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Exploring Farm Business and Household Expenditure Patterns and Community Linkages

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Abstract

Farm operators are an integral part of some rural economies. The businesses they operate often hire seasonal and full-time employees and purchase goods and services from local farm implement dealers, input suppliers, and financial institutions. Farm household spending on food, furniture and appliances, trucks and automobiles, and a range of consumer goods also support local jobs and retail businesses in some communities. Based on the 2002 agricultural census and the 2004 Agricultural Resource Management Survey, this paper explores the linkages between farm household/ business expenditures and local communities.

Keywords: Farm business expenditures, farm household spending, employment, community linkage

Introduction

A persistent claim of farm groups and many farmers is that government support of the farm sector benefits rural economies through the forward and backward linkages farm businesses have with input suppliers, commodity processors, and agricultural product marketing. There are several reasons why farm policy may affect the economic wellbeing of farming communities. First, farming is an important industry in many rural communities, directly employing 1.9 million residents as primary operatives. Farm jobs and related jobs in the farm input, service, and food processing industries are therefore influenced by farm policy. Second, farm program payments influence farm household consumption by stabilizing the incomes of farm operators and landlords (El-Osta, Mishra, and Ahearn, 2004), which may in turn support nonfarm jobs in nearby communities and elsewhere. Third, to the extent that farm program payments support farmland values (Goodwin, Mishra, and Ortalo-Magné, 2003; Lence and Mishra, 2003), increase farm income (El-Osta, Mishra, and Morehart, 2007), and create or sustain nonfarm jobs (Tweeten, 1979), they help pay for local public services and other institutions critical to the wellbeing of rural communities that depend on farming (Thompson, 2007).

Farm operators remain an integral part of many rural communities, but their numbers continue to decline (Ghelfi and McGranahan, 2004). The businesses they operate often hire seasonal and full-time employees, buy goods and services from local farm implement dealers and input suppliers, and purchase services from financial institutions. Farm household spending on food, furniture and appliances, trucks and automobiles, and a variety of consumer goods supports local jobs and may impact the composition of the local retail sector in some communities. In 2006, total farm business

operating and capital cash expenditures amounted to more than $146 billion nationwide, and farm households spent an additional $66 billion for consumer goods and services.[1] While perhaps only a portion of these expenditures were spent on locally produced goods and services, farm and farm household expenditures still create significant local economic activity in some communities. The degree to which this spending influences local economies depends on the nature of the spending and the nature of the communities. Local impacts of farm business and household spending tends to be greater if spending is for hired labor, local services, or locally produced goods (Shaffer, Deller, and Marcouiller, 2004). The importance of farm business expenditures and farm household spending to the local economy is also greater if the economy is relatively undiversified and farming is the dominant industry (Gonzalez, 2003).

Based on the 2002 Census of Agricultural, the 2004 Agricultural Resource Management Survey (ARMS), the Bureau of Economic Analysis' Regional Economic Information System (REIS), and additional county level information, this paper explores the linkages between farm household and business spending in and outside local communities, and how these connections vary given differential access to urban consumer amenities. This paper first looks at the geographic location of farm operations and farm households relative to major population centers to determine which farms are located in areas likely to depend most on farm production and spending. Using data on the number and size of farms from the 2002 Census of Agriculture, and county population, commuting, and employment data from the 2000 Census of Population and other sources, we develop a geographic framework for describing farm household-community linkages.

[1] ARMS 2006 Phase 3, Version 1 data.

The paper then takes a closer look at the economic ties between farm households and communities by examining the extent to which farm household and business spending patterns are locally oriented using farm operator responses to the 2004 ARMS. The 2004 ARMS survey includes a group of questions concerning the geographic pattern of farm business and household purchases. The survey also includes detailed accounting of farm operation business expenditures and aggregate measures of farm household spending. This information is used to measure the local spending potential of farm business and households in different communities. To gain more insight into the household characteristics, farm business attributes, and local factors associated with farm and farm household purchases in and outside local markets, we supplement our univariate comparisons with a series of probit regressions.

Much of this analysis is descriptive, but we propose four hypotheses. First, we hypothesize there is considerable variability with respect to farm operations and expenditure patterns in metropolitan counties. Rural populations inhabiting metropolitan core counties are substantial but remain largely unnoticed in the discussion of farm-community linkages. Second, we hypothesize that farms located in relatively remote counties are more likely to purchase "everyday" household items in towns nearest to their farms, but on average will travel farther than farm operators living in relatively less remote counties for big ticket items or farm machinery. On the other hand, farms located in more densely populated counties in urban core areas will also travel relatively farther to purchase farm inputs and machinery because such items are not typically found in larger metropolitan areas. Both cases identify where farmers spend money for household items and farm inputs, which provides some indication of the potential effects of farm

spending on local economies. Third, we hypothesize that farm households and businesses with larger expenditure budgets will, holding other factors constant, be more likely to travel farther distances to purchase major household items or farm machinery because of the premium attached search and travel costs often needed to get better prices is easier to justify. Last, we hypothesize that nonlocal purchase of farm business items will be highest for the most remote farm communities because, all else equal, many of these items are not available locally.

The remainder of the paper is organized as follows. The next section outlines the data used in the analysis. The section following describes the county classification system used to identify farm-community linkages in a broader regional context, along with the definitions used to identify local and regional markets where farmers purchase household goods and farm business items. Discussions of the results follow, and the final section concludes with ideas for further research.

Farm Survey Data and Supplemental County Information

Farm information including the number of farms, farms receiving program payments, and the total amount of program payments received by farms comes from the 2002 Census of Agriculture (www.agcensus.usda.gov/Publications/2002/index.asp). The Census of Agriculture is the leading source of facts and statistics about the agricultural production for every state and county in the United States. The census defines a farm as any place producing and selling $1,000 or more of agricultural products during the census year. The definition is consistent with the definition used for other USDA surveys.

Farm household and business expenditure information is from the USDA's Agricultural Resource Management Survey (ARMS, www.ers.usda.gov/Data/ARMS). ARMS is the only annual source of data on the finances and practices of a nationally representative sample of US farms that includes information on the characteristics of farm operators and their households. ARMS is a collection of annual surveys that focus on the farm enterprise and on specific crops. This research uses data from the 2004 Phase III ARMS questionnaire (N = 6,641) to analyze the geographic distribution of farm business and household expenditure patterns. Family farms are the unit of analysis in this part of the study. That is, we exclude non-family corporate and cooperative farms and other operations with a hired farm manager. Family farms operated approximately 932 million acres of farm and ranchland in 2004 (94 percent of the total) and accounted for more than 97 percent of US farms. In addition to operator, farm business, and household characteristics, the 2004 ARMS questionnaire asked respondents how far they traveled to purchase: (1) farm inputs, such as seed, feed, fertilizer, and chemicals, (2) farm machinery and equipment, (3) "everyday" items such as groceries, clothes, and household supplies, and (4) major "big ticket" household items like cars, furniture, and appliances. Respondents were also asked how far it was to the nearest town or city of various sizes and to the nearest hospital and school.

ARMS respondents are matched to proximate county level information to measure the relationships between farm household spending and private nonfarm employment in local retail and supporting agricultural services across a rural–urban county classification system. To measure the extent to which farm household and business expenditures were geographically distributed across persons working in

occupations other than farming, total nonfarm private employment in 2002 and 2004 was extracted from the Bureau of Economic Analysis' Regional Information System (REIS) files (www.bea.gov/regional/reis).

County level classifications based on the OMB metro/nonmetropolitan typology were obtained from ERS (151.121.68.30/Briefing/Rurality/Typology). The percent of persons in nonmetropolitan counties commuting to urban core counties was obtained from the 2000 Population Census (www.census.gov/main/www/cen2000.html).

