ADDRESSING EMPIRICAL CHALLENGES RELATED TO THE INCENTIVE COMPATIBILITY OF STATED PREFERENCE METHODS

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Stated preference methods

- Used to determine public's preferences, especially towards non-market goods
- Survey-based – in specially designed surveys respondents state what they would do
- Flexible – enable valuation of hypothetical states
- Important for cost-benefit analysis – allow to estimate the benefits

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BUT much scepticism whether survey responses reflect actual preferences

- Surveys are often (seen as) hypothetical
- Lack of economic-based incentives to answer a survey truthfully
- Empirical evidence on hypothetical bias
- Strategic voting

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How to obtain true preferences of survey respondents?

Conditions for incentive compatibility

(Carson and Groves 2007; Carson et al. 2014)

Incentive compatibility = Revealing true preferences is the respondent's optimal strategy.

1. Respondents understand and answer the question being asked.
2. The survey is seen as a take-it-or-leave-it offer.
3. The survey involves a yes-no answer on a single project.
   (the Gibbard-Satterthwaite theorem)
4. The authority can enforce the payment (coercive payment).
5. The survey is perceived as consequential:
   - Respondents care about the good being valued.
   - Respondents believe that their responses will affect the finally implemented policy.

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Later advancements:
- A sequence of questions
  Vossler et al. 2012
- Open-ended format
  Holladay and Vossler 2016

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EXISTING EVIDENCE ON

the role of consequentiality for stated preferences

- Studies that exogenously vary **communicated consequentiality** (defined by a researcher)
  - Manipulate the probability of a voting being binding
    (Carson et al. 2014; Cummings and Taylor 1998; Landry and List 2007)
  - Assign various weights to respondents' votes in determining the final action
    (Vossler and Evans 2009)
  - Include / exclude scripts about informing policy makers about the survey results
    (Meyerhoff et al. 2014; Drichoutis et al. 2015)
- Studies that control respondents' beliefs in policy consequentiality (**perceived consequentiality**)
  - Measured through respondents' self-reports to a direct question,
    e.g., „Do you believe that your votes will be taken into account by policy makers?"
  - Response scale:
    - Binary – yes/no (Broadbent 2012)
    - Likert scale (Herriges et al. 2010; Vossler et al. 2012; Vossler et al. 2013)

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  A consequential context fosters truthful preference revelation

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  Mixed evidence of the impact of perceptions on truthfulness of respondents' behaviour

Our research questions

Communicated consequentiality

1) How to **design survey scripts** to induce respondents to believe in consequentiality?

   "The effect of consequentiality scripts in stated preference surveys is in its infancy." (Kling, Phaneuf and Zhao 2012)

Perceived consequentiality

2) How to appropriately include measures of unobservable beliefs about consequentiality in **econometric models** of stated preferences?

   We propose a Hybrid Mixed Logit model – a comprehensive framework:
   - to identify effects of unobservable beliefs on stated preferences,
   - whilst incorporating observable measures of these beliefs.

Study design

- Discrete Choice Experiment; CAWI; A representative sample of 1,700 citizens of Warsaw
- Public good scenario: Cheap tickets to municipal theatres in Warsaw, Poland

	Alternative A	**Alternative B** Continuation of the current policy	**Attribute levels**
Entertainment theatres	No change	No change	Tickets for 5 PLN, No change
Drama repertory theatres	Tickets for 5 PLN	No change	
Children's theatres	No change	No change	
Experimental theatres	Tickets for 5 PLN	No change	
Annual cost for you (tax)	100 PLN	0 PLN	10, 20, 50, 100 PLN
Your choice	□	□	

- 12 choice tasks per respondent
- Design optimised for Bayesian D-efficiency

Study design

- Communicated consequentiality
  - Exposition of actual consequences following from the survey
  - 4 treatments (split-sample):

    1 –> **no particular information** about future consequences

    2 –> **at the beginning** the survey states that the respondents' choices might influence future policies

    3 –> Treatment 2 + **reminders in two more places** about possible ties to actual policy

    4 –> Treatment 3 + **a highlighted reminder** about potential actual consequences right before choice tasks

    } Typical for valuation surveys

- Perceived consequentiality
  - A follow-up question: "Do you think that your choices in the survey will influence future decisions regarding financing municipal theatres in Warsaw?"
  - Five-degree Likert scale (1 – definitely no, …, 5 – definitely yes)

