Managing Machinery Expenses



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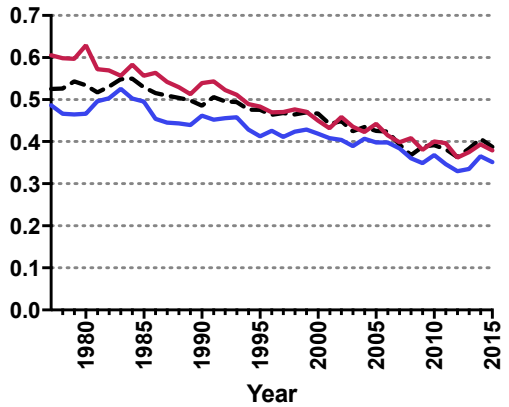
Machinery costs as a percent of total costs



Based on KFMA data

- Machinery costs as a percent of total costs have declined
  - No till
  - Size advantages
  - Better machinery technology
  - GMOs
- Still, machinery expense 35-40% of total costs

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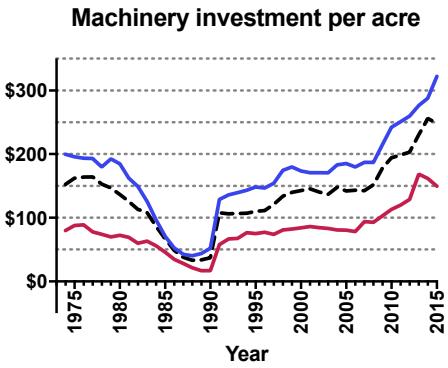
How did we get through the 80's farm crisis?



Adjusted for inflation

- Farmers quit buying machinery during 1st farm crisis
  - Farmer's choice or lender's requirement?
  - By 1989, machinery investment was only 25% of pre-crisis level
- Recovery of machinery investment by early 1990's
- Newer or additional machinery added started in 2007
- Machinery reserve?

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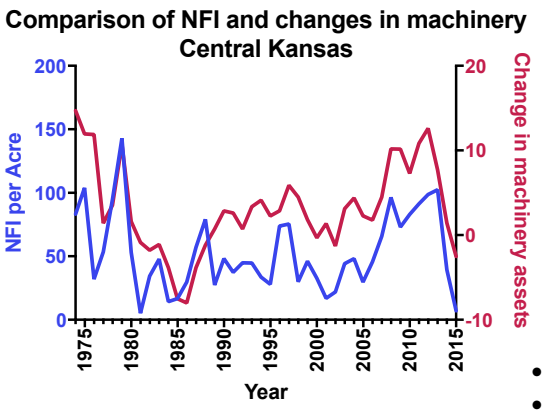
Strong correlation between NFI and machinery purchases



- 0.69 correlation
- No indication of any lag
  - Farmers react quickly to changes in NFI when making machinery purchase decisions
  - Trying to take advantage of 179 depreciation?

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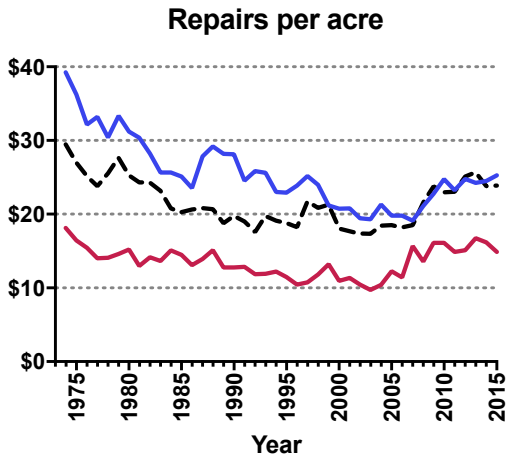

- Lack of purchases during 1980 crisis did not lead to greater repairs
  - More repairs done on farm?
  - Are on-farm repairs possible today?
- Gradual decline in repairs per acre until 2007

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Options for Machinery

- Purchase
  - Replace frequently
  - Replace something every year
  - Replace when cash is available
  - Keep it forever
- Lease
- Rent
- Custom Hire

Questions to Consider

- How much will it cost? (total cost *and* $/acre) Will the machine increase efficiency or profitability on my operation? Can my capital be used more profitably in other areas of my farm? (ROI)
- Can I afford it? How much capital do I need? How will it impact my working capital and cash flow?
- Are there tax advantages to owning? (Depends on your situation)
- What about reliability and timeliness?