Geographic Framework for Describing Farm-Community Linkages

This section outlines the geographic framework used to describe the distribution of farm households and their expenditure patterns based on the 2002 Agricultural Census and ARMS 2004 data. First, a county typology is constructed that combines the Office of Management and Budget's (OMB) well known classification system that partitions counties into metro- versus nonmetropolitan groups with a rural density measure recently suggested by Isserman (2005). Information about commuting patterns to work in metropolitan areas is also included in the system to gauge community ties to core population centers. Second, based on information from ARMS respondents, we define a metric to measure the extent to which farm households spend locally, or travel outside their local market area to purchase household items, farm inputs, or farm machinery.

Integrated county classification system: combining conventional measures with recent developments

There are at least three reasons why it is important to distinguish "rural" from "urban" locations when describing farm community linkages using counties as the unit of analysis. First, for some the notion of "farm community" is often synonymous with ideas of "rurality". But more often today, the "rural farmscape" geography is really a fragmented mosaic embedded in expanding core metropolitan statistical areas. And more often, farm operators and their spouses choose to supplement farm income with off farm work opportunities (El-Osta, Ahearn, and Mishra, 2004). In some cases, regions defined as "rural" have strong economic ties to core metropolitan counties, as evidenced by commuter traffic, resource extraction, or export base economies. Second, definitions of "rural" may have implications for farm policy with respect to dispersing program payments. Therefore, policies defining program eligibility based on broad notions of "metropolitan" versus "nonmetropolitan" may overlook target groups for which the policy is designed (Isserman, 2005). Third, because counties are the smallest unit on which information about public goods provision, local finances, and human and physical capital is collected, the differential constraints faced by individuals living in more or less remote areas can be better appreciated and conveyed to policy makers with definitions of "rurality" that acknowledge the rural populations living in core urban regions in particular and how connected remote communities are with urban core areas in general.

There are a myriad of definitions used by researchers to classify counties into rural and urban categories (Waldorf, 2006). Isserman (2005) counts seven overlapping definitions used to define program eligibility for the largest federal programs based on some notion of "rurality". On the most general level, these conventions revolve around notions of regional *integration* or *separation* (Isserman, 2005). The Office of

Management and Budget's (OMB) metropolitan versus nonmetropolitan typology, as well as the Economic Research Service's rural-urban continuum (RUC) and urban influence (IU) codes are examples of classification systems based on the county integration concept. While there are subtle differences, the systems generally identify urban core areas while appreciating the degree to which populations in adjacent counties commute to work in these core areas. The resulting county mosaic generated by the RUC and IU systems closely approximates a Cristallerian-type hierarchy of central cities. On the other hand, an example of a classification system that focuses on separation is the US Census' classification of county inhabitants into "rural" and "urban" groups, and is driven primarily by population density.

The county classification used in this paper combines the well-known metropolitan/nonmetropolitan convention with a rural density measure recently proposed by Isserman (2005). One advantage of this approach is that it appreciates the blending of urban and rural populations in a county, the presence of urban people and places in nonmetropolitan counties, and the idea of hierarchical county linkages to urban core economies. Based on Isserman's taxonomy, "Rural" are those counties with a population density of less than 500 persons per square mile and less than 10 percent of the population living in urban centers with populations less than 10,000 persons. "Urban" counties are those with 500 or more persons per square mile, an urban population of more than 90 percent, and a total urban population of more than 50,000. "Mixed Urban" and "Mixed Rural" counties are those that do not fall into these categories and are differentiated by a population density criterion (< 320 persons per square mile for Mixed Rural, > 320 persons per square mile for Mixed Urban).

In addition, we also use the percent of workers living in nonmetropolitan counties commuting to adjacent metropolitan counties to identify how economically integrated a nonmetropolitan county is to an urban core region with respect to jobs. On average, 15 percent of workers in counties that are adjacent to metropolitan areas commute to the urban core. Using this 15 percent level as the cutoff, we arbitrarily categorize adjacent counties into two groups: (1) those whose economies are closely linked to a larger metropolitan area (i.e., have 15 percent or more commuting to the metro core), and (2) those whose economy may still function independently.

Combined, these conventions yield fourteen mutually exclusive categories (Figure 1). Metropolitan core counties are subdivided into Urban, Mixed Urban, Mixed Rural, and Rural counties. Nonmetropolitan counties are further divided along two lines. First, counties where more (or less) than 15 percent of the working population commutes to an adjacent metropolitan county; second, along the four axes of the rural density scale. Given the distribution of farms across this classification system, there were 11 categories used to analyze the 2002 Agricultural Census and ARMS 2004 data across an urban–rural classification system. (That is, there were no farms identified in some of the categories.) Because of the relatively small number of farms surveyed in the Mixed Urban/Micropolitan counties (n = 348), the counties in this group were combined with the Mixed Rural/Micropolitan group (Table 1).

Defining local market areas and supplementary probit regressions

Based on the ARMS 2004 survey responses, we supplement our univariate comparisons of the geographic distribution of farm expenditure patterns with a series of

probit regressions to gain some insight into the factors associated with decisions to purchase certain items outside local buying centers or local markets. In the first model, we focus our attention on the expenditure patterns for household items (1) such as groceries and other everyday items, and (2) larger durable goods such as cars and trucks. In a second model, we examine the farm operator purchasing patterns for (3) farm input purchases (including seeds, chemicals, and fertilizer), and (4) farm machinery, including items such as tractors, cultivators, combines, and other farm equipment.

Three potential markets were defined based on survey responses. Farmers were asked how far their operations were from the nearest town, and how far they were from the closest town of 10,000 or more persons. These two cutoff points defined the first two purchasing tiers. At least for household items, a city of 10,000 persons is likely to include suppliers of "everyday" items and many of the big-ticket items as well. A city of 10,000 might not be large enough to supply specialty items, but since the respondent was asked where he or she did *most* of the shopping, going beyond a city of this size suggests that the farm operator and household head was willing to by-pass local merchants. The last market boundary was determined if the respondent shopped beyond the nearest town of 10,000 and outside of the county.

Distances traveled to purchase farm inputs and household items do not easily translate into whether farm operators are purchasing from "local" suppliers since no information was available on where the nearest farm suppliers, grocery stores, and car or truck dealerships were located in 2004. However, it was possible to estimate whether the distances reported by farmers imply that they are spending outside the county where their farm is located. We do this by assuming that a county is circular and calculating its

diameter based on its size in square miles. The diameter should provide close to the maximum distance that a county resident would have to travel to reach another county. Counties are not generally round, and a resident in one corner of the county may have to travel more than the diameter to reach the other corner of the county. But for the vast majority of a county's residents, the relevant county boundary is much closer than the diameter.

Farm operators were then asked how far they traveled to purchase groceries and other everyday household items, major purchases (such as cars or trucks), farm inputs, and farm machinery. Where these items were purchased (e.g., the nearest town, the nearest town of 10,000, or beyond) usually corresponded with the stated distance to these locations. However, a number of respondents indicated they traveled a few miles beyond these locales to purchase these items. To attend to this response pattern, a farm operator was counted as purchasing an item at a local buying center if the distance traveled to purchase that item was at least equal to but no greater than 10 miles from the purchasing point. This decision rule may be conservative in some urban settings, but an extra 10 miles in more remote areas or a relatively large county may not be perceived by a respondent as being too far to travel to purchase some goods. In any case, the cutoff points are conservative. In other situations, the nearest town of 10,000 was the town closest to the respondent, especially for farm households located in more urban areas. Nonetheless, we can still determine which personal, farm business attributes, and proximate characteristics are correlated with the decision to purchase farm household or business items in nearby markets or outside of the market area of a respondent, all else equal.

