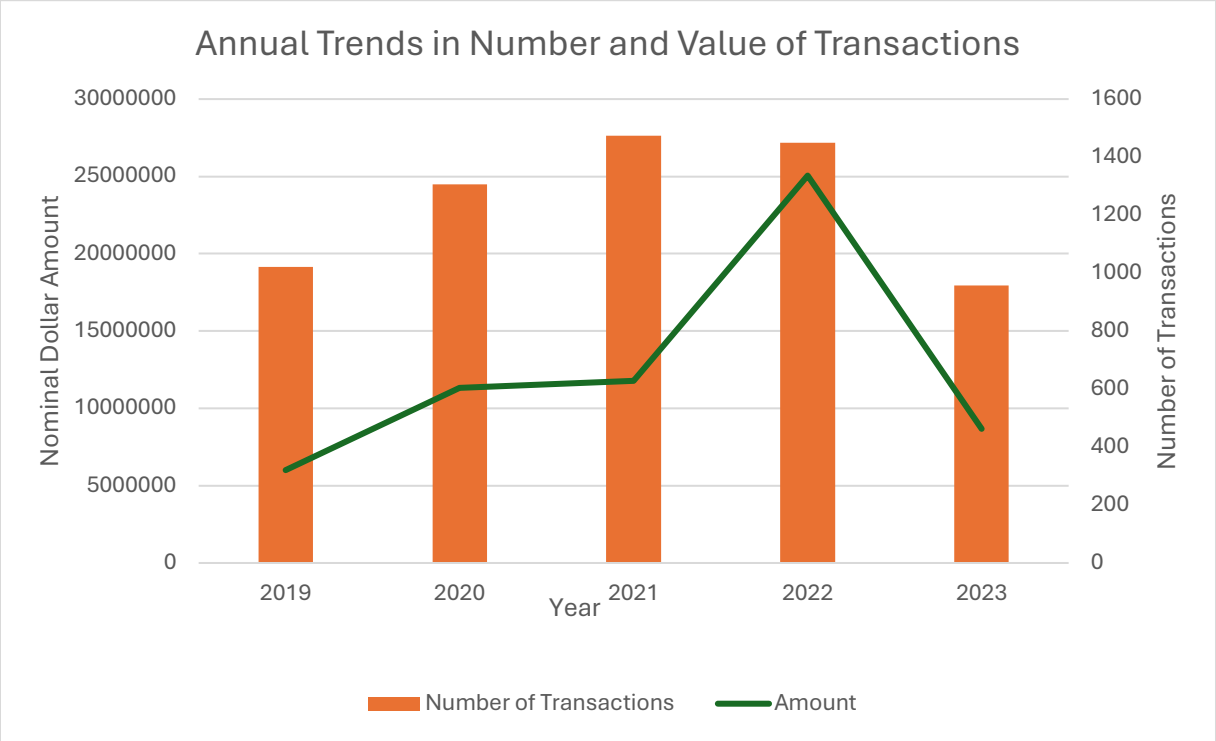
to support that smaller farmers were most affected by the surge of investors' demand for land. They asserted that although agricultural buyers can effectively compete with non-agricultural buyers for farmland on selected plot and site characteristics, there was a considerable dropout rate of individual and family farms from land transactions. Magnan & Sunley (2017) again assert that investor activity has increased rapidly through the mid-2000s, but seems to have tapered off after 2012, though total investor holdings continued to increase. Therefore, an increasing trend of non-agricultural investors buying out agricultural buyers could pose significant effects on agricultural sustainability, considering that the rent-to-value ratio of agricultural rents is decreasing (Nickerson et al., 2012), which may cause non-agricultural investors to repurpose the land to maximize profit.

DATA AND METHODS

Data

The study utilizes agricultural land and rural transaction data from Mississippi, provided by the American Society of Farm Managers and Rural Appraisers (ASFMRA), combined with geographic and locational characteristics data obtained from the U.S. Census, the USDA-NASS, and the Mississippi Secretary of State business search. The initial transaction dataset includes 6,207 transactions from 2019 to 2023 (first half of the year 2023), along with parcel-level characteristics such as transaction date, buyer and seller information, price per acre, acreage size, location, land use types, and types of agricultural products. The data include transactions totaling $3.03 billion in prices paid for 853,458.8 acres.

Figure 2: Annual trend in number and value of transactions



Source: Land Transaction Data in Mississippi from 2019-2023

The data further provides more information on sub-parcel acreage size, price, and use. For instance, a hypothetical 50-acre parcel may include 5 acres of residential site, 20 acres of cropland (further divided into different cropland categories), 15 acres of woodland, and 10 acres of hardwood with their corresponding prices.