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First, Make Sure Equipment is Running Well

- Half of corn loses at corn head
- 2 kernels per ft^2 = 1 bu acre loss
- 1 ear in 436 ft^2 = 1 bu acre loss (loss in 1/100 of an acre)

Seeds per sq ft = 1 bu for other crops

- Wheat – 20 seeds per ft^2
- Soybeans – 4 seeds per ft^2
- Sorghum – 31 seeds per ft^2

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Option 1: Purchase

- Advantages
  - Control over use of machine, easier management, timeliness
  - Generally considered less expensive in the long run
  - Tax advantages – expense up to $500,000; no SE tax when sold
- Disadvantages
  - May require more cash up front, tie up capital
  - Farmer pays for all operating expenses (labor, fuel, repairs, insurance, taxes)

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Reasons to Replace

- Cost minimization
  - Rule of thumb: Replace when the annualized total cost of owning and operating the machine begins to increase
    - i.e., Depreciation and interest decrease over time while repairs increase and fuel costs stay constant
  - Models are very sensitive to estimates
    - Requires some knowledge of future repairs
  - Typical curves are very flat
    - i.e., wide possible range of replace ages

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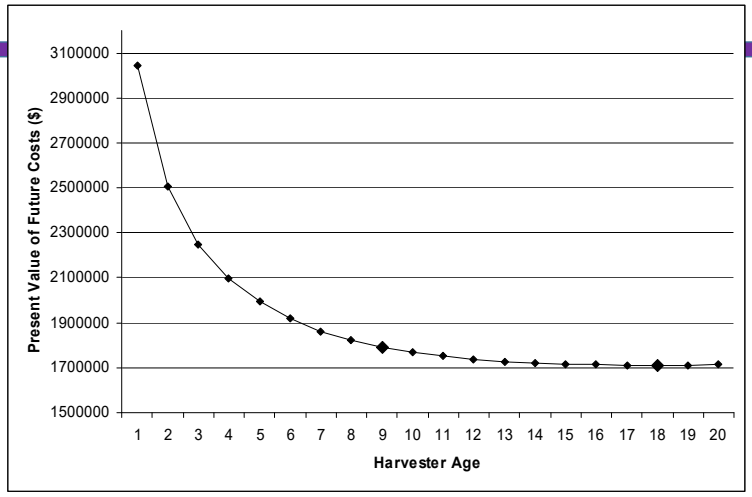
Example of cost minimization



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Reason to Replace (cont)

- Reliability
  - Previous cost minimization left this out
  - Ability to get crop planted or harvested at the optimal times
    - Small harvest windows
    - Weather damage the longer crop stays in the field
  - Difficult to measure
    - Intuition?

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Reason to Replace (cont)

- Other
  - Pride of ownership
  - New technology
  - Need for capacity

Replacement Strategies

- Replace frequently
  - More reliable equipment
  - Equipment under warranty
- Replace something every year
  - Evens out equipment spending
  - May reduce borrowing needs
- Replace when cash is available
  - Levels out NFI
  - Difficult to predict

Replacement Strategies (cont)

- Keep it forever
  - May be least costly option
  - May be best for cash flow
  - Reliability becomes a factor
    - Need for backup equipment
  - Sacrificing latest technology

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Option 2: Lease

- Advantages
  - Control over use of machine, timeliness
  - Locks in payments (i.e., inflation hedge)
  - Conserves capital for other uses (lease payments may be lower than loan payments)
  - Good option for rapidly expanding business or farmer planning to retire in 3 – 5 years
- Disadvantages
  - Does not allow for the buildup of equity

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Option 3: Rent

- Advantages
  - Short-term contract (hours, days, weeks, or months)
  - Low capital commitment
  - Better control over machine operation
- Disadvantages
  - The number of rental companies might be limited
  - Farmer needs to operate machine
  - May need insurance on machine

