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Staff Paper Series

Impacts of Reduced Farm Spending on Rural Minnesota Communities

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ECONOMICS**

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Impacts of Reduced Farm Spending on Rural Minnesota Communities

By William F. Lazarus

May 2018

Executive Summary

- Low crop prices have reduced farm incomes in Minnesota and elsewhere in the U.S., with forecasts of more the same for at least another year.
- Crop producers are being encouraged to “tighten their belts”. Capital expenditures for machinery and buildings, land rents, and fertilizer are the most likely areas to cut back.
- IMPLAN input-output software was used to calculate the impacts of potential reductions in farm machinery and building purchases, cropland rental rates, and fertilizer expenditures on employment in five regions and for Minnesota statewide. Farm household discretionary spending on goods such as televisions and sofas might also see cutbacks with reduced incomes, but is NOT considered in this analysis.
- The reductions compared were based on the difference between peak purchases between 2012 and 2016, compared to 2017.
- The IMPLAN estimates of employment impacts are compared with overall regional nonfarm employment changes between 2013 and 2017.
- The changes in land rental payments and the overall spending are compared with the changes in average farm real estate sale values between 2013 and 2017.

What does this all mean for rural Minnesota communities? From the data that’s currently available we conclude the following:

- The economic impacts are likely to vary by community. Some communities and counties are more vulnerable to sustained grain price swings due to their economic composition.
- The impact of grain prices on individual farmers is not discussed in detail here. It can be assumed that the financial impacts will be significant. Additionally, psychological impacts from the added stress that challenging economic times will cause is also not accounted for.
- Job losses at farm machinery dealers, construction firms, fertilizer dealers, and in other sectors supplying them were 1,539 in the South central region and 860 in the Southwest. These job losses would be a severe economic hit to those workers and their families, although in percentage terms the total impact on the regional economy with secondary ripple effects were 0.59% in the South Central and 1.0% in the Southwest. The statewide impact is 0.58%.
- Another measure of community impact is that labor income would decline by \$159/person in the South Central region (244,515 total employment in 2016) to \$322/person in the Southwest region (66,838 total employment), and \$228/person statewide (2.9 million employment). Figure 7 shows that the industry sectors that are most affected are trade and the financial and real estate sector.
- Farm real estate value changes across the regions appear to be consistent with changes in land rents.

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Introduction

Minnesota crop producers experienced several years of relatively high crop prices in 2008-2013. The monthly average price received by Minnesota producers for corn peaked at \$7.54/bushel in August, 2012 and remained above \$5.00/bushel through October of 2013 (Figure 1). By comparison, monthly Minnesota corn prices averaged \$2.36 in 2004, a decade earlier. But, “all good things must come to an end”, and the corn price moved down to under \$4.00/bushel by July, 2014 and has remained there since (USDA National Agricultural Statistics Service 2015).

The low prices obviously can have a negative impact on farm income. But, concerns have also been raised about the impacts of reduced farm spending on rural communities. That is the focus of this paper. The community impact concern was first expressed to me over two years ago. At that time, however, there was optimism that producers would have sufficient financial reserves to tide them over until prices would rebound, so that there would be little impact on farm spending. The corn price has now been below \$4.00 for over two years, and has averaged under \$3.50 for half of that time. Prospects are for large U.S. corn and soybean crops in 2016, so commentators are now suggesting that prices are not likely to rebound until some other part of the world experiences a short crop (Good, Farmdoc, 9/12/16).

The goal of this analysis is to quantify the extent to which future reductions in farm spending may have affected rural communities in Minnesota in 2016. If farm spending is reduced in a way that affects the local community, what categories of spending are likely to be observed? The first category that comes to mind is farmland rental payments, since extension economists have been recommending that producers renegotiate rental rates as a cost-cutting move. Capital expenditures for new machinery and buildings are also likely to be affected as in general they are easier to defer than, say, operating inputs such as seed. Fertilizer prices have also declined, while it is unclear yet how much producers will cut back on fertilizer rates to cut costs.

Reductions in these spending categories may not necessarily indicate farm financial stress. An alternative explanation is that capital purchases when incomes were high have left producers with inventories of newer equipment and buildings that don't need replacement yet. Reducing purchases may just be a prudent way to conserve working capital. Also, surveys suggest that fertilizer application rates in the past may have been higher than necessary. Producers are being encouraged to reduce fertilizer rates to minimize impacts on water quality. Whether the reduced spending is due to financial stress of these other factors, the impact on the economy will be similar.

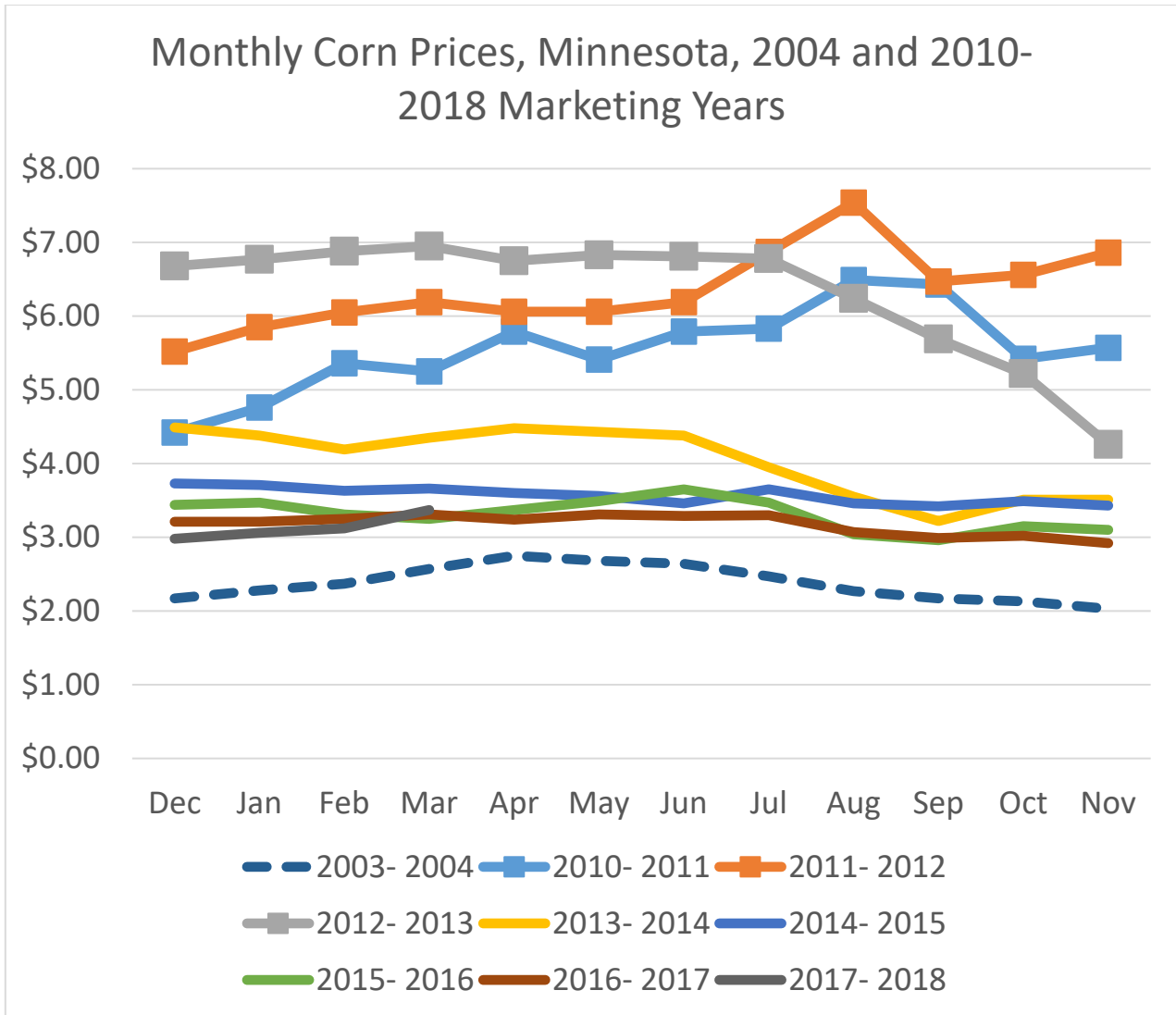


Figure 1.

