PROFITABILITY MIGRATION IN MINNESOTA FARMS

Subtheme - Knowledge & Information

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Abstract:

Producers who benchmark are seeking growth and improvement for their farms, but how can they achieve it? What are the top producers doing differently, and are they doing it consistently? Can information be gleaned from financial statement data to help producers narrow their focus and make their farm businesses stronger? This paper uses data from the FINBIN farm financial database to analyze how often a farm migrates between profitability efficiency groups to establish a set of consistently top farms. Consistently top farms are found to be much more efficient in overhead expenses such as fuel, repairs, and interest payments. Top farms had less debt and had more working capital as a percentage of gross revenue.

Keywords: *profitability, efficiency, migration, net farm income*

1. Introduction

Whether one chooses to admit it, many of us spend our lives trying to "keep up with the Joneses." This can have a negative connotation, but it doesn't have to. In the 2012 Census of Agriculture, there were 74,542 farms in Minnesota, USA (USDA-NASS, 2014). Of those farms, many will benchmark, or compare themselves with others, and that comparison can be one of the single most useful exercises a producer can undertake to make their farm business stronger. In a recent survey completed by the Center for Farm Financial Management (CFFM) at the University of Minnesota (2016), 81% of producers who participated in a farm business management program responded that comparing their whole farm financial performance to others was either valuable or extremely valuable. These same producers responded that benchmarking was worth an average of over $12,000 to their business.

Producers who benchmark are seeking growth and improvement, especially during times of financial stress such as that currently facing U.S. production agriculture. So how can they

achieve it? What are the top producers doing differently? And are they doing it consistently? Do the top producers change each year? Can we glean information from financial statement data to help producers narrow their focus and make their farm businesses stronger?

This paper will utilize data from the FINBIN farm financial database to examine how often farms move between profitability groups in order to determine if there are factors that contribute to farms being consistently profitable. Determining this information will impact educational efforts as educators, lenders and consultants can utilize this knowledge to help producers create stronger businesses.

2. Material Studied/Area Description/Methods

What top producers do to reach and maintain the higher level of performance is a routine question asked by educators. For example, Boland and Patrick (1994) found that pigs sold per sow per year, as well as feed efficiency, were the most important factors in determining hog producer profitability. Another publication found that labor and feed efficiency affected Michigan dairy farm profitability the most (Mahnken, 2007). Ibendahl (2013) determined that management, along with weather and luck, influenced net farm income from year to year.

All of these studies split farms into profitability groups, raising the question of how often producers move between these groups. Are there producers who consistently appear in the top profitability groups, and if so, what do they do to stay there? Ibendahl (2013) found that only two to three percent of farms in the Kansas Farm Management Association were consistently in the top decile of farms. Farms participating in the Kentucky Farm Business Management program had a high probability of remaining in the same profitability group, as determined by Return on Equity (Dunaway and Katchova, 2014).

In 2015 there were nearly 2,300 producers who participated in the Farm Business Management programs offered through Minnesota State University(1) and the University of Minnesota Extension Southwest Farm Business Management(2) program. Producers who participated in either of these programs subscribed to services offered by educators. These services help farmers improve their farm records, while delving further into what those records mean for them. These two programs utilized FINPACK, a farm financial analysis and planning software package developed by CFFM. After the financial records are completed, producers share their data to be included in the FINBIN farm financial database. Since 2006, a panel of 664 Minnesota farms contributed data to FINBIN each of the ten years from 2006 to 2015.

Accrual net farm income (NFI) is commonly used to analyze farm financial performance. NFI represents a return to an operator's labor, management and equity (Becker et al., 2014). It analyzes a farm's performance by making adjustments for inventory changes and depreciation, as well as changes to prepaid expenses, accounts payable and accounts receivable. These accrual adjustments provide a better picture of what happened on the farm during that period by recording income and expenses when they are incurred (FFSC, 2017). NFI has been found to be a more accurate description of what occurred on a farm in a given year than other commonly used metrics, such as net farm cash income from Schedule F tax returns (Barnard, Ellinger and Wilson, 2010). Figure 1 displays the median NFI(3) for panel farms, as well as Minnesota farms in FINBIN from 2006-2015. This panel consistently had a higher median NFI than the median NFI of all Minnesota farms in FINBIN. Over this period, the panel had a median NFI of $98,055, while the entire Minnesota dataset in FINBIN had a median NFI of $76,659.