Given these potential buying centers: (1) the nearest town, (2) the nearest town of 10,000, or (3) beyond the nearest town of 10,000 and outside of the county; we regress operator characteristics, farm household and business attributes, and local and regional factors on the decision to (1) purchase "everyday" household items (e.g., groceries), (2) "big ticket" items like appliances, cars, or trucks, (3) farm inputs (e.g., seeds, chemicals, and fertilizers), and (4) farm machinery (e.g., combines, tractors, or planters) in each of these markets.

We assume an additive random utility model represents the decision to purchase household items or farm inputs/machinery at one of these three buying centers (McFadden, 1981; Cameron and Trivedi, 2005; Greene, 2003). A farm operator will purchase goods or inputs at a given buying center if the utility gained by purchasing at that location (V^A) is greater than the utility gained from purchasing the same good at other locations (V^B). The decision for operator *i* is:

(1) $V_i^A = X_i'\alpha_A + e_{iA}$,

(2) $V_i^B = X_i'\alpha_B + e_{iB}$,

where X_i are farm operator, farm business, local, and regional characteristics hypothesized to determine utility, (α_A, α_B) are weights determining the importance of these factors with respect to determining utility, and (e_{iA}, e_{iB}) are random components of utility, respectively. The farm operator purchases household items or farm inputs at market A when $V^A > V^B$.

While utility is unobservable, the decision to purchase goods in a location is available. Let $M_i = 1$ when the utility of purchasing goods in market A is greater than

market B for farmer *i*. Purchasing goods at market *M* is a random event because of the random components of utility with

$$(3) \quad \Pr[M_i = 1] = \Pr[X_i'\alpha_A + e_{iA} > X_i'\alpha_B + e_{iB}],$$

$$= \Pr[e_{iB} - e_{iA} < X_i'\alpha_A - X_i'\alpha_B],$$

$$= F[X_i'(\alpha_A - \alpha_B)],$$

where *F* is the cumulative density function of $e_B - e_A$. The system is identified when $\alpha_A = \alpha_A = \alpha$, and when $e_B - e_A$ is scale normalized (Cameron and Trivedi, 2005). The most common strategy to untangle this decision structure is to specify the *F* as the cumulative density function of the standard normal distribution or the logistic function, which forms the binary probit or binary logit model. In this paper, we specify the purchasing decision in a given market as a binary probit model, with var($e_{iB} - e_{iA}$) = 1.

We examine the household item and farm input/machinery purchasing decisions with two models. Five proximate county level variables were common to both models. The first two were dummy variables indicating if the farmer lived in a high commuting nonmetropolitan county (with more than 15 percent of the population commuting to an adjacent metropolitan county), or lived in a low commuting nonmetropolitan (less than 15 percent of the population commuted to an adjacent metropolitan county). The third proximate variable was the distance from the farm operation to the nearest town with a population of 10,000 or more persons. The fourth county level variable was the size of the county's largest city. Finally, the last county level variable shared by both models was the number of farmers living in the respondent's county. Presumably, large numbers of farmers create the market needed to attract farm input suppliers and implement dealers. For farm business purchases, it is hypothesized that a more rural location will reduced the

likelihood a farm operator would purchase items beyond local markets. On the other hand, distance to the nearest large city helps define the local market area. Holding other factors constant, it is hypothesized that distance to the nearest large city will be negatively related with the likelihood of shopping outside the local market area. That is, the larger the area covered by the local market, the more travel is required to get outside the local market.

Farm household size and the log of total household expenditures in 2004 was included in the household items models. Farm business and capital expenditures (in logs), a variable indicating if farm sales were greater than $100,000 (=1), and whether the farm was a livestock operation (as determined by the percent of sales generated by livestock sales) (=1) was included in the farm input/machinery model. Farm operator characteristics common to both models included whether the respondent had attended college, and the operator's age.

Because of the complex survey design of ARMS, variances of the probit regression were calculated based on standards established by the National Agricultural Statistical Service, using the delete-a-group jackknife variance estimator (Kott; Dubman). El-Osta, Mishra, and Ahearn detail and outline implementation of this procedure.

Results and Discussion

Where Are Farm Households Located?

The nature of the farm household-community relationship is likely a function of the size and diversity of the local economy. Because of the land intensive nature of most farming operations, it is often assumed that farm households are predominantly located in rural

areas that are relatively far from major population centers. In 2002, 41 percent of farms were located within metropolitan statistical areas according to the OMB metropolitan statistical area definition (Table 1). But the classification system used in this paper provides a more detailed picture of the distribution of farms in the metropolitan complex (Figure 1). As one might expect, the number of farms increases moving away from urban centers to the urban-rural transition counties, and then decreases in the most remote counties with low population densities; a pattern that appears consistent with the notion of "von Thünen" land rent gradients. Moving away from the urban core, the von Thünen model predicts that farmland will be used to produce high-valued or perishable crops (e.g., fruits and vegetables), or farm products that are bulky and difficult to transport (e.g. dairy products). But land on the margin of the rural-urban transition will be dedicated to production of more extensive crops requiring relatively more farmland (e.g., grains and pulses, forestry). Of the farms located in urban core areas, 31 percent were located in relatively remote, low population density counties (at least less than 320 persons per square mile), and about 9 percent of the farms located in metropolitan statistical areas were in counties with relatively low population densities (<500 persons per square mile). What this means for farms located in metropolitan core areas depends on where the farm is located. For farms located in urban or mixed urban counties (e.g., relatively high to high population densities), it is likely that farms will have a harder time influencing the economic vitality of their surrounding communities than will farms located in the more remote rural counties surrounding the core. On the other hand, for those farms located in the rural and mixed rural counties, it seems that farm operators would be more likely to spend locally on some items, all else equal.

A similar picture emerges for micropolitan and noncore counties outside the metropolitan core. While most farms are located in less densely populated areas, nearly 60 percent of U.S. farms are within fairly easy commuting distance of one or more major population centers. And while a higher percentage of these “urban proximity” farms have low sales levels relative to more distant farms, over 50 percent of high sales farms (those with $100,000 or more in annual farm commodity sales) are located in or near metropolitan areas. On the other hand, farms may be affected by the size and diversity of the local economy in a number of ways (e.g., higher land values due to urban encroachment could influence farming choices) that, in turn, affect expenditure decisions.

About 23 percent of the farms were located in micropolitan counties. Of these 506 thousand farms, 87% were located in mixed rural counties, but the majority of these farms were located in low commuting counties (about 286 thousand farms). That more farms are located in the low commuting counties suggests relatively higher land rents in the high commuting mixed rural counties, perhaps reflecting their “exurban community” status. Almost 13 percent of farms located in the micropolitan county group were located in counties with less than 500 persons per square mile, further suggesting that the farms located there are either relatively larger (farming more extensive crops and renting more farmland), or simply nonexistent.

Another 35 percent (743 thousand) of farms were located in these noncore counties. Of these, about one quarter of the farms were located in counties where less than 15 percent of the population commuted to work in other counties. Most high sales farms were located in the noncore counties (47 percent), followed by metropolitan counties (27 percent).

The distribution of farms receiving program payments and the disbursement of these payments across the county typology was similar. About 35 percent of program payments were distributed to farms in metropolitan counties, with about 75 percent of these payments going to farms located in counties with relatively low population density (<500 and <320 persons per square mile for rural and mixed rural counties, respectively). Nearly 40 percent of the farm program payments were received by producers in the noncore counties, with most (79 percent) going to farms in low commuting counties. What these figures show is that about one third of the 6.54 billion dollars distributed in 2002 went to farms in noncore counties where more than 15 percent of the working population was dependent on jobs in those counties, while about 27 percent of this total was distributed to farms operating in the less densely populated counties in the metropolitan core. Counties intermediate to core and noncore areas received about 22 percent of these payments. If farming's backward and forward linkages are significant to the local economy, and if program payments have any influence on local economies, it is likely to occur among the 42 percent of farms located in counties that are relatively isolated from major population centers. These economies tend to be smaller and are more easily dominated by one or two industrial sectors, such as agriculture or forestry. Nearly one-fourth of these counties are classified as farming-dependent by ERS, based on the relatively high proportion of their earnings from, or employment in, agriculture.[2]

The Geography of Farm Business and Household Purchases

[2] For a precise definition of farming-dependent counties, see www.ers.usda.gov/Briefing/Rurality/Typology/.