FINBIN Data for Five Regions and the State as a Whole

The cash outflows for these items (machinery and building purchases, land rent, and fertilizer purchases) are taken from the FINBIN database of farm business and financial summaries. The FINBIN data is aggregated into regions that are somewhat different from those used by the USDA National Agricultural Statistics Service. The FINBIN regions are shown at the bottom of reports generated on the FINBIN site, www.finbin.umn.edu. Not all Minnesota counties have data in the FINBIN database, which only generates whole-farm summaries for counties with at least ten participating farms. IMPLAN data is available for all counties, so several counties lacking FINBIN data but near participating counties are included here in the regional averages. It was assumed that their spending per cropland acre is the same as for the FINBIN farms.

The “adjusted” FINBIN regions assumed for this analysis are shown in Table 3 and Figure 3. The Northeast/East Central region is omitted from this analysis in order to focus on the regions with more agricultural activity. Hennepin County is omitted from these IMPLAN analyses even though it is included in the FINBIN reports for the West Central region, so that the results would better reflect the more rural counties in that region.

Four areas of reduced spending are considered here, based on the logic above: 1) farm machinery purchases, 2) farm building construction, 3) cropland rental payments, and 4) fertilizer expenditures. Other data sources used are the U.S. Census Bureau’s County Business Patterns database, and the IMPLAN input-output software package (Minnesota IMPLAN Group, Center for Farm Financial Management 2017, U.S. Census Bureau Undated). Both of these sources are available at the county level.

Farm household discretionary spending on goods such as televisions and sofas might also see cutbacks with reduced incomes, but is not considered in this analysis.

An implicit assumption is that the farms in the region or the state make all of their machinery and building purchases from businesses in that region or state, and pay most of their rent payments to landowners who live there, as discussed in more detail later.

Figure 2 and Table 2 show average net cash farm income and cash outflows per farm for farms in Minnesota in 2004 and 2012-17. Figure 3 compares the percentage changes declines the regions. The highest cash outflow out of the four years 2012-15 is used as a comparison benchmark against 2017 for each item in this analysis. Machinery purchases and building purchases were highest in 2012 in every region except for the South Central and Southeast, where they peaked in 2013. Land rent payments peaked in 2014 in every region except for the Southeast region. Fertilizer expenditures were highest in 2012 in all regions.

While incomes and spending are down compared to recent years, they are still above the levels of 2004, before the runup in crop prices. The only exception is machinery purchases, which were slightly below the 2004 level.

The machinery and building purchase data is from the FINBIN whole farm statement of cash flows, while the net cash farm income, rental payments, and fertilizer purchases are from the detailed income statement.

The direct impact of reduced machinery purchases is expected to be felt mainly by machinery dealers rather than machinery manufacturers, because the data shows little farm machinery manufacturing in

most of the regions. The margin from farm machinery expenditures kept by the dealers is 17.7% in the IMPLAN default database. The remaining 82.3% is assumed to be passed on to the machinery manufacturing plants, most but not all of which are outside Minnesota. Table 4 shows the IMPLAN estimates of the purchases from farm machinery manufacturers that are made from local manufacturers in each region and in Minnesota. The IMPLAN trade flows database contains estimates of how much of the local demand for farm machinery is supplied by local manufacturers. Those percentages vary by region, and are shown in the last column. The percentages seem high given that the easily-recognized large manufacturers such as Deere and CaseIH do not have plants in the state other than the Agco plant in Jackson County. There are many smaller manufacturers, however. County Business Patterns lists 68 farm machinery manufacturing plants with a total of 885 employees in 39 counties, although only two counties have enough employees in this sector to report (Jackson County has 846 employees and Hennepin has 39) (U.S. Census Bureau Undated). The Mergent Intellect database shows that there are 235 individual farm machinery manufacturing firms with \$414 million in annual sales in the state (Mergent Intellect 2016). Forty-two of these companies have over \$1 million in sales. The spending per farm was expanded to regional totals using the acres per farm compared with the regional totals in Table 5.

Figure 4 shows how the income and spending declines compare across the regions. The largest decline in net cash farm income occurred in the southeastern region, where agriculture is dominated by corn, soybeans, and dairy enterprises. The northwestern region saw the smallest income decline. This region, consisting largely of the Red River Valley, produces some soybeans and corn but also other crops such as wheat and canola.

The southwestern region saw the largest decline in land rental payments while the west central region had the smallest decline. Both regions grow large acreages of corn and soybeans. One possible factor supporting land rental rates in the west central region is that several large new dairy operations have recently been established there.

It is interesting that farm building purchases saw the smallest change in the southeastern region even though it had the largest income decline. Building purchases are the smallest of the four spending categories, so it may be affected less by income changes than the other categories. Some dairy operations have been investing in expensive robotic milking systems to save labor and encourage the younger generation to join the operation, so perhaps that has been a factor in the southeastern region.

The four spending categories are combined in Figure 6 and Table 6 to focus attention on how these farm income and spending declines compare with recent changes in overall regional employment and farm real estate sales values. Average farm real estate values declined in each region and tracked the rent payment trends. The southwestern region saw the largest declines in rent payments, real estate values, and regional employment. The regional employment data is from the U.S. Bureau of Labor Statistics. The farm real estate values (in 2017 dollars based on the Consumer Price Index) are based on actual sales reported to the Minnesota Department of Revenue and summarized on the Minnesota Land Economics website (Lazarus 2018).

Total employment increased between 2013 and 2017 statewide and in each region except for the southwest, which saw a decline of 0.4 percent. It is interesting that the largest employment increase was in the south central region even though the rents and farm real estate values were down in that region.

Table 1. Average annual net cash income and cash outflows by FINBIN farms in Minnesota in recent years

	Peak year	Peak/farm ^a	Peak to 2017
Net cash farm income	2012	\$214,991	-52%
Purchase of mach. & equipment	2012	\$105,566	-53%
Purchase of farm buildings	2013	\$41,516	-27%
Land rent	2014	\$105,724	-8%
Fertilizer expense	2012	\$96,906	-46%
Machinery, Buildings, Rent & Fertilizer	2012	\$383,115	-35%
Number of farms in 2017 – 2,306			
Total crop acres per farm in 2017 – 786 acres			

^a2017 dollars

Sources: (Center for Farm Financial Management 2017)

Table 2. Net cash farm income and selected cash outflows by FINBIN farms in Minnesota by year, 2004 and 2012-17, in 2017 dollars

	2004	2012	2013	2014	2015	2016	2017
<u>Net cash farm income</u>	\$104,363	\$214,991	\$206,734	\$161,353	\$118,577	\$112,630	\$103,533
<u>Cash outflow:</u>							
Land rent	\$54,164	\$98,456	\$101,122	\$105,724	\$100,908	\$101,064	\$96,905
Machinery	\$48,135	\$105,566	\$101,943	\$73,685	\$53,618	\$46,819	\$50,014
Buildings	\$19,193	\$41,516	\$39,694	\$34,301	\$32,694	\$25,185	\$30,407
Fertilizer	\$31,319	\$96,906	\$77,651	\$66,989	\$67,452	\$58,193	\$52,205

