2014

Towards Sustainable Agricultural Systems: Scope for Economic Experimentation

Simanti Banerjee
University of Nebraska-Lincoln, simanti.banerjee@unl.edu

Cornhusker Economics

University of Nebraska–Lincoln Extension

University of Nebraska Lincoln

December 10, 2014

Institute of Agriculture & Natural Resources
Department of Agricultural Economics
http://agecon.unl.edu/cornhuskereconomics
Follow us on Twitter and Facebook @UNLAgEcon

Towards Sustainable Agricultural Systems: Scope for Economic Experimentation

Market Report	Year Ago	4 Wks Ago	12/6/14
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.	131.48	168.00	172.38
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	189.26	281.60	294.54
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	163.55	237.73	256.64
Choice Boxed Beef, 600-750 lb. Carcass.	202.65	250.35	255.44
Western Corn Belt Base Hog Price Carcass, Negotiated.	77.56	86.53	84.47
Pork Carcass Cutout, 185 lb. Carcass 51-52% Lean.	89.37	95.41	92.23
Slaughter Lambs, Ch. & Pr., Heavy, Wooled, South Dakota, Direct.	162.38	163.00	149.01
National Carcass Lamb Cutout FOB.	359.11	377.03	387.78
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	6.57	5.01	5.86
Corn, No. 2, Yellow Nebraska City, bu.	4.16	3.20	3.57
Soybeans, No. 1, Yellow Nebraska City, bu.	12.98	9.55	9.81
Grain Sorghum, No.2, Yellow Dorchester, cwt.	7.32	6.39	6.82
Oats, No. 2, Heavy Minneapolis, Mn, bu.	3.73	3.45	3.45
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	225.00	189.00	194.00
Alfalfa, Large Rounds, Good Platte Valley, ton.	135.00	85.00	85.00
Grass Hay, Large Rounds, Good Nebraska, ton.	115.00	85.00	83.00
Dried Distillers Grains, 10% Moisture Nebraska Average.	220.00	113.50	125.00
Wet Distillers Grains, 65-70% Moisture Nebraska Average.	61.00	43.50	45.45

* No Market

Agricultural systems provide multiple benefits for society. These benefits are derived from crop and animal production, income and livelihood generation, the natural environment and the cultural legacy of farming communities. Sustained delivery of these benefits depends on the clear understanding of agricultural processes fostered by cross-disciplinary collaborations between economists, animal scientists, ecologists, community development specialists, and agronomists, to mention a few. In this context, economic experiments can play a key role in enhancing the understanding of how people and communities respond to scientific innovations and socio-economic policies intended to safeguard the integrity of agricultural systems.

Economic experiments are human-subject experiments in which the experimenter systematically varies economic incentives facing subjects to evaluate how human beings respond to

- scientific innovations such as new varieties of seeds,
- shifts in economic policies such as changes in environmental objectives of farmland conservation programs
- new institutions such as changes in non-point source water quality trading schemes
- new social norms that may impact the socio-economic landscape of decision making

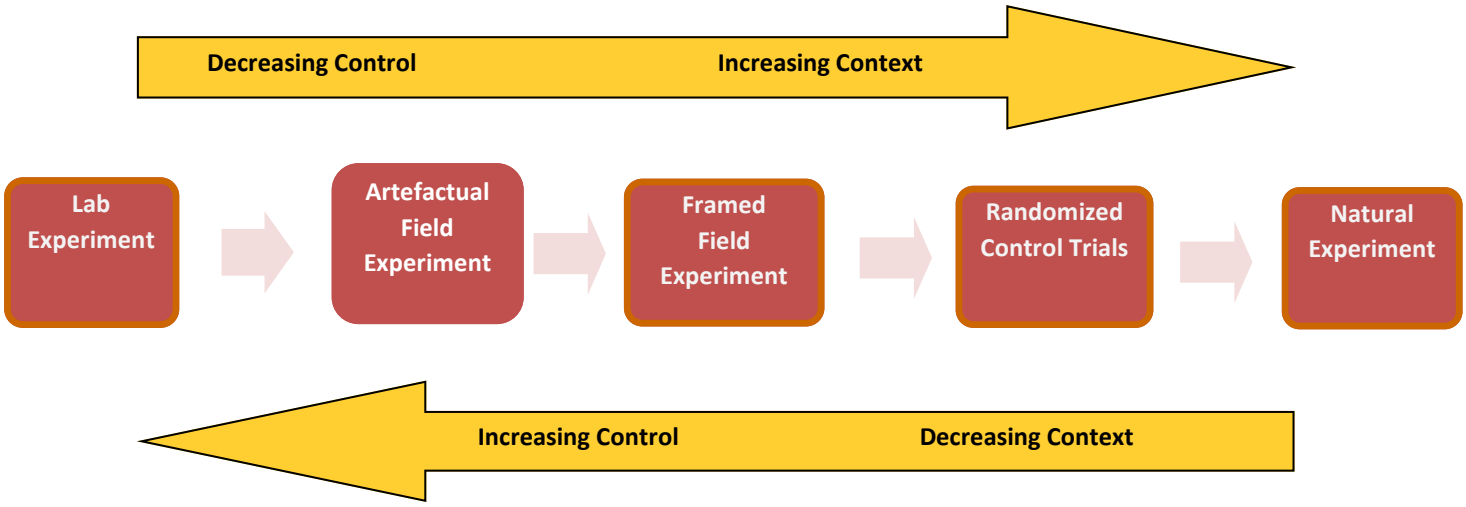
Experiments shed light on how heterogeneous sets of agents respond to new interventions and how human behavior differs from theoretical bench-

