

Developing Ecosystem Services Businesses as New Revenues for Farms in Communities Facing Exurban Development

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Concern

- Farms provide public goods through influence on ecosystem services outside traditional agricultural commodities
- In urban fringe:
 - Cultural/aesthetic services: open space, wildlife habitat services
 - Provisioning/regulating services: water quality impacts and filtration, carbon storage

Problem of capturing community benefits as revenues

- Communities tend to free-ride on the good stewardship decisions of farmers
- How can economic thinking create opportunities to lead “consumers” (or non-farm residents in rural-urban fringe) to contribute revenues?
- Revenues enable farmers to be better stewards of community character and ecosystem service values
 - Enable integration of public goods into business plans

Situation: Farmers manage hayfields for ecosystem services

- Bobolink as “flagship” or symbolic umbrella
- One 10-acre field for nesting habitat
- Payment
 - Offsets farm mgt. constraints
 - Encourages hay production for multiple benefits
- How to package and price?
 - One field benefits many people



Experimental Economics Approach

- This project draws heavily on literature concerning threshold public goods
 - Each unit has a “provision point” related to the contract cost to deliver a single field
 - Up to about \$5000/10-acres unsubsidized
 - Could offer “matching fund” or “subsidy” that lowers provision point to, say, \$2500
 - Costs depend on farming context within the state: Rhode Island costs may be dramatically different than upstate New York or Vermont costs

One focus:

Multiple fields; multiple consumer groups

- Testing incentive methods designed for small community
- We are expanding methods tested in a prior project ...based on “one field, one group”
- If individuals benefit from provision of more than one field, how can “provision point” incentive mechanisms serve as a foundation for “sale” of multiple fields?
 - Lab experiments to help improve field experiments

Experimental Economics Market

- Use “induced value”
 - a monetary payment participants “earn” in a manner that simulates benefits from a public good
 - Each “field” provided pays a benefit to participant
- Testing effect of group arrangement
 - Two groups, each responsible for one field
 - Each field benefits members of both groups
 - Single group, potentially provides two fields
 - Each field benefits all participants

Incentives and Values in Experiment

- Use rebates of excess funds to reduce incentives to “free ride” or “cheap ride”
- Rebate rules tested and compared:
 - PPM: Provision point with money back guarantee
 - PR: Proportional rebate of excess contributions
 - UPC: Uniform price cap (pay lower of cap or offer)
- Marginal benefit ratio (alpha)
 - Ratio of the benefit from (value of) second unit provided to the benefit from (value of) first unit
 - Test diminishing, constant, and increasing marginal value

Implementation

- Conducted 11 experimental sessions
- Total 132 participants, mostly URI undergraduates
- Used networked terminals with z-tree software
- About 90 minutes per session; average earnings of \$35
- Each subject made 90 contribution decisions

Group Regression Model: WTP

- The regression model (random effect model)