In 2004, farm operators reported a total of $144 billion in cash farm business expenses and an additional $32 billion in capital purchases (Table 2). Cash farm expenses and capital expenses include purchases from other farm operators as well as expenses for hired labor, chemical inputs, equipment, interest, and other business expenses from farm input suppliers. Households of the primary farm operator reported total household expenses of over $78 billion. Over 50 percent of total business expenses, capital purchases, and household spending was by farms in metropolitan and closely linked counties (Figure 2).

What these expenditures mean for the local economy depends on what is being purchased and where it is purchased. Expenditures for locally produced goods and services have a much larger impact on the local economy than purchases of goods produced elsewhere, having little local value added (Kraybill and Johnson, 1989). And, purchases that bypass local suppliers entirely may have little or no local impact. While any evaluation of expenditures based on broad spending categories should be viewed as only a rough approximation of the "local" nature of farm business and household spending, Table 2 shows how differing expenditure categories are treated in this analysis. Property taxes, utility costs, improvements to land, buildings, and structures, and maintenance costs are essentially local. While funds may go to distant landowners or migratory workers, rental payments and labor costs represent expenditures for the use of local resources, and so are considered local by nature. Other farm business expenditures may be incurred locally, or they may be for goods and services purchased at considerable distance from the farm and its local community. Seed, feed, fuel, and other inputs can often be purchased over the internet or from distant mail/phone order suppliers. Even

when purchased locally, expenditures on these items may have very little impact on the local community if they are produced elsewhere. In 2004, these potentially nonlocal farm expenditures amounted to $115 billion (65 percent of all farm business expenditures and capital purchases that year).

There appear to be some differences in the amount of farm business expenditures spent locally in the more densely populated metropolitan core counties compared to the more remote and less densely populated nonmetropolitan and noncore counties. Farm business expenses for items most likely spent locally are greater in the more densely populated Urban and Mixed Urban metropolitan core counties. Moving away from the urban core, the proportion of total farm business items purchased locally declines to 28 percent in the least densely populated metropolitan core counties. A similar pattern emerges in the nonmetropolitan counties, with the percent of total farm business expenditures spent locally lowest in the most rural counties. What seems obvious is that the costs of acquiring some farm business inputs is greater in more remote places because these items are absent and most likely have to be purchased from other places, increasing search or transport costs. On the other hand, labor costs are higher in the densely populated metropolitan core counties, as one might expect. Labor supply for agriculture in the more densely populated counties is lower because of the relative abundance of job opportunities in other sectors (or the paucity of agriculture), thus driving agricultural wages higher. In the most densely populated urban areas, about 20 to 25 percent of farm business expenses went to labor, but in the most remote counties with low commuting, labor costs were only 6 to 7 percent of total farm business expenditures. This also reflects the greater likelihood that urban farms are in more labor intensive specialties (e.g.,

nursery, vegetables) than rural farms. Seed costs were also higher in more densely populated counties in metropolitan core counties (about 12% of the farm business budget) than in more rural places (less than 6% of the operating budget in low commuting counties), suggesting either that these counties import seed from more remote areas or that these counties are more concentrated in nursery and greenhouse operations that tend to have much higher expenditures on seed. Conversely, rent paid to land owners increases moving away from the metropolitan core counties (6 percent of total expenditures) to less densely populated areas (10 percent of total expenditures), which is consistent with larger operations renting more farmland in more remote counties. Assuming our local/nonlocal categories provide some rough measure of where purchases are likely to occur, these expenditure patterns suggest that the amount spent locally by farm businesses is variable, and depends on where a farm is located. What these findings also suggest is that in the most remote farming communities, a large proportion of the farm business budget may be spent outside of local community. And in general, we might expect that spending for a particular item will, all else equal, be higher where that commodity is in relatively scarce supply or where demand is lower. This may be surprising for some advocates of "buy local" programs, and the notion that increasing the purchasing power of farming communities through farm programs or by other means will necessarily translate into local economic growth. Growth in any farming community or otherwise may be difficult if the goods demanded by producers or consumers in these communities can only be purchased elsewhere.

To gauge the contribution of these expenditures to the local economy, we first normalized the sum of farm household and business expenditures in each county

classification by the total number of private nonfarm employees in each category. Farm and farm household expenditures relative to the size of the local economy were far higher in more remote (less densely populated) counties in core metropolitan and nonmetropolitan counties (Figure 3). In counties located in metropolitan statistical areas, the sum of farm business and capital expenses per nonfarm private employee increases from $97/worker to $5,323/worker moving from the urban core to the least densely populated counties were more farms are located, reflecting the dearth of jobs in the more remote areas. A similar pattern is evident in the low and high commuting nonmetropolitan counties. In the low population density/low commuting noncore counties, farm business and capital expenditures per nonfarm job was $9,846/worker. Expenditures by farm households ranged from $28/private nonfarm worker in the most densely populated metro areas with farms to $3,555/ private nonfarm worker in distant rural counties. Within farm-dependent counties, farm and farm household spending amounts to $21,257/ private nonfarm worker, further reflecting the dearth of jobs in such counties.

Distance to Markets

Table 3 reports the average distances reported by the respondents, by geographic location. Nationwide, the average distances traveled for farm inputs and food, clothing were similar, as were the average distances traveled for farm equipment and major household purchases. As one might expect, farm operators and household members traveled farther for major purchases than for “everyday” purchases. For “everyday” goods and services, the average travel distance for farms located within nonmetropolitan

and noncore counties was between 3.1 and 5.5 miles higher (respectively) than the average for farms located within metropolitan areas. Average travel distances for major items were somewhat longer in more isolated locations, especially for major household items. Travel distance to purchase big-ticket items for farm households located in low density metropolitan core counties were similar to farms located in the rural-micropolitan counties and noncore counties with relatively low commuter traffic. On average, farm households located in remote counties with high commuter traffic appear to purchase major household items in other counties. While average travel distances increased as the geographic isolation of the farm from major population centers increased, differences were modest. Given traffic congestion, these average differences imply that food, clothing, and many farm inputs take less time to purchase in more isolated locations than they do for farms close to population centers.

Travel distance to purchase farm inputs was similar across geographic locations in counties with intermediate population densities, and in metropolitan core and nonmetropolitan counties with low population densities. Not surprisingly, farms located in more densely populated urban core counties travel at least as far as farms located in more remote areas to purchase farm inputs. The same pattern is observed with farm machinery purchases, suggesting that farm service dealerships and input suppliers balance their location decisions based on demand for inputs and farm machinery (i.e., where farms are located), but also where operating costs are minimized (e.g., relatively lower land rent for warehousing and storage of seed or large farm machinery, and possibly access to supporting machine and repair service or rail services).

In general, the distance penalty for farms in relatively remote, low population density areas was larger for household items than for farm inputs and equipment, perhaps reflecting differences between the geographic distribution of farm and household expenditures. Farm input and equipment dealers can profitably locate in relatively low population density areas because that is where the farms are located. Grocery stores and car dealers are more likely to gravitate toward population centers. While, on average, travel times do not vary that much from one location to the next, farm operators were not asked any questions on the selection or prices they faced in different locales. At least for household consumption items, it seems likely that the smaller average size of cities in more remote locales and the longer distances remote farm households are from larger cities comes with disadvantages associated with the availability of specialty goods and perhaps their price. The notion that many rural (and central city) residents live in "food deserts" is an example of this phenomenon (AP, 2004).