Econometric approach

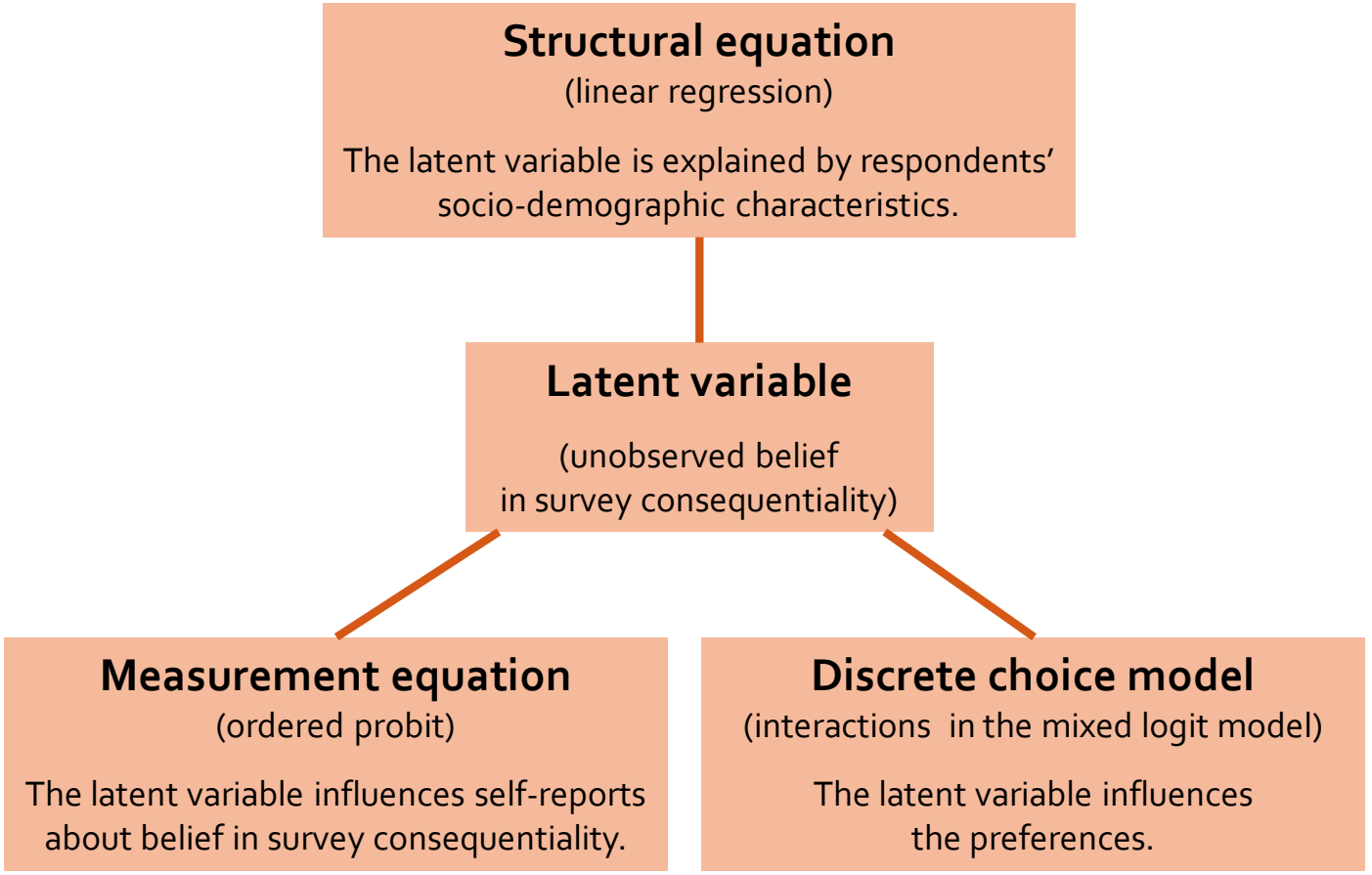
How to include measures of unobservable beliefs?

- Directly including stated measures of beliefs may be problematic:
  - stated beliefs are measured imprecisely; possible measurement error,
  - stated beliefs may be correlated with other unobserved factors that influence choices.
- Herriges et al. (2010) use instrumental variables to identify the impact of perceived consequentiality on preferences.
- Vossler et al. (2012) and Vossler and Watson (2013) mention binary probit instrumental variable models.
- We propose a Hybrid Mixed Logit model.

