

# Farm Business and Household Expenditure Patterns and Local Communities: Evidence from a National Farm Survey

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Farm operators are an integral part of some rural economies. The businesses they operate support jobs and purchase goods and services from local implement and input suppliers. Farm household spending on food, furniture and appliances, trucks and automobiles, and a range of consumer goods also supports local jobs and retail businesses. Based on the 2004 Agricultural Resource Management Survey, the linkages between farm household and business expenditures and communities are explored. Farms in urban areas purchase household goods in markets closest to the farmstead, but traveled further to purchase farm business items. The opposite pattern was observed in rural locations.

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Farming is an important industry in many rural communities, directly employing 1.9 million residents as primary operatives. Total farm business operating and capital cash expenditures amounted to more than \$146 billion nationwide in 2006. Farm households spent an additional \$66 billion for consumer goods and services. While perhaps only a portion of these expenditures were spent on locally produced goods and services, farm and farm household spending still creates significant economic activity in some communities. The degree to which these purchases influence local economies depends on the nature of the spending, the origin of the goods purchased, the size and diversity of the local economy, and the extent to which goods available in local markets meet farm household and business needs (Foltz and Zeuli). Local impacts of farm business and household spending are larger if spending is for hired labor, local services, or locally produced goods (Shaffer, Deller, and Marcouiller; Kraybill and Johnson). The importance of farm business expenditures and farm household spending to the local

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economy is also greater if the economy is relatively undiversified and farming is the dominant industry (Gonzalez).

By definition, farm spending outside local markets is more likely to occur when goods are not locally available. However, the extent to which spending occurs beyond local markets varies, depending on where the farm operation is located, the type of operation, and the goods in question (e.g., household necessities or farm business items). The objective of this article is to describe these spending patterns using a nationally representative survey of U.S. farm households. There is considerable variability with respect to farm operations and expenditure patterns, especially in metropolitan areas. In 2002, 41% of all farms were located in metropolitan counties. Kelsey found that some farms located closer to urban areas often traveled outside their home county to purchase inputs. Gale found that program payments to farm families in metropolitan counties had little impact on the local economy because they were only a small share of household income. But when counties are the primary unit of analyses, the rural population potentially benefiting from farm spending in metropolitan counties may remain largely underrepresented in studies examining farm-community linkages when conventional county classifications are applied. This analysis attempts to acknowledge linkages between farm and rural communities located in metropolitan statistical areas, as well as farm-community ties in other nonmetropolitan counties.

We hypothesize that farms located in relatively remote counties are more likely to purchase "everyday" household items in towns near their farms, but on average will travel farther than farm operators living in more densely populated counties for major "big ticket" household items (e.g., cars, trucks, appliances, or other durable goods) or farm inputs or machinery. Goldschmidt's seminal monograph first addressed farm-community linkages from this angle, although that case study focused on the relationship between farm scale economies, local spending patterns, and community wellbeing. Heady and Sonka concluded that small farm purchasing patterns would indeed lead to increased incomes in rural communities, but at the expense of farm household income in areas with few off-farm work opportunities. Strange found that the consolidation of many small farm operations into a few large operations and the demise of small town economies were correlated. Lawrence, Otto, and Meyer found that a larger proportion of input expenditures of larger hog operations were spent outside local markets. Foltz, Jackson-Smith, and Chen concluded that larger dairy operations more frequently purchased feed and other inputs outside local communities. In a related study, Foltz and Zeuli found that small farms do not necessarily purchase inputs locally, but producers were more likely to purchase inputs locally in communities offering an array of marketing outlets. Foltz and Zeuli suggested that attachment to a community with respect to purchasing inputs results from the procompetitive effects arising from local market diversity.

Travel costs play an important role in farm business expenditure patterns. Farm operators located in more densely populated counties may travel relatively farther to purchase specialized inputs and machinery because such items are more difficult to find in larger metropolitan areas (Kelsey). But farm households and businesses with larger expenditure budgets may be more inclined to travel farther to purchase major household items or farm machinery because the premium attached to search and travel costs often needed to find better prices is easier to

justify. Nonlocal purchases of farm business items may also be higher in more remote farm communities because many of these items are not locally available.

Based on the 2004 United States Department of Agriculture (USDA) Agricultural Resource Management Survey (ARMS), this paper examines farm household and business spending patterns in and beyond local communities. The analysis is primarily descriptive, providing a nationally representative profile of farm household and business spending patterns and the extent to which this spending was distributed across counties in the lower 48 states. Secondary county data provide an additional dimension with respect to understanding the geographic distribution of farm household and business spending patterns per private nonfarm job. Multinomial logit regressions supplement the univariate results, providing further insight into the farm household characteristics, business attributes, and local factors associated with farm expenditures in and outside local markets. The main findings are that farm household and business expenditure patterns vary significantly across the rural-urban geography, depending on how "urban" or "rural" the county is where a farm household is located, and depending on the goods examined.

Definitions of "rural" have implications for farm policy. But policies defining program eligibility based on broad notions of "metropolitan" or "nonmetropolitan" areas may overlook target groups for whom they are designed (Isserman). The approach taken here combines the Office of Management and Budget's (OMB) metro-/nonmetropolitan county classification system with a rural density measure suggested by Isserman. The resulting typology appreciates rural communities in metropolitan counties, which in turn provides more information about the relationships between farm spending and nonfarm private employment in these areas. Describing the geographic distribution of farm household and business spending patterns relative to nonfarm private employment is a step toward understanding the geographic role of farm policy with respect to income stabilization and potential effects on local economies.

The main contribution of this article is that it provides a nationally representative profile of farm household and business expenditure patterns based on primary data across a rural-urban county typology that acknowledges the rural populations living in metropolitan areas. In so doing, the paper supplements the "stylized facts" empirically observed and anecdotally cited throughout the related literature (see Bollman). The first part of the analysis looks at the geographic distribution of farm business expenditures, breaking down variable and fixed costs into items that are likely purchased locally, purchased in intermediate markets that may be local or nonlocal, or purchased nonlocally. The second part looks at aggregate farm household and business expenditures per nonfarm private employee, using the same county typology. The final part of the analysis examines in more detail the distribution of farm household and business expenditures, using a graduated definition of "local" based on survey responses.