One reason for the longer travel distances in less populated areas of the country may be the lack of nearby merchants. Particularly for household items, more populated counties are far more likely to have local merchants. And given the fact that farm input and equipment suppliers also serve weekend gardeners and nonfarm homeowners, these too are more likely in counties with more residents. Thus, the fact that farm operators in remote areas purchase inputs and equipment outside their respective communities does not necessarily imply that they are by-passing local merchants. To get a better measure of spending outside the local market area, one might ask whether the farmer routinely travels outside his or her home county *and* travels farther than the nearest city of 10,000 or more residents.

As one might expect, the frequency of household and farm business purchases outside the community closest to the farmstead increases moving away from population centers (Table 4). For farms located in moderate to the most densely populated counties in metropolitan core regions, 85 to 92 percent of grocery and everyday item purchases were made in the town closet to the farm. Grocery purchases made locally ranged between 72 and 76 percent in the micropolitan counties, and about 65 percent in the noncore counties. Nationally, for big-ticket items, about 8.5 percent of farm households shop outside their home county and beyond the nearest town of 10,000 persons. In the least densely populated counties in metropolitan core counties and the noncore counties, 23 to 27 percent of spending on big-ticket items was in or near the community where the farm was located (i.e., purchases were made in the nearest town). As might be expected, the frequency of local purchases of farm machinery was relatively low for farms located in the densely populated metropolitan core counties, since farm machinery dealers are likely located in more rural areas. Still, roughly 66% of farm machinery purchases were made outside the respondent's nearest town.

Whether for lower prices, wider selection, better service, or some other reason, on average roughly 50 percent respondents in nonmetropolitan counties, the low population density counties in the metropolitan core, and noncore counties routinely purchased major big-ticket items or farm machinery beyond their local communities. The converse seems true for groceries and other everyday items; about 77 percent of grocery purchases are made in towns nearby the farmstead.

Probit regression results for farm household and business purchasing patterns

For farm business purchases, noncore counties with less than 15 percent of the workers commuting to other counties reduced the likelihood that a farm operator would regularly purchase items outside immediate and more distant markets, holding other factors constant (Table 5). On the other hand, distance to the nearest large city was positively related with purchasing outside the nearest town ($P = 0.14$), but negatively related with farm input purchases beyond towns of 10,000 persons ($P < 0.0001$) or entirely outside the county and beyond the nearest town of 10,000 persons ($P = 0.01$). The purchasing pattern of farm machinery was similar with respect to reported distance to the nearest town of 10,000. These results may be picking up the purchasing patterns of farmers living in very remote, small towns in counties with no towns with 10,000 persons or more. (There were 1,906 counties [61 percent] where the largest towns had less than 10,000 persons.) Not surprisingly, as the number of farmers in the county increases, the likelihood of shopping outside the nearest town of 10,000 persons ($P = 0.02$) and outside the county and beyond the nearest town of 10,000 persons ($P < 0.0001$) decreases with respect to farm input purchases. Presumably, large numbers of farmers create the market needed to attract farm input suppliers and implement dealers. The total farm business capital expenditures were positively related with more distant shopping ($P < 0.01$). As farm business expenditures increase, the added search and travel costs often needed to get better prices are easier to justify. While not significant, the signs of the other variables included in the model were generally unsurprising.

Farm households in noncore counties with relatively fewer persons commuting to work outside the county were less likely to go shop outside their nearest town for everyday items and groceries, holding other factors constant. A similar effect is apparent

with respect to everyday and major item purchases in nearest town and the distance to the nearest city of 10,000 persons (P = 0.05). The farther away a farm household is from a major population center, the less easy it is to find everyday or specialty items in local retail stores. The size of the county's largest city was negatively related with household purchases of big-ticket items; the larger the city, the less likely farm households would shop elsewhere (P = 0.12). The number of farmers in the county had a negative influence on the likelihood of purchasing everyday household items beyond the nearest town of 10,000 persons and outside of the county. As expected, the size of a household's expenditures was positively related with more distant shopping. As household expenditures increase, the extra search costs needed to find lower prices are justifiable.

Conclusions and suggestions for further research

The results we present in this study are preliminary, and serve as a platform from which to further examine the backward and forward linkages between farms' economic ties to local communities in particular and regional economies in general. First, a relatively new county typology system was used to classify counties into categories representing the connections between rural populations and the regional economies wherein they live. Future studies will consider collapsing the "Mixed Rural" and "Rural" nonmetropolitan counties into two categories; low and high commuting nonmetropolitan counties. However, Isserman's (2005) rural density measure effectively differentiates the broad class of core metropolitan counties into a smaller groups of counties consistent with the fact that 41 percent of the nation's farms live in metropolitan counties. Of these 41 percent, 77 percent live in relatively remote, low population density counties where farm

expenditure patterns are similar to producers living in the most remote counties of the nation.

In sum, a significant portion of farm and farm household spending on equipment and consumer durables was conducted outside the nearest town, and often well beyond the county boundary. The purchase of nondurable household items tended to be more localized, but nationwide, 8 percent of farm inputs were purchased outside the local market, as defined in this study. Less sparsely populated areas that contain a large farm population are evidently well served by local farm input suppliers and have adequate access to "everyday" household items. However, big-ticket items are often harder to purchase locally in the most remote counties. Distance from large urban centers may not be as important as distance from a reasonable-sized city in determining how far farm operators and household members typically travel for farm and household purchases.

Next steps include a closer examination of farm business expenditure patterns as they relate to employment in the agriculture-supporting industries, such as food processing, farm service dealerships, and seed and fertilizer companies. While examination of the relationship between farm production expenses and private nonfarm employment sheds some light on the potential contribution of expenditures on local employment, the measure is arguably too aggregate. In addition, additional questions on the 2004 ARMS survey related to use of internet services to purchase goods and services. The extent to which these technologies influence local spending patterns would give additional insight the use of alternative ways to purchase goods and services, and how these tie into local spending.

Table 1. Geographic location of farms and distribution of farm payments, 2004.

Geographic location	Farmers	Farms			Farm program payments disbursed
		Total	High sales	Receiving program payments	
Metropolitan core counties /1:		----------Percent of U.S. total----------			
Rural 2/	199,644	9.4%	7.9%	9.4%	7.8%
Mixed Rural	466,746	22.0%	15.0%	14.9%	19.4%
Mixed Urban	128,594	6.1%	3.1%	3.4%	5.5%
Urban	77,794	3.7%	1.0%	1.3%	2.7%
Sub total	872,778	41.1%	27.1%	29.0%	35.5%
Nonmetropolitan counties:					
Micropolitan counties:					
Mixed Rural:					
High commuting	156,351	7.4%	6.6%	7.0%	7.0%
Low commuting	286,166	13.5%	15.9%	15.2%	14.7%
Sub total	442,517	20.8%	22.4%	22.2%	21.7%
Rural:					
High commuting	7,601	0.4%	0.1%	0.2%	0.1%
Low commuting	56,517	2.7%	3.2%	3.3%	3.0%
Sub total	64,118	3.0%	3.3%	3.5%	3.1%
Non-core counties:					
High commuting	190,403	9.0%	7.9%	9.4%	8.4%
Low commuting	553,159	26.1%	39.3%	35.9%	31.3%
Sub total	743,562	35.0%	47.2%	45.3%	39.6%
Total	2,122,975	100%	100%	100%	100%

Source: Agricultural Census 2002

Notes:

1/ Office of Management and Budget county typology system.

2/ Isserman's (2005) rural – urban density typology.

Table 2. Distribution of farm business expenditures over the integrated county typology, 2004.