marks. There are different types of experiments depending upon the nature of the subject pool. On one end of the spectrum we have controlled and context-free *laboratory experiments* involving student subjects randomly recruited from a university's population. Lab experiments are useful for testing the proof-of concept and internal theoretical validity of new interventions before they are rolled out in the field with real stakeholders. They are low-cost relative to "field experimentation" with, for example, farmers (students have much lower opportunity costs of experimental participation than farmers) and permit the wind-tunnel testing of new policies just as one would test an aircraft prototype (Shogren 2004). On the other end of the spectrum are *natural experiments* where experimental intervention is determined by nature, historical events or randomly implemented policy measures. These experiments are characterized by zero experimenter control and full real life context and enable the study of societal phenomenon in their most general form. In between, are other types of experiments broadly classified as *field experiments* which vary on the basis of the control and context introduced into the experimental environment often known as the testbed (Plott 1997) and the nature of the subject pool. The figure provides a representation of this classification.

While considering this classification, we note that rather than considering one class of economic experiment to be more representative and/or more real than another, scientific investigation and effective policy making are better served by considering that each experiment type provides useful guidance for designing the next one. For example, lab experiments provide results which can inform the effective design of artefactual field experiments involving real stakeholders (i.e. more real life context but less experimenter control).

Traditionally, economic experiments focused on testing theoretical predictions associated with different types of market structures such as monopoly. Then they came to be used extensively to study strategic behavior and Nash equilibrium selection in different types of games. These were typically context neutral laboratory experiments with applications to a wide variety of socio-economic contexts. In relation to agricultural systems, experimentation has focused on testing new policies to combat agricultural water pollution (Suter et al. 2010), protect biodiversity by reducing habitat fragmentation on private farmland ecosystems (Parkhurst and Shogren 2007, Banerjee et al. 2014), study behavior in relation to ground water extraction for agriculture (Suter et al. 2012) and willingness to adopt new farming technologies (Duflo et al. 2011).

Experimentation has also opened up the possibility of studying the manner in which various behavioral and non-economic factors impact economic decision making. For example, experimenters routinely elicit subject's risk attitudes (Holt and Laury 2002) and time discount rates (Harrison et al. 2002) to test how these features impact behavior. Consideration of non -economic factors as well as the general agreement that the rational agent model may not always apply has opened up channels of collaboration between economists and psychologists and the growth of the new field of behavioral economics For example Weng and Carlsson's (2013) study shows how kinship towards one's team impacts common property resource extraction decisions, Eckel and Wilson's (2007) study shows how community status impacts economic behavior and Alcott's (2011) study shows how social norms impact residential energy use.



There is considerable agreement for the most part that agricultural systems worldwide are facing stresses caused by both natural and human elements. Effective and sustained preservation of these systems requires that sound science drive policy. Since natural resources are harvested for profit and individual decision making is a product of economic and non-economic factors, we need to understand how policies directed towards protecting these systems will affect human behavior. Here, economic experimentation can help in identifying direct impacts and unintended consequences a priori. These outcomes in turn will enable policy makers to design policies effectively and target scarce tax dollars in a manner that society can get the greatest benefit for the least cost.

References:

Alcott, H. 2011. Social Norms and Energy Conservation. *Journal of Public Economics*, Volume: 95 (9-10), pp. 1082-1095.

Banerjee, S., F. P. de Vries, N. Hanley and D. P. van Soest. 2014. The impact of information provision on Agglomeration Bonus performance: An experimental study on local networks, *American Journal of Agricultural Economics*, Volume: 96 (4), pp. 1009 – 1029.

Duflo, E., M. Kremer, and J. Robinson. 2011. Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya. *American Economic Review*, Volume: 101(6): 2350-90

Eckel, C. C. and R. K. Wilson. 2007. Social learning in coordination games: does status matter? *Experimental Economics*, Volume: 10, pp. 317-329.

Harrison, G., M. Lau and M. Williams (2002). "Estimating individual discount rates in Denmark: A field experiment," *American Economic Review*, 92, p1606-1617.

Holt, C and Laury, S.K. 2002. Risk Aversion and Incentive Effects. *American Economic Review* 92: 5, pp. 1644-1655

Parkhurst, G.M., and J.F. Shogren. 2007. Spatial Incentives to Coordinate Contiguous Habitat. *Ecological Economics* 64 (2): 344–55.

Plott, C.R. 1997. Laboratory Experimental Testbeds: Application to the PCS Auction. *Journal of Economics & Management Strategy*, Volume: 6 (3): 605–38.

Shogren, J. F. 2004. Incentive Mechanism Testbeds: Discussion. *American Journal of Agricultural Economics*, Volume: 86(5), pp. 1218-1219.

Suter, J.F., K. Segerson, C.A. Vossler, and G.L. Poe. 2010. Voluntary-Threat Policies to Reduce Ambient Water Pollution. *American Journal of Agricultural Economics* 92 (4): 1195-1213.

Suter, J.F., J.M. Duke, K.D Messer, and H.A. Michael. 2012. Behavior in a Spatially Explicit Groundwater Resource: Evidence from the Lab. *American Journal of Agricultural Economics* 94(5): 1094-1112

Weng, Q. and F. Carlsson. 2013. Cooperation in teams: the role of identity, punishment and endowment distribution. Working Papers in Economics, No: 551. Available at: https://gupea.ub.gu.se/handle/2077/32033

Simanti Banerjee
Experimental, Behavioral and Environmental Economist
Department of Ag Economics
University of Nebraska-Lincoln
simanti.banerjee@unl.edu