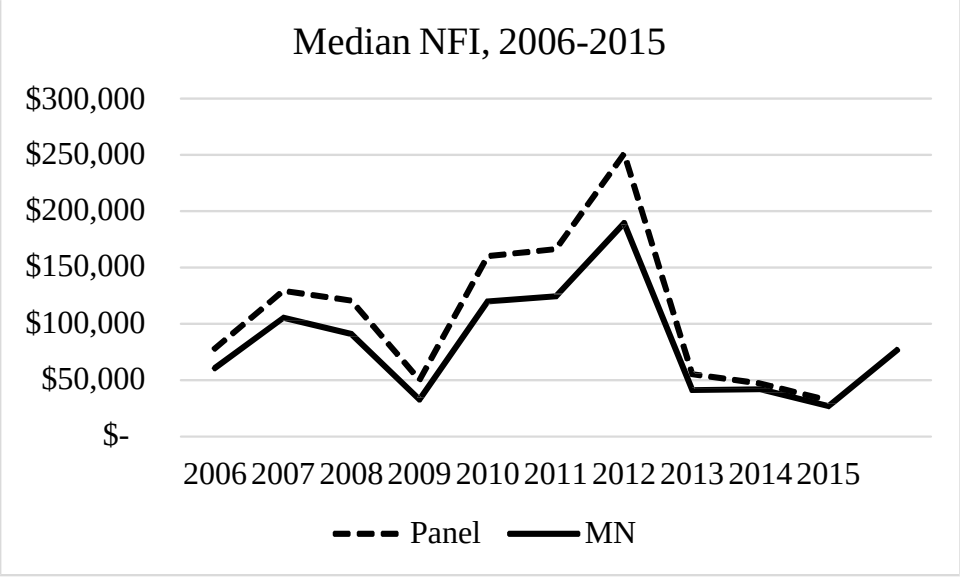

Figure 1. Median NFI by NFI/VFP groups, 2006-2015

1 Data provided by Minnesota State University Farm Business Management program
2 Data provided by Southwest Farm Business Management, University of Minnesota
3 NFI is treated as the return to an operator's unpaid labor & management in FINBIN

Benchmarking is the process of comparing similar businesses to one another. One way to complete this comparison is to separate farms into groups determined by profitability. In Table 1, the dataset was split into three profitability groups based on NFI for the years 2006-2015. These three distinct groups aid in identifying profitable farms and their unique characteristics. As expected, metrics such as expenses/hectare (Exp/ha) are lower for the top third than the other two groups. This correlates with the median hectares for each group, increasing as profitability increases. However, this table exposes a bias using NFI to segment farms into profitability groups in that NFI is difficult to compare across farms of varying sizes.

Table 1. Summary medians of profitability groups, panel, 2006-2015

	Low Third	**Mid Third**	**Top Third**	**All Groups**
Hectares	169.90	255.58	501.77	284.74
Exp/ha	$1,632.86	$1,506.13	$1,429.21	$1,518.34
NFI/ha	$45.75	$383.93	$583.05	$360.15
NFI	$7,998	$97,186	$291,943	$98,055
NFI/VFP	3.7%	22.4%	30.6%	21.2%
OpExp%[4]	81.72	67.38	61.70	69.03
ROA	0.6%	5.5%	9.2%	4.8%
CR[5]	1.41	1.98	2.59	1.96
WCtoGR[6]	19.48	32.81	46.71	33.41
TDC[7]	0.89	2.05	3.50	2.01

When using NFI as the determining factor, the most profitable farms are those that farm the most hectares, as seen in Figure 2. In fact, this occurs each year for the top third of farms, and in seven of the 10 years for the middle third group of farms.

4 OpExp% = Operating Expense Ratio
5 CR = Current Ratio
6 WCtoGR = Working Capital to Gross Revenue
7 TDC = Term Debt Coverage