Econometric approach

Hybrid Choice Model

- Incorporate **perceptions**, psychological factors into the random utility model
- Here, the psychological factor: beliefs about survey consequentiality
- Enable to **model explicitly** the effect of an experimental condition on respondents' perceptions, and the effect of the perceptions on their (observed) choices
- **Avoid endogeneity**



Econometric approach

Hybrid Mixed Logit Model

1. Discrete choice model in WTP-space with random parameters (Mixed Logit);
   Utility derived by consumer *n* choosing alternative *j* in choice task *t* (U_{njt}):

$$U_{njt} = \alpha_n c_{njt} + b_n X_{njt} + \varepsilon_{njt} = \alpha_n \left(c_{njt} + \beta_n X_{njt} \right) + \varepsilon_{njt}$$

monetary attribute

non-monetary attributes

error term

consumer-specific, log-normally distributed (random) parameter

consumer-specific, normally distributed (random) parameters

money-metric marginal utilities of attributes (willingness to pay, WTP)

The means of the random parameters are explained by the latent variable.

Econometric approach

Hybrid Mixed Logit Model

2. Structural equation – a linear regression

$$LV_n = \Psi' X_n^{str} + \zeta_n$$

LV_n – the latent variable, X_n^{str} – socio-demographic variables, Ψ – a matrix of coefficients, ζ_n – error terms

3. Measurement equation – ordered probit

$$I_n^* = \Gamma' LV_n + \eta_n$$

I_n – an indicator of the latent variable (responses on a five-degree Likert scale), $I_n = \begin{cases} 1 \ for \ I_n^* < \gamma_1 \\ 2 \ for \ \gamma_1 \le I_n^* < \gamma_2 \\ \dots \\ 5 \ for \ \gamma_4 \le I_n^* \end{cases}$

Γ – a matrix of coefficients, η_n – error terms

All equations are estimated simultaneously, using the simulated maximum likelihood method.

(10,000 scrambled Sobol draws)

Structural equation

Dependent variable:
Belief in consequentiality (latent variable, LV)

Female	0.2992***
	[0.0615]
Age	-0.0037**
	[0.0019]
High school degree	0.1531*
	[0.0896]
University degree	-0.0300
	[0.0896]
Household income	0.1272***
	[0.0312]
Children	0.0143
	[0.0443]

***, **, * - Significance at the 1% , 5% and 10% level, respectively.
Standard errors are given in brackets.

- Individual socio-demographic characteristics influence latent beliefs in consequentiality.
- Respondents who perceive the survey as more consequential:
  - female,
  - younger,
  - wealthier.

Measurement equation

Dependent variable:
Indicator of the belief in consequentiality (self-reported)

Latent variable	**0.1762*** **
	[0.0361]
Threshold 1	-1.6173***
	[0.0512]
Threshold 2	-0.7364***
	[0.1570]
Threshold 3	0.6206***
	[0.1575]
Threshold 4	1.5957***
	[0.1587]

*** - Significance at the 1% level.
Standard errors are given in brackets.

Latent beliefs in consequentiality are positively correlated with self-reported measures of the beliefs.

Discrete Choice Experiment (WTP-space, in PLN)

	Means	St. Dev.	Interactions with treatment	Interactions with LV
Status Quo	2.5542 [1.6409]	43.7707*** [1.5122]	1.0524 [1.4199]	-6.1479*** [1.9452]
Entertainment theatres	32.5676*** [1.2731]	5.4877 [4.3528]	3.9768*** [1.1878]	32.9290*** [1.8254]
Drama repertory theatres	20.8851*** [1.0256]	11.6298*** [1.6107]	3.4792*** [1.0029]	18.8256*** [1.4931]
Children's theatres	10.5138*** [0.9683]	15.3949*** [1.2652]	0.4765 [0.9424]	5.2935*** [1.4564]
Experimental theatres	9.7442*** [0.9634]	16.0875*** [1.2660]	-0.1184 [0.9146]	10.7760*** [1.4881]
Cost	2.1776*** [0.0670]	1.0708*** [0.0702]	-0.1678*** [0.0453]	-0.5728*** [0.0783]

