Does Social Capital influence the best farm management option in the presence of AES?

Impact Assessment of Land Use Change
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Presentation outline

• I. Introduction: Objective
• II. Conceptual Framework
• III. Case Study
  • Microeconomic model
  • AES considered
• IV. Results and discussion
• V. Conclusion, policy implications
I. Introduction
Agri-Environmental Schemes

• Voluntary measures
• Multi-annual compromises (5 year)
• Compensation payments based on Provider Gets Principle
• Main measures by implementation objective
  – Crop rotation (34%)
  – Landscape & Nature (22 %) (*higher rates for NL, UK, SW*)
  – Organic farming (8%)
  – Extensification (6%)
  – Input reduction (2%)
  – Others (28%)
• Low adoption rates in Spain
I. Introduction

Study Objective

Finding

SC affects adoption rates (Mathijs, 2003; Knowler & Bradshaw, 2007; Jongeneel, 2008)

Issue

Lack of theoretical construct. How does SC affects adoption?

Objective

Do Social factors modify the farmer opportunity cost of contracting and thus affect the management decision according to technical variables?
II. Conceptual framework

Description of Social Capital: a little bit of sociology in an economic world …


- Social relations, networks, norms and values matter in the functioning and development of society has been present in the economics, sociology, anthropology and political science literature. However only in the past 10 years there has been an attempt to unify the concept embodying these multidisciplinary views.

- How do we link SC to mainstream economics?

Transaction Costs

“Social capital implies that there are aspects of social structure and organization that act as resources for individuals, allowing them to realize their personal aims and interests, therefore lowering transaction costs”. (Pretty and Smith, 2004)
II. Conceptual framework
Description of Social Capital: a little bit of sociology in an economic world …

Level 1. Structural (networks, connections)
+ Bridging: within (homogenous)
+ Bonding: between (heterogenous)
+ Linking: People on power (leverage ideas, info, …)

Level 2. Norms of Behaviour
Thick/Thin Trust
Common rules, norms and sanctions

Level 2. Cognitive
+ Trust: Reduces TC
+ Reciprocity: L/T Obligations (env outcomes)
+ Rules/sanctions: “rules of the game” = invest in collective good

Level 1. Societal Structures
Connectedness
Formal Association
Informal Association
Work ties
Family ties

Bonding SC
Bridging SC
II. Conceptual framework
Previous studies linking SC and environmental friendly practices

1. Studies NOT specialized focused on SC: variables related to “social capital formation” (structural) as well as “trust” (cognitive) within farmers intrinsic factor on explaining AES adoption. Tested and significant (e.g. FU)

2. Studies specialized focused on SC

<table>
<thead>
<tr>
<th>Author</th>
<th>Method</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathijs, 2003</td>
<td>Multivariate probit analysis</td>
<td>SC in adoption in countryside stewardship policies</td>
</tr>
<tr>
<td>Cramb, 2005</td>
<td>Logistic regression</td>
<td>Participation in landcare and the adoption of soil conservation</td>
</tr>
<tr>
<td>Pretty and Smith, 2003</td>
<td>Qualitative</td>
<td>Building social capital helps social learning and biodiversity</td>
</tr>
<tr>
<td>Swinton, 2000</td>
<td>Two random effects GLS regression</td>
<td>Influence of social capital in erosion control</td>
</tr>
<tr>
<td>Social capital studies by the World Bank</td>
<td>Qualitative</td>
<td>Importance of SC and collective action on promoting sustainable agricultural practices when there is no monetary support</td>
</tr>
</tbody>
</table>
III. Case Study
Theoretical assumption

H1: Social capital can help to explain the best management option in the presence of AES

H2: The role of social capital in explaining this decision is through diminishing transaction costs

Our basic conceptual model assumes that “the forgone profit is completely described by the farming system characteristics (profit maximiser farmer, not taking into account utility), while social capital variables influence the decision basically due to the reduction of Transaction Costs”.
III. Case Study
Microeconomic framework

To test these assumptions and to solve the objective questions 2 models are compared:

\[ b = \rho v - \nabla \pi_v \left( Z^T \right) \]

M.1: Farmer as a **financial** profit max.

\[ b = \rho v - \nabla \pi_v \left( Z^T \right) - TC \left( Z^{sc} \right) \]

M.2: Farmer as an **economic** profit max.