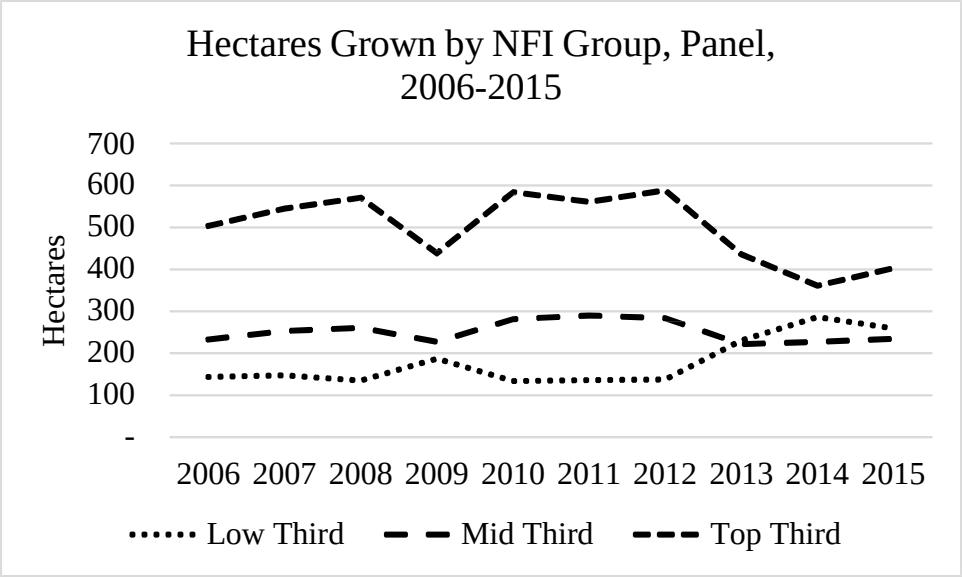

Figure 2. Hectares grown by NFI group, panel, 2006-2015

However, having a large NFI doesn't necessarily mean a farm is the most efficient in turning resources into profit. For example, a farm that raises 2,000 hectares should have an NFI higher than a farm of 500 hectares. In order to analyze if a farm is truly converting inputs into a return on labor and management, NFI needs to be normalized. The ratio of net farm income to value of farm production (NFI/VFP) combines profitability with efficiency while normalizing NFI (profitability) by dividing NFI by the value of farm production (VFP). This ratio describes how efficiently a farm is converting inputs into NFI, or how much of the farm's production the farm is retained as its return to labor and management. By using this calculation, the top third group is extremely efficient at converting inputs into returns with a NFI/VFP of 38.4%, meaning they are keeping $38.40 of every $100 in VFP. By contrast, the mid third group is keeping 20.6%, and the low third is negative with -0.8%. Splitting the dataset into groups determined by NFI/VFP discounts the impact of hectares on profitability. Consider a producer with only 200 hectares (493 acres) who is incredibly efficient with operating expenses. They may still have one of the most profitable operations, despite their size. Table 2 displays more drastic differences in median expenses and expense utilization. For example, for Exp/ha, between the top third and mid third groups there is a $217/ha difference and a $409/ha difference between the top third and low third, showing the top third as much more efficient in converting inputs into returns. This is further substantiated by a NFI/ha of $691/ha for the top third, $353 for the mid third, and $44 for the low third.

This also suggests that total crop hectares does not increase as NFI/VFP increases. The top third has a median of 286 hectares, indicating they are likely more efficient with their land base, and implying that a small farm can be just as profitable as a large farm. Expenses and their conversion into returns to labor and management, however, are characteristics that appear to be major drivers of farm profitability.

Table 2. Panel summary medians, by NFI/VFP groups, 2006-2015

	Low Third	**Mid Third**	**Top Third**	**All Groups**
Hectares	251.28	320.66	286.48	284.74
Exp/ha	$1,722.06	$1,529.76	$1,312.57	$1,518.34
NFI/ha	$44.36	$353.26	$691.06	$360.15
NFI	$9,156	$106,019	$197,360	$98,055
NFI/VFP	3.0%	22.6%	37.5%	21.2%
OpExp%	82.91	68.68	55.30	69.03
ROA	0.6%	5.3%	8.6%	4.8%
CR	1.36	1.95	2.85	1.96
WCtoGR	15.67	32.10	52.72	33.41
TDC	0.88	2.16	3.81	2.01

In order to examine the movement between efficiency groups within this panel dataset, farms were examined for their prior year grouping and compared to their present year groups. A value was then assigned to represent a farm's movement. If a farm was in the low third in 2014 and moved to the top third in 2015, they were assigned a value of "C-A." The categories are outlined in Table 3.

Table 3. Movement key

Was Top Third	A-A	Remained in top third
	A-B	Dropped down to mid third
	A-C	Dropped down to low third
Was Mid Third	B-A	Moved up to top third
	B-B	Remained in mid third
	B-C	Dropped down to low third
Was Low Third	C-A	Moved up to top third
	C-B	Moved up to mid third
	C-C	Remained in low third

3. Results

When examining all years in the panel in aggregate, shown in Figure 3, there was a greater occurrence of farms remaining in the top or low third group if a producer had appeared there the year prior. The mid third group had higher levels of movement, evenly split amongst remaining in the mid third, or moving either up or down. When combined, producers moved from one group to another 51% of the time.