### **Primary Farm Survey Data and Secondary County Information**

Farm household and business expenditure information is from the USDA's ARMS (ARMS, [www.ers.usda.gov/Data/ARMS](http://www.ers.usda.gov/Data/ARMS)). ARMS is the only annual data

source on the finances and practices of a nationally representative sample of U.S. farms that includes information on the characteristics of farm operators and their households. This paper uses data from the 2004 Phase III ARMS questionnaire. Family farms are the unit of analysis (6,641 respondents, representing 2,054,281 farms). Nonfamily corporate and cooperative farms and other operations with a hired farm manager were excluded. Family farms operated approximately 932 million acres of farm and rangeland in 2004 (94% of the total) and accounted for more than 97% of U.S. farms. In addition to operator, farm business, and household characteristics, the 2004 ARMS asked farm operators how far they traveled to purchase: (a) farm inputs (such as seed, feed, fertilizer, and chemicals), (b) farm machinery and equipment (such as tractors, planters, and combines), (c) "everyday" items (such as groceries, clothes, and household supplies), and (d) major "big ticket" household items (including cars, furniture, and appliances). Respondents were asked how far their operations were from the nearest town or city of various sizes.

Respondents were matched with county-level information. Total nonfarm private employment in 2004 was extracted from the Bureau of Economic Analysis' Regional Economic Information System files ([www.bea.gov/regional/reis](http://www.bea.gov/regional/reis)) to estimate the extent to which farm household and business expenditures were geographically distributed across jobs other than farming. A county-level classification based on the OMB's metro/nonmetropolitan typology was obtained from the Economic Research Service (ERS) (151.121.68.30/Briefing/Rurality/Typology). The percentage of persons in nonmetropolitan counties commuting to urban core counties was extracted from the 2000 Population Census ([www.census.gov/main/www/cen2000.html](http://www.census.gov/main/www/cen2000.html)). Additional U.S. Census 2000 information, including the percentage of the county population classified as urban or rural, as well as city size was collected to construct Isserman's rural density typology (defined below).

## **Methods and Definitions**

Categories characterizing the "localness" of purchases and expenditures from survey responses are described first. Then, the county classification system used to identify farm-community linkages is summarized. Description of the variables used in a series of regressions identifying where farmers purchase household goods and farm business items follows. In each analysis, we use a graduated definition of "local," noting that we do not necessarily identify local markets as those defined by county borders.

### ***Definition of "Local" for the Geographic Distribution of Farm Business Expenditures***

What farm business expenditures mean for the local economy depends on what is purchased, where it is purchased, and how the local economy is delineated. Expenditures for locally produced goods and services have a much larger impact on the local economy than purchases of goods produced elsewhere. Purchases bypassing local suppliers entirely may have little or no local impact. Property taxes, utility costs, improvements to land, buildings and structures, and maintenance costs are essentially local. Funds may go to distant landowners or

migratory workers, but 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 a considerable distance from the farm and the local community. Seed, feed, fuel, and other inputs can be purchased over the internet or from distant mail/phone order suppliers. Even when purchased locally, expenditures on these items may have little impact on the local community if they are produced elsewhere. 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 1 shows how differing expenditure categories are treated in this analysis. In 2004, 35% of all farm business expenditures and capital purchases (\$62 billion) were made in the town nearest the farm.

### ***Definition of "Local" for the Farm Household and Business Purchasing Patterns***

Delineating a local economy is highly ambiguous. Most commonly, county or municipal boundaries are used, imposed by the availability of data that assumes that administrative boundaries provide plausible proxies for functional boundaries. Yet, functional boundaries defined by retail market areas, labor commuting sheds, or service provision districts may have little if any correspondence with a county or municipal boundary (Organisation for Economic Co-operation and Development). Community economics emphasizes the role of potential interaction for delineating "local boundaries" (Shaffer, Deller, and Marcouiller). The greatest challenge is that one's sense of locality will vary based on the physical and settlement characteristics of a place and its surroundings. This makes a strict spatial definition of "local markets" very difficult. For example, many localities may be contained within a 10-mile radius in a topography characterized by deep valleys. But this same definition may fail to capture fully a single locality on a plain. Similarly, in a rapidly growing ex-urban area, one's sense of locality may not extend beyond the nearest town, given the extent of leakage into a large regional economy. In more sparsely populated areas, one's sense of locality could include a number of nearby towns that may include a regional center some distance from one's residence if it is the sole provider of essential services.

For this analysis, we use survey responses to categorize purchases on a graduated scale of localness. Four potential markets were identified based on responses. Farmers were asked how far their operations were from the nearest town and how far they were from the nearest town of 10,000 or more persons. These two cutoffs defined the three potentially local purchasing tiers. "Most local" purchases were made no farther than the nearest town, while "Intermediate" purchases bypassed the nearest town but were closer than the nearest town of 10,000 or more persons. "Likely nonlocal" purchases bypassed a city of at least 10,000 persons. At least for household items, a city of 10,000 persons is likely to include suppliers of "everyday" items and many big ticket items. If essential services for the farm household were supplied from large regional centers, then purchases some distance from the farm could be construed as local. More likely, purchases beyond larger towns would constitute a leakage from a farm's local economy if most of the required

**Table 1. Distribution of farm business expenditures over the integrated county typology, 2004**

	Nonmetropolitan Counties											
	Metropolitan Core Counties						Micropolitan Counties			Noncore Counties		
	Total	Urban		Mixed		Rural	High Commuting	Low Commuting	Mixed Rural	High Commuting	Low Commuting	Rural
		Urban	Mixed	Urban	Rural	Rural						
<b>Variable Costs</b>												
Fertilizer	18.84 <sup>a</sup>	0.4	1.26	3.83	1.27	1.59	2.72	0.66	1.54		5.57	
Fuel	8.91	0.21	0.56	1.73	0.54	0.52	1.17	0.25	0.71		3.21	
Seed	8.85	0.79	0.69	1.70	0.53	0.87	1.10	0.30	0.59		2.29	
Livestock, feed	31.46	1.33	1.42	5.76	1.86	1.75	6.31	1.73	1.65		9.65	
Labor <sup>b</sup>	17.28	1.59	2.28	6.28	0.62	1.07	1.61	0.38	0.87		2.58	
Maintenance/utilities <sup>b</sup>	22.68	1.00	1.92	5.52	1.30	1.52	3.26	0.69	1.62		5.85	
Working capital <sup>b</sup>	4.44	0.13	0.37	1.28	0.20	0.42	0.64	0.15	0.27		0.98	
<b>Fixed costs</b>												
Insurance/interest	14.56	0.35	0.85	2.99	1.03	1.05	2.02	0.40	1.13		4.72	
Rent/lease expense <sup>b</sup>	12.27	0.19	0.82	2.15	0.67	0.91	2.04	0.42	1.03		4.04	
Total business outlay	176.55	6.93	12.30	38.63	11.24	12.64	25.79	6.03	12.71		50.26	
Percent spent locally	35%	45%	47%	42%	28%	34%	32%	29%	33%		29%	
Percent spent nonlocally	65%	55%	53%	58%	72%	66%	68%	71%	67%		71%	

Source: ARMS 2004 Phase III version 1 (N = 6,641, expanded farm population = 2,054,281).

