

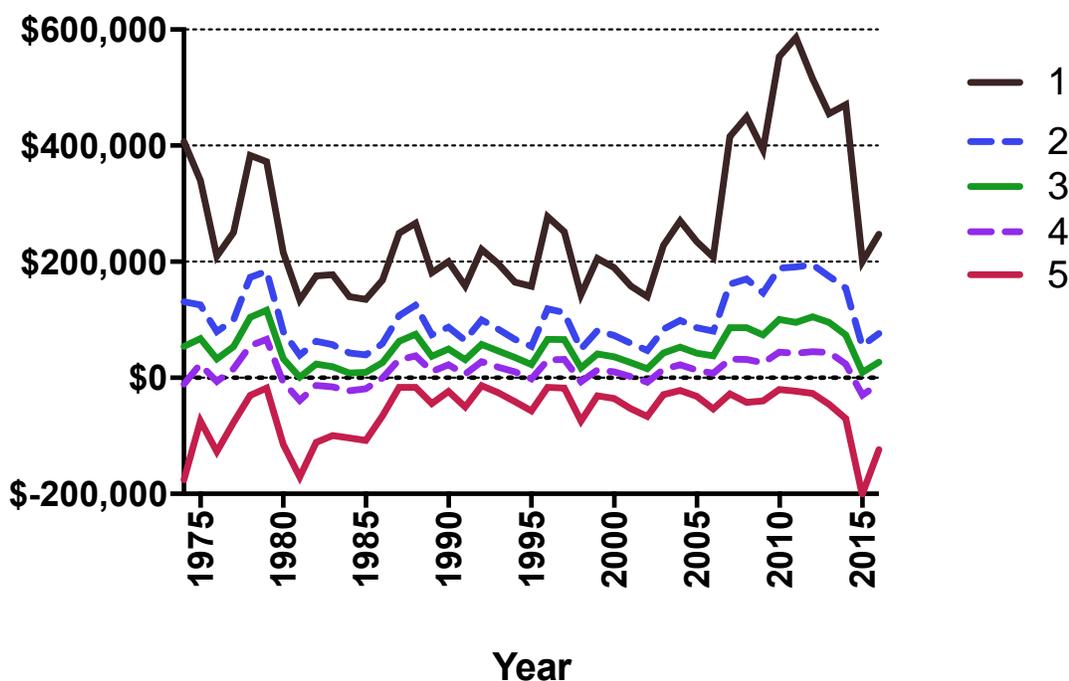
# Machinery Replacement Strategies

Gregg Ibendahl ([ibendahl@ksu.edu](mailto:ibendahl@ksu.edu))

Kansas State University Department of Agricultural Economics – September 2017

The current farm financial climate that started in the mid 2010’s has many of the same characteristics of the 1980’s farm crisis. Then, as now, net farm income leading up to the farm crisis was near record levels but dropped very quickly. During the 1980’s farm crisis, net farm income was below zero for many farms. Net farm income has not approached those low levels until the last few years.

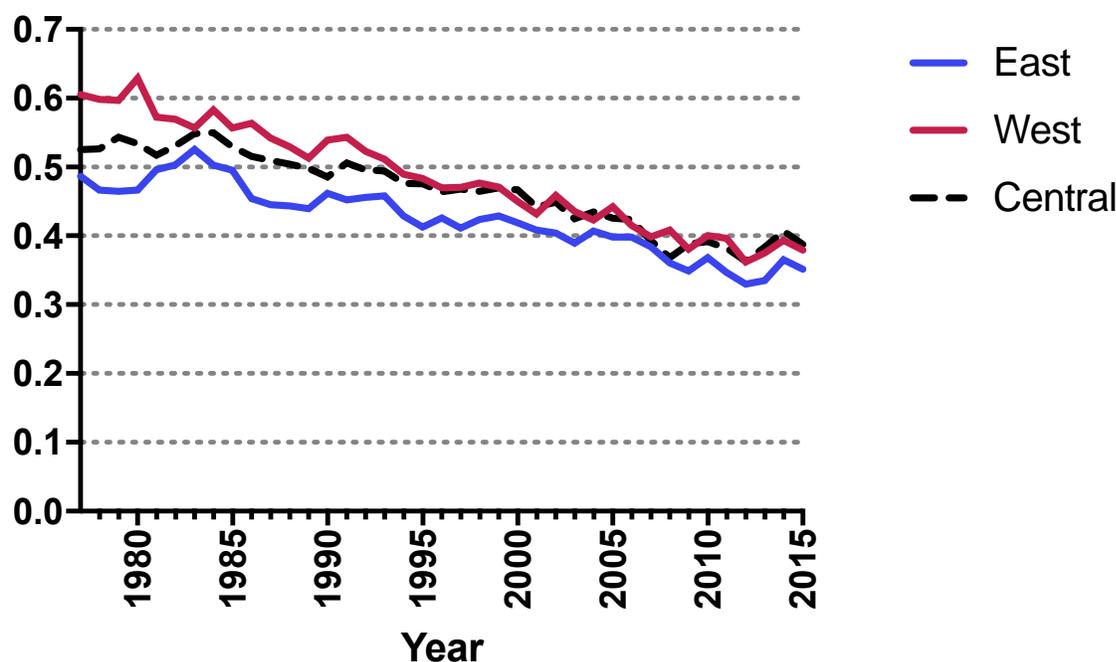
As shown in Figure 1, which represents net farm income by quintile group, there are many similarities to the 1980’s when comparing the net farm income amounts leading into the farm crisis. As Figure 1 indicates, in any given year, the bottom 20% of net farm income farms typically break even. However, during the 1980’s farm crisis the bottom quintile group lost money. This is now being repeated currently.