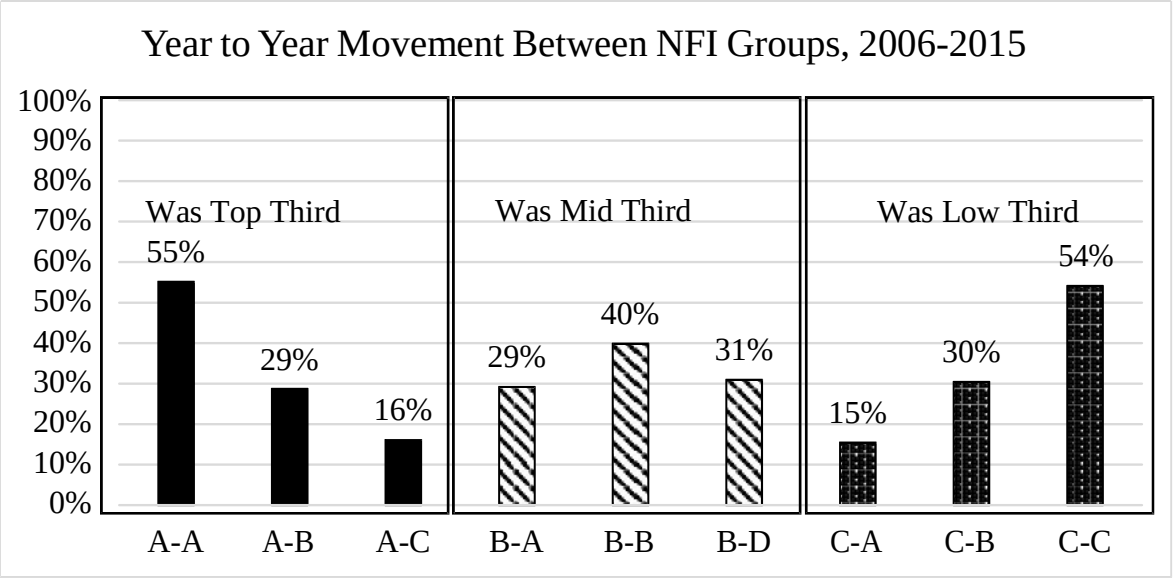

Figure 3. Year to year movement between NFI/VFP groups, 2006-2015

By looking at each year individually, shown in Figure 4, the number of producers that migrated between efficiency groups (combined moved and dropped categories) was less prevalent than those producers that remained in their previous groups. This is true until 2013 when more farms moved than remained in their previous groups.

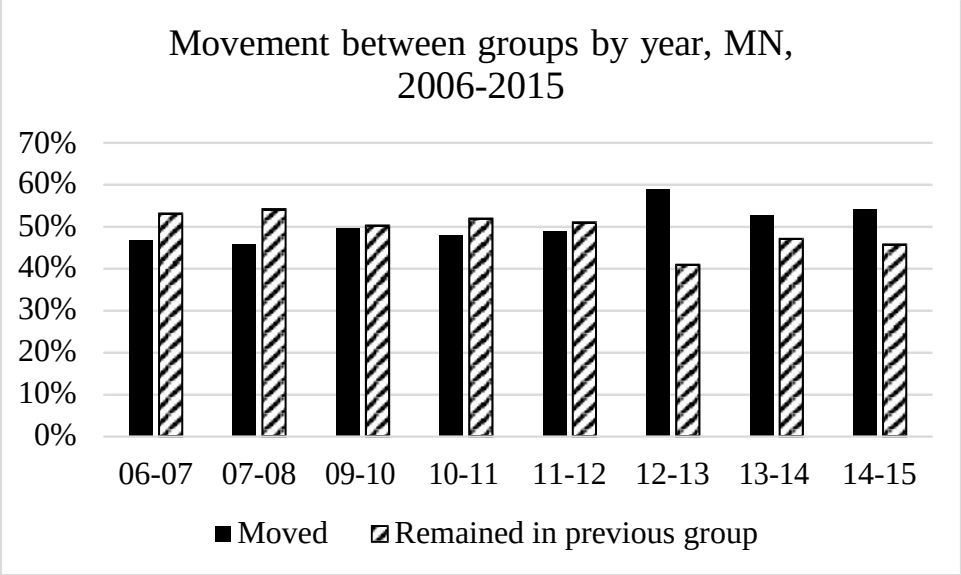

Figure 4. Movement between groups by year, MN, 2006-2015

The panel was then split further into farms considered "stable." Farms were deemed "stable" in their efficiency grouping if they ranked in that group seven or more times. This is consistent with Boland and Patrick (1994), and Mahnken (2007), who both determined a stability percentage in examining producer performance. Overall, there were 251 farms out of the 664 (37.8%) in the panel who met this criteria, with 102 in the top third, 46 in the mid third, and 103 in the low third. Of the crop farms, 36% were determined to be stable, while 42% of livestock farms were considered stable. Stable crop farms had a larger distribution in the top third, while livestock farms were predominantly in the low third.

