Social networks, consumer beliefs and nutrition behavior: Theory and empirical evidence for Germany

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Problem

- Circa 30% of total health expenditures are related to nutrition based morbidities in Germany
- Medical Facts regarding nutrition and health are very well understood
- Potential for functional food (food with health implications)
- Nutritional behavior can only very limited be controlled by scientific knowledge (consumer information, training) or incentives (fat tax)
- Unhealthy nutrition is much more behavioral and less a medical phenomena

Theorethical Model

Health-beliefs and preferences for functional food: A new approach

Consumers are fundamentally uncertain about the technological relation between food characteristics (E) and implied Z-goods (Z), namely health, thus, consumers form beliefs, $\tilde{A}$. Applying a linear approximation of the approach implies linear utility functions at the micro and macro stages:

$$V(Z) = \sum_k \beta_k Z_k + \beta_p^z P_z$$
$$U(E) = \sum_i \alpha_i X_i^E + \alpha_p^E P_E \quad \Rightarrow \quad \alpha_i = \sum_k \tilde{a}_{ki}\beta_k$$

Belief-up-dating Model

A simple linear Belief-up-dating Model

- Ideosyncratic shocks bias individual learning of the underlying food-health technology
- Information exchange with local social neighborhood reduces bias and thus increases efficiency of learning
- communication is organized in social networks:

$$\tilde{A}_i = t_{ii}\tilde{A}_i^0 + (1-t_{ii}) \cdot \textstyle\sum_j \hat{t}_{ij}\tilde{A}_j \qquad (1)$$
$$with: \hat{t}_{ij} = \frac{t_{ij}}{(1-t_{ii})}$$

Rewriting eq.(1) in matrix notation:

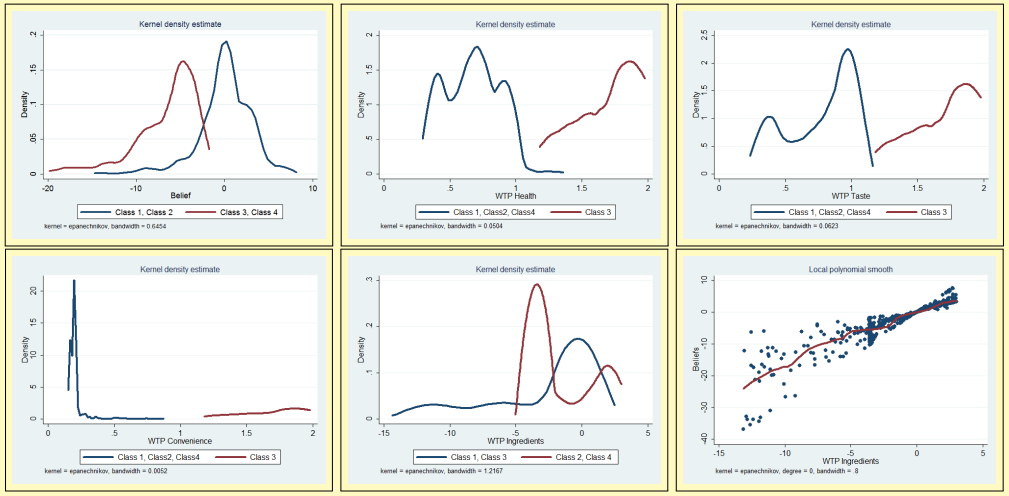
$$\tilde{A} = \left[I - (1-t_{diag})\,\hat{T}\right]^{-1} \cdot t_{diag} \cdot \tilde{A}^0 \qquad (2)$$

$M = \left[I - (1-t_{diag})\,\hat{T}\right]^{-1} t_{diag}$ is the matrix of network multiplier corresponding to the Hubbell-Index.

- A_i = beliefs after communication
- A_i^0 = agent i's initial beliefs after private updating
- t_{ii} = own control (weight for the own belief)
- $(1-t_{ii})$ = influence or communication field of other agents

Empirical Model

Using own unique social and medical survey data of 1000 probands collected within the Focus-project we test our theory applying a two-stage latent class estimation of macro and micro food preferences. In particular, the approach allows a statistical testing of the impact of peer group network effects on consumer beliefs, preferences and nutrition behavior.



Results

- We derive a new consumer theory including explicitly consumer's fundamental uncertainty regrading consumption technology.
- In our theory consumers form beliefs on how specific consumer good characteristics translate into relevant z-goods which determine consumers' utility.
- Applied to demand for functional food consumers form beliefs regarding the impact of functional ingredients on health.
- Consumers up-date beliefs via communication learning organized in social networks. Accordingly, EGO-centric network structures are determinants of individual consumer beliefs and hence preferences for functional food.
- Empirically estimate consumer beliefs based on an unique own choice experiment data set.
- Further, we identify EGO-centric network parameters as relevant determinants of individual consumer beliefs controlling explicitly for latent homophily.