**Figure 1. Average NFI by Quintile Group**

Despite the difficulty of the 1980’s farm crisis, many farms managed to survive. These farms made machinery adjustments that greatly helped their cash flow. Machinery costs as a percentage of total costs are quite high. As shown in Figure 2, machinery costs as a percentage of total costs is nearly 40%. This percentage is actually lower than it was in the 1980’s when it was over 50%. A shift to no-till production

and better pesticide technology as well as efficiency gains from bigger equipment have help reduce the share of costs attributable to machinery.



**Figure 2. Machinery Costs as a Percent of Total Costs**

Despite the change in machinery costs, equipment is still a significant cost item on most farms. Machinery can also have a big effect on cash flow. Farmers can survive a limited period of low profitability if there is adequate cash on hand to meet expenses and contribute to family living. However, running out of cash can bankrupt a farm business. This is especially true in times of farm financial stress when agricultural lenders may be reluctant to provide operating loans to farmers.

There are several strategies farmers can use to replace equipment and they all have different effects of cash flow. There are at least five replacement strategies that farmers can follow with their farm equipment. From a profitability perspective, the best strategy is to minimize the long-run cost of the equipment by replacing equipment when the annual cost of the equipment in a given year starts to exceed the equipment cost from replacement (Perrin, 1972). By minimizing the cost of equipment, farmers are maximizing their long-run profits. However, from a cash flow perspective, this strategy may not be optimal as some equipment might be replaced in years of low profitability resulting in cash flow problems for farmers.

The four other strategies as outlined by Edwards are to replace frequently, replace something every year, replace when cash is available, or keep the piece of equipment forever. Replacing frequently is a strategy of minimizing breakdowns and repairs and maintenance by trading machinery every few years

or less. Repairs, if needed, would likely be covered by warranty and thus not cost the farmer anything. However, the farmer is replacing equipment before it reaches its cost minimization point, so it is likely not the most profitable option or the best for cash flow. Farmers who practice this strategy likely value reliability and want to minimize the cost of down time.

The next option is to replace something every year so that the amount spent every year is approximately the same. This strategy avoids farmers having to make large cash outlays in any given year. The disadvantage of this strategy is that machinery might be replaced before it has reached its cost minimization point and thus long run profitability might be less than optimal. However, from a cash flow perspective, farmers might be able to finance purchases from earnings rather than using debt financing as the amount of cash outlay is consistent from year to year. Still, overall cash flow for a farmer could be a problem as there may be some years of low profitability where there isn't enough cash generated to pay for any equipment purchases.