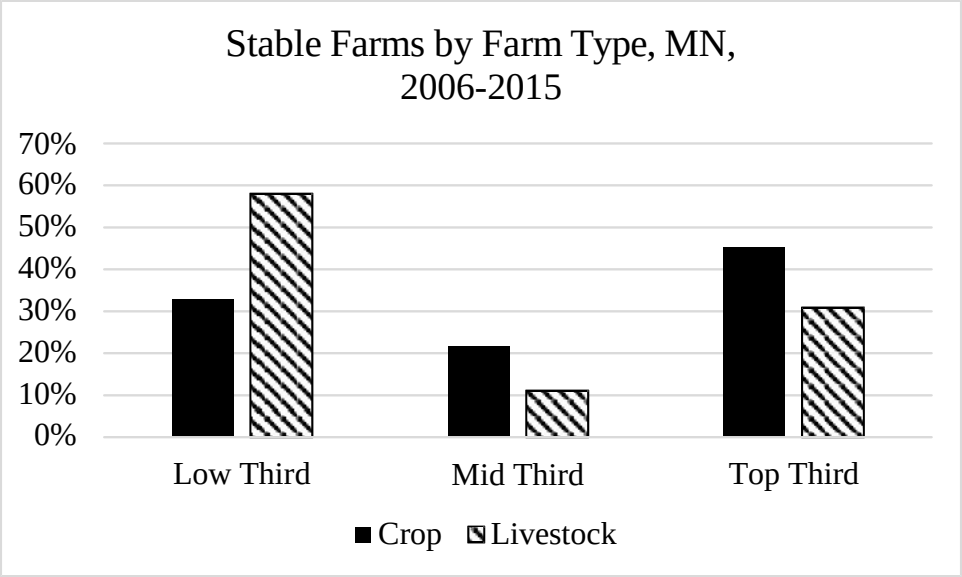

Figure 5. Stable farms by farm type, MN, 2006-2015

Summary medians for the three stability groups are shown below in Table 4. As was the case with the panel dataset, the largest number of crop hectares did not reside with the top third profitability group.

Table 4. Summary medians of stable farms for profitability groups

	Low Third	**Mid Third**	**Top Third**	**Stable Groups**
Hectares	210.74	336.11	276.62	257.66
Exp/ha	$1,925.31	$1,572.18	$1,302.00	$1,556.22
NFI/ha	$100.85	$395.73	$650.58	$376.66
NFI	$20,151	$119,963	$179,083	$98,039
NFI/VFP	5.9%	22.7%	37.6%	21.4%
OpExp%	80.78	66.78	54.72	67.99
ROA	1.8%	6.2%	7.2%	4.7%
CR	1.23	1.89	3.13	1.86
WCtoGR	9.02	29.39	65.31	31.86
TDC	1.11	2.10	3.63	1.93

4. Discussion

What top producers do differently to maintain a high level of profitability is continually sought after by producers, consultants, lenders, and educators. Producers strive to discover what characteristics they can emulate from the top farms in order to achieve financial health, and in turn, increase the farm business's longevity.

Out of 664 farms in Minnesota that have consistently contributed data to the FINBIN database from 2006-2015, producers move between profitability groups 51% of the time. The majority of the movement has occurred in the mid third group, which can be attributed to the lower frequency of farms remaining in that group from year to year. Farms in the top or low third groups maintained a higher likelihood of remaining in the top or lower third from year to year. Why does this occur? What are these producers doing that keeps them in these groups?

Referring back to the earlier summary medians for the stable groups and the panel efficiency groups, when profitability was determined by dividing NFI by VFP, size of farm in terms of crop hectares did not seem to be the major driver. In fact, the top third rarely grew the most hectares. VFP/ha, shown in Figure 6, was not a major factor. In fact, each of the three panel groups were virtually the same. While the top third was consistently receiving more for their product than the other groups, the difference in VFP/ha between the efficiency groups does not account for the difference seen when looking at NFI/ha. The larger difference between the groups exists between expenses per hectare.