Net Cash Farm Income and Spending are Down, but Are Still Higher Than in 2004 (2017 dollars)

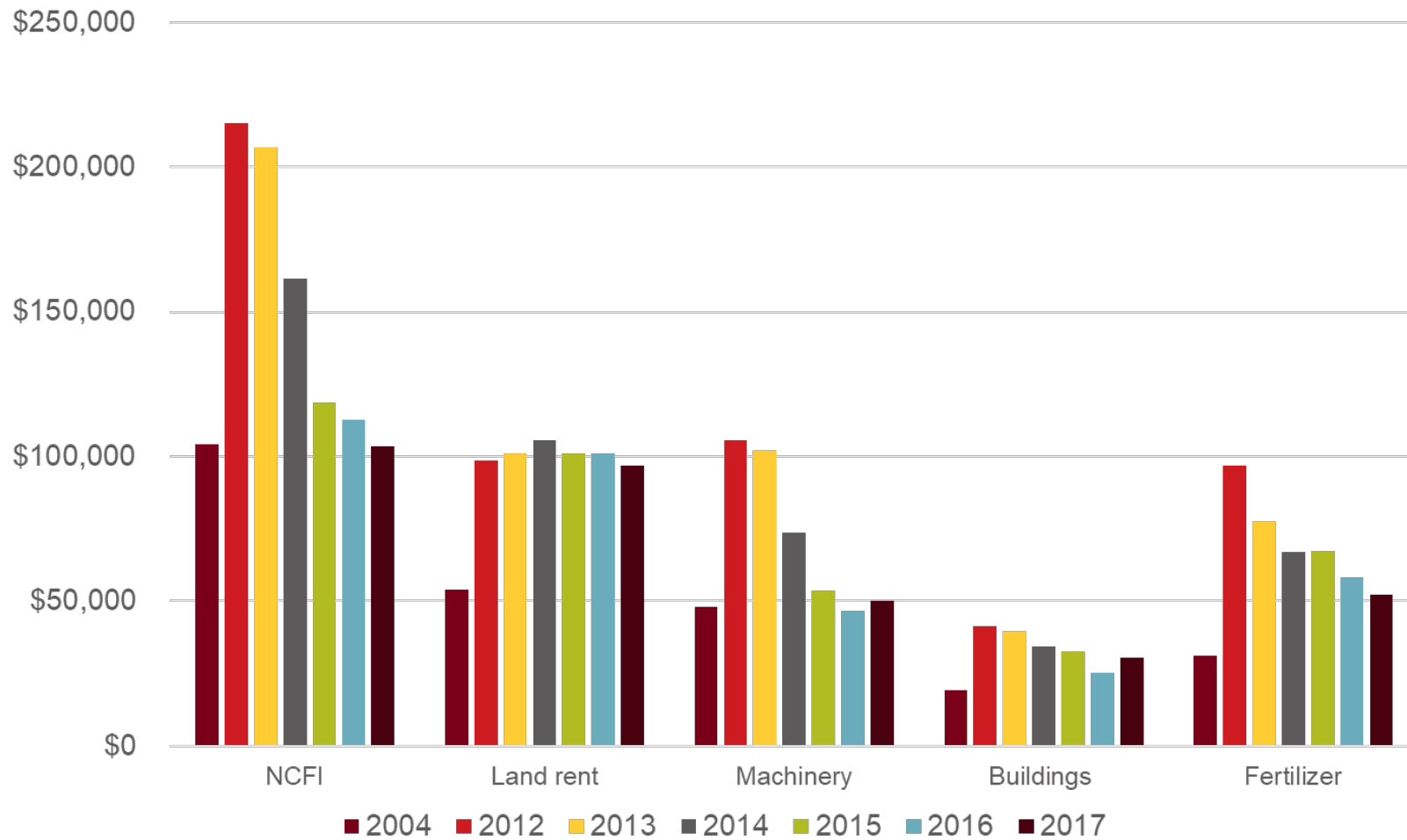


Figure 2.

Regions Included in the Analysis

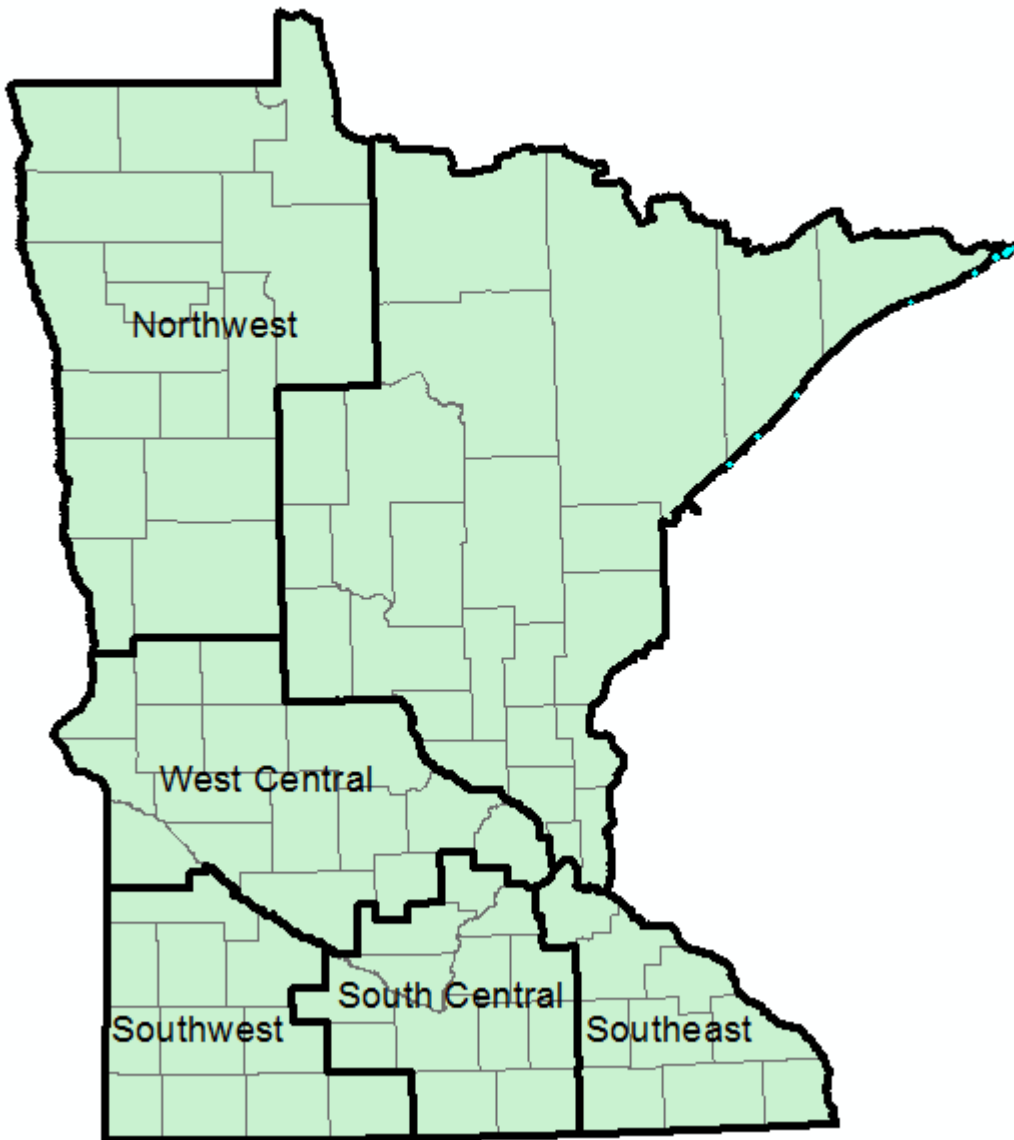


Figure 3.