For the finalized dataset, we exclude observations which predominantly involve residential site development, as our research focuses on farmland transactions (80% or more of the transactions are categorized as residential site; alternative thresholds would be tested). Variables based on dollar values are converted to 2023 real-dollar terms.

Variable Description

As we examine the relationship between the price paid for farmland and the type of buyer, we use a hedonic pricing model for this study. The dependent variable is the inflation-adjusted log of the price paid for the farmland purchase transaction. The independent variables include parcel characteristics (acreage size, location, net income of parcel, and land use type), county-level characteristics (population, number of agricultural lenders including commercial banks, farm

credit system, and credit unions, as well as per capita personal income), and macroeconomic variables such as interest.

Table 1: Descriptive Statistics of Variables

Variables	Mean	Std Dev.
Log Price	12.37	1.13
Parcel Size	137.50	323.45
Log Couty Population	10.28	0.9
Number of Lenders	29.91	28.21
Log Per Capita Income	10.66	0.17

Source: Land Transaction Data in Mississippi from 2019-2023

The main variable of interest is the buyer type, for which we categorize each buyer as an individual, agricultural business, institutional investor, or non-agricultural/non-institutional investor business. Based on the names in each transaction, we manually make the categorization. Buyers and sellers are classified as non-individual and non-family-based businesses if they operate as corporations, limited partnerships (LPs), limited liability companies (LLCs), trust funds, and real-estate developers. These entities were then classified into mutually exclusive groups of agricultural, institutional investors, and others based on their North American Industrial Classification System (NAICS) code (NAICS Association, 2023). We identify the NAICS code of corporations, LPs, and LLCs through the Mississippi Secretary of State Business Search, as these types of businesses are required to file with the Secretary of State if they are either formed in Mississippi or operate in Mississippi. The NAICS code is a six-digit number indicating the industry within which an entity operates. The first two digits of the NAICS indicate the industry of operation. The non-individual buyers were classified using the first two digits of the entity's NAICS code found on the Mississippi Secretary of State business search. The classification utilized NAICS codes starting with 11 (agricultural entities), 52 (finance and insurance entities), and 53 (real estate, rental, and leasing entities). All other NAICS codes were classified as "others".

How each classification is conducted is provided in Table 3.2 below, and Figure 3.2 presents the number of transactions by buyer type. Between 2019 and 2023, the proportion of institutional investors increased steadily from 6.36% to 10.42%, indicating a growing presence of these entities

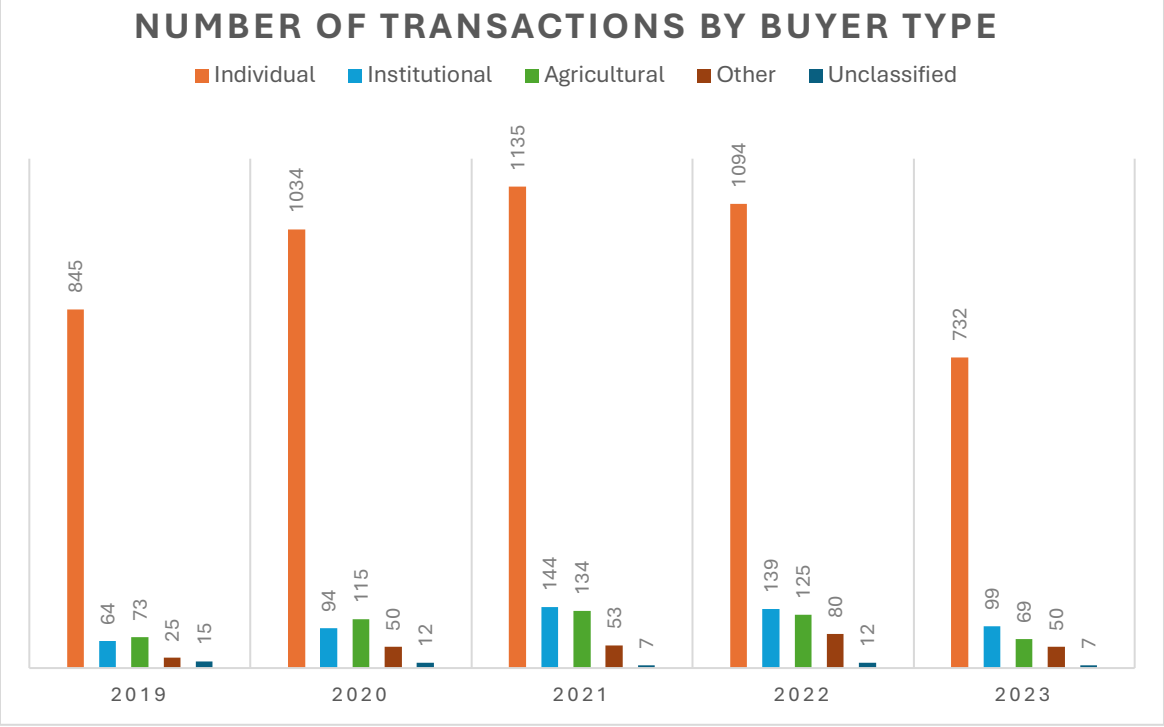
in the market. This classification allows us to assess the marginal contribution of the buyer or seller type and the difference in price per acre of farmland relative to agricultural buyers.