\( b \): change in forgone profit  
\( \rho \): AES premium  
\( v \): surface under contract  
\( \pi_v \): farm profit  
\( TC \): Transaction Costs

**H1:** The goodness of fit of both models is compared (m. 2 should outperforms m. 1)

**H2:** The change in the effect of farm technical characteristics is compared in both models (the coefficient of technical variables should be similar in m. 1 & m. 2)
III. Case Study
Microeconomic model: The probit model

Latent model

\[ b_i = \beta_0 + \sum_{k=1}^{K} \beta_{ki} x_{ki} + \varepsilon_i \]

- \( b_i \): latent variable
- \( \beta_{ki} \): coefficients (including a constant, \( \beta_0 \))
- \( x_{ki} \): independent variables (\( Z^T \) in m.1; \( Z^T \) & \( Z^{SC} \) in m.2)
- \( \varepsilon_i \): Error terms (Normal distribution)

Observed variable

\[ Y_i = \begin{cases} 
1 & \text{if} \quad b_i \geq 0 \\
0 & \text{if} \quad b_i \leq 0 
\end{cases} \]

** The input data is based on technical (\( Z^T \)) in model 1, adding social capital features (\( Z^{SC} \)) in model 2 **
### III. Case Study
Description of the AES: The Alternative Crop Measure

<table>
<thead>
<tr>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Farm with non-irrigated COP declared surface for 99-00 harvest</td>
</tr>
<tr>
<td>- 25% of enrolled plots limiting forest area</td>
</tr>
<tr>
<td>- Farm located in municipalities compromising Natura 2000 Sites</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Implementing a farm management plan</td>
</tr>
<tr>
<td>- <strong>Cultivate Alfalfa maintaining the vegetable part of the plant green in summer</strong></td>
</tr>
<tr>
<td>- <strong>Harvesting and/or grazing forbidden from 31/VIII to 15/IX</strong></td>
</tr>
<tr>
<td>- For farm-holds with livestock: belonging to veterinary control group</td>
</tr>
<tr>
<td>- Conventional and in favour of slope ploughing forbidden</td>
</tr>
<tr>
<td>- Maximum of 10% cereal allowed in fodder crops fields</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>102.00 € ha⁻¹</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>Reduce fire risk and increase nitrogen soil content</strong></td>
</tr>
</tbody>
</table>
III. Case Study
Model Explanatory variables

### Farm characteristics (Zₚ)

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSU-PER-HA</td>
<td>Livestock units per hectare</td>
</tr>
<tr>
<td>LSU</td>
<td>Presence of livestock in the farm-hold (1 if yes)</td>
</tr>
<tr>
<td>NON-IRR-CEREAL</td>
<td>Crop distribution includes no-irrigated cereal (1 if yes)</td>
</tr>
<tr>
<td>IRR-CEREAL</td>
<td>Crop distribution includes irrigated cereal (1 if yes)</td>
</tr>
<tr>
<td>IRR-ALFALFA</td>
<td>Farm irrigated pulse crop surface (has.)</td>
</tr>
<tr>
<td>NON-I-ALFALFA-00</td>
<td>Farm already had pulse crops before AES (1 if yes)</td>
</tr>
<tr>
<td>HARVESTER</td>
<td>Farm owns harvester (1 if yes)</td>
</tr>
<tr>
<td>FUT-IRRIGATION</td>
<td>Probability of new irrigation developments (10-point increasing scale)</td>
</tr>
</tbody>
</table>

### Social Capital (Zₛᶜ)

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOP</td>
<td>Farmer member of agricultural cooperative (1 if yes)</td>
</tr>
<tr>
<td>AGR-TRAINING</td>
<td>Farmer participates in agricultural training courses (1 if yes)</td>
</tr>
<tr>
<td>INF-AES-FINEN</td>
<td>Farmer informed about AES by financial entities (1 if yes)</td>
</tr>
<tr>
<td>ADD-INF-SOUR</td>
<td>Farmer seeks agricultural policy information from multiple sources (1 if yes)</td>
</tr>
</tbody>
</table>
### IV. Model results

Adoption of ACM Probit model 1 (technical variables)

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \beta )</th>
<th>( Sd. )</th>
<th>( p\text{-value} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.011</td>
<td>0.483</td>
<td>0.036</td>
</tr>
<tr>
<td>LSU</td>
<td>0.725</td>
<td>0.300</td>
<td>0.016</td>
</tr>
<tr>
<td>NON-IRR-CEREAL</td>
<td>-1.172</td>
<td>0.472</td>
<td>0.013</td>
</tr>
<tr>
<td>IRR-CEREAL</td>
<td>-0.912</td>
<td>0.335</td>
<td>0.006</td>
</tr>
<tr>
<td>IRR-ALFALFA</td>
<td>0.036</td>
<td>0.019</td>
<td>0.056</td>
</tr>
<tr>
<td>NON-I-ALFALFA-00</td>
<td>0.891</td>
<td>0.319</td>
<td>0.005</td>
</tr>
<tr>
<td>HARVESTER</td>
<td>-1.158</td>
<td>0.721</td>
<td>0.108</td>
</tr>
<tr>
<td>FUT-IRRIGATION</td>
<td>-0.138</td>
<td>0.065</td>
<td>0.034</td>
</tr>
</tbody>
</table>

\( \chi^2 = 47.145, p\text{-value} = 0.000 \)

Mc Fadden \( R^2 = 0.336 \)