Notes: <sup>a</sup> Billions of dollars.

<sup>b</sup> Expenses tied to local areas.

goods and services are available nearer the farm. A city of 10,000 might not be large enough to supply specialty items, but because the respondent was asked where he or she did *most* shopping, going beyond a city of this size suggests that the farm operator and household head was willing to bypass local merchants. Purchases were defined as “nonlocal” when 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 purchased from “local” suppliers because no information was available on where the nearest farm suppliers, grocery stores, and car or truck dealerships were located. Nor was there any information available to discern whether the items purchased were local in origin. However, notwithstanding the weak functional justification for equating county boundaries with local economies, county-level government in much of the country generates a strong administrative interest in examining leakages across county borders. It was possible to estimate whether the distances reported by farmers implied that they were spending outside the county where their farm was located. We do this by assuming that a county is circular and calculating its diameter based on its size in square miles. While the procedure is admittedly ad hoc, 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 majority of a county’s residents, the relevant county boundary is likely much closer than the diameter.

Farm operators were asked how far they traveled to purchase groceries and other everyday household items, major purchases (such as appliances 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) typically corresponded with the stated distance to these locations. However, a number of respondents indicated they traveled a few miles beyond these locales to make purchases. To attend to this response pattern, a farm operator was considered to have purchased an item at a particular 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 more urban settings, but an extra 10 miles in remote areas or a relatively large county may not be perceived by some respondents as too far to travel to purchase certain goods. In other situations, the nearest town of 10,000 was the town closest to the respondent, especially for farm households closer to urban areas. Nonetheless, which personal characteristics, farm business attributes, and secondary factors are correlated with the decision to purchase farm household or business items in nearby markets or beyond can be estimated. Given these potential purchasing centers: (a) “Most local” in the nearest town, (b) “Intermediate” bypassing the nearest town, (c) “Likely nonlocal” bypassing the nearest town of 10,000, or (d) “Nonlocal” beyond the nearest town of 10,000 and outside the county; we regress operator characteristics, farm household and business attributes, and local and regional factors on the decision to (a) purchase “everyday” household items (e.g., groceries), (b) big ticket items (e.g., appliances, cars, or trucks), (c) farm inputs (e.g., seeds, chemicals, and fertilizers), and (d) farm machinery (e.g., combines, tractors, or planters) in each of these markets. These categories are mutually exclusive with no inherent ordering, so we use a series

of multinomial logit (MNL) regressions to supplement the purchasing patterns identified by the above conventions.

### ***Geographic Framework for Describing Farm-Community Linkages***

The county typology combined the OMB county classification with a rural density measure suggested by Isserman. Information about commuting patterns to work in metropolitan areas was included in the typology to account for economic ties to core population centers. Based on ARMS respondents' financial information, we first examine the distribution of farm business and capital expenditures across this typology. Then, we use the classification system to examine farm expenditures normalized by nonfarm private employment. Finally, we use the typology to determine the frequency farm households spent locally or traveled outside local market areas to purchase household items, and farm inputs or machinery, across the county typology.

Counties are the smallest unit on which aggregate information about public goods provision, local finances, and human and physical capital is collected. Therefore, the differential constraints faced by individuals living in more or less remote counties can be better appreciated and conveyed to policy makers with definitions of "rurality" that also acknowledge the rural populations living in core urban regions. Previous research has used many definitions to classify counties as "rural" and "urban." Isserman counted seven overlapping definitions used to define program eligibility for the largest federal programs based on some vocabulary of "rurality." The typical conventions are based on notions of regional *integration* or *separation*. The OMB's metropolitan/nonmetropolitan typology, and the Economic Research Service's rural-urban continuum and urban influence codes are examples of classification systems based on the county *integration* concept. These systems identify urban core areas while appreciating the degree to which populations in adjacent counties commute to work in core metropolitan areas. On the other hand, an example of a classification system based on the idea of *separation* is the U.S. Census' classification of county residents into "rural" and "urban" groups (as percents), and is generally defined by population density.

The county typology used here combines the OMB metropolitan/nonmetropolitan convention with a rural density measure (Isserman). The rural density classification appreciates urban-rural population interactions, the presence of urban people and places in nonmetropolitan counties, and the idea of hierarchical linkages to urban economies. The taxonomy considers "rural" counties as those with a population density of less than 500 persons per square mile and less than 10% 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%, 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). Admittedly, this results in yet another county classification system. However, a more detailed picture of settlement patterns and rural-urban core interaction results by including population density measures with the conventional classification systems.



The percentage of nonmetropolitan workers commuting to metropolitan core counties is included in the typology to gauge how economically integrated nonmetropolitan counties are with urban core regions. On average, 15% of the workers in nonmetropolitan counties have jobs in metropolitan counties. Using this level as a cutoff, we categorize nonmetropolitan counties into two groups: (a) those whose economies are closely linked to a larger metropolitan area (as measured by 15% or more workers commuting to a metropolitan core county) and (b) those counties whose economies are less integrated with metropolitan core regions.

Combined, these conventions yield fourteen mutually exclusive categories. Metropolitan core counties were subdivided into Urban, Mixed Urban, Mixed Rural, and Rural counties. By definition, Urban counties are not included in nonmetropolitan counties. Nonmetropolitan counties were further separated along two lines. First, counties where more (or less) than 15% of the working population commuted to a metropolitan county; second, along the four axes of Isserman's rural density scale (Urban, Mixed Urban, Mixed Rural, Rural). Given the distribution of family farms across this classification system, there were nine categories used to analyze the ARMS 2004 data across this system because there were no farms represented in five of the categories.