Table 2: Variable Construction and Description

Variable Name	Description
Individual	Individuals or family,
Non-individual	Limited Partners, LLCs, Corporations
Non-Individual Buyer Type	
Non-Individual Agricultural	NAICS code beginning '11' and no NAICS codes starting with '52' or '53'.
Institutional Investor	Entities for which any associated NAICS code begins with '52' or '53'.
Others	Entities for which none of the associated NAICS codes begin with '11', '52', or '53'.

Source: NAICS codes accessed from company filings with Business Search websites

Figure 3: Annual transaction trend by buyer type



Source: Land Transaction Data in Mississippi from 2019-2023

Model Specification

The hedonic pricing model has been used by many studies to assess the impact of various parcel characteristics on the value of a parcel (Gregory et al., 2020; Huang et al., 2006). According to the seminal work of Rosen (1974), hedonic pricing models relate observed land prices to land attributes and other factors that may have an influence on land prices and are often used with goods with varying attributes that can only be sold as a collective unit. The hedonic pricing model estimates the value that is placed on goods of varying characteristics by consumers. This model is derived from the Present Value Model, which constructs the present value of a product as a discounted value of future earnings or returns (in this case, rent) from holding a property (Lichtenberg, 2002). Due to this, any features or enhancements that affect the returns that can be obtained from the property (agricultural land) will also influence its value. Therefore, it is assumed that present returns and expectations for future returns have a significant influence on farmland's value.

The application of the hedonic pricing model is justified as it is able to decompose a heterogeneous product made up of a bundle of characteristics into their characteristic prices (Brown & Mendelsohn, 1984). A change in the attributes of the land will change the willingness to pay for it.

The hedonic analysis allows for the measure of the contribution of non-individual agricultural and institutional investor buyers to agricultural land value, and the difference in relation to agricultural buyers. The price per acre of a parcel i in a year t and county j is expressed as:

$$InP_{ijt} = \beta_0 + \beta_1 Buyer\ Type_{ijt} + \beta_2 X_{ijt} + \theta Z_{jt} + \gamma_j + \delta_t + \varepsilon_{ijt} \quad (1)$$

Our main variable of interest is $Buyer\ Type_{ijt}$, which is an envelope of dummy variables that includes individual buyer, institutional investor buyer, agricultural buyer, and other buyers. For an institutional investor buyer, a *Buyer Type* equals 1 if parcel *i* in year *t* and county *j* is purchased by an institutional investor and 0 if otherwise. The effect of interest of model (1) is to determine β_1 which measures the difference between the non-individual agricultural buyers, institutional investor buyers, and other non-individual buyers relative to individual buyers.

X_{ijt} represents a vector of control variables that denote parcel-specific attributes, including acreage size, improvement value of the parcel, and land use types (recreational, pasture/lifestyle, cropland,

and residential land). Z_{jt} is county-level control variables, such as county population, number of commercial banks, number of credit unions, number of lenders, and county per capita personal income, γ_j and δ_t are county and year fixed effects, respectively. ε_{it} is the error term..

Model (1) addresses some issues present in previous studies (Magnan & Sunley, 2017; Vyn & Shang, 2021). While Magnan & Sunley (2017) used the volume of farmland transactions and identified patterns such as peaks in investments and compared prices paid by institutional investors to investigate the financialization of agricultural land by investors (institutions and wealthy individuals), the study did not use a regression method to determine this relationship.

A study by Vyn & Shang (2021) considered nonfarmer buyers (investment companies and foreign buyers) to include all buyers other than farmers or farming institutions. This study explores the buyer type in granular detail by classifying buyers into individual buyers, non-agricultural buyers, and institutional investor buyers (investment and real estate companies), allowing us to estimate their impact on price per acre relative to individual buyers.