Table 3. Counties included in this analysis, by region

Northwest	South Central	Southeast	Southwest	West Central
BECKER	BLUE EARTH	DAKOTA	COTTONWOOD	BIG STONE
BELTRAMI	BROWN	DODGE	JACKSON	CHIPPEWA
CLAY	CARVER	FILLMORE	LINCOLN	DOUGLAS
CLEARWATER	FARIBAULT	GOODHUE	LYON	GRANT
KITTSOON	FREEBORN	HOUSTON	MARTIN	KANDIYOHI
LAKE OF THE WOODS	LE SUEUR	MOWER	MURRAY	LAC QUI PARLE
MAHNOMEN	NICOLLET	OLMSTED	NOBLES	MCLEOD
MARSHALL	RICE	WABASHA	PIPESTONE	MEEKER
NORMAN	SCOTT	WINONA	REDWOOD	POPE
OTTER TAIL	SIBLEY		ROCK	RENVILLE
PENNINGTON	STEELE		YELLOW	STEARNS
POLK	WASECA		MEDICINE	STEVENS
RED LAKE	WATONWAN			SWIFT
ROSEAU				TRAVERSE
WILKIN				WRIGHT

Note: The Minneapolis-St. Paul metropolitan area is located mainly in Hennepin, Ramsey, and Anoka Counties, which are omitted from the regional IMPLAN analyses. The other large metro areas in Minnesota are Rochester, in Olmsted County in the Southeast region, and St. Cloud in Stearns County which is included in the West Central region.

Declines in Net Cash Farm Income and Spending from the Peak Year to 2017

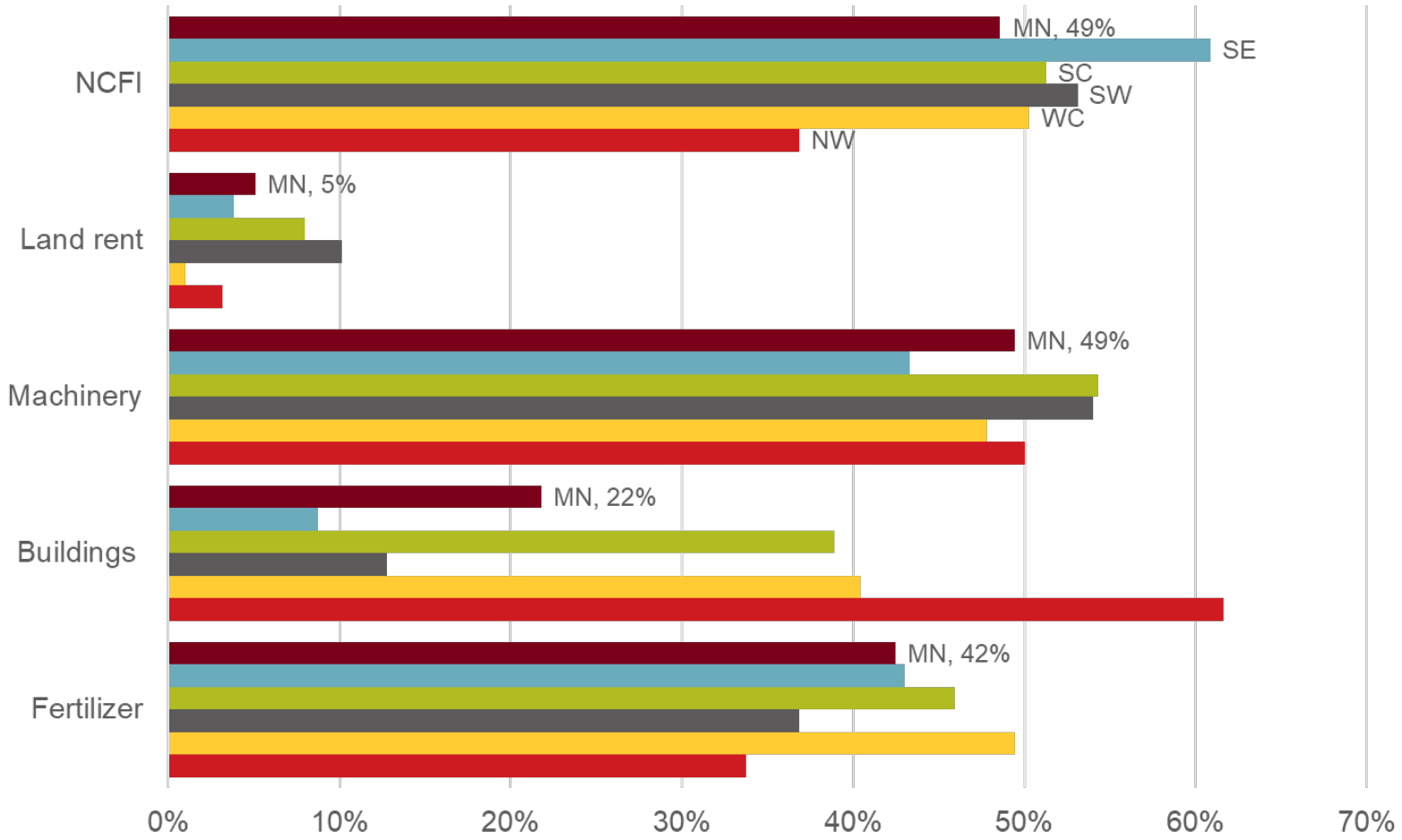


Figure 4.

Table 4. IMPLAN estimates of the purchases from farm machinery manufacturers that are made from local manufacturers in each region and in Minnesota

Region	Machinery manufacturing in the local study area
Minnesota	33.3%
Northwest	26.1%
West Central	25.7%
Southwest	7.8%
South Central	27.3%
Southeast	23.9%

Putting it all together to estimate economic impacts

Agriculture is an important part of the economies of these regions and the state, but the service sector, retail and wholesale trade, and manufacturing are the largest sectors (Figure 5). The Minneapolis-St. Paul metropolitan area is included in the Minnesota data in Figure 5 but is not included in the regional numbers. As a result, the regional data shows more agriculture and manufacturing and less in services than in the Minnesota numbers.

The statewide scenario presented in Figure 7 assumes that each spending category declines relative to the peak year at the percentages shown in Figure 4. The total reduction in employment due to the reduced farm spending is 11,209 jobs, with trade and the financial, insurance, and real estate services sectors being the most impacted. However, total Minnesota employment rose by 205,920 jobs or 7.6% between 2012 and 2017 while the statewide unemployment rate declined from 5.6% to 3.5% over that period. It would appear that there were ample other employment opportunities for the displaced workers if not necessarily in the right geographic locations.

The peak year expenditures are also inflated to 2017 dollars using the Consumer Price Index to adjust for the intervening years. The “secondary impacts” shown are the sum of the indirect impacts on supplier industries and the induced impacts on household. The “Peak to 2017” per-farm changes were extrapolated to regional or statewide totals based on ratio of the per-farm acreages to the cropland acreages reported in the 2012 Census of Agriculture that are shown below in table 5.

Table 5. Cropland acres by FINBIN region

FINBIN Region	Cropland acres, 2012
Minnesota	21,597,136
Northeast and East Central	1,737,872
West Central	4,947,008
Southwest	3,747,005
South Central	3,233,422
Southeast	2,161,490

Source: USDA Census of Agriculture

The construction impacts are handled differently from machinery in that 100% of farm spending is considered rather than just dealer margins. A set of regional purchase coefficients in IMPLAN are used to allocate shares of construction firm spending between in-county and outside suppliers. The impact of the reduction in land rental payments is based on the assumption that only 60% of the land is owned by landowners who live in the county, based on estimates provided by the county directors of the USDA Farm Service Agency offices in Nobles and Kandiyohi counties based on their mailing lists. This analysis focuses on multi-county regions, so it is possible that that 60% is low for this analysis since some landowners may live outside their county but within the region.