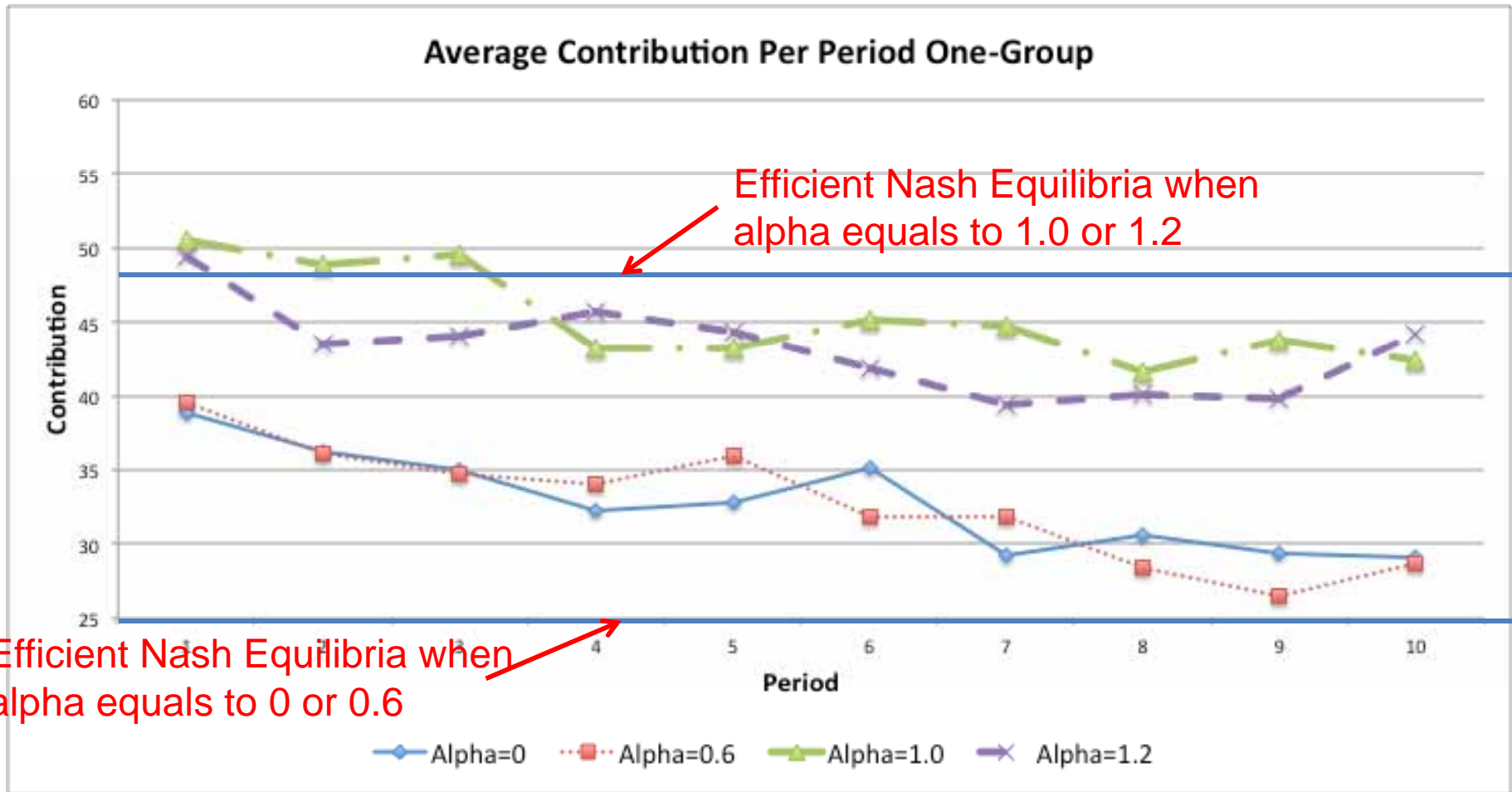
$$y_{it} = \beta_1 * \alpha + \beta_2 * \text{Rebate} + \beta_3 * \text{Group} + \beta_4 * \text{Period} + \beta_5 * \text{Group} * \alpha + \beta_6 * \text{Group} * \text{Rebate} + \beta_7 * \text{Group} * \text{Period} + \beta_8 * \text{Rebate} * \alpha + \beta_9 * \text{Rebate} * \text{Period} + \beta_{10} * \text{Alpha} * \text{Period} + \alpha + u_i + \varepsilon_{it}$$

Variables		Description	Note
<i>Alpha</i>	Alpha0	The ratio of the marginal benefit of the second to the first unit is 0	Reference level
	Alpha06	The ratio of the marginal benefit of the second to the first unit is 0.6	
	Alpha10	The ratio of the marginal benefit of the second to the first unit is 1	
	Alpha12	The ratio of the marginal benefit of the second to the first unit is 1.2	
<i>Rebate</i>	PPM	No rebate provision point mechanism	Reference level
	PR	Proportional rebate provision point mechanism	
	UPC	Uniform price rebate provision point mechanism	
<i>Group</i>	TwoG	Two-group arrangement	Reference level
	OneG	Owo-group arrangement	
<i>Period</i>		Decision period within each treatment, from 1 to 10.	
<i>Value</i>		Individual induced value for the first unit public good	Only the individual contribution model

- We specified five models, one base model with all the interaction terms and the other four which eliminate one or more interaction terms.

Results: Benefits and Group Division

- Participants do alter values in response to marginal benefits of first and second units
 - Offers of WTP sensitive to scope of benefits
- Participants forming a single group offer more in aggregate, but less individually.
- Large group contributions more stable
- Proportional Rebate is most effective in raising contribution, followed by Uniform Price Cap
 - Marginal rebate rules are increasing contributions



*Alpha is the marginal benefit ratio.

