When Compensation Backfires: Heterogeneity in Acceptance of Hydrogen Infrastructure in Germany

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Motivation und Central Research Question

The German government has an infrastructure plan to construct extensive hydrogen pipelines by 2032, marking a key step in advancing the sustainable energy transition. However, public knowledge and perceptions of such infrastructure projects can vary significantly, which in turn may influence individuals' willingness-to-accept (WTA) infrastructure development near their homes or properties. Compensation mechanisms can play a critical role in increasing WTA for such infrastructure projects among private households and communities. Previous research (van Wijk et al., 2021) indicates systematic differences in public acceptance between individual and municipal-level compensation measures. Furthermore, studies such as Vuichard et al. (2022) show that individuals have heterogenous preferences for compensation types, for example financial or non-financial.

A nuanced understanding of compensation mechanisms—both monetary and non-monetary—at the community and household levels could help optimizing infrastructure planning and implementation. To explore this perspective, we have designed and conducted a binary choice experiment. In a representative survey questionnaire for the population in Germany, we have collected data on technical knowledge and opinions about the hydrogen technology and (b) experimentally tested individuals' WTA private and community-level compensation. Preliminary results indicate that while high levels of private compensation increase the acceptance significantly, high level compensation at the community level statistically significantly lowers acceptance of infrastructure measures.

Methodological Approach

In a uniquely designed survey-based binary choice experiment, a dataset on private households, representative of the German population, was collected. While all survey participants responded to the survey questionnaire, experimental treatments—hypothetical scenarios involving compensation choices—were randomly allocated among participants. Using a binary choice experimental setup with a combination of between and within-subjects design, similar to Simora et al. (2018), the experimental segment of the survey presents hypothetical choice situations. In these scenarios, respondents are asked to take part in a referendum either in favor of or against (hypothetical) hydrogen pipeline infrastructure planning near their residence, influenced by varying forms (private and community) and levels of compensation (monetary and non-monetary).

Table 1: Experimental Design and Data Overview

Control Group ***(N = 1,004)***	**Private Household** ***(N = 1,007)***	**Community** ***(N = 1,008)***	**Community Non-monetary** ***(N = 1,006)***
No Compensation	Private HH (100 €) *(N = 334)*	Community (100 €) *(N = 339)*	Non-monetary compensation in the form of facilities and other infrastructure measures
	Private HH *(*500 €) *(N = 336)*	Community (500 €) *(N = 334)*	
	Private HH (1000 €) *(N = 337)*	Community (1000 €) *(N = 337)*	

Moreover, we assume that citizens' perceptions (e.g., regarding safety and trust in the technology) and knowledge about hydrogen technology and its potential use cases may vary widely. Hence, we have included a set of questions in the survey to measure “informedness” about hydrogen technology.

The survey-based experiment was carried out in April, 2024. Table 1 indicates the distribution of observations across different treatment groups.

Results and conclusions

Preliminary findings suggest that lower levels of monetary compensation in our experimental setup do not significantly impact public acceptance of infrastructure projects. Acceptance levels among participants receiving low compensation are statistically indistinguishable from those in the control group, which received no compensation at all.

In contrast, high levels of monetary compensation at the individual (private) level are effective in increasing public acceptance. This suggests that when individuals receive direct and substantial financial benefits, their willingness to accept infrastructure development statistically significantly increases.

However, our results indicate that high monetary compensation at the community level significantly reduces acceptance. One possible explanation is that large-scale community compensation crowds out intrinsic motivation. When compensation is framed as a financial transaction at the community level, individuals may shift from evaluating the project based on its broader societal benefits to viewing it through a purely economic lens. This could reduce their willingness to support infrastructure that they might have otherwise accepted for reasons such as environmental sustainability, regional development, or collective progress.

Additionally, community-level compensation might be perceived as a signal that the project imposes significant negative externalities, leading to increased skepticism or resistance. It may also trigger concerns about fairness in how benefits are distributed, further eroding public support.

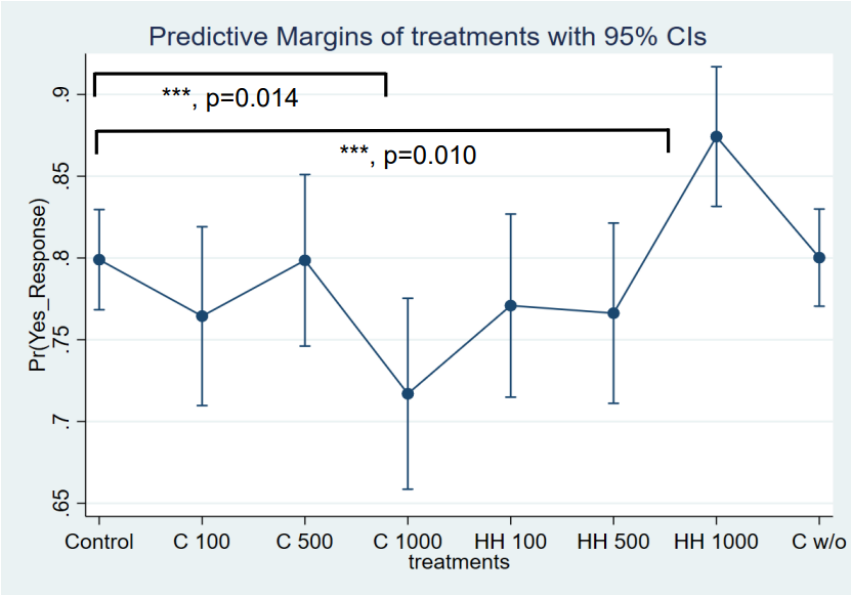

Figure 1: Differences in predictive margins of experimental treatments.

Selected Literature

[1] Simora, Michael; Frondel, Manuel; Vance, Colin (2018): Does financial compensation increase the acceptance of power lines? Evidence from Germany, Ruhr Economic Papers, No. 742.
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[3] Vuichard, P., Broughel, A., Wüstenhagen, R., Tabi, A., & Knauf, J. (2022). Keep it local and bird-friendly: Exploring the social acceptance of wind energy in Switzerland, Estonia, and Ukraine. Energy Research & Social Science, 88, 102508.
[4] Atasoy, A.T., Madlener R (2025). When Compensation Backfires: Heterogeneity in Acceptance of Hydrogen Infrastructure in Germany, FCN Working Paper. (in prep).