Table 7 and Figure 7 contain several different metrics that may be of interest to different audiences. Job losses at farm machinery dealers, construction firms, fertilizer dealers, and in other sectors supplying them range from 1,480 in the South Central region to 824 in the Southwest. These job losses would be a severe economic hit to those workers and their families, although in percentage terms the total impact on the regional economy with secondary ripple effects ranges from 0.31% for the state and 0.48% in the South central region to 0.81% percent in the Southwest.

It should be noted that the impact of machinery sales on dealer employment is what is considered here. Most dealers will also have a service and parts side to the business, which is not considered here. It is also notable that while declines in machinery purchases and farm construction in the region seem like large numbers, in percentage terms the total impact on the regional economy with secondary ripple effects is less than five percent.

Another measure of community impact is that labor income would decline by amounts ranging from \$153/person in the South Central region (553,532 population in 2015) to \$307/person in the Southwest region (147,494 population), and \$130/person statewide (5.5 million population).

Tables 8 and 9 show the employment and labor income impacts for each spending category, and show that the industry sectors that are most affected are the financial and real estate sector along with manufacturing and trade.

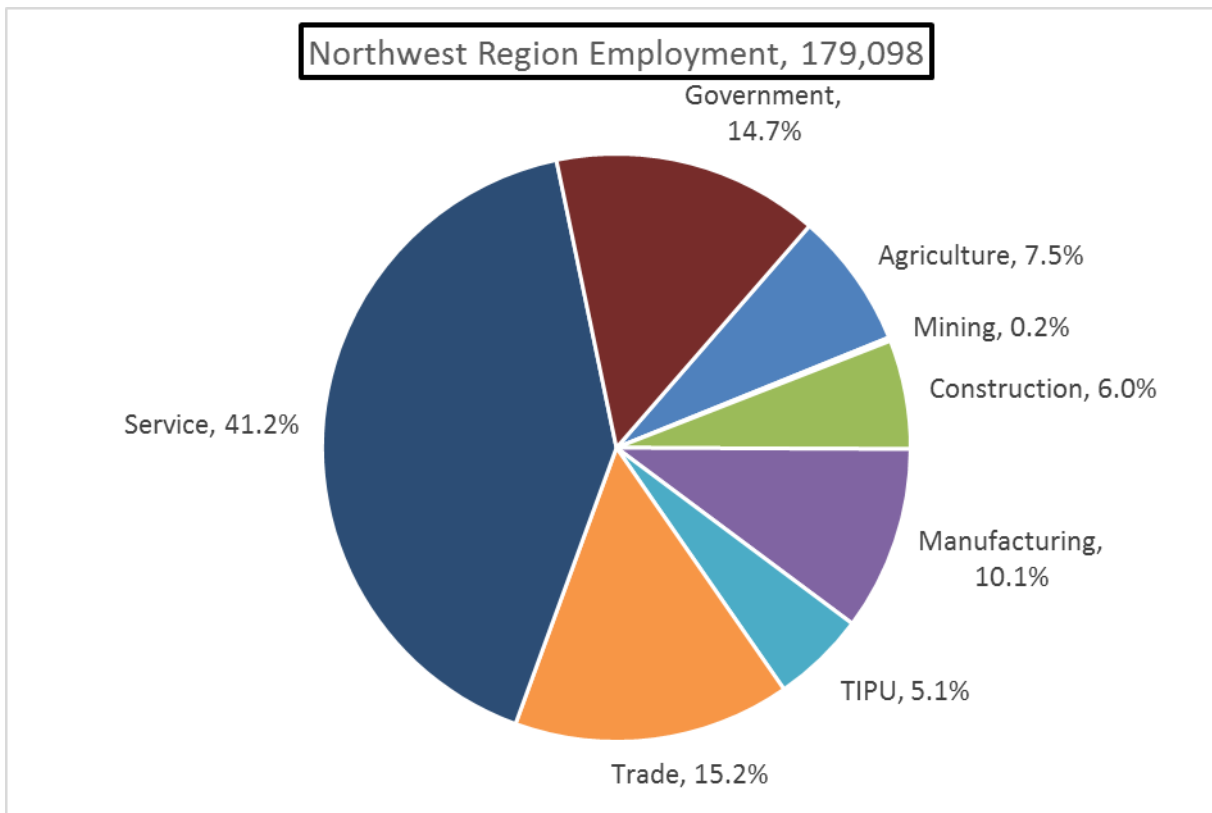
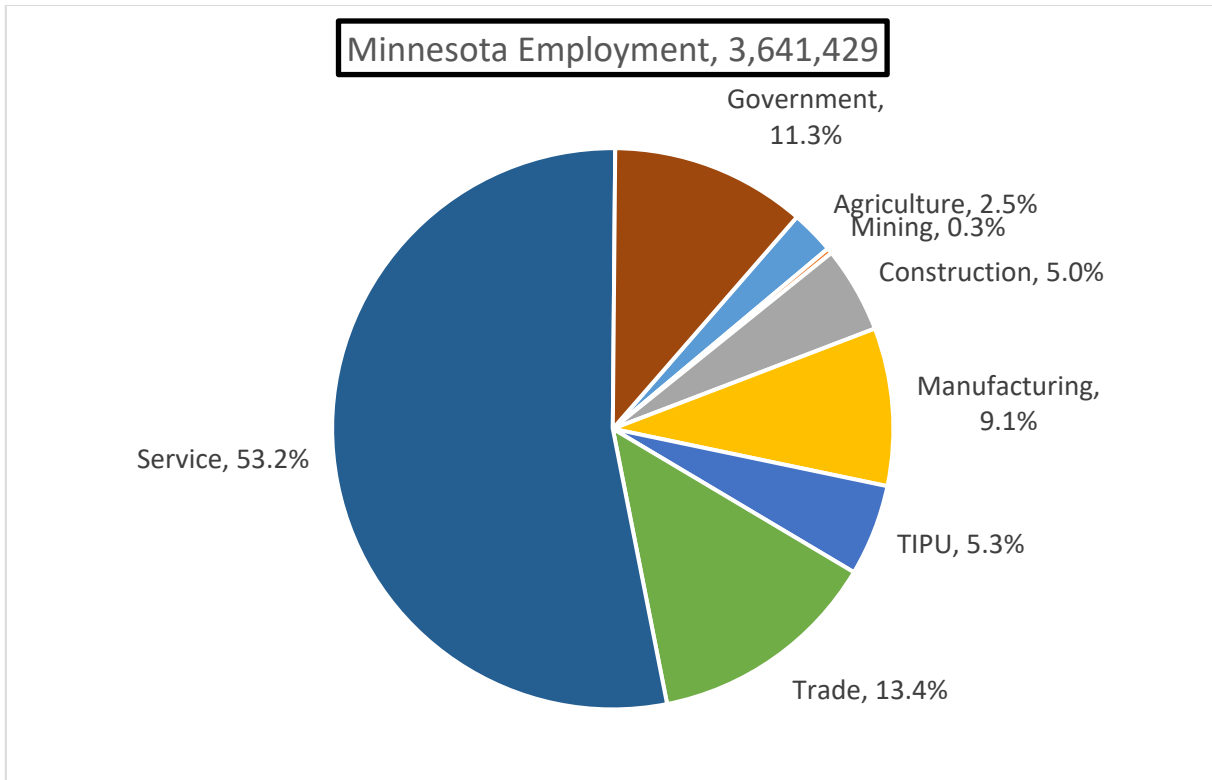
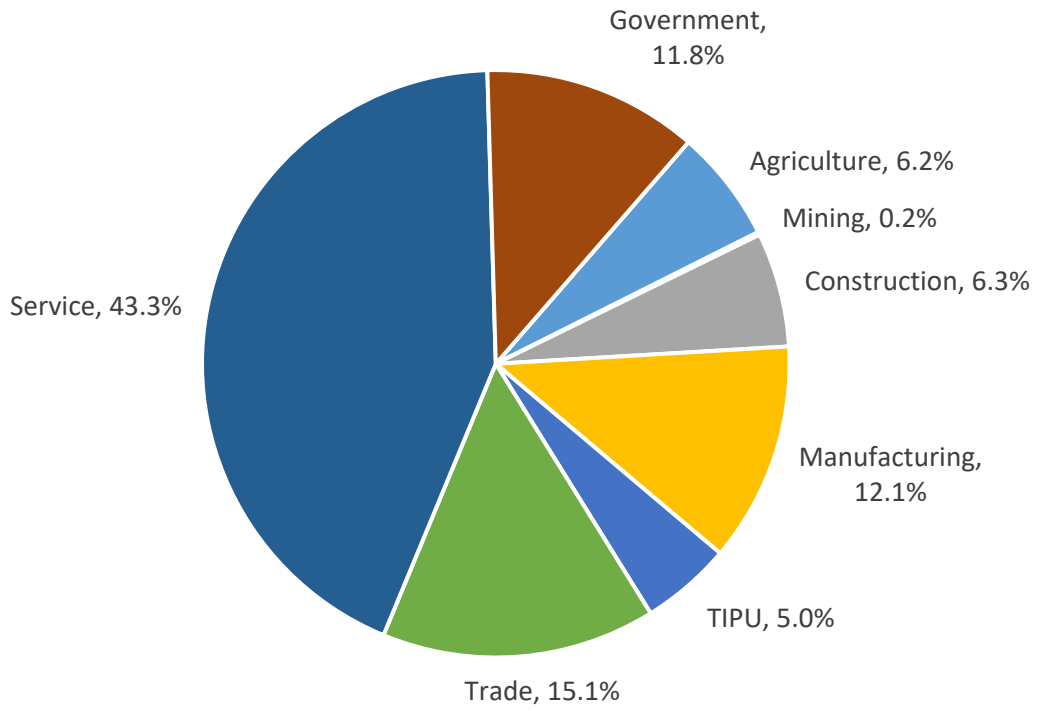