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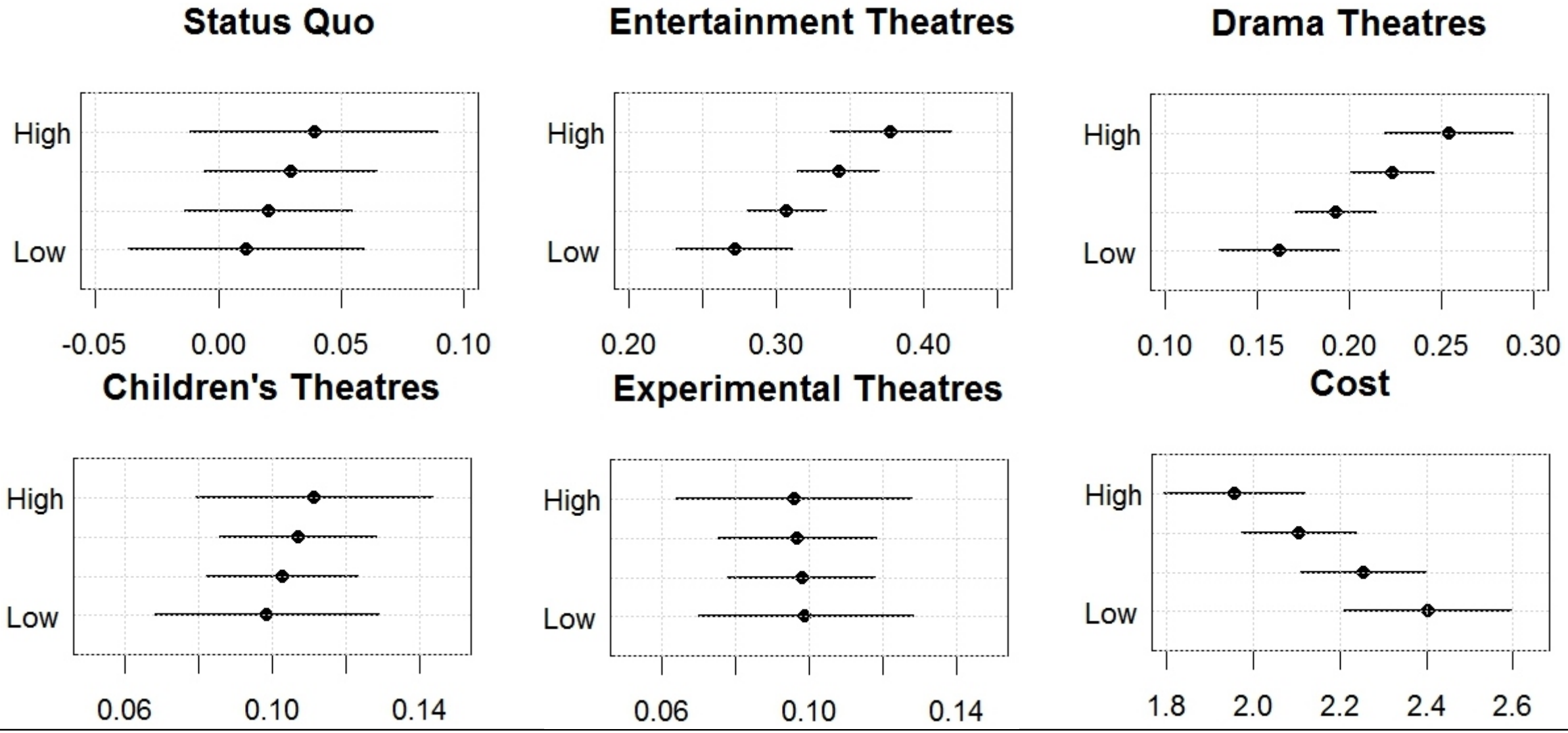
Influence of communicated consequentiality on WTP



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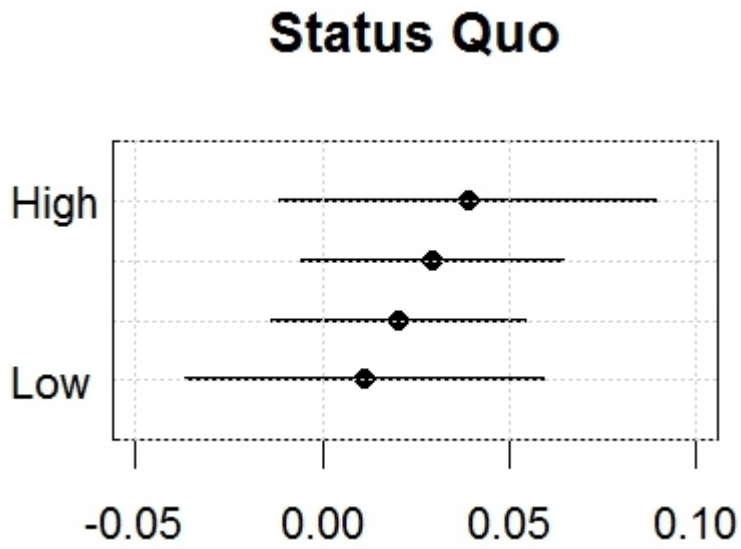

