

Farmer Preferences for the Design of Agroforestry Subsidy Programs in Germany: A Discrete Choice Experiment

AUTHORS

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I. INTRODUCTION

When utilized, farm subsidies can bridge the economically unprofitable phase during the establishment of agroforestry systems (AFS) and thus address a barrier to their adoption (García de Jalón et al. 2018). The question arises whether current subsidy programs are well designed to accomplish this task. In Germany, AFS are supported through the first and the second pillar of the CAP. Despite this, uptake of AFS in Germany has remained limited (Duden et al. 2025). To investigate the potential effect on farmers' preferences for subsidy programs, we conducted a discrete choice experiment (DCE) in southern Germany (see Figure 1 for regional distribution of participants).

II. METHODS AND RESULTS

1. DCE Preparation and Questionnaire

Preparation began with expert interviews, which provided insights into potential adjustments to the subsidy programs. Based on these interviews, a D-efficient design was generated using the software Ngene (ChoiceMetrics 2024), drawing on the attributes and levels shown in Table 1. A pilot study was conducted to optimize the DCE design. Finally, the DCE was carried out via an online questionnaire from July 2025 to January 2026.

Participants chose between establishing an AFS under the proposed subsidy program (Alternatives A/B) and not establishing an AFS ("opt-out"). Each participant completed eight choice scenarios. Afterwards, participants provided additional information about their farms, including whether they already engaged in agroforestry (i.e., "pre-compliant farmer", PCF) or managed their farm organically.

2. Model

The dataset was analyzed in R (R Core Team 2025) using the "Apollo" package (Hess & Palma 2019). Models were built stepwise and compared by the Akaike Information Criterion (AIC): a base model with DCE attributes, an extended model including covariates, and a final mixed model with random effects using 250 Halton draws. The final model is presented in Equation 1.

Equation 1: MMNL model with fixed and random effects. Effects are added using "+", crossed effects are denoted by ".", and random effects are separated by ":".

= Maintenance support + Investment support + Consultancy support + Design Requirements + Blacklist + AFS + Organic farm + Animal husbandry + Part time Farm + PCF : Block + District + Error

3. Results

The results of this DCE reveal how farmers assess the characteristics of subsidy programs. The estimated utility parameters are displayed in Table 2. Positive parameter values indicate utility, whereas negative values indicate disutility associated with a given variable.

The attributes maintenance and investment support positively influence the acceptance of a subsidy program. This supports the assumption that monetary incentives are a key factor in the design of subsidy programs. Only minor, statistically non-significant effects were found for the other attributes, implying no influence on farmers' preferences. This may be explained by a lack of in-depth knowledge among many farmers about these requirements and their implications. While the decision to establish an AFS is perceived negatively, we observe significant inter-individual heterogeneity for this variable. Furthermore, farmers who manage organic farms or are PCFs display a more positive attitude towards the proposed subsidy programs.

III. CONCLUSION

This study identifies monetary incentives as the primary drivers of farmers' acceptance of agroforestry subsidy programs in southern Germany. Significant heterogeneity in preferences for establishing agroforestry indicates that adoption is shaped by individual attitudes and farm characteristics rather than uniform features. These results suggest that targeted instruments can effectively address economic barriers to agroforestry adoption. Future research expanding this analysis to other federal states will clarify regional variations and inform broader policy design for agroforestry systems.