Results: Individual Contributions

- UPC and PR incentive rules yield about 13% higher offers compared to no rebate rule
- Separating into two groups raises individual contributions about 7%
 - Provision point causes non-provision more often with two groups, leading to higher individual contributions
- When a second unit has value, people with high value offer proportionately more of their value, while people with lower value offer proportionately less.
 - UPC may be best for people who value good more

Preliminary Implications

- Two groups charged with providing (buying) one field each may be more stable over time and maintain higher aggregate contributions (revenue)
- Rebate rules raise contributions
 - PR may be more effective overall
 - UPC may raise higher offers from high-value people
- If marginal values decline slowly, rebate rules and multiple group approach may generate more revenues

Field Experiments

- Previous experience attempted to drive potential buyers to web-site for purchases
- Many New England CSA's may be too small to have enough customers for bobolink fields
 - CSA approach likely would need collaboration among CSA's to pool consumers to support single field
- Marketing through “farmers markets” has not been productive
 - Consumers focused on immediate food purchases



PARTICIPATION DETAILS

We are asking members of your group to purchase shares of an annual farmer agreement for 2011.

- Shares are initially priced at \$12.50 each
- On October 15, if your group purchases enough shares (200-400 depending on the field), we will implement the agreement with your participating farmer.
- If your group purchases more than enough shares, we will reduce the price of all shares until we have only the amount needed to pay the farmer, and we will rebate all leftover money. In heretore, leftover money will reduce your final cost per share, and the most generous buyers will receive larger rebates.
- If we have not sold enough shares, we will return all money collected, and your group's hayfield will not be managed for birds this year.

Please consider what this agreement is worth to you, and how that translates into the highest number of shares you are willing to buy. We established a minimum number of shares for members of your group, but you may purchase more to help your group succeed. When many people participate at the same time, the costs to you and your group remain low while providing the environmental benefits that come with healthy farms, hayfields, and bird populations.

Thank you for investing in your community's character, agriculture, and wildlife. This fall we will send you a report on the outcome of your group's field for 2011.

OFFER DETAILS

You must purchase at least 3 shares at \$12.50 each to support your group's agreement, though you may purchase more. If your group buys more shares than are required to implement your agreement, the price of your shares will be reduced and the difference rebated (see Participation Details above). All money will be refunded if your group's field cannot be supported.

THE UNIVERSITY OF RHODE ISLAND

CONTACT INFO

Please contact us with any comments or questions:

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If you have questions regarding the conduct of this URI research project, you may also contact the Vice President for Research and Economic Development at URI at 70 Lower College Road, Kingston, RI 02881 (401-874-4328) in reference to project number HU0807-021.



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Example Web-Site Pages (experimental)



OFFER ACCEPTED

Thank you for accepting this offer. Following are three different payment options:

1. **Print and Mail Payment:** If you prefer to print this offer and pay by mail, click here.
2. **Make a Binding Pledge:** If you prefer to make a binding pledge, click here, and we will bill you in November for the final amount.
3. **Pay Now by Credit Card:** If you prefer to pay now by credit card, please fill in the necessary payment information below.

Payment Details (by credit card below)

Payment Amount:

- I will purchase 3 shares in my group's agreement for a total of \$37.50
- I highly value this hayfield management agreement and choose to purchase a greater number of shares:
- (shares are \$12.50 each, number of shares must be greater than 3)

Choose which state you would like for your payment to be applied to:

- Rhode Island
- Vermont
- I have no preference

If your group does not purchase enough shares, or if you are due a rebate, how would you like your refund/rebate processed?

- Returned as credit on my credit card
- Held to support agreements in the 2012 season (we will completely refund your rebate if your agreement is not funded in 2012)

Billing Information

Cardholder Name:

Billing Address:

City:

State:

Zip Code:

Email Address:

Credit Card Information

Card Type: [Choose one:

Card Number:

Expiration Date: [Choose month...:] [Choose year...:

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Pre-test and Future Experiment

- Revenue share through mail solicitation
 - Mail contributions \$1100
 - Web contributions \$335
 - \$540 from PR; \$465 from UPC; \$450 from PPM
- Planning field experiment for Jamestown, RI, 2012
 - Testing 2-groups with 2 fields and mixture of marginal incentive rules