		Metropolitan core counties				>15% workers commute			<15% workers commute		
						Micropolitan counties			Micropolitan counties		
	Total	Urban	Mixed Urban	Mixed Rural	Rural	Mixed Rural	Rural 2/	Noncore	Mixed Rural	Rural	Noncore
Variable costs											
Working capital	4.4 1/	0.13	0.37	1.28	0.2	0.42	.	0.27	0.64	0.15	0.98
Feed	16.9	1.12	1.00	4.07	1.07	1.28	.	1.14	2.25	0.9	4.06
Fertilizer	18.8	0.4	1.26	3.83	1.27	1.55	.	1.54	2.72	0.66	5.57
Fuel	8.9	0.21	0.56	1.73	0.54	0.51	.	0.71	1.17	0.25	3.21
Other livestock	3.1	0.05	0.16	0.73	0.18	0.18	.	0.21	0.64	0.17	0.8
Livestock purchases	11.4	0.16	0.26	0.96	0.61	0.26	.	0.3	3.42	0.66	4.79
Seed	8.9	0.79	0.69	1.7	0.53	0.86	.	0.59	1.1	0.3	2.29
Maintenance 3/	10.8	0.28	0.79	2.37	0.72	0.72	.	0.85	1.57	0.35	3.08
Labor 3/	17.3	1.59	2.28	6.28	0.62	1.06	.	0.87	1.61	0.38	2.58
Other 3/	7.4	0.56	0.76	1.97	0.36	0.5	.	0.48	0.93	0.19	1.65
Utilities 3/	4.5	0.16	0.37	1.18	0.22	0.24	.	0.29	0.76	0.15	1.12
Fixed costs											
Insurance	5.8	0.2	0.39	1.23	0.38	0.38	.	0.42	0.79	0.15	1.83
Interest	8.8	0.15	0.46	1.76	0.65	0.62	.	0.71	1.23	0.25	2.89
Rent/lease expense 3/	12.3	0.19	0.82	2.15	0.67	0.89	.	1.03	2.04	0.42	4.04
Property taxes 3/	4.8	0.18	0.4	1.13	0.4	0.35	.	0.41	0.63	0.12	1.22
Total business expenses	144.1	6.17	10.57	32.37	8.43	9.81	.	9.84	21.51	5.1	40.11
Capital expenses	32.4	0.76	1.73	6.26	2.82	2.5	.	2.89	4.29	0.93	10.15
Tot. business outlay	176.6	6.92	12.3	38.63	11.25	12.31	.	12.73	25.8	6.03	50.26
Local expenditures	61.5	3.08	5.79	16.35	3.2	4.18	.	4.21	8.18	1.76	14.66
Nonlocal expenditures	115	3.84	6.52	22.28	8.05	8.14	.	8.52	17.61	4.26	35.6
Percent spent locally	34.84	44.49	47.03	42.32	28.42	33.92	.	33.06	31.72	29.25	29.17
Percent spent non locally	65.16	55.51	52.97	57.68	71.58	66.08	.	66.94	68.28	70.75	70.83

Source: ARMS 2004 Phase III version 1 (N = 6,641, expanded farm population = 2,054,281), Isserman (2005)
Notes: 1/ Billions of dollars, 2/ Suppressed for disclosure issues, 3/ Expenses tied to local areas.

Table 3. Average distance (miles) traveled to purchase household and farm business items.

Geographic location		*Household purchases of:* Groceries	Major items	*Farm business purchases of:* Machinery	Credit	Inputs	Avg. county diameter
Metropolitan core counties:							
Rural		15.4	23.0	24.9	17.3	17.8	26.2
Mixed Rural		11.7	16.9	18.4	13.9	13.4	33.7
Mixed Urban		10.1	14.5	19.1	13.9	11.8	26.6
Urban		7.8	14.3	20.5	19.0	18.7	21.9
Nonmetropolitan							
Micropolitan counties:							
Mixed Rural							
	High commuting	12.2	18.1	18.3	13.7	11.5	31.7
	Low commuting	14.1	18.7	19.3	14.3	13.5	35.7
Rural							
	High commuting	14.9	24.1	24.6	10.7	17.4	23.9
	Low commuting	16.1	23.1	21.5	16.5	17.1	28.0
Non-core counties	High commuting	17.4	30.7	27.3	17.8	16.3	28.5
	Low commuting	16.0	24.3	22.6	14.6	13.5	34.7

Source: ARMS 2004 Phase 3 version 1, Isserman (2005).

Table 4. Purchasing patterns of farm households for groceries, major household items, and farm machinery, 2004.

	Metro core counties				Micropolitan counties				Non-core counties	
					Commuting workers				Commuting workers	
					< 15%		> 15%			
Item	Urban	Mixed Urban	Mixed Rural	Rural	Mixed Rural	Rural	Mixed Rural	Rural	< 15%	> 15%
Number of observations	203	409	1433	598	964	210	503	11	1735	575
Expanded number of farms	52,014	114,769	423,257	203,560	275,214	55,051	152,562	6,448	566,745	204,661
Grocery purchases:	----------Percent of farms in county typology----------									
By pass nearest town	4.8	11.2	18.1	25.1	21.4	22.1	17.4	.	27.8	32.7
By-pass town, +10,000 population	3.6	2.6	5.7	4.3	3.4	2.9	3.8	.	3.9	2.4
Purchase outside county and beyond town of 10,000+	0.04	0.3	1.5	2.4	3.2	1.2	2.4	.	2.9	0.9
Local purchases	91.6	85.8	74.7	68.2	72.1	73.8	76.4	.	65.4	64.0
Sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	100.0	100.0
Major item purchase:	----------Percent of farms in county typology----------									
By pass nearest town	28.1	27.0	36.0	50.0	46.1	31.1	36.0	.	52.1	53.2
By-pass town, +10,000 population	25.4	10.3	17.3	14.1	10.6	11.2	19.6	.	13.7	11.2
Purchase outside county and beyond town of 10,000+	10.8	2.8	7.6	8.5	10.4	7.2	10.4	.	11.1	8.0
Local purchases	35.8	59.9	39.1	27.4	32.9	50.5	34.0	.	23.1	27.6
Sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	100.0	100.0
Farm machinery purchases:	----------Percent of farms in county typology----------									
By pass nearest town	36.3	32.8	39.3	46.1	40.5	33.4	37.6	.	50.3	45.0
By-pass town, +10,000 population	35.8	22.6	24.4	16.7	13.1	16.2	21.1	.	13.8	13.2
Purchase outside county and beyond town of 10,000+	16.1	13.9	13.9	12.2	10.7	11.6	11.9	.	10.1	7.7
Local purchases	11.7	30.7	22.4	25.0	35.8	38.7	29.4	.	25.8	34.1
Sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0	.	100.0	100.0

Source: ARMS 2004 Phase III, version 1; OMB metropolitan statistical area classification; Isserman (2005).

Null entries were suppressed due to disclosure (n = 11).

Table 5. Factors associated with farm input and machinery purchases outside local markets.