Figure 5. Employment in Minnesota and the Five FINBIN Regions, 2015

West Central Region Employment, 309,508



South Central Region Employment, 310,008

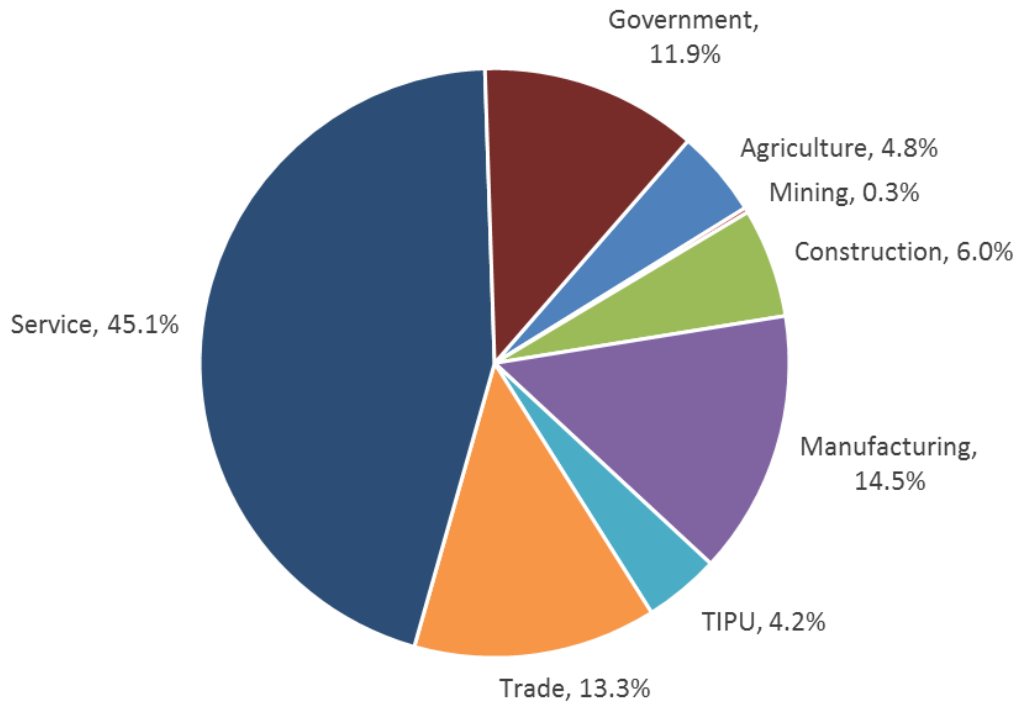
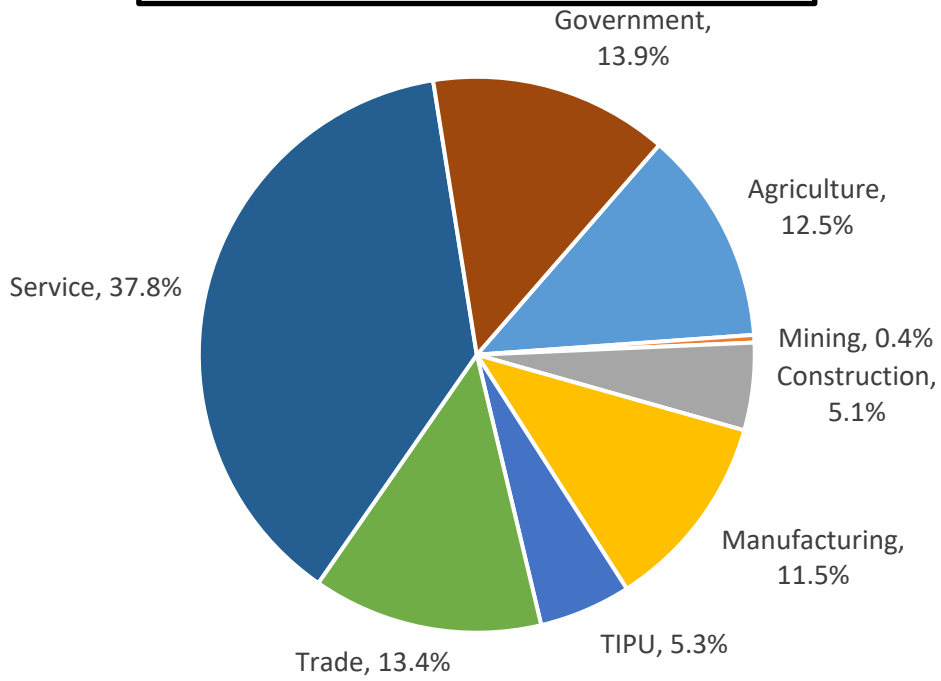


Figure 5 (continued)

