INTRODUCTION

TRANSACTION CHARACTERISTICS
- High transportation costs
- Large variability in prices, quality and yield
- Relational governance between farmers
- Recently: biogas plants with high demand for silage maize

RESEARCH OBJECTIVE
- Assess the influence of biogas plants on silage maize trade:
  - Importance of transaction costs
  - Influence of biogas plants on WTP for silage maize

MODEL RESULTS

Impact of increasing transaction costs on informal silage maize trade

<table>
<thead>
<tr>
<th></th>
<th>Initial total transaction costs (€)</th>
<th>Number of selling farms</th>
<th>Number of buying farms</th>
<th>Total number of transactions</th>
<th>Average volume of silage maize transacted per transaction (ton)</th>
<th>Average distance of transactions (km)</th>
<th>Average WTP for silage maize by farmers with a negative maize balance (€/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without biogas plant</td>
<td>300</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>28</td>
<td>2.5</td>
<td>161</td>
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<td>1800</td>
<td>3</td>
<td>3</td>
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<td>55</td>
<td>1.5</td>
<td>214</td>
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<tr>
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<td>3000</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>66</td>
<td>1.5</td>
<td>232</td>
</tr>
<tr>
<td>With large biogas plant</td>
<td>300</td>
<td>39</td>
<td>2</td>
<td>39</td>
<td>125</td>
<td>4.6</td>
<td>250</td>
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<tr>
<td></td>
<td>1800</td>
<td>37</td>
<td>2</td>
<td>37</td>
<td>131</td>
<td>4.7</td>
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<td>2</td>
<td>34</td>
<td>140</td>
<td>4.7</td>
<td>250</td>
</tr>
</tbody>
</table>

CONCEPTUAL MODEL

SIMULATION OF BILATERAL TRADE IN GAMS

Objective function
- Revenue maximization
- Roughage cost minimization

Heterogenous transaction costs (TC):
- Search costs (SC)
- Negotiation costs (NC)
- Enforcement costs (EC)

Dynamic TC upon repeated transactions
- SC = 0, NC = 0
- EC_{ij}(x+1) = EC_{ij}(x) \times (1 - (0.5 + (1 - 0.5) \times (1 - 0.5z)))

PRELIMINARY CONCLUSION

INFLUENCE TRANSACTION COSTS
- Number of transactions declines
- Volume transacted increases
- WTP for silage maize increases

INFLUENCE BIOGAS PLANT
- Higher number of transactions
- Transactions over larger distances
- Higher WTP for silage maize

Unravelling the informal silage maize trade:
A multi-agent modelling approach

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