Regularly purchase outside the:	Local market		Town, 10,000+ persons		Market area	
Farm inputs	Estimate	T-value[1]	Estimate	T-value[1]	Estimate	T-value[1]
Constant	-1.865	-0.807	-2.489	-1.489	-2.404	-1.642
Farm located in a noncore county:						
With high metro commuting	-0.389	-0.198	-0.418	-0.159	-0.402	-0.142
With low metro commuting	-0.375	-1.665	-0.495	-2.373	-0.415	-2.292
Not adjacent to a metro area	-0.381	-1.118	0.249	0.709	-0.190	-0.502
Distance to nearest city of 10,000	0.009	1.554	-0.047	-7.514	-0.019	-3.022
Size of county's largest city (log)	-0.114	-0.459	-0.040	-0.228	-0.062	-0.580
Number of farmers in county (1,000's)	-1.E-04	-0.527	-2.E-04	-2.644	-0.001	-6.145
Sales > $100,000 (=1)	-0.581	-1.092	-0.649	-0.866	-0.460	-0.426
Capital expenditures ($1,000's) (log)	0.405	3.000	0.369	3.981	0.301	5.094
Livestock operation (=1)	0.055	0.066	-0.002	-0.002	0.101	0.063
Operator's age	-0.007	-0.725	-0.004	-0.732	-0.003	-0.426
College education (=1)	-0.086	-0.873	0.097	0.264	-0.067	-0.098
Mean of dependent variable	58%		28%		16%	
Sample size	6,348		6,348		6,434	
Expanded farms represented	1,947,292		1,947,292		1,984,182	
Log likelihood	-1,247,530		-1,015,588		-828,544	
Pseudo R^2	0.057		0.114		0.064	
Farm machinery & equipment						
Constant	-1.372	-0.592	-2.371	-1.425	-2.479	-1.728
Farm located in a noncore county:						
With high metro commuting	-0.351	-0.176	-0.358	-0.133	-0.366	-0.122
With low metro commuting	-0.362	-1.580	-0.422	-2.746	-0.366	-2.351
Not adjacent to a metro area	-0.422	-1.153	0.364	0.996	-0.145	-0.423
Distance to nearest city of 10,000	0.008	2.068	-0.045	-6.843	-0.017	-2.056
Size of county's largest city (log)	-0.138	-0.680	-0.032	-0.219	-0.034	-0.430
Number of farmers in county (1,000's)	-9.E-05	-0.397	-2.E-04	-4.052	-0.001	-6.724
Sales > $100,000 (=1)	-0.445	-0.801	-0.468	-0.581	-0.284	-0.251
Capital expenditures ($1,000's) (log)	0.315	3.812	0.295	5.529	0.241	5.019
Livestock operation (=1)	0.052	0.058	-0.027	-0.019	0.108	0.061
Operator's age	-0.002	-0.197	0.000	-0.015	-0.001	-0.198
College education (=1)	-0.017	-0.101	0.150	0.275	-0.074	-0.090
Mean of dependent variable	52%		23%		13%	
Sample size	6,263		6,263		6,434	
Expanded farms represented	1,917,146		1,917,146		1,984,182	
Log likelihood	-1,274,639		-943,006		-736,938	
Pseudo R^2	0.039		0.096		0.054	

Source: ARMS 2004 Phase III, version 1.

Notes: 1/ Critical t value for the 5%, 10%, and 15% levels are 2.14, 1.76, and 1.52.

Table 6. Factors associated with household and larger purchases outside local markets.

Regularly purchase outside the:	Local market		Town, 10,000+ persons		Market area	
Farm household purchases	Estimate	T-value[1]	Estimate	T-value[1]	Estimate	T-value[1]
Constant	-0.867	-0.208	-1.203	-0.305	-5.175	-1.107
Farm household located in a noncore county:						
With high metro commuting	0.042	0.027	-0.709	-0.747	-0.436	-0.345
With low metro commuting	0.043	0.280	-0.405	-1.394	-0.195	-0.367
Not adjacent to a metro area	-1.103	-1.644	-0.382	-0.616	-0.627	-0.977
Distance to nearest city of 10,000	0.012	2.169	-0.039	-1.053	-0.003	-0.214
Size of county's largest city (log)	-0.075	-0.311	-0.156	-0.678	-0.343	-1.841
Number of farmers in county (1,000's)	-4.E-05	-0.266	-2.E-06	-0.016	-0.001	-3.396
Total household expenditures (log)	0.130	0.638	0.071	0.420	0.362	1.273
Operator's age	-0.013	-1.862	0.001	0.084	0.025	1.592
Household size	0.007	0.056	0.028	0.420	0.003	0.040
College education (=1)	-0.150	-0.358	0.144	0.404	0.167	0.339
Mean of dependent variable	33%		6%		2%	
Sample size	6,351		6,351		6,429	
Expanded farms represented	1,953,042		1,953,042		1,983,072	
Log likelihood	-1,199,289		-409,848		-196,829	
Pseudo R^2	0.027		0.047		0.051	
Major household purchases						
Constant	-1.150	-0.215	-1.911	-0.173	-2.925	-0.915
Farm household located in a noncore county:						
With high metro commuting	-0.212	-0.116	-0.389	-0.137	-0.140	-0.087
With low metro commuting	-0.336	-1.182	-0.423	-1.305	-0.053	-0.177
Not adjacent to a metro area	-0.677	-2.414	0.164	0.573	-0.226	-0.820
Distance to nearest city of 10,000	0.019	4.641	-0.028	-6.000	-0.007	-0.748
Size of county's largest city (log)	-0.100	-0.650	-0.082	-1.169	-0.228	-1.662
Number of farmers in county (1,000's)	-3.E-05	-0.128	4.E-05	0.265	-1.E-04	-1.052
Total household expenditures (log)	0.264	0.373	0.243	0.214	0.353	2.181
Operator's age	-0.011	-1.593	-0.007	-1.368	-0.003	-0.291
Household size	-0.026	-0.179	-0.030	-0.077	-0.085	-1.206
College education (=1)	-0.131	-0.457	-0.094	-0.094	-0.269	-1.008
Mean of dependent variable	53%		20%		10%	
Sample size	6,319		6,319		6,429	
Expanded farms represented	1,917,146		1,917,146		1,983,072	
Log likelihood	-1,294,004		-915,332		-640,467	
Pseudo R^2	0.038		0.047		0.024	

Source: ARMS 2004 Phase III, version 1.

Notes: 1/ Critical t value for the 5%, 10%, and 15% levels are 2.14, 1.76, and 1.52.

