



Additionality in U.S. Agri-Environmental Programs for Working Land: A Preliminary Look at New Data

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USDA working land programs have grown rapidly

- Fund practices for land in crop production, grazing, and other forms of livestock production
- Funding increased sharply over the past decade:
 - \$200 million in 2000; \$2 billion in 2010
- Largest working land programs:
 - Environmental Quality Incentives Program (EQIP)
 - Conservation Stewardship Program (CSP)
 - Conservation Reserve Continuous Signup (CRP)



What are we getting for our money?

- Are practices additional?
 - Are payments leveraging adoption of practices that would not be adopted without payments?
 - Are payments accelerating the pace of practice adoption?
- What can be done to increase additionality?
 - Focus payments on subset of practices that are not likely to be adopted without incentives?
 - Focus payments in regions where practices are most likely to be additional?



Do we observe farms where adoption of specific practice is unlikely without an incentive?

- Methodology: Matching Estimator
 - Match farms where practice adoption was subsidized with farms not subsidized
 - Matching methods are designed to identify non-subsidized farms that are observationally very similar to the subsidized farm
 - Nearest neighbor
 - Propensity scores
 - Additionality is high if few of non-subsidized farms also adopted the practice



Do we observe farms where adoption of specific practice is unlikely without an incentive?

- Data: Agricultural Resources Management Survey
 - Crop specific field data; 2009 wheat, 2010 corn
 - Field and farm-level data
 - Asked about use of conservation practices, when they were adopted, and whether payments were received
 - Tillage
 - Nutrient management
 - Soil Conservation structures (e.g. terraces)
 - Buffers (filter strips, riparian buffers)