South Central Region Employment, 101,299



Southeast Region Employment, 476,403

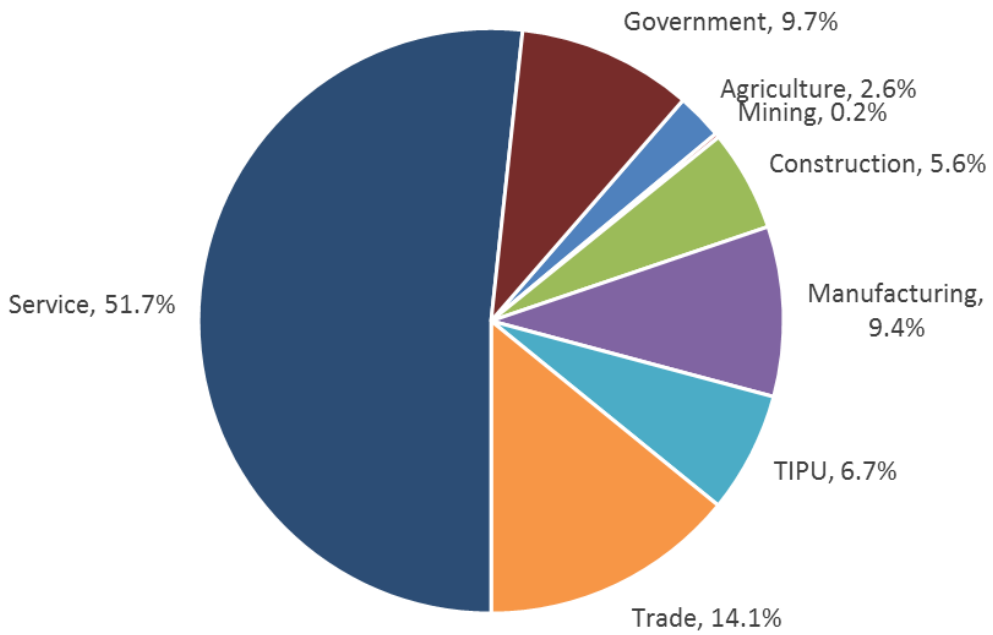


Figure 5 (continued)

Recent changes in income, purchases, rents, real estate values & regional nonfarm employment from peak

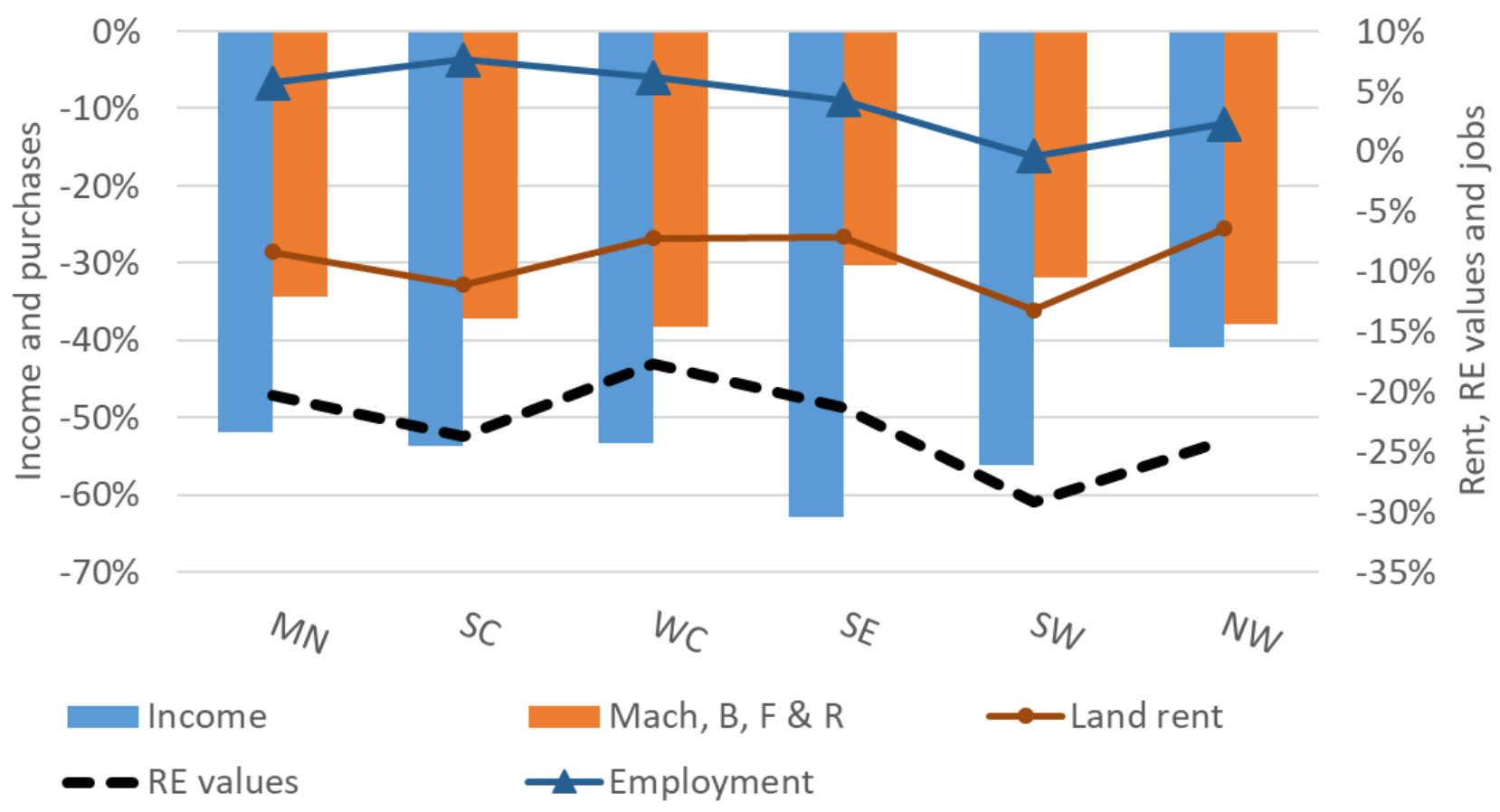


Figure 6.