Number of observations = 104

% of correct predictions = 79.8 %

Sensitivity = 87.1 %

Specificity = 69.0 %

✔ Specialization cereal (-): Irrigated, harvester cereal

✔ Fodder management (+): Irrigated alfalfa, already non-irrigated sainfoin/alfalfa, Livestock (sheep)

✔ Opportunity cost of converting to irrigation (-):
### IV. Model results

Adoption of ACM Probit model 2 (technical + SC variables)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model [1]: $Z^T$</th>
<th>Model [2]: $Z^T + Z^SC$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.011</td>
<td>0.775</td>
</tr>
<tr>
<td>LSU</td>
<td>0.725</td>
<td>1.054</td>
</tr>
<tr>
<td>NON-IRR-CEREAL</td>
<td>-1.172</td>
<td>-1.281</td>
</tr>
<tr>
<td>IRR-CEREAL</td>
<td>-0.912</td>
<td>-1.051</td>
</tr>
<tr>
<td>IRR-ALFALFA</td>
<td>0.036</td>
<td>0.039</td>
</tr>
<tr>
<td>NON-I-ALFALFA-00</td>
<td>0.891</td>
<td>1.112</td>
</tr>
<tr>
<td>HARVESTER</td>
<td>-1.158</td>
<td>-1.668</td>
</tr>
<tr>
<td>FUT-IRRIGATION</td>
<td>-0.138</td>
<td>-0.108</td>
</tr>
<tr>
<td>COOP</td>
<td></td>
<td>0.741</td>
</tr>
<tr>
<td>AGR-TRAINING</td>
<td>0.767</td>
<td>0.767</td>
</tr>
<tr>
<td>INF-AES-FINEN</td>
<td>1.553</td>
<td>1.553</td>
</tr>
<tr>
<td>ADD-INF-SOUR</td>
<td>0.865</td>
<td>0.865</td>
</tr>
</tbody>
</table>

$\chi^2 = 47.145, \text{ p-value} = 0.000$

$\chi^2 = 59.572, \text{ p-value} = 0.000$

Mc Fadden $R^2 = 0.336$

Number of observations = 104

% of correct predictions = 79.8%

Number of observations = 104

% of correct predictions = 83.7%

- Better goodness of fit m. 2: SC variables important to explain adoption supporting H1 (Mc Fadden $R^2$ from 33 to 43%)

- $\beta$ of technical features have not significantly changed: SC ↓ TC supporting H2

- However there is one exception, (-) EFFECT COOPERATIVES, therefore not always SC actors are diminishing AES TC.
IV. Model results
Social Capital Influence Discussion

✔ Cooperatives (-): inc. cereal profitability (easy access to inputs, dec. TC cereal production), drawback to change crop pattern to fodder crops

✔ Assistance to agriculture formation courses (+): Social networks (awareness phase)

✔ Informed about AES by Financial Entities (+): (19%, 31% FU, 49 % ACO)

  ✔ Collaborating entity in the SFP & AES contracting phase (=“paper work”, only involved in the last stage of the implementation process). Implying that….

  ✔ There has not been a learning process and/or conscious decision by the farmer. End of contract problem.

✔ Additional Information Sources: Social networks
IV. Model results
Comparing the models on a per farm basis…Results (m. 1 & m. 2)
IV. Model results
Comparing the models on a per farm basis…Results (m. 1 & m. 2)
IV. Model results

Study objective question

1. Do Social factors modify the farmer opportunity cost of contracting and thus affect the management decision according to technical variables?

- SC correctly reinforced adoption for a majority of farmers (56/67=84%)
- Among potential adopters only for 11 farmers SC is lacking and therefore discouraging (at least “not encouraging”) adoption
V. Conclusion and Policy implications

1. Importance of SC factors explaining AES adoption (sociology matters) mainly through a reduction in TC associated with enrolment. However…

2. Important to differentiate the effects along the AES implementation process and among the different stakeholders (not only “quantity”, but “quality” SC)
   - Cooperatives (-). Increases cereal profit. Difficult change crop pattern.
   - Financial Entities (+), but implying a deficiency in the learning process (involved in the contracting phase)

3. 1/3 farmer who were not aware are potential adopters. Task for social actors to improve information dissemination

4. SC mainly involved in the implementation and contracting phase in the case studies, while persuasion and confirmation stages are much more developed in other studies.
V. Conclusion and Policy implications

5. Mainly micro-structural dimension of SC. Further research on SC more focused on cognitive form (World Bank SC initiative: importance of SC inducing collective actions in env. issues not involving compensation payments).

6. Farmers should be more involved in the design of AES (overall decrease in TC and more feasible AES, Spain confrontation between Env. Groups and government: what to do with Traditional Fallow Land and set aside after liberalisation?).

7. Study “Other” potential forms of managing AES involving SC:

   • Co-operative environment like Dutch environmental cooperatives or
     • Collective contracts: collective hedgerow planting in Denmark (effect on Danish agricultural landscape and because of the bottom-up approach contribute to SC cohesion)
Thanks to the farmers for their suggestions and time

Thank you for your attention

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