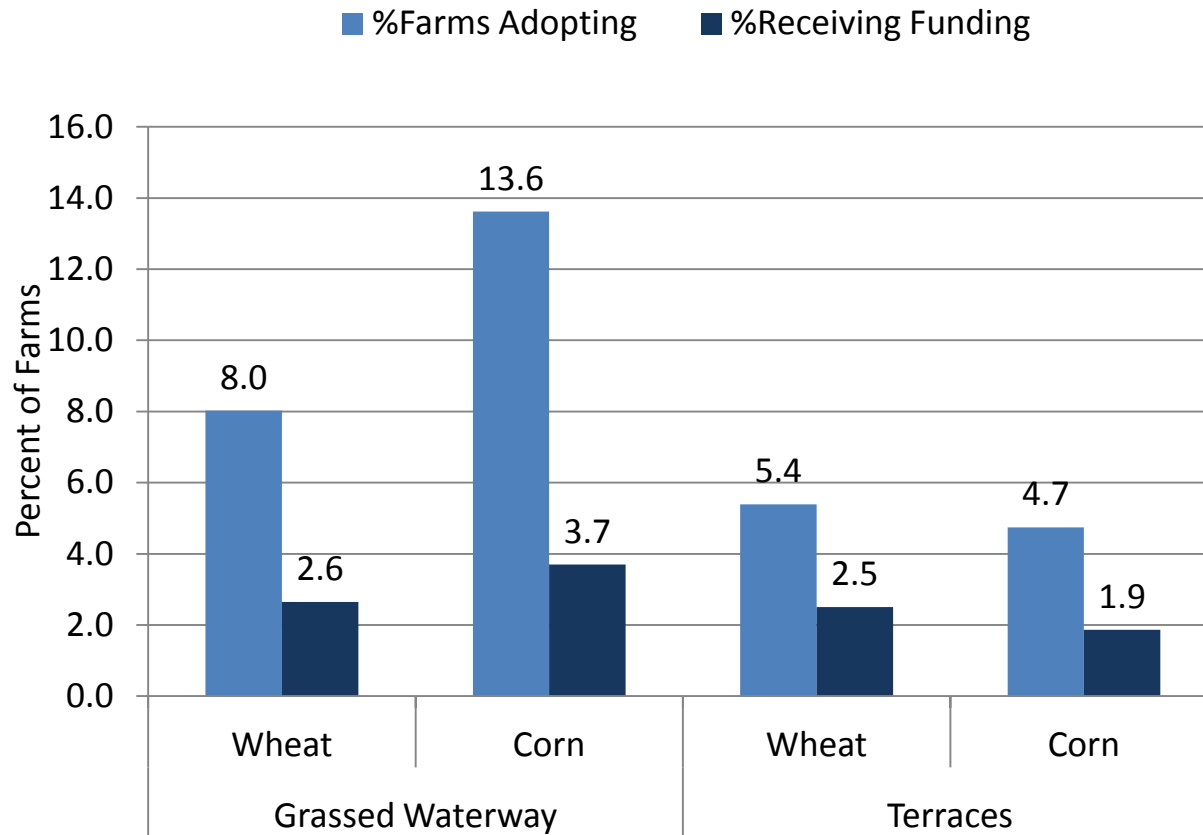


Structural soil conservation/buffer practices

- Terraces
 - Shorten slope length
 - Divert runoff from fields
- Grassed waterways
 - Carry runoff off fields
 - Filter out sediment and nutrients