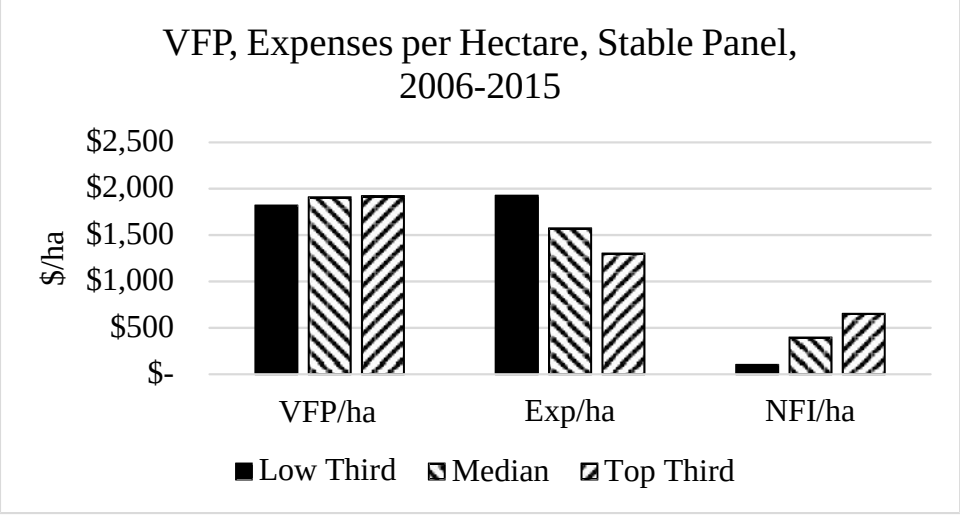

Figure 6. VFP/ha, op exp/ha and NFI/hectare, stable panel, 2006-2015

This is supported when examining the operating expense ratio (OpExp%), which is calculated by dividing operating expenses by gross farm income. It indicates what portion of the gross farm income is going towards paying operating expenses, such as seed or fuel. For example, the top third had a median opexp% of 55.30%, meaning that for every dollar of gross farm income $0.55 went toward operating expenses. According to the Farm Finance Scorecard (Becker et al., 2014), if this number is greater than 80%, a farm is considered vulnerable; if it is lower than 60%, the farm is considered strong. This variable is consistent throughout the dataset. In fact, the low third group of the panel had five years where the opexp% was in the vulnerable range, while the top third had six years in the strong range, shown in Figure 7.

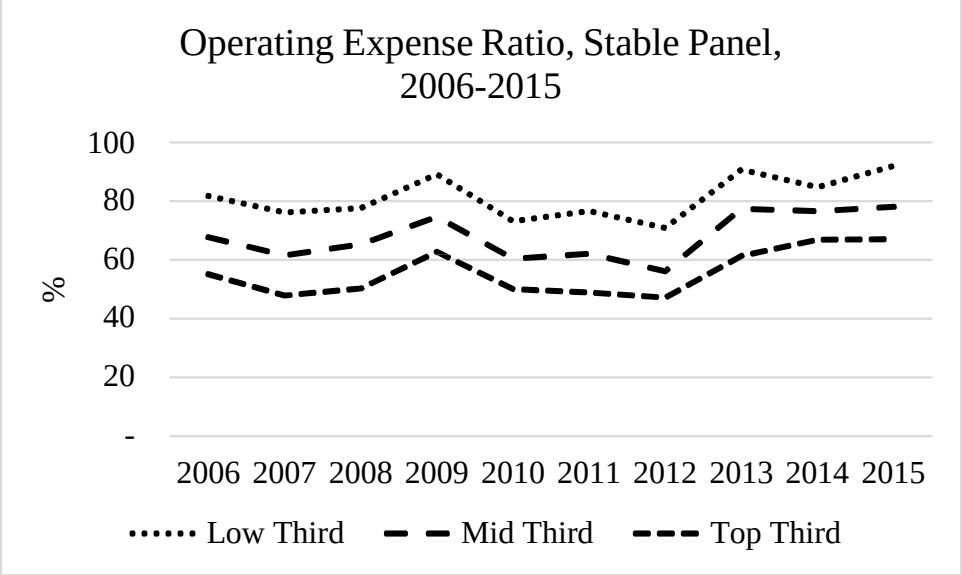

Figure 7. Operating expense ratio, stable panel, 2006-2015

Further, the top third group had a working capital to gross revenue (WCtoGR) ratio that was consistently much higher than the other groups. WCtoGR (current assets minus current liabilities divided by gross revenue) measures how much of a farm's gross revenue has been stored in working capital, or liquid assets. For example, it can be said that a WCtoGR of 65.31 means that the farm has 65.31% of their gross revenue already stored in working capital and free to be used for operating expenses or debt retirement. The top third was not only consistently higher than the other two groups, shown in Figure 8, but was 72% higher than the median. Because the top farms have so much of their gross farm revenue in working capital, they are able to withstand downturns in prices, while still being able to pay their loans and

input bills. Therefore, it is likely that farms in the top third have more ability to "flex their muscle" and seek the best deals on inputs because they can be patient and strike when the best opportunity becomes available.