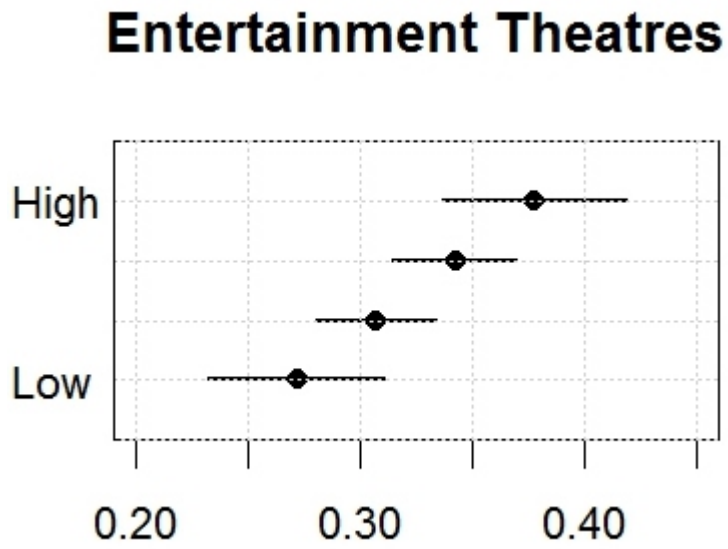

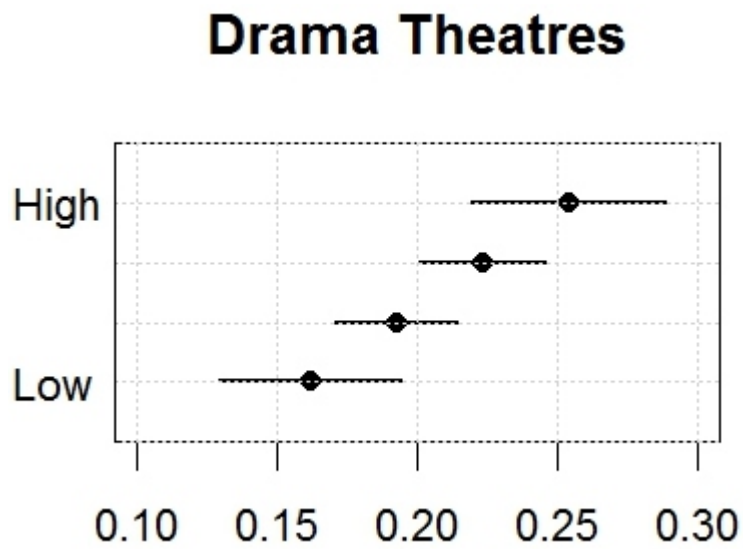

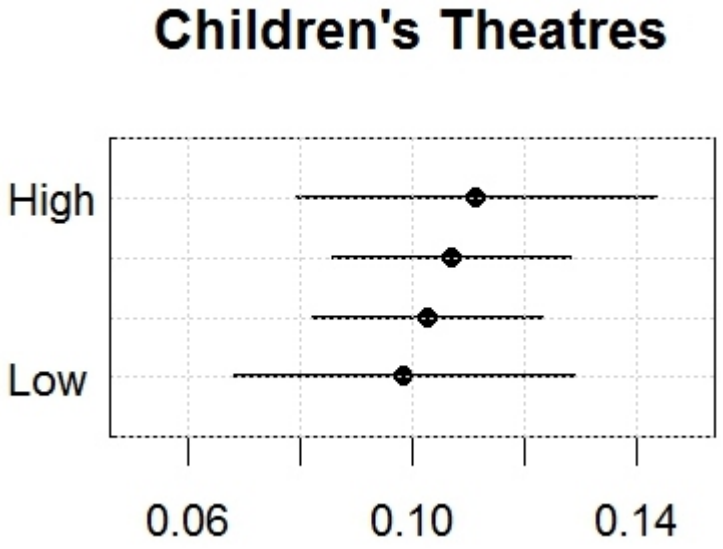