### ***Supplementary Multinomial Logit Regressions***

Foltz, Jackson-Smith, and Chen (FJC) and Foltz and Zeuli examined the interrelationships between dairy farm scale and linkages with the economic vitality of local communities using an indirect cost function model. These studies estimated the influence of transport costs on input purchasing patterns allowing for increasing returns to scale. Their procedures were not used here because the 2004 ARMS survey did not ask operators where they purchased specific inputs, only where they purchased broad categories of items. Nor is there information available as to whether the items they purchased were produced locally.

We abstract from the FJC model, assuming that farm household and businesses purchasing decisions are separable (although items in both classes could be purchased in the same location), and that farm operators maximize utility by purchasing goods or inputs at a given buying center that minimizes search and travel costs. We define two MNL models for household and business purchasing patterns. The first model (Model 1) focuses on the expenditure patterns for household items such as: (a) groceries and other "everyday" items, (b) larger durable goods such as cars, trucks, and major appliances. The second model (Model 2) examines the purchasing patterns for (c) farm inputs, including seeds, chemicals, and fertilizer, and (d) farm machinery, including tractors, combines, and other farm equipment.

Seven secondary county-level variables were common to Models 1 and 2. The first two indicated if the respondent lived in a high-commuting nonmetropolitan county (with more than 15% of the population commuting to a metropolitan county), or lived in a low-commuting nonmetropolitan (less than 15% of the population commuting to a metropolitan county). The third variable was the distance the farm operation was from 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 (in natural logs). Fifth, to control for county size, the natural logarithm of the

county area was included. Sixth, the number of farmers living in the respondent's county was included in both models. 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 more rural locations will reduce the likelihood a farm operator would purchase items beyond local markets. On the other hand, distance to the nearest large city helps define local market areas. It is hypothesized that distance to the nearest city of 10,000 persons will be negatively related with the likelihood of shopping outside a local market area. That is, the larger the area covered by the local market, the more travel is required to leave that market. Finally, the USDA Economic Research Service farm resource regions were included in both models (U.S. Department of Agriculture—Economic Research Service) to control for regional differences in land prices and growing conditions (e.g., Khanna). Farm operator characteristics common to both models included whether the respondent had attended college, and the operator's age (in natural logs).

The natural log of farm household size and total household expenditures were included in the household item purchasing model (Model 1). Farm business and capital expenditures (in natural logs), and an "enterprise diversity" measure was included in the farm input/machinery purchasing model (Model 2). Thiel's entropy measure proxies farm operation diversity. The variable is based on the revenue shares earned from crop farming (grains, vegetable, nursery, oilseed, tobacco, and other crops) and livestock production (including poultry, hogs, beef and dairy cattle, and other animals), and ranges between 0 (complete specialization in a single activity) and 1 (an equal proportion of revenue generated from each activity). Supply-side/location factors may also influence the distribution of farm supplies centers. A dummy variable indicating whether the county where the respondent resided was identified as a farm input/equipment supply center was included in Model 2.<sup>1</sup>

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

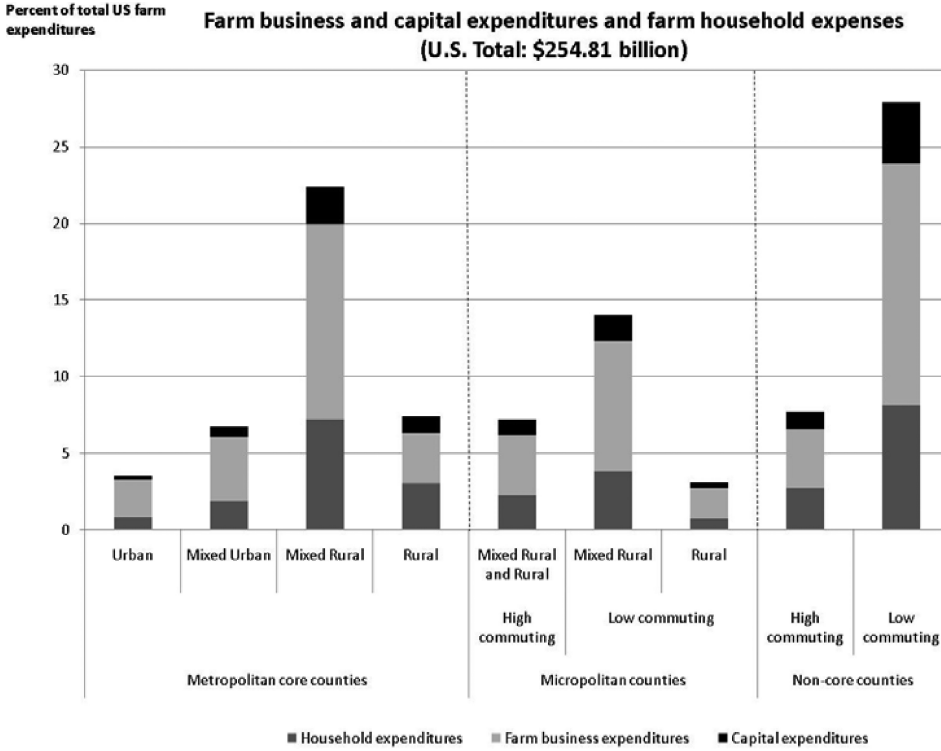
## **Results and Discussion**

### ***Geographic Distribution of Farm Household and Business Expenditures***

In 2004, farm operators reported a total of \$144 billion in cash farm business expenses and an additional \$32 billion in capital purchases (table 1). 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. Respondents reported total farm household expenses of over \$78 billion. Over 50% of total business expenses, capital purchases, and household spending was by farms in metropolitan and high-commuting counties (figure 1).