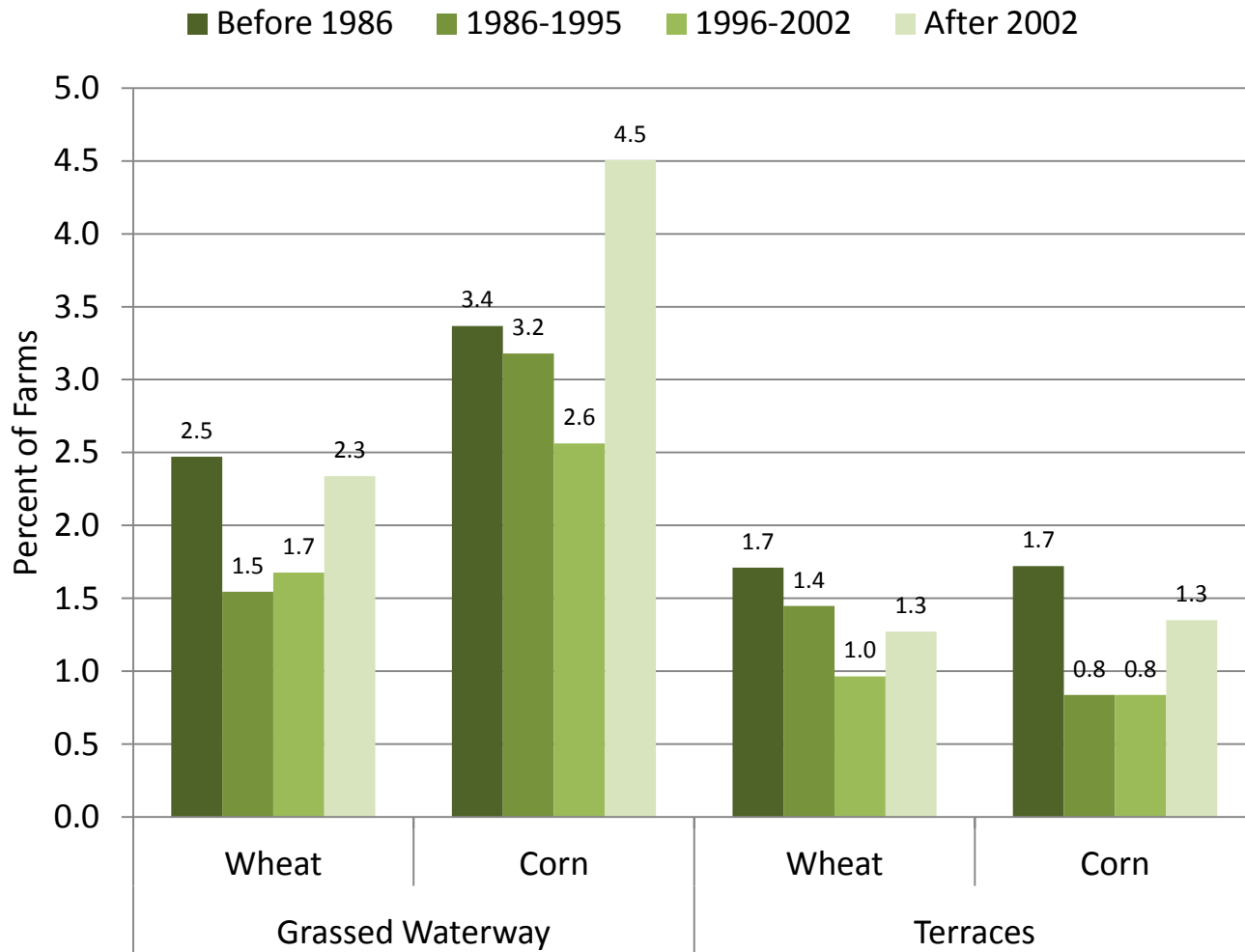


Structural practice adoption on wheat (2009) and corn (2010) fields in ARMS survey



Source: Economic Research Service, Agricultural Resources Management Survey, 2009 and 2010.