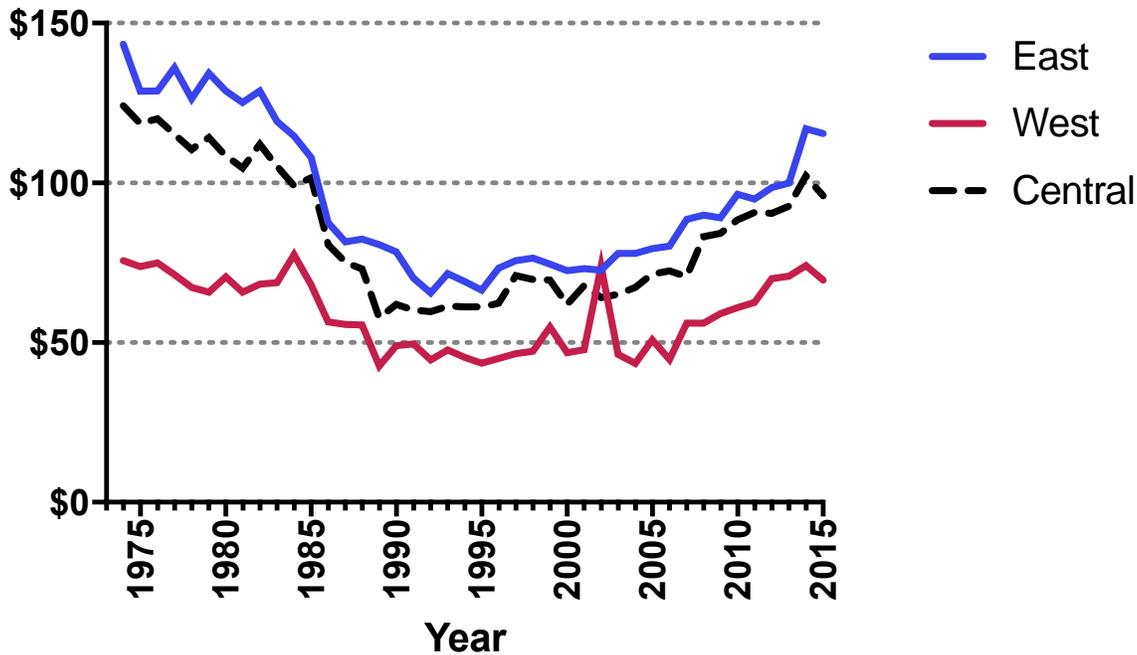
The option practiced by many producers in Kansas is to replace when cash is available. This approach has the advantage of evening out cash flow by buying and expensing farm machinery in the most profitable years when more cash is available and then not buying in low profit years when cash is tight. While this approach might even out cash flow from year to year, long run profitability is less than optimal as some equipment might be replaced before it should and other equipment might be replaced past the optimal point of replacement.

The final option for machinery replacement is to keep the piece of machinery forever. In other words, farmers would keep the machinery until it no longer functions and cannot be repaired. This approach might maximize cash flow but long-term profitability is likely to be less than optimal if machinery is kept past its optimal replacement point. However, as shown in Perrin, the long run cost curve for a piece of machinery shows a long period of nearly flat costs. Thus, keeping the machinery longer than normal likely has minimal effect on profitability. The real danger with keeping machinery for a long time is the reliability factor. Older machinery will require more repairs and be less reliable. Producers who follow this strategy likely have other options should equipment break at a critical time. Such options might include extra machinery or quick availability to rental machines or custom operators.

It is clear when examining the equipment levels on KFMA farms that farmers have been practicing the strategy of replace equipment when cash is available. From 1990 to about 2007, farms in eastern Kansas maintained around \$175 of machinery per acre (in current dollars). Farms in central Kansas had \$150 of machinery per acre and farms in western Kansas had just under \$100 of machinery per acre. Starting in 2007, when grain farm income jumped to record levels, farmers took those extra profits and invested them into machinery. Current levels of farm machinery investment are from \$300 per acre in the east to \$150 per acre in the west.

This strategy of buying more and newer equipment during those very profitable years allowed farmers to build a "bank" of farm machinery. While the practice of increasing machinery investment per acre does add to a higher machinery costs per acre (see Figure 3), many of these extra costs are from the economic

costs of tying more money up in machinery that might have been used elsewhere. From a cash flow perspective, such a machinery strategy helps to smooth out year to year cash flow.



**Figure 3 – Total Machinery Costs per Acre**

Now farmers have a bank of machinery they can tap into to help survive the current period of lower profitability. By not having to buy equipment, farmers can hopefully maintain a positive cash flow even if profitability remains depressed.

References:

Edwards. <https://www.extension.iastate.edu/agdm/crops/html/a3-30.html>

Perrin, R. K. (1972). Asset replacement principles. *American Journal of Agricultural Economics*, 54(1), 60-67.

[View more information about the authors of this publication and other K-State agricultural economics faculty.](#)

For more information about this publication and others, visit [AgManager.info](http://AgManager.info).

K-State Agricultural Economics | 342 Waters Hall, Manhattan, KS 66506-4011 | (785) 532-1504 | fax: (785) 532-6925

[Copyright 2017 AgManager.info, K-State Department of Agricultural Economics.](#)