Option 4: Custom Hire

- Advantages
  - Producer not responsible for machine repairs, daily maintenance, selling machine, etc.
  - Free up time and avoid hiring part-time help
    - i.e., Operator is part of package
  - No long-term capital commitment
  - Ideal for specialized work
  - Know your costs in advance (no surprises)
- Disadvantages
  - Less control over timeliness and quality of work

Summary of methods of acquiring machinery

Method	Capital outlay required for investment	Cash flow requirements	Repairs and maintenance costs	Income tax deductions	Operating labor	Control over use and timeliness of operation	Risk of obsolescence
Ownership:			Full cost		Supplied by farm operator	Full control	Full risk
Cash purchase	Full cash cost	Operating costs		Depreciation, operating costs			
Credit purchase	Down payment or trade-in	Operating costs plus loan payments		Depreciation, operating costs, interest			
Custom hire	No investment capital required	Custom hire cost	No cost	Custom charges	Supplied by custom operator	Limited control over timeliness and use	No risk
Short-term rental	No investment capital required	Operating costs plus rental fees	Limited cost depending on agreement	Rental fees	Supplied by farm operator	Limited control over timeliness and use	No risk
Lease:	No investment capital required	Operating costs plus lease payments	Full cost		Supplied by farm operator	Full control	
Operating lease				Lease payments, operating costs			Low risk
Finance lease				Depreciation, interest, operating costs			Full risk

From Iowa State Publication A3-21

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Summary –

Considerations for farmers for the next few years

- Many farmers built up a "bank" of machinery
  - Time to draw down these reserves
  - Reducing machinery investment per acre by 50% would put farms inline with historical norms
- Proper maintenance can help reduce field loses as well as reduce repairs
- When equipment is needed, analyze all options for impacts to profitability as well as cash flow.

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Examples

Lease vs Purchase spreadsheet (Iowa State) -
https://www.extension.iastate.edu/agdm/crops/xls/a3-21_35machfinancing.xls

Machine ownership vs Custom hire (Iowa State) –
https://www.extension.iastate.edu/agdm/crops/xls/a3-330wnerch.xlsx

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Lease or Purchase Example: Case IH 9230 Combine

Purchase Price	$317,500
Down Payment	20%
Interest Rate	6.90%
Loan Length (years)	5
Annual Payment	$61,782
Salvage Value (in 5 years)	$162,000
Section 179 Deduction	$500,000
Book Value (in 5 years)	$58,963

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Example: Case IH 9230 Combine

Annual Insurance and Housing	$2,242
Annual Repairs	$2,540
Annual Labor	$4,112
Annual Fuel and Oil	$8,811
Total Fixed and Variable Costs	**$17,705**
Federal Tax Rate	18.0%
Self Employment Tax	15.3%
State Tax Rate	0.0%
Total Tax	**33.3%**

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Purchase Case IH 9230 Combine

Net Cash Flows for Purchase

Year	Down/Loan Payment	Remaining Value When Sold	Repair Costs	Tax Savings or Payments	Net Cash Flow
0	$ 63,500				$ 63,500
1	61,782	$ -	$ 1,265	$ (101,356)	(38,308)
2	61,782	-	2,054	(5,999)	57,838
3	61,782	-	2,872	(5,276)	59,379
4	61,782	-	3,713	(4,495)	61,001
5	61,782	(109,274)	4,571	(3,649)	(46,570)
6	-	-	-	32,151	32,151
Total	**$ 372,412**	**$ (109,274)**	**$ 14,475**	**$ (88,622)**	**$ 188,991**

Source: Iowa State University Extension

Cash flow is now a more important consideration

Selling combine creates income tax

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Lease Case IH 9230 Combine

Net Cash Flows for Lease					
Year	Lease Payments	Remaining Value When Sold	Repair Costs	Tax Savings or Payments	Net Cash Flow
0	$ 42,000				$ 42,000
1	42,000	$ -	$ 1,265	$ (13,408)	29,857
2	42,000	-	$ 2,054	(13,811)	30,242
3	42,000	-	$ 2,872	(14,063)	30,809
4	42,000	-	$ 3,713	(14,325)	31,388
5	-	-	$ 4,571	(14,593)	(10,022)
6	-	-	$ -	(1,459)	(1,459)
Total	**$ 210,000**	**$ -**	**$ 14,475**	**$ (71,659)**	**$ 152,816**