Large share of structural practices adopted in 2002 or earlier



Source: Economic Research Service, Agricultural Resources Management Survey, 2009 and 2010.

Management practices

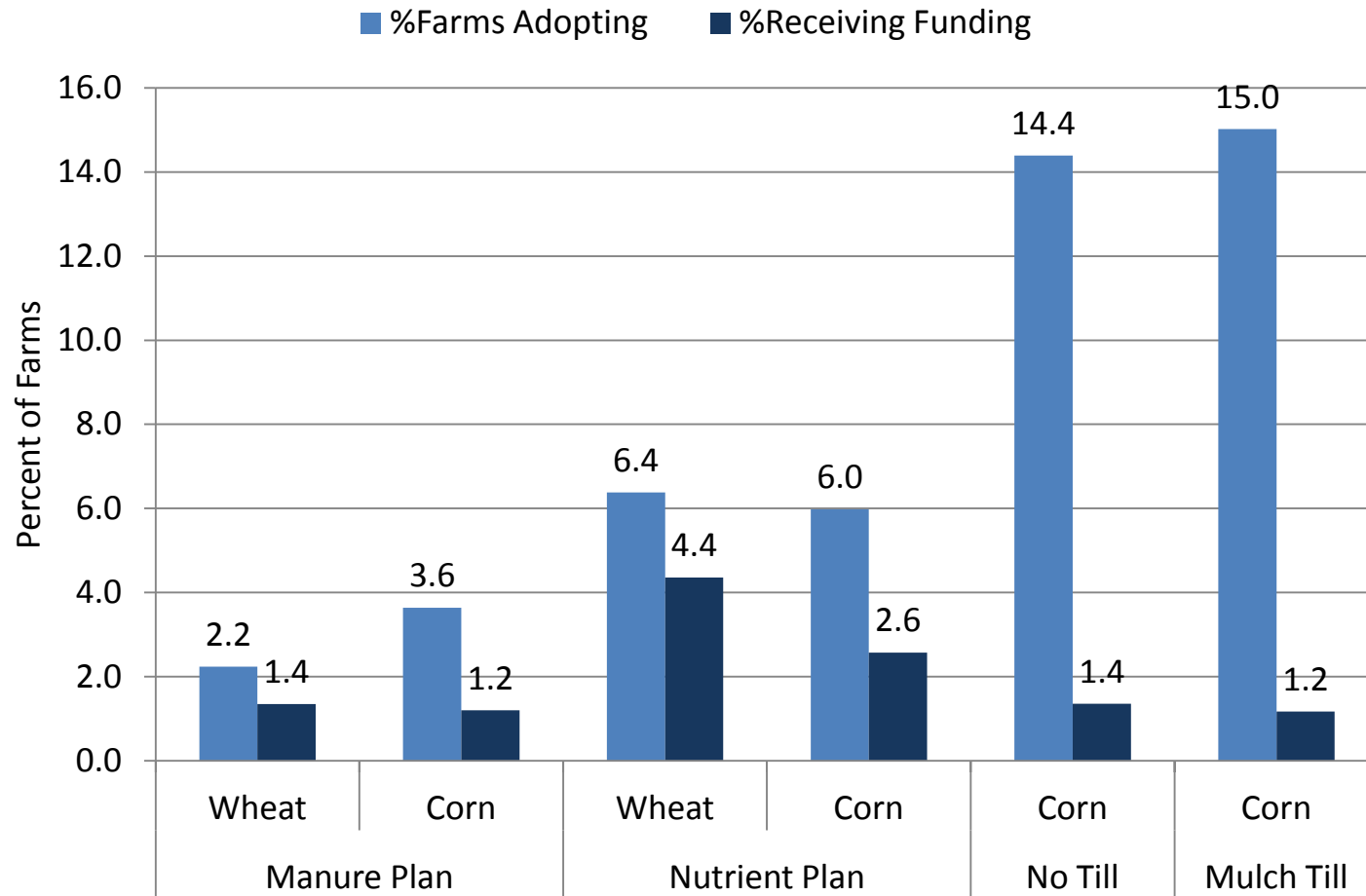
- Conservation tillage
 - Mulch till
 - No till