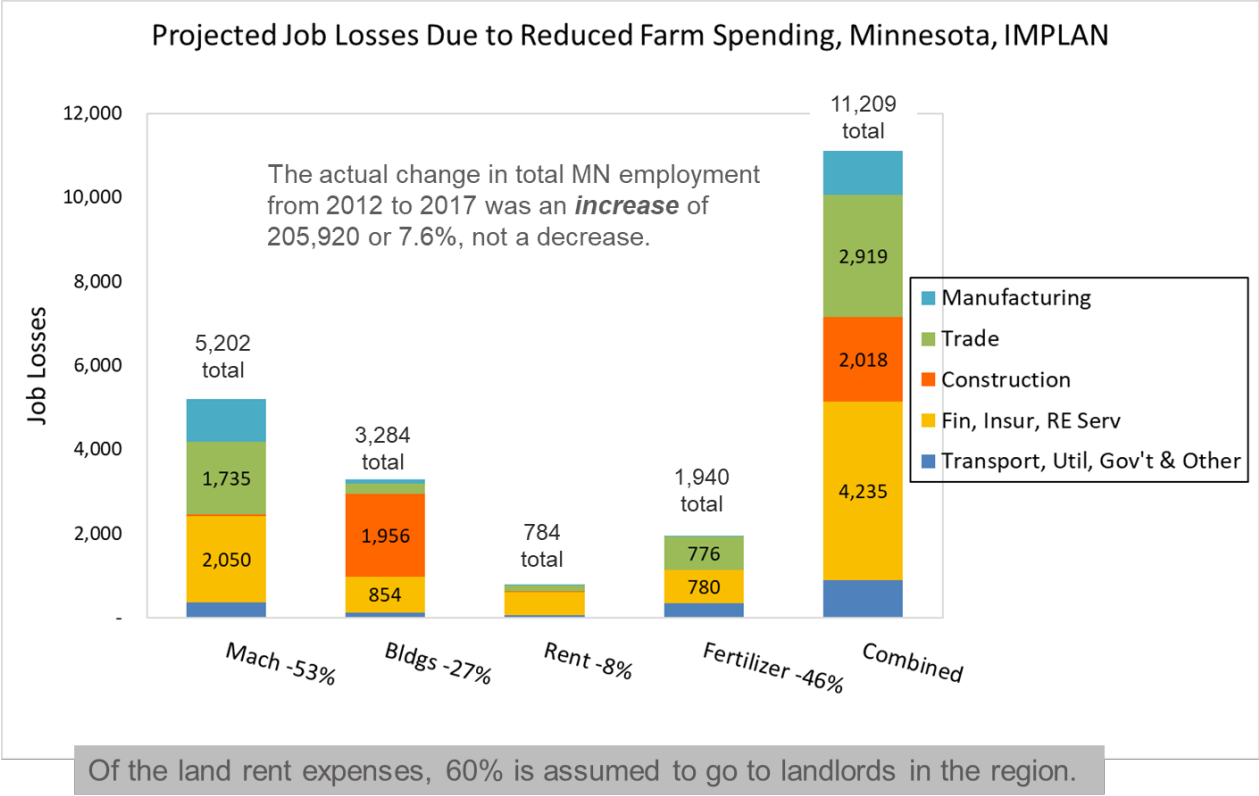


Figure 7.

Table 6. Comparison of changes in net cash farm income, total spending in the selected categories, and land rent spending from the peak year to 2017, with regional employment and farm real estate value changes from 2013 to 2017 at the state and regional levels, in 2017 dollars.

	MN	SC	WC	SE	SW	NW
Net cash farm income/farm	-52%	-54%	-53%	-63%	-56%	-41%
Outlays for: Machinery	-53%	-57%	-51%	-46%	-57%	-53%
Buildings	-27%	-41%	-43%	-12%	-18%	-64%
Fertilizer	-46%	-49%	-53%	-47%	-41%	-38%
Land rent	-8%	-11%	-7%	-7%	-13%	-6%
Mach, bldg, rent & fert purchases	-34%	-37%	-38%	-30%	-32%	-38%
Farm RE value change, 2013-17	-20%	-24%	-18%	-21%	-29%	-24%
Regional employment chg, 2013-17	5.7%	7.6%	6.2%	4.3%	-0.4%	2.3%

Table 7. Comparison of impacts of spending changes at the state and regional level, peak year to 2017, in 2017 dollars

	Minnesota	South Central	Southwest
Mach, bldg, rent & fert purchases	-34%	-37%	-32%
Total population, 2015	5.5 million	553,532	147,494
Total nonfarm employment, 2017	2.9 mill.	244,515	66,838
IMPLAN employment change	-11,209	-1,480	-824
Change as % of NF employment	-0.31%	-0.48%	-0.81%
Per capita labor income impact	-\$130	-\$153	-\$307
Change in land rent per acre	-8%	-11%	-13%
Farm RE Value Change, 2013-17 marketing year averages	-20%	-24%	-29%

Table 8. Direct, secondary, and total impacts of the reductions in machinery purchases, farm building construction, and land rental payments

	Employment	Labor Income
Minnesota, population 5,489,594		
Direct Impact - machinery (\$million)	-2,033	-\$163,891,664
- building construction	-1,942	-\$122,732,898
- fertilizer	-5,241	-\$474,513,572
Total	-9,216	-\$761,138,134
Secondary impact	-9,166	-\$489,774,682
Total impact	-18,382	-\$1,250,912,816
Percent of local economy	-0.5%	-0.6%
Per capita change		-\$228

Table 9. Industry breakdown of the direct, secondary, and total impacts of the reductions in machinery purchases, farm building construction, and land rental payments, Minnesota

	Output	Employment	Labor Income
<u>Minnesota</u>			
Ag & Forestry	0.2%	0.16%	0.1%
Construction	10.4%	11.13%	10.3%
Manufacturing	20.7%	6.45%	6.6%
Transport & Util	6.4%	3.51%	3.4%
Trade	26.5%	43.77%	52.9%
Fin, Insur, RE Serv	31.5%	33.70%	25.7%
Public Administration	1.0%	0.84%	0.9%
Private Households	3.3%	0.38%	0.1%

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APPENDIX 1: METHODOLOGY

Special models, called input-output models, exist to conduct economic impact analysis. There are several input-output models available. IMPLAN (IMpact Analysis for PLANning, MIG) is one such model. Many economists use IMPLAN for economic contribution analysis because it can measure output and employment impacts, is available on a county-by-county basis, and is flexible for the user. IMPLAN has some limitations and qualifications, but it is one of the best tools available to economists for input-output modeling. Understanding the IMPLAN tool, its capabilities, and its limitations will help ensure the best results from the model.

One of the most critical aspects of understanding economic impact analysis is the distinction between the “local” and “non-local” economy. The local economy is identified as part of the model-building process. Either the group requesting the study or the analyst defines the local area. Typically, the study area (the local economy) is a county or a group of counties that share economic linkages. In this study, the study area is the entire state of Minnesota.

A few definitions are essential in order to properly read the results of an IMPLAN analysis. The terms and their definitions are provided below.

Output

Output is measured in dollars and is equivalent to total sales. The output measure can include significant “double counting.” Think of corn, for example. The value of the corn is counted when it is sold to the mill, again when it is sold to the dairy farmer, again as part of the price of fluid milk, and yet again when it is sold as cheese. The value of the corn is built into the price of each of these items and then the sales of each of these items are added up to get total sales (or output).

Employment

Employment includes full- and part-time workers and is measured in annual average jobs, not full-time equivalents (FTE’s). IMPLAN includes total wage and salaried employees, as well as the self-employed, in employment estimates. Because employment is measured in jobs and not in dollar values, it tends to be a very stable metric.

Labor Income

Labor income measures the value added to the product by the labor component. So, in the corn example when the corn is sold to the mill, a certain percentage of the sale goes to the farmer for his/her labor. Then when the mill sells the corn as feed to the dairy farmer, it includes some markup for its labor costs in the price. When the dairy farmer sells the milk to the cheese manufacturer, he/she includes a value for his/her labor. These individual value increments for labor can be measured, which amounts to labor income. Labor income does *not* include double counting.

Direct Impact

Direct impact is equivalent to the initial activity in the economy. In this study, it is the expenditures of businesses receiving federal funding via the SBIR and STTR programs.

Indirect Impact

The indirect impact is the summation of changes in the local economy that occur due to spending for inputs (goods and services) by the industry or industries directly impacted. For instance, if employment in a manufacturing plant increases by 100 jobs, this implies a corresponding increase in output by the plant. As the plant increases output, it must also purchase more inputs, such as electricity, steel, and equipment. As the plant increases purchases of these items, its suppliers must also increase production, and so forth. As these ripples move through the economy, they can be captured and measured. Ripples related to the purchase of goods and services are indirect impacts. In this study, indirect impacts are those associated with spending by small businesses to purchase inputs.

Induced Impact

The induced impact is the summation of changes in the local economy that occur due to spending by labor, that is spending by employees in the industry or industries directly impacted. For instance, if employment in a manufacturing plant increases by 100 jobs, the new employees will have more money to spend to purchase housing, buy groceries, and go out to dinner. As they spend their new income, more activity occurs in the local economy. This can be quantified and is called the induced impact. Primarily, in this study, the induced impacts are those economic changes related to spending by employees of small businesses receiving federal funding.

Total Impact

The total impact is the summation of the direct, indirect, and induced impacts.