Farm business expenditures spent in towns nearest farms in more densely populated metropolitan counties is different compared to more remote, less

**Figure 1. Distribution of farm household, business, and capital expenditures, 2004**



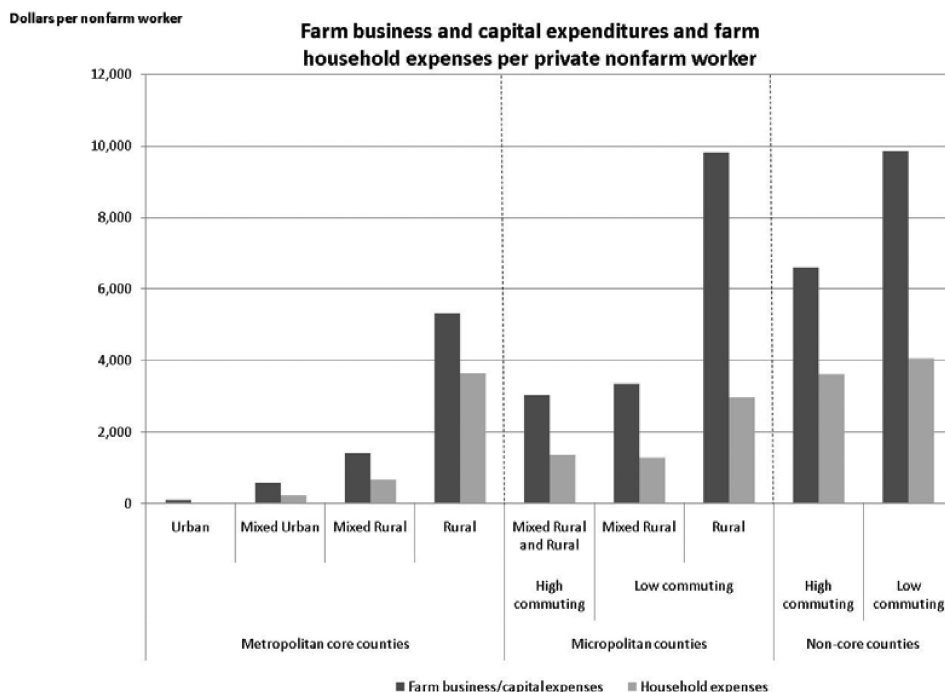
Notes: "Urban," "Mixed Urban," "Mixed Rural," and "Rural" typology follow Isserman's rural density classification. Metropolitan "core" counties are classified by the Office of Management and Budget as counties containing a recognized population nucleus and surrounding counties, which are "tightly integrated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

densely populated micropolitan and noncore counties. Farm business expenses for items most likely spent in the nearest town are greater in the more densely populated Urban and Mixed Urban metropolitan counties. Moving away from the urban core, the proportion of total farm business items purchased in the nearest town declined to 28% in the least densely populated metropolitan counties (figure 1). A similar pattern emerges in the nonmetropolitan counties, with the percentage of total farm business expenditures spent in the nearest town lowest in the most rural counties. What appears 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 elsewhere, increasing search or transport costs. On the other hand, labor costs are higher in densely populated metropolitan counties, as one might expect (table 1). But 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 jobs in the agricultural sector), thus driving agricultural wages higher. In the most densely populated urban areas, about 20% to 25% of farm business expenses went to labor, but in the most remote

counties with low commuting, labor costs were only 6% to 7% of total farm business expenditures. This finding may reflect the farms located near urban areas that are involved in relatively labor-intensive operations (e.g., nursery, horticulture, small animal husbandry, and vegetable farming) than row-crop farms in more rural areas. Seed costs were also higher in more densely populated counties in the metropolitan core areas (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 seed producing regions, or that these counties are more concentrated in nursery and greenhouse operations that tend to have much higher expenditures on vegetable seed or horticultural root stock. Given the questions in the survey, answering the first possibility is impossible. But 64% of the operations reporting sales revenue from nursery products were located in or near metropolitan markets in 2004. Conversely, land rent, as a share of business expenditures, increases moving away from the metropolitan core counties (6% of total expenditures) to less densely populated areas (10% of total expenditures), which is consistent with larger operations renting more farmland in more remote counties. While these local/nonlocal categories only approximate where purchases are likely to occur, the expenditure patterns suggest that the amount spent in the nearest town by farm businesses depends on where a farm is located and what off-farm job opportunities are available. These findings also suggest that in the most remote counties, a large proportion of the farm business budget may be spent outside the local community. And in general, the amount spent on a particular item will be higher where that commodity is in relatively scarce supply or where demand is lower. This may seem at odds with the assumption that increasing farm household purchasing power by stabilizing income through farm policy or through other programs necessarily stimulates local economic growth. Economic growth in farm-dependent communities may be difficult if the goods demanded by farm households in these communities can only be purchased elsewhere or were made nonlocally. The type of retail services available will also affect the extent to which purchases made locally impact the local economy. For example, big-box retail stores may be located well beyond local markets, or their suppliers may be located abroad. Thus, impact from local spending on the economy may be dampened, depending also on the mix of retail shopping opportunities (see also Foltz, Jackson-Smith, and Chen).

To estimate the potential contribution of farm household and business expenditures on private employment, we normalized the sum of farm household and business expenditures by the total number of private nonfarm employees in each county category. As expected, farm business and farm household expenditures relative to the size of the economic activity in the county were far greater in less densely populated areas in metropolitan and nonmetropolitan counties (figure 2). For counties located in metropolitan statistical areas, the sum of farm business and capital expenses per nonfarm private job increased from \$97 to \$5,323/nonfarm job moving from the urban core to the least densely populated metropolitan counties where more farms are located, reflecting the dearth of employment opportunities in more remote counties. A similar pattern was evident in the low- and high-commuting nonmetropolitan counties. In the low population density/low-commuting noncore counties, farm business and capital expenditures were \$9,846/nonfarm job. Expenditures by farm households ranged from

**Figure 2. Distribution of farm household and business expenditures per private nonfarm worker, 2004**



Notes: "Urban," "Mixed Urban," "Mixed Rural," and "Rural" typology follow Isserman's rural 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."

\$28/nonfarm job in the most densely populated metropolitan areas with farms to \$3,555/ nonfarm job in distant rural counties.