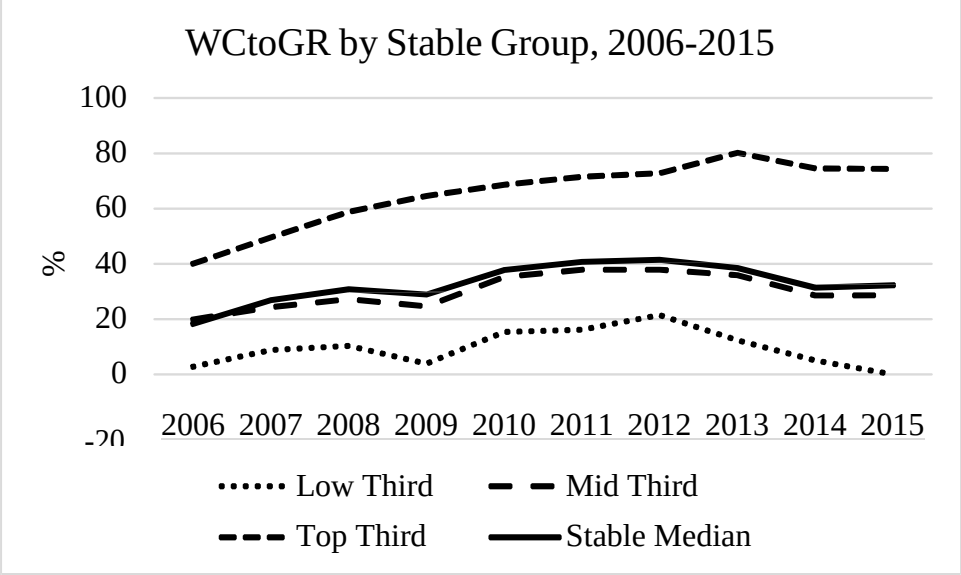

Figure 8. Working capital to gross revenue, stable panel, 2006-2015

Farms consistently in the top third did not vary greatly from the other groups in terms of seed, fertilizer, or chemical cost per hectare. This indicates these farms did not sacrifice yield to increase their net return. In fact, the top third had higher median yields for corn, soybeans and wheat. However, the top third of farms was consistently more efficient in fuel and repairs per hectare, land rent per hectare, and interest expense per hectare, or overhead costs.

Table 5. Yield and Expenses per hectare, stable panel, 2006-2015

	Low Third	Mid Third	Top Third	All Stable Groups
Corn Yield (bu/ha)	404.57	432.86	446.23	429.21
Soybean Yield (bu/ha)	112.35	120.89	124.89	119.92
Wheat Yield (bu/ha)	122.41	140.74	143.69	137.13
Seed/ha	$138.50	$185.77	$170.56	$159.93
Fertilizer/ha	$153.15	$178.59	$172.91	$165.92
Chemicals/ha	$59.99	$71.71	$67.66	$65.37
Fuel & Repairs/ha	$238.80	$205.73	$146.71	$193.44
Interest/ha	$139.18	$87.02	$58.02	$95.88
Land Rent/ha	$204.82	$273.81	$189.69	$210.28

When specifically examining land rent, the top third group had the lowest rent/ha value in nine out of 10 years. While there was a small difference between the top and low groups, the mid group had a median rent/ha that was 44% higher than the top group. This coincides with the mid group growing more hectares of crops as well as renting considerably more hectares than the other groups, shown in figure 9. Top third farms were therefore able to separate themselves by limiting their exposure to losses in bad years. Minnesota farms in FINBIN lost $136/ha in 2015 on rented acres while owned acres returned $53/ha to labor and management (University of Minnesota, 2017). And although they may not have grown more hectares, by growing a higher percentage of owned versus rented hectares, they demonstrated management ability by limiting exposure from high priced land rent.

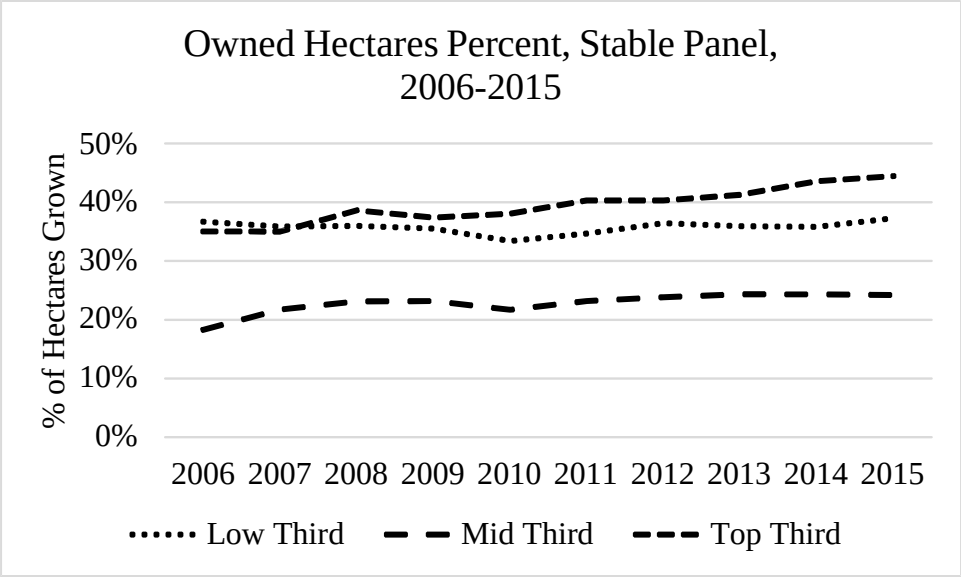

Figure 9. Owned hectares as percent of hectares grown, stable panel, 2006-2015

The top third further distinguished themselves in two other major categories – fuel and repairs, as well as interest expense. Farms in the top third had fuel and repair expenses that were $59 better per hectare than the mid third, and $92 better than the low third. This difference would point to management's ability to capitalize on opportunities for lowered fuel prices, as well as better maintenance of equipment and buildings.