Source: Iowa State University Extension

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Purchase vs. Lease Comparison

Yearly After-tax Cash Outflows		
Year	Purchase	Lease
0	$63,500	$42,000
1	-$38,308	$29,857
2	$57,838	$30,242
3	$59,379	$30,809
4	$61,001	$31,388
5	-$46,570	-$10,022
6	$32,151	-$1,459
Total cash flow	**$188,991**	**$152,816**
Present value	$169,928	$142,203
Annual cost	**$38,819**	**$32,485**

Adjustment for time value of money →

Source: Iowa State University Extension

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Purchase vs. Custom Hire: 1,825 acres

Self-Propelled Harvester or Sprayer: Ownership versus Custom Hire

Ag Decision Maker -- Iowa State University Extension and Outreach

AgDM File A3-33 Combine Ownership or Custom Hire

Place the cursor over cells with red triangles to read comments.

Enter your input values in shaded cells.

Ownership Input Values

	Base Unit	Attachment or Harvesting Head			
Type of machine	SP combine	Corn	Soybeans	Wheat	Total
Purchase price or current used value of machine	$317,500				$ 317,500
Current new list price of comparable machine	$317,500				$ 317,500
Accumulated hours of use (engine)	-				hours
Current age of machine	2				years
Years of ownership remaining	5				years
		Corn	Soybeans	Wheat	
Acres of your own crop harvested or sprayed annually		650	325	850	1,825
Acres harvested or sprayed for others annually,custom hire		-	-	0	-
Acres harvested or sprayed per hour	Click for typical values	9.7	12.9	12.9	acres/hour
Fuel used, gallons per acre	Click for typical values	1.45	1.00	1.00	gallons/acre
Price of fuel, $ per gallon	$2.50	/gallon			
Interest rate for machinery investment	6.90%				
Machinery labor rate, $ per hour	$18.00	/hour			
Hours of labor needed for hauling, drying, storing	150	hours			

Source: Iowa State University Extension

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Purchase vs. Custom Hire: 1,825 acres

Total cost per acre including base unit	**$45.58**	**$34.00**	**$34.02**	**$38.09**
Total cost including labor for hauling, drying, & storing	$47.35	$35.32	$35.34	$72,222
Custom hire income received				$0
Total cost minus custom hire income				**$72,222**

KSU 2016 Custom Rates based on yield

Custom Hire Input Values

Input Data		Corn	Soybeans	Wheat	Total
Custom hire charge per acre		$34.17	$27.67	$28.44	
Extra (+) or reduced (-) field loss from custom harvesting, %					
Expected yield, bu. per acre *(leave blank if no field loss)*		95	28	50	
Expected price, $ per bu. *(leave blank if no field loss)*		$3.30	$10.25	$4.15	
Value of extra or reduced yield		$0	$0	$0	$0
Hours of labor needed for hauling,drying,storing	150	$1,146	$427	$0	$1,573
Custom hire charge		$22,211	$8,993	$24,174	$55,377
Total annual cost for custom hiring		$23,356	$9,420	$24,174	**$56,951**
Total cost per acre for custom hiring		$35.93	$28.99	$28.44	$31.21

Comparison

Added savings (+) or cost (-) for ownership	Custom hire is less costly.	**($15,272)**
Minimum acres of own crops to break even on ownership		2,453
Minimum acres of custom work needed to break even on ownership, if any		-

Source: Iowa State University Extension

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Alternative 1: Joint Ownership

- Must reach agreement
  - Work habits and care of the machine
  - Scheduling
  - Labor and repairs – who is responsible?
- Written agreement to dissolve
  - Disagreement
  - Termination from farming by one party (retirement, death, expansion)
  - Method to determine machine's value

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Alternative 2: Rent Out Machinery

- Generates additional revenue
- Spreads machinery costs over more acres
- Works best to rent outside of local area (when you don't need the machine)

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Questions or comments?

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