### ***Local and Nonlocal Purchasing Patterns***

The frequency of farm household and business purchases outside the community nearest the farmstead increased moving away from population centers (table 2). For farms located in moderate to very densely populated counties in metropolitan areas, 86% to 92% of grocery and everyday item purchases were made in the town closest to the farm. Grocery purchases made in the nearest town ranged between 72% and 76% in the micropolitan counties, and about 65% in the noncore counties. Nationally, for big ticket items, about 8.5% of farm households shopped outside their home county and beyond the nearest city of 10,000 persons. In the least densely populated metropolitan and noncore counties, 23% to 27% of spending on big ticket items was in or near the community where the farm was located, respectively. The frequency of farm machinery purchases in the nearest town was relatively low for farms located in the densely populated metropolitan counties because farm machinery dealers are likely located in areas

**Table 2. Purchasing patterns of farm households for groceries, major household items, and farm machinery, 2004**

Item	Metropolitan Core Counties						Micropolitan Counties						
	Urban			Rural			High Commuting			Low Commuting			
	Mixed Urban	Mixed Rural	Rural	Mixed Urban	Mixed Rural	Rural	Mixed Rural/Rural	Mixed Rural	Rural	Mixed Rural	Rural	High Commuting	Low Commuting
Number of observations	203	409	1,433	598	514	964	210	1,735					
Expanded number of farms	52,014	114,769	423,257	203,560	159,010	275,214	55,051	566,745					
<i>Grocery purchases:</i>													
Most local	91.6	85.8	74.7	68.2	77.4	73.8	72.1	65.4					
Intermediate local	4.8	11.2	18.1	25.1	16.7	22.1	21.4	27.8					
Likely nonlocal	3.6	2.6	5.7	4.3	3.7	2.9	3.4	3.9					
Nonlocal	0.04	0.3	1.5	2.4	2.3	1.2	3.2	2.9					
Sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0					
<i>Major item purchase:</i>													
Most local	35.8	59.9	39.1	27.4	35.5	50.5	32.9	23.1					
Intermediate local	28.1	27.0	36.0	50.0	35.4	31.1	46.1	52.1					
Likely nonlocal	25.4	10.3	17.3	14.1	19.1	11.2	10.6	13.7					
Nonlocal	10.8	2.8	7.6	8.5	10.0	7.2	10.4	11.1					
Sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0					

Continued

Table 2. Continued

Item	Metropolitan Core Counties						Metropolitan Counties								
	Urban			Mixed Rural			High Commuting			Low Commuting			Noncore Counties		
	Urban	Mixed Urban	Rural	Mixed Rural	Rural	Rural	Mixed Rural/Rural	Rural	Rural	High Commuting	Mixed Rural	Rural	High Commuting	Low Commuting	
<i>Farm machinery purchases:</i>															
Most local	11.7	30.7	22.4	25.0	30.9	38.7	35.8	34.1	25.8						
Intermediate local	36.3	32.8	39.3	46.1	36.9	33.4	40.5	45.0	50.3						
Likely nonlocal	35.8	22.6	24.4	16.7	20.5	16.2	13.1	13.2	13.8						
Nonlocal	16.1	13.9	13.9	12.2	11.8	11.6	10.7	7.7	10.1						
Sum	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0						
<i>Average distance (miles) to:</i>															
Nearest town	5.5	7.8	7.0	8.8	8.3	8.5	8.8	8.2	9.5						
Nearest town, 10,000 persons	7.0	12.7	12.9	24.5	15.2	17.3	23.7	28.1	41.0						
County diameter	33.8	30.2	36.5	29.1	31.7	35.4	27.4	29.8	34.2						

Source: ARMS 2004 Phase III, version 1.

with relatively more farms. Still, roughly 66% of the farm machinery purchases were beyond the farm operator's nearest town.

Whether for lower prices, a wider selection, better service, or some other reason, on average roughly 50% of the farm operators in nonmetropolitan counties, the low-population-density metropolitan counties and noncore counties routinely purchased major household items or farm machinery beyond the nearest town. In contrast, for groceries and other everyday items, about 77% of grocery purchases were in towns near the farmstead.

### ***Supplemental MNL Regressions for Farm Household and Business Purchasing Patterns***

Farm households in noncore counties not adjacent to a metropolitan area were more likely to purchase everyday items and groceries in the town nearest their farm (Model 1, column 1, table 3). But the farther the respondent was from the nearest city of 10,000 persons, the more likely they were to bypass the nearest town to purchase everyday household items. Willingness to bypass local merchants and travel to towns with 10,000 or more persons is suggestive of a market threshold with respect to everyday household items. Households with larger expenditures were also more likely to shop for everyday items beyond the nearest town. And, the larger the county, the more likely purchases for everyday household items were made in the nearest town, presumably to minimize search costs. Farmers living in the Southern Seaboard region were less likely to purchase everyday household beyond the nearest town of 10,000 persons.

Respondents in counties not adjacent to metropolitan areas and in counties with relatively little commuting traffic were more likely to purchase major household items in the town nearest their farm (Model 1, column 2, table 3). Apparently, as income levels increase, there is a premium placed on shopping for some major items beyond local markets. As household expenditures increase, the extra search costs needed to find lower prices are justifiable. Respondents were willing to bypass local merchants for big ticket items, but less likely to bypass towns with 10,000 or more persons, again suggesting some market threshold. Respondents living in larger counties were also more likely to shop for major household items in the nearest town. But in general, it appears that 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. Farmers located in the Heartland, Great Plains, Prairie Gateway, Eastern Upland, and the Southern Seaboard resource regions were less likely to shop for major items beyond the nearest town with 10,000 or more persons.

Factors associated with farm business purchasing patterns were somewhat different from those corresponding with everyday purchases (Model 2). Farm operators located in low-commuting counties were less likely to purchase farm inputs or machinery nonlocally, whereas operators located in counties not adjacent to a metropolitan county were less likely to purchase farm machinery or farm inputs in the intermediate market category, bypassing the nearest town. Farm operators were less likely to purchase farm machinery or inputs nonlocally in counties with relatively larger farmer populations. Large numbers of farmers create the market needed to attract farm input suppliers and implement dealers (table 4, columns 1



**Table 3. Multinomial logit marginal effects for purchasing patterns of farm household items, 2004**

Variable	Model 1										
	Regularly Purchase Groceries					Regularly Purchase Major Items					
	Most Local	Intermediate Local	Likely Nonlocal	Likely Nonlocal	Most Local	Intermediate Local	Likely Nonlocal	Likely Nonlocal	Nonlocal	Nonlocal	
Noncore County											
With highmetro commuting	-0.0197	0.0271	-0.0005	-0.0070	0.0301	-0.0268	-0.0030	-0.0003	-0.0003		
With low metro commuting	0.0284	-0.0232	-0.0005	-0.0046	0.0967**	-0.0809***	-0.0134**	-0.0024	-0.0024		
Not adjacent to metro area	0.1405***	-0.1295***	-0.0043	-0.0066	0.2268***	-0.1986***	0.0022	-0.0304*	-0.0304*		
Distance to nearest city of 10,000	-0.0025***	0.0027***	-0.0001	-0.0001	-0.0056***	0.0079***	-0.0016***	-0.0007	-0.0007		
Size of county's largest city (log)	-0.0277	0.0317	-1E-05	-0.0040	-0.0017	0.0064	0.0031	-0.0078	-0.0078		
Farmers in county (1,000's) (log)	-0.0138	0.0151	-0.0001	-0.0012	0.0057	0.0039	0.0009	-0.0106	-0.0106		
Total household expenditures (log)	-0.0300**	0.0254*	-0.0003	0.0049	-0.0794	0.0373	-0.0017	0.0438***	0.0438***		
Age (log)	0.0937*	-0.1185**	-0.0004	0.0253*	0.1059	-0.0863	-0.0100	-0.0096	-0.0096		
Household size (log)	0.0033	-0.0085	0.0001	0.0051	0.0226	-0.0006	0.0004	-0.0225	-0.0225		
Operator college education (=1)	0.0168	-0.0175	0.0001	0.0006	0.0123	0.0124	0.0022	-0.0269*	-0.0269*		