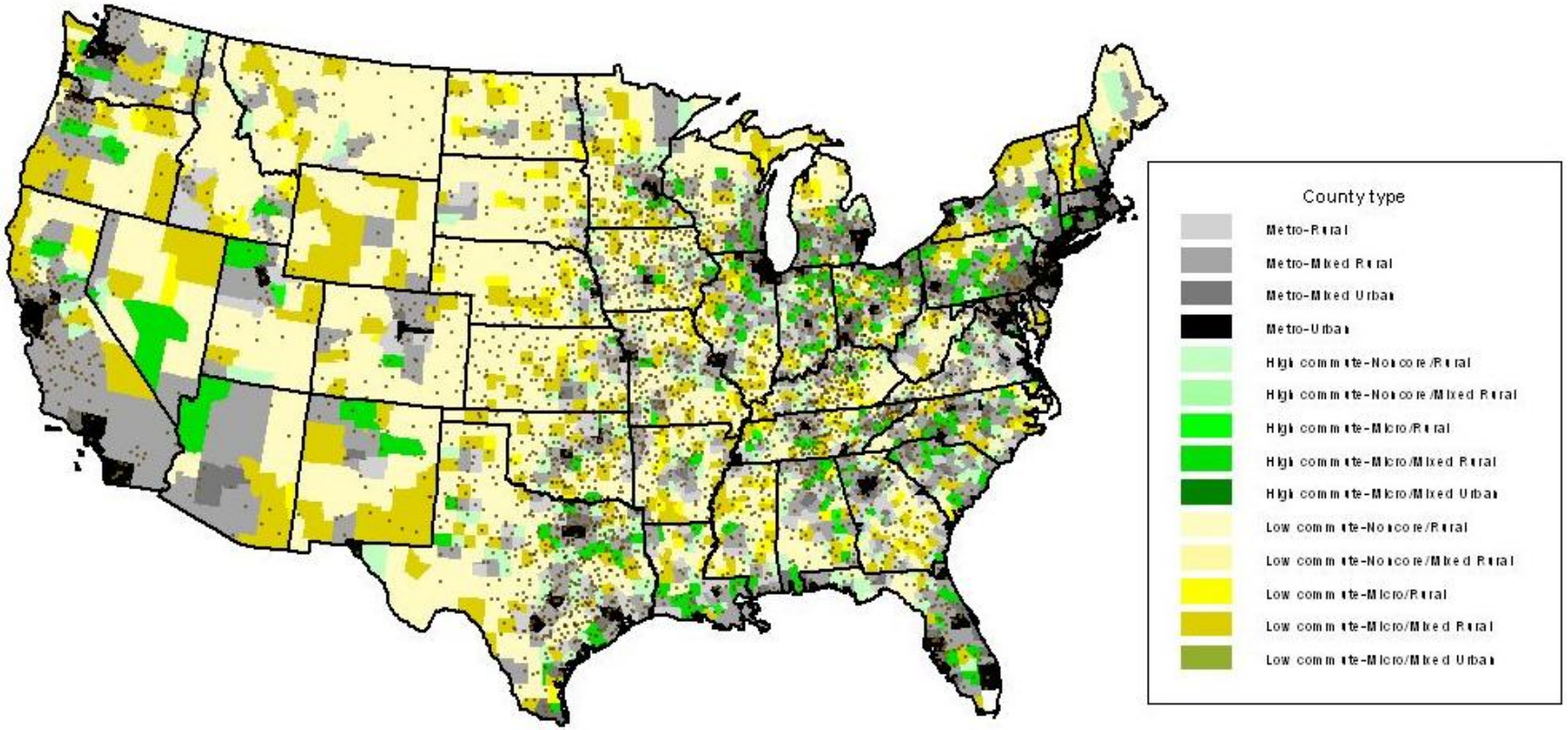
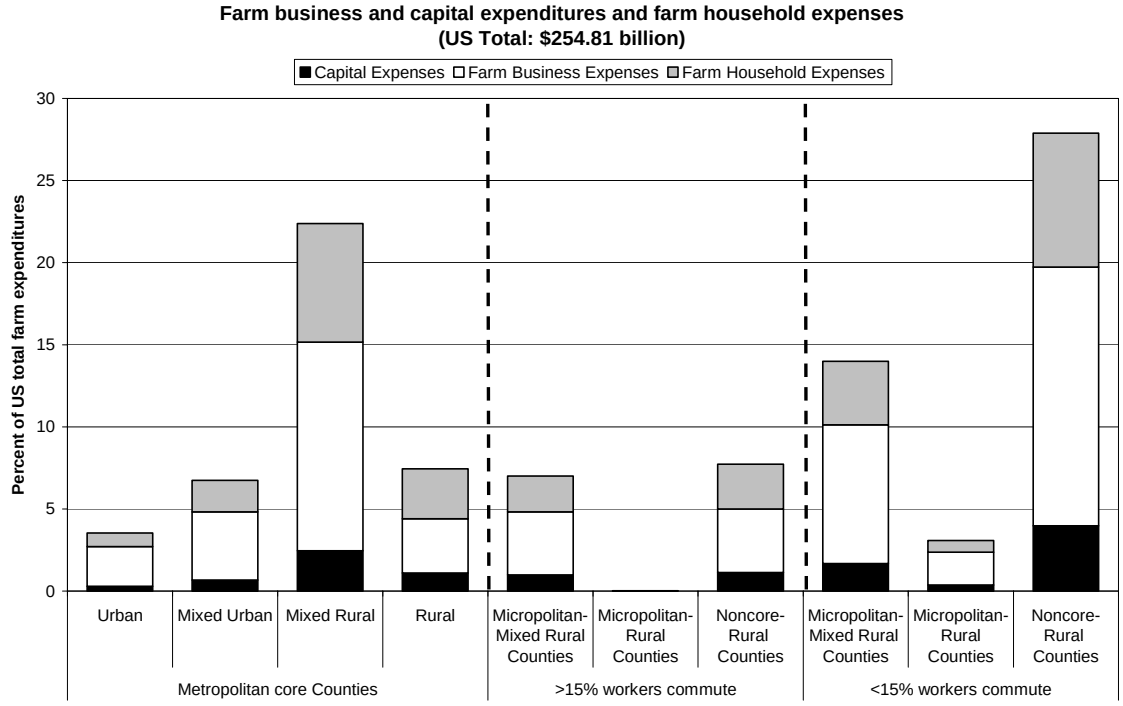


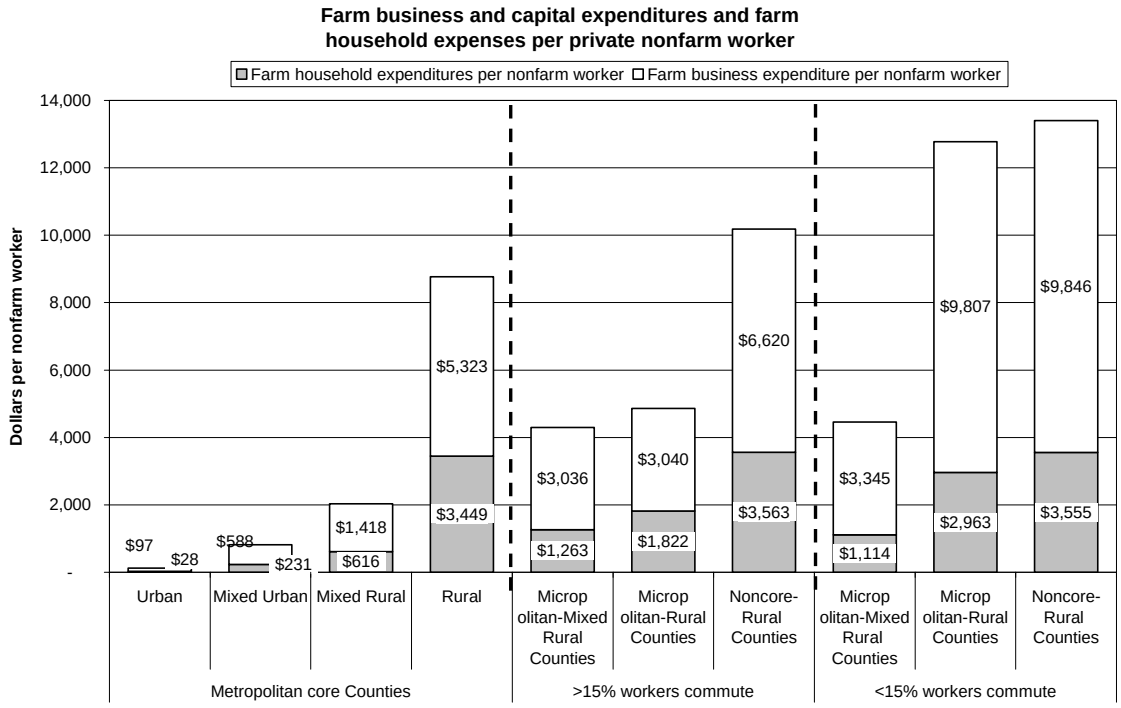
Figure 1. Distribution of farms across the integrated Isserman-OMB typology (1 dot = 500 farms)
Sources: USDA Agricultural Census, 2002, Isserman (2005).



Sources: ARMS 2004 Phase 3, Version 1, Isserman (2005), and the Office of Management and Budget (OMB)

Figure 2. Distribution of farm household, business, and capital expenditures.

Notes: "Urban", "Mixed Urban", "Mixed Rural", and "Rural" typology follow Isserman's (2005) rural – urban density classification. Metropolitan "core" counties are classified by the Office of Management and Budget as counties containing a recognized population nucleus and surrounding counties which are "tightly integrated with the core". Micropolitan-rural counties were suppressed due to disclosure (n = 11 observations).



Sources: ARMS 2004 Phase 3, Version 1, Isserman (2005), BEA-REIS 2004, and the Office of Management and Budget (OMB)

Figure 3. Distribution of farm household and business expenditures per private nonfarm worker, 2004.

Notes: "Urban", "Mixed Urban", "Mixed Rural", and "Rural" typology follow Isserman's (2005) rural – urban density classification. Metropolitan "core" counties are classified by the Office of Management and Budget as counties containing a recognized population nucleus and surrounding counties which are "tightly integrated with the core".

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