RESULTS AND DISCUSSION

Results are provided in Table 3. We run different specifications with different control variables and fixed effects due to multicollinearity among variables (discussed later). To address the issue of heteroskedasticity in the error term, we use robust standard errors for all model specifications. In Column (1), we have all control variables and county, and year fixed effects included. Overall, the results indicate that non-individuals pay a higher price for agricultural land in general. More specifically, non-individual agricultural buyers pay, on average, 11.87% more per acre than individual buyers. Institutional investors pay 23.18% more, while other non-individual buyers pay 32.59% more per acre than individual buyers. As discussed previously, we did expect positive signs for non-individual buyers as they can price more aggressively due to their limited liabilities and leverage more in the financial market. An interesting finding is that institutional investors pay 7.36% less per acre than other non-individual buyers. This may be explained by the fact that institutional investors are generally more informed and tend to diversify their investment portfolios more effectively than non-agricultural buyers.

Table 3: Differences in Price Paid by Different Types of Agricultural Land Buyers

	(1)	(2)	(3)
Non-Individual Agricultural	0.0428**	0.1122***	0.0426**
	(0.0209)	(0.0226)	(0.0210)
Institutional Investor	0.1312***	0.2085***	0.1308***
	(0.0215)	(0.0233)	(0.0215)
Others	0.1922***	0.2821***	0.1929***
	(0.0342)	(0.0367)	(0.0341)
Parcel-level Characteristics	X	X	X
County-level Characteristics	X	X	
County FE	X		X
Year FE	X	X	X
N	5,750	5,750	5,750
R-Square	0.5908	0.4896	0.5907

Note: ***, **, and * represent significance at 1%, 5%, and 10% respectively. Standard errors of the estimates are in parentheses ( ).

It must be noted that, however, in Column (1), we observed a multicollinearity problem among some of the county control variables and county fixed effects after running a variance inflation factor (VIF) test. To address the issue, in Columns (2) and (3), we run different specifications with different set of control variables and fixed effects, where we do not simultaneously run both county-level characteristics and county fixed effects, as they are highly correlated.

Regardless of different specifications, we consistently observe that institutional buyers pay more in the farmland transactions, and they are all statistically significant and different at the 1% level. The result shows that non-agricultural buyers pay on average 18.52% higher than agricultural buyers. Institutional investors, on the other hand, pay a per-acre price that is 10.11% higher than that of agricultural buyers. This is possible because institutional investors such as financial firms, real estate companies, and investment firms typically have greater access to capital, higher endowment, and superior investment expertise.

CONCLUSION

In this study, we examined the relationship between farmland prices and different buyer types using transaction parcel-level data provided by financial institutions in Mississippi to examine the effect of institutional investors on agricultural land value. The trend indicates the increasing participation of non-agricultural businesses in agricultural land market. Beyond the increasing participation of institutional investors as identified through their NAICS codes, we further document that these institutional investors, as well as non-agricultural buyers, pay a higher price in purchasing agricultural land. This premium suggests that institutional buyers are either willing or able to outbid traditional buyers, potentially due to their long-term investment goals, access to capital, or lower sensitivity to short-term profitability.

Increasing participation of institutional investors in the farmland market may have conflicting effects on the local farmer. While this dynamic may place upward pressure on farmland values, thereby increasing farmers' net worth, it may also price out local farmers. Increased net worth may translate into potential collateral for production loans; however, increased net worth also means higher taxes in the form of property tax, inheritance tax, or capital gain tax. The increasing trend of institutional investors in the farmland market may lead to a potential shift from individual and family-owned and operated farmland to investor-owned farmland. This phenomenon may affect the local farmland market depending on whether investors repurpose land or improve it and lease it to farmers.

Due to these implications for the local farmer, future policies may focus on protecting the ability of local farmers to afford and access farmland, since the growing presence of institutional investors may intensify competition in the farmland market and drive up prices, potentially displacing small-scale, individual, or family-owned farms. They could include targeted support programs that support the access of local and new/beginner farmers. Subsidized loans or grants can be offered to local farmers who are at risk of being priced out. Similarly, new or beginning farmers can be provided with subsidized loans or deferred payment options to reduce the upfront cost of farmland acquisition. Tax incentives could be provided to individuals, families, and agricultural buyers actively engaged in farming.

One of the limitations in this study is that we do not observe motivation for purchase by various buyer types due to data inconsistency and skewness of the buyer motivation. A clear motivation of the buyer could provide more insights into the analysis of institutional investor involvement and provide a precise determination of the impact on the local farmer. Future studies could explore the long-term impacts of institutional ownership of farmland on the local farmer. This study, in its current form, did not account for proximity to urban areas, which will be addressed in the future. Nonetheless, we are confident that the inclusion of urban proximity will not significantly change the results; however, it could explain variations in the institutional investors' impact on land prices.

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