Continued

Table 3. Continued

Variable	Model 1									
	Regularly Purchase Groceries					Regularly Purchase Major Items				
	Most Local	Intermediate Local	Likely Nonlocal	Nonlocal	Most Local	Intermediate Local	Likely Nonlocal	Nonlocal		
County area (log)	0.0477*	-0.0450**	-0.0001	-0.0027	0.0479**	-0.0364*	-0.0035	-0.0080		
Heartland (=1)	-0.0832	0.0915	-0.0004	-0.0078	-0.0582	0.1113	-0.0121*	-0.0410		
Northern crescent (=1)	-0.0969	0.1064	-0.0002	-0.0093	-0.1113	0.1413	-0.0026	-0.0275		
Great plains (=1)	-0.0119	0.0211	-0.0007	-0.0086	0.0317	-0.0074	-0.0157***	-0.0085		
Prairie gateway (=1)	0.0160	-0.0062	-0.0006	-0.0092	0.0072	-0.0330	-0.0091*	0.0349		
East. uplands (=1)	0.0073	0.0046	-0.0009	-0.0110	-0.0195	0.0438	-0.0114*	-0.0129		
So. seaboard (=1)	-0.0327	0.0475	-0.0008	-0.0140**	-0.0136	0.0415	-0.0137**	-0.0142		
Basin/range (=1)	0.0195	-0.0264	0.0002	0.0067	0.1215	-0.1167	0.0067	-0.0115		
Mississippi portal (=1)	0.0083	-0.0047	0.0005	-0.0041	0.0150	0.0227	-0.0075	-0.0302		
Mean of dependent variable	0.8210	0.1640	0.0007	0.0144	0.6322	0.2622	0.0154	0.0902		
Sample	6,351				6,319					
Expanded farm population	1,953,042				1,944,952					
Pseudo R <sup>2</sup>	0.1045				0.1263					

Source: ARMS 2004 Phase III, version 1.

Notes: Definitions of "local" appear on page 610.

Entries with \*\*\*, \*\*, \* are significant at the 1%, 5%, and 10% levels, respectively.

**Table 4. Multinomial logit marginal effects for purchasing patterns of farm business items**

Variable	Model 2												
	Regularly Purchase Farm Machinery						Regularly Purchase Inputs						
	Most Local	Intermediate Local	Likely Nonlocal	Nonlocal	Most Local	Intermediate Local	Likely Nonlocal	Nonlocal	Most Local	Intermediate Local	Likely Nonlocal	Nonlocal	
Noncore County													
With high metro commuting	0.0306	-0.0059	0.0065	-0.0311	0.0557*	-0.0132	0.0031	-0.0456	0.0306	-0.0059	0.0065	-0.0311	0.0557*
With low metro commuting	0.0456	-0.0167	-0.0035	-0.0254*	0.0662	-0.0213	-0.0060	-0.0388**	0.0456	-0.0167	-0.0035	-0.0254*	0.0662
Not adjacent to metro area	0.1173	-0.1344***	0.0317	-0.0146	0.1466	-0.1409***	0.0184	-0.0241	0.1173	-0.1344***	0.0317	-0.0146	0.1466
Distance to nearest city of 10,000	-0.0017	0.0061	-0.0018	-0.0026	-0.0020	0.0076	-0.0022***	-0.0034	-0.0017	0.0061	-0.0018	-0.0026	-0.0020
Size of county's largest city (log)	0.0181	-0.0147	0.0005	-0.0039	0.0143	-0.0106	0.0019	-0.0057	0.0181	-0.0147	0.0005	-0.0039	0.0143
Farmers in county (1,000's) (log)	0.0334	0.0193	0.0043	-0.0569***	0.0446	0.0178	0.0054	-0.0679***	0.0334	0.0193	0.0043	-0.0569***	0.0446
Capital expenditures(\$1,000's)(log)	-0.0521*	0.0284	0.0019	0.0219**	-0.0687	0.0339	0.0029	0.0319*	-0.0521*	0.0284	0.0019	0.0219**	-0.0687
Operator age (log)	0.0006	0.0167	0.0016	-0.0189	0.0655	-0.0256	-0.0025	-0.0375	0.0006	0.0167	0.0016	-0.0189	0.0655
Operator college education (=1)	-0.0098	0.0085	0.0097	-0.0084	0.0001	0.0048	0.0070	-0.0119	-0.0098	0.0085	0.0097	-0.0084	0.0001
Farm supply center (=1)	0.0838	-0.0367	-0.0045	-0.0427**	0.0906	-0.0421	-0.0035	-0.0450*	0.0838	-0.0367	-0.0045	-0.0427**	0.0906