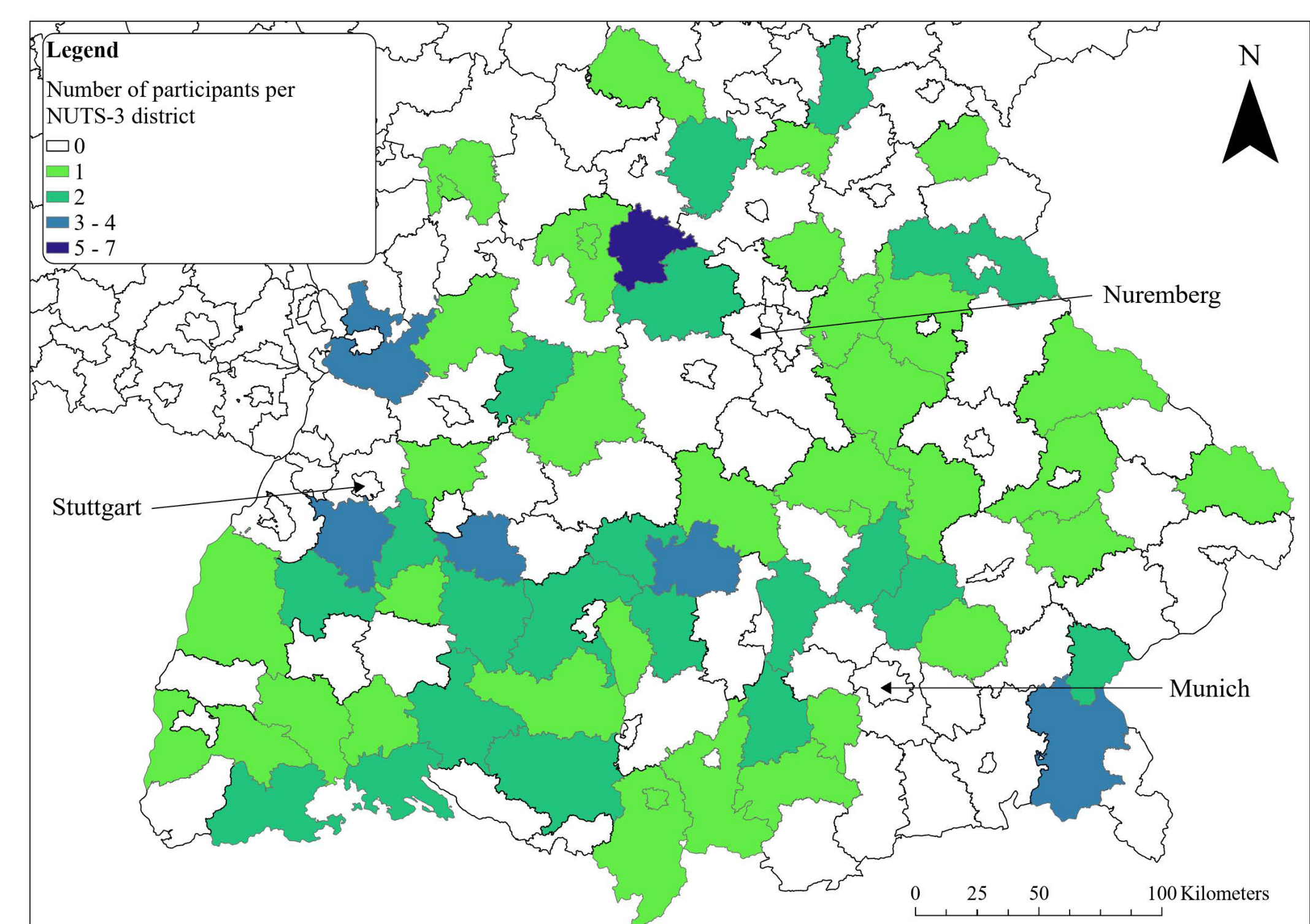


Figure 1: Distribution of Questionnaire Participants across NUTS 3 Districts (German: "Landkreis")

Table 1: Attributes and levels of the discrete choice experiment (DCE)

DCE attribute	Level
Maintenance support (€ ha ⁻¹)	Annual payment: 200, 600, 1.000 One-time payment: 2.000, 6.000, 10.000
Investment support (%)	0, 50, 100
Consultancy support (%)	0, 50, 100
Regulatory framework	Status quo, no regulations, no blacklist, no design specifications

Table 2: Estimates of the final model (McFadden pseudo-R²=0.39).

Attribute	Parameter ^a	(SE)	Covariate	Parameter ^a	(SE)
Maintenance support	0.0005***		Organic farm	1.623*	0.7786
Investment support	0.0175***	0.003	Part time farm	1.1221	0.827
Consultancy support	0.0038	0.0026	Animal husbandry	-1.3925	0.8499
Design Requirements	0.0716	0.1837	PCF	3.3766***	0.7886
Blacklist	-0.1685	0.1747	Block (SD ^b)	0.8621***	
AFS	-2.2262	2.3336	District (SD ^b)	0.0122***	
^a Significance levels: *p < 0.05, **p < 0.01, ***p < 0.001; ^b Standard deviation					

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