While the land rent per hectare difference between the top and low groups was not as drastic as the difference with the mid third, the difference in interest expense per hectare between the top and low groups is vast. In fact, the nearly $80 difference in median interest expense between the top and low groups demonstrates another key characteristic of the top farms in this dataset. They have less debt per hectare. Top farms had a median liabilities per hectare figure of $1,562.65 (adjusted to 2015 dollars), while the mid third had $2,144.83 per hectare and the low third had $3,002.75 per hectare. Top farms also had less debt in the last two years than at any other point, shown in figure 10.

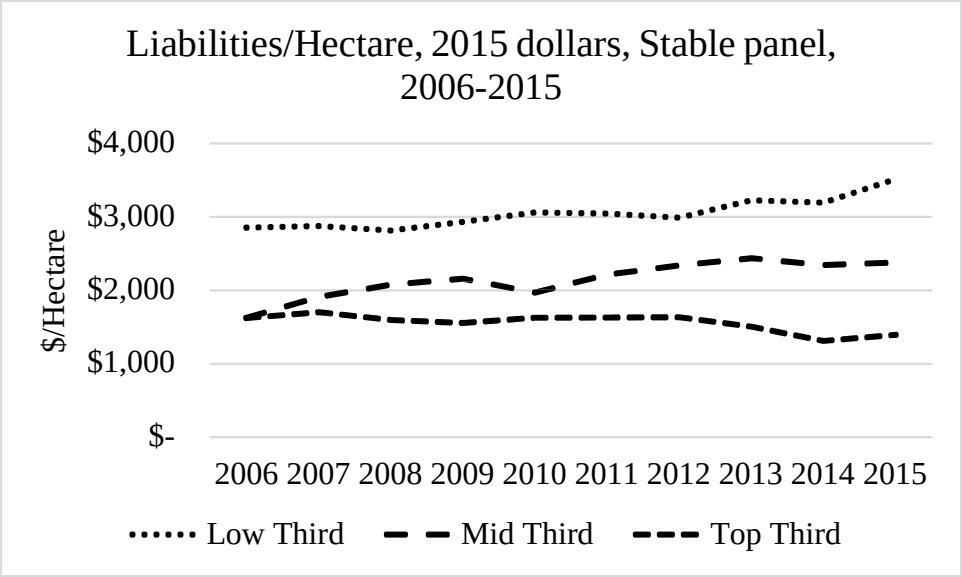

Figure 10. Liabilities per hectare, 2015 dollars, stable panel, 2006-2015

The top farms became the top farms because they were able to control expenses. While not a new concept, the data discussed in this paper shows that the expenses to control are not necessarily the major expenses that are typically considered. This work has discussed how the top farms did not cut direct expenses compared to others; rather they managed their overhead costs throughout the time period examined. They were able to maintain equipment, thereby requiring less maintenance, as well as less debt to purchase equipment. Further exploration in this topic is needed, however, as combining financial data with non-financial factors, such as negotiation skills or educational behavior, lend to the management abilities of producers.

5. Conclusions

Financial statements are a like a treasure map. Understanding their content can help a producer recognize their financial strengths and weaknesses. As discussed, a panel of 664 Minnesota farms that consistently contributed data to FINBIN from 2006-2015 were examined to determine how often farms move between efficiency groups as determined using the NFI/VFP ratio. This ratio describes how much of the farm's production is retained as returns to labor and management, and removes effects of farm size on overall profitability. This is confirmed by the panel data in that the top third did not have the most crop hectares of the three efficiency groups.

Farms in the panel moved between efficiency groups 51% of the time, though most of the movement occurred in the mid third group. It was more common that a farm would stay in the top or low third if they were already in that group. The question remained – what characteristics do the top third possess that allows them to consistently maintain their top third status? While the value of farm production per hectare did account for a small portion of the difference in NFI/ha, the larger difference resulted from operating expense management. The top third of farms were better able to convert operating expenses into labor and management returns. This group was far more successful in this area, further evidenced by the opexp%. However, the area in which the top farms distinguished themselves was not in direct expenses, but in overhead. Land rent, fuel and repairs, as well as interest expenses were far lower for the top farms. These expenses demonstrate that top farms were better able to maintain what they already had to avoid an added burden of debt. The top third group had more of their gross revenue stored in working capital. These items work together to describe the consistently top farms in the panel, and hypothesize what they do year after year to make them the top farms.

The current environment in agriculture is one of financial stress, so how can other producers use this information to improve their farming operation? This information can be used to emphasize to producers the importance of expense efficiency as seen in the top farms, and to benchmark themselves against previous performance and the top farms. The farms that will continue to be successful in production agriculture will be those that are able to convert operating expenses into returns to labor and management the most efficiently, as well as building working capital to withstand price declines and avoid added debt.

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