*Continued*

Table 4. Continued

Variable	Model 2									
	Regularly Purchase Farm Machinery					Regularly Purchase Inputs				
	Most Local	Intermediate Local	Likely Nonlocal	Nonlocal	Most Local	Intermediate Local	Likely Nonlocal	Nonlocal		
Farm commodity mix (index)	-0.0799	0.0019	0.0156	0.0625	-0.0738	0.0288	0.0025	0.0425		
County area (log)	0.0163	-0.0158	-0.0007	0.0002	0.0196	-0.0163	-0.0022	-0.0011		
Heartland (=1)	-0.0556	0.0775	-0.0107	-0.0112	-0.1133	0.1353	-0.0145	-0.0075		
Northern Crescent (=1)	-0.1307***	0.1159***	-0.0008	0.0156	-0.1943	0.1663**	-0.0049	0.0329		
Great Plains (=1)	0.0019	0.0125	-0.0094	-0.0050	-0.0750	0.0708	-0.0096	0.0138		
Prairie Gateway (=1)	-0.0306	0.0342	-0.0107	0.0071	-0.0846*	0.0608	-0.0132	0.0369		
East. Uplands (=1)	-0.0937	0.1169	-0.0106	-0.0126	-0.1418**	0.1534*	-0.0124	0.0008		
So. Seaboard (=1)	-0.0505	0.0906	-0.0107	-0.0294	-0.0960	0.1332	-0.0110	-0.0263		
Basin/range (=1)	0.0081	-0.1143	0.0139	0.0923	-0.0673	-0.0858	0.0101	0.1431		
Mississippi Portal (=1)	-0.0709	0.0568	-0.0026	0.0167	-0.1481	0.1449**	-0.0057	0.0089		
Sample	6,263				6,348					
Expanded farm population	1,917,146				1,947,292					
Pseudo R <sup>2</sup>	0.1183				0.1355					

Source: ARMS 2004 Phase III, version 1.

Notes: Definitions of "local" appear on page 610.

Entries with \*\*\*, \*\*, \* are significant at the 1%, 5%, and 10% levels.

and 2). Operators located in counties identified as farm equipment supply centers were less likely to purchase machinery or inputs nonlocally. Total farm business capital expenditures were positively related with the likelihood of making nonlocal purchases. As farm business expenditures increase, the added search and travel costs needed to find better prices are easier to justify. While not significant, the signs of the other variables included in the models were generally unsurprising.

## **Conclusions and Suggestions for Further Research**

A persistent claim of farm groups and many farmers is that rural economies benefit from the support of the farm sector through the forward and backward linkages farm operations have with agricultural input suppliers and commodity processors. Farm program payments also influence farm household expenditures by stabilizing farm operator and landlord incomes (El-Osta, Mishra, and Ahearn), which may in turn support nonfarm jobs in nearby communities and elsewhere (Gale). To the extent that farm program payments influence farmland values (Goodwin, Mishra, and Ortalo-Magné), increase or supplement farm income (El-Osta, Mishra, and Morehart), and create or sustain nonfarm jobs (Tweeten), they help pay for local public services and other institutions critical to the wellbeing of rural communities that depend on farming (Thompson). Farm jobs and related jobs in the farm input, service, and food processing industries are therefore influenced by farm policy. However, the extent to which farm income stabilization translates into local dollars depends on a variety of factors, including the local availability of household goods and farm inputs or machinery, the availability of off-farm work opportunities, the importance of farming as an income source, and whether goods purchased locally are produced elsewhere.

While it is exceedingly difficult to disentangle cause and effect between farm household spending and local community growth using cross-sectional primary data sources, this research sheds some light on farm household and business purchasing patterns, and the potential role this spending has in local economies. Based on a nationally representative survey of farm households and secondary county information, this research examined the geographic distribution of farm business and household spending patterns. A county typology was constructed, accounting for the distribution of farms in metropolitan areas, and the potential contribution of farm household and business spending in these areas. The classification system integrated a conventional county typology with a rural density measure, which effectively differentiated the broad class of metropolitan counties into smaller groups of counties, thereby providing a more detailed profile of farm household spending patterns in metropolitan areas as well as other non-metropolitan counties.

There was considerable variability with respect to the geographic distribution of household and business spending patterns. Farms located in more urban areas tended to buy household items in markets closest to the farmstead, but traveled further to purchase farm business items. In more rural locations, the opposite pattern was observed. Less sparsely populated areas with larger farm populations appear better served by local farm input suppliers than farms located in more densely populated areas. However, access to "everyday" household items appears more difficult in more remote counties. Big ticket items are also more difficult to

purchase in the nearest town for many farm households; even those in or near more densely populated urban areas. Distance from large urban centers may not be as important as distance from reasonably sized cities in determining how far farm operators typically travel for farm and household purchases.

The results do support the notion that farm-community linkages are strongest where farms are numerous and where the sector is large enough to anchor a regional farm supply center. In contrast, these linkages appear to be weaker where farms make large capital expenditures. These results suggest interesting parallels between farming and the manufacturing sector, where the “local embeddedness” of industrial clusters is associated with numerous small- and medium-sized enterprises and multinodal input supply networks. Yet, despite relatively large employment shares in some counties that easily exceed conventional thresholds used to identify industrial clusters, farming is rarely categorized as an economic cluster. In addition to the linkages identified in this analysis with respect to farm business purchases, examining whether counties with more localized farm economies derive benefits associated with industrial clusters, or if this is limited to counties specializing in differentiated agricultural goods such as organic production is an area for future research (see Eades; Higgins, Dibden, Cocklin).

A more detailed analysis would compare nonfarm household expenditures with those of farm households, thereby providing a yardstick with which to compare farm household expenditures to the rest of the economy. In addition, the local/nonlocal categories used in the expenditure analysis contain no information about which goods are produced locally. This level of detail is difficult to obtain, but it would nonetheless provide a much richer picture of the potential impact of farm household spending on local economies.

Future directions include 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. This requires more detailed employment information, which is difficult to obtain due to disclosure concerns. Questions also remain related to use of internet services to purchase goods and services. The extent to which these technologies influence spending patterns would give more insight into the use of alternative ways to purchase goods and services, and their influence on local economies.

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## **Endnote**

<sup>1</sup>Because nearly all counties have at least one business classified as Farm and Garden Machinery Wholesalers; Farm Supplies Wholesalers; Nursery, Garden Center, and Farm Supply Stores; or Farm Product Warehousing and Storage (NAICS 423820, 424910, 444220 and 493130, respectively), an attempt was made to identify those counties with larger and more diversified farm supply sectors. A disjoint cluster analysis using unpublished Quarterly Census of Employment and Wages data on employment and the number of establishments in each of the detailed industries above appeared to differentiate “supply center” counties from counties with smaller and/or less diversified farm supply functions. The resulting cluster structure was validated by examining where supply centers

were found on the rural-urban continuum. Nearly 30% of the largest nonmetro counties adjacent to metropolitan counties were identified as supply centers while fewer than 5% of the smallest nonadjacent nonmetro counties were identified as supply centers. This suggests that merely using a proxy for farm supply centers such as a town of more than 10,000 may overstate the farm supply capability of many large nonmetro counties and completely miss this capability in some small nonmetro counties.

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