- Nutrient management
 - Comprehensive
 - Manure application

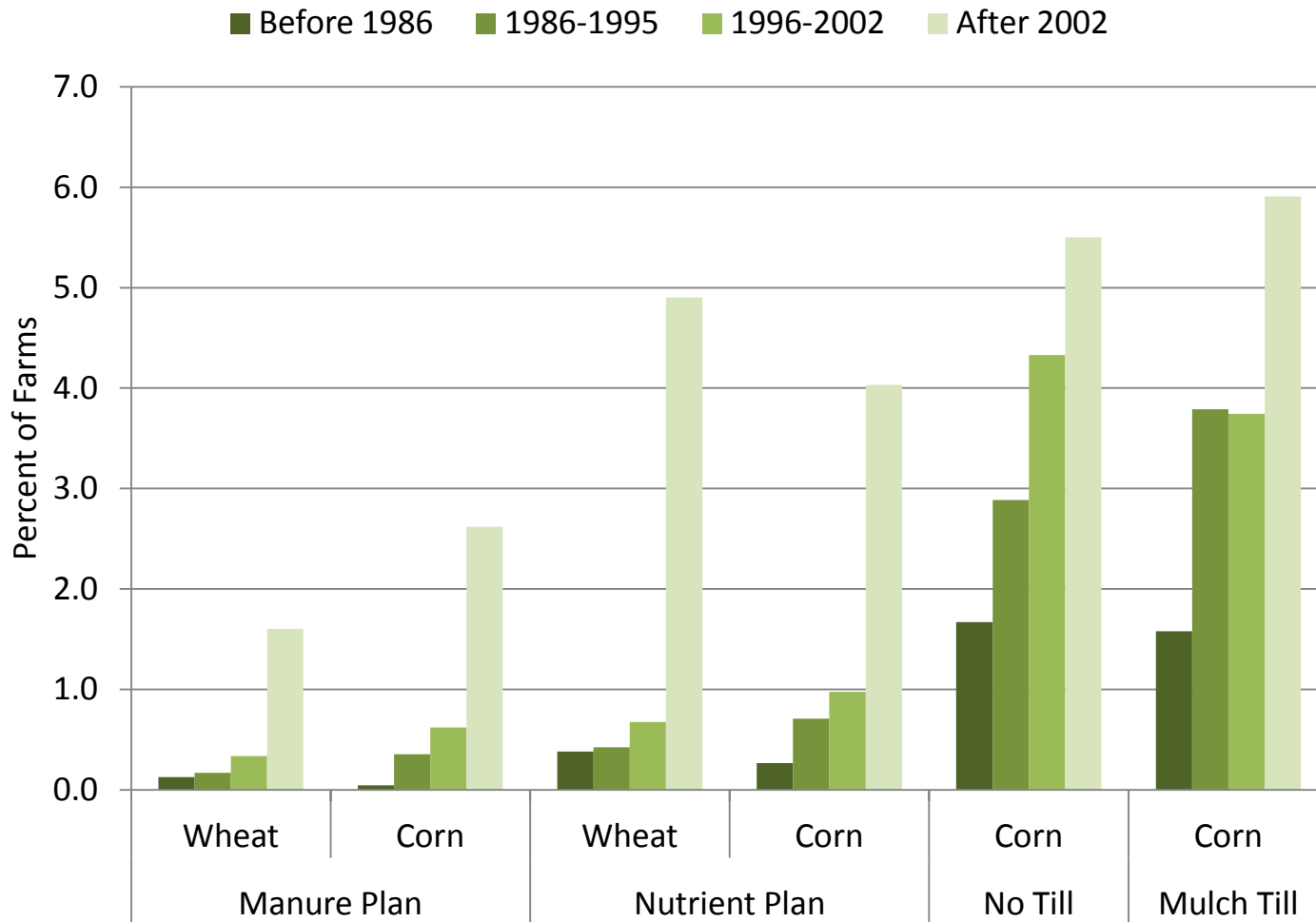


Management practice adoption on wheat (2009) and corn (2010) fields in ARMS survey



Source: Economic Research Service, Agricultural Resources Management Survey, 2009 and 2010.

Large share of management practices adopted since 2002



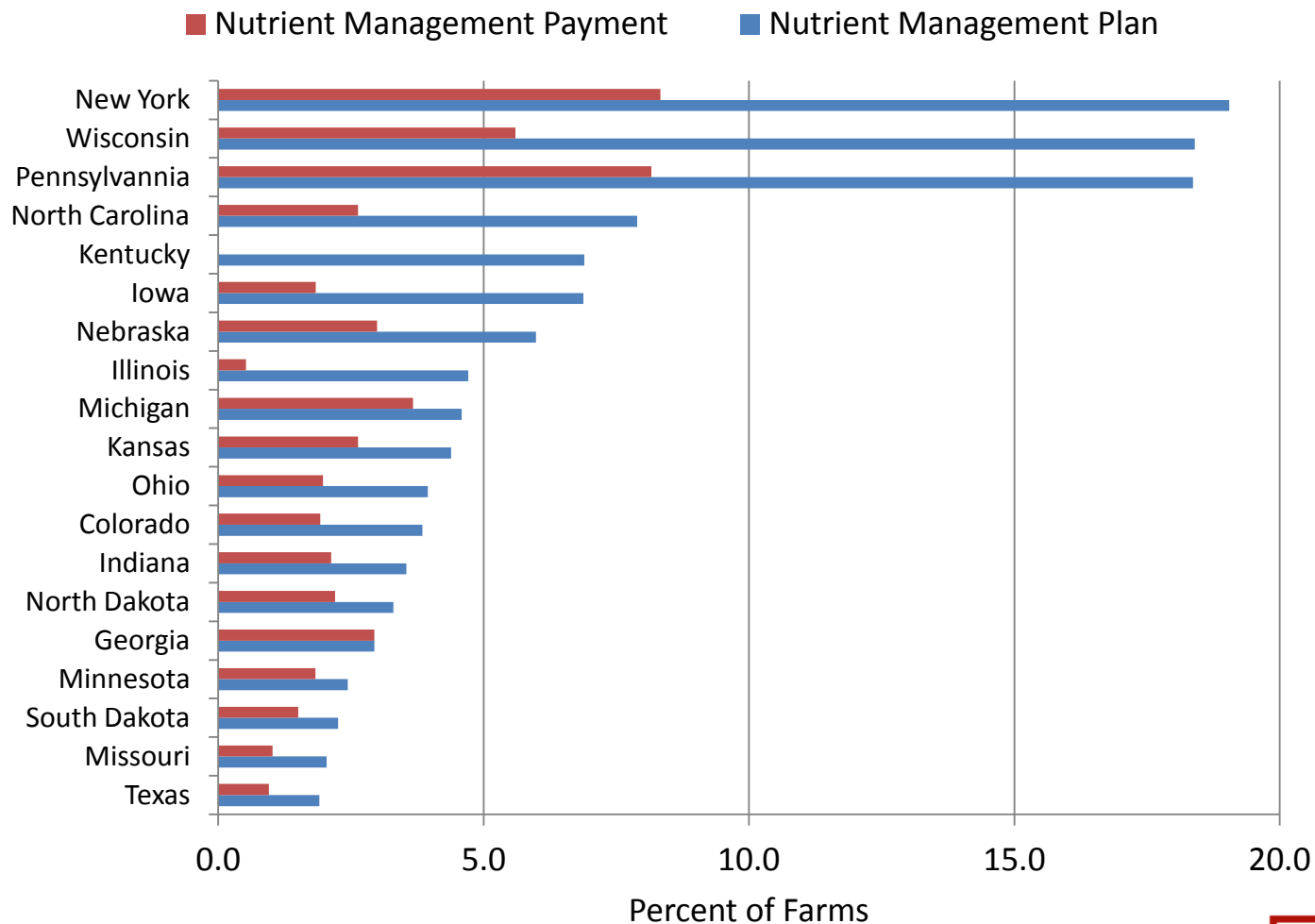
Source: Economic Research Service, Agricultural Resources Management Survey, 2009 and 2010.

A closer look at nutrient management in corn production for 2010

- Many states have their own nutrient management requirements
 - How do adoption and funding vary across states?
- A nutrient management Plan is a collection of practices.
 - Do farms with NM plans manage nutrients differently?
 - What is relationship to livestock operations?



Nutrient management plan adoption and payments vary state



Source: Economic Research Service, Agricultural Resources Management Survey, 2010.

Corn farmers with nutrient management plans were more likely to apply manure

Specific Practice		Nutrient Management Plan		No Nutrient Management Plan
		Funded	Not Funded	Plan
Average Nitrogen fertilizer application	lbs/acre	106	122	126
Average Expected yield	bu/acre	162	170	158
Average N application/expected yield	lbs/bu	0.67	0.71	0.81
Apply manure	%	40	43	19
Nitrogen inhibitor	%	14	15	13
Nitrogen soil test	%	52	19	22
Apply nitrogen in fall	%	7	11	18
Apply nitrogen after planting	%	52	40	34
Broadcast fertilizer without incorporation	%	26	38	33
Number of observations		42	53	1765

Source: Economic Research Service, Agricultural Resources Management Survey, 2010.

Corn farmers with nutrient management plans applied less nitrogen fertilizer in 2010

Specific Practice		Nutrient Management Plan		No Nutrient Management Plan
		Funded	Not Funded	Plan
Average Nitrogen fertilizer application	lbs/acre	106	122	126
Average Expected yield	bu/acre	162	170	158
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Source: Economic Research Service, Agricultural Resources Management Survey, 2010.

Corn farmers with nutrient management plans were more likely to test soil nitrogen

Specific Practice		Nutrient Management Plan		No Nutrient Management Plan
		Funded	Not Funded	
Average Nitrogen fertilizer application	lbs/acre	106	122	126
Average Expected yield	bu/acre	162	170	158
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Number of observations		42	53	1765

Source: Economic Research Service, Agricultural Resources Management Survey, 2010.

Corn farmers with nutrient management plans were less likely to apply fertilizer in the fall

Specific Practice		Nutrient Management Plan		No Nutrient Management Plan
		Funded	Not Funded	Plan
Average Nitrogen fertilizer application	lbs/acre	106	122	126
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Number of observations		42	53	1765

Source: Economic Research Service, Agricultural Resources Management Survey, 2010.

Corn farmers with nutrient management plans were more likely to apply fertilizer after planting

Specific Practice		Nutrient Management Plan		No Nutrient Management Plan
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Average Nitrogen fertilizer application	lbs/acre	106	122	126
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Source: Economic Research Service, Agricultural Resources Management Survey, 2010.

Challenges

- This early look at the data indicates that teasing out factors affecting additionality will be difficult
 - Overall, many farms have adopted conservation practices without payments
 - On the other hand, there appears to have been a surge in adoption of conservation practices that coincides with the post-2002 surge in funding for working land programs

Challenges

- Practices may be seen as complements or substitutes; practice-by-practice analysis may not be sufficient
 - Fertilizer application after planting may allow producers to reduce nutrients lost to the environment and lower application rates
 - The presence of terraces may discourage conservation tillage because soil erosion is already controlled

Challenges

- The likelihood of conservation program funding can vary across states, counties, and even farms
 - In the Environmental Quality Incentives Program, for example, states and even counties have considerable autonomy in allocating Federal conservation funds
 - In the Conservation Security Program, funding was focused on a limited number of watersheds
 - What practices are actually used on a given farm or field depends on some site-specific characteristics such as soil and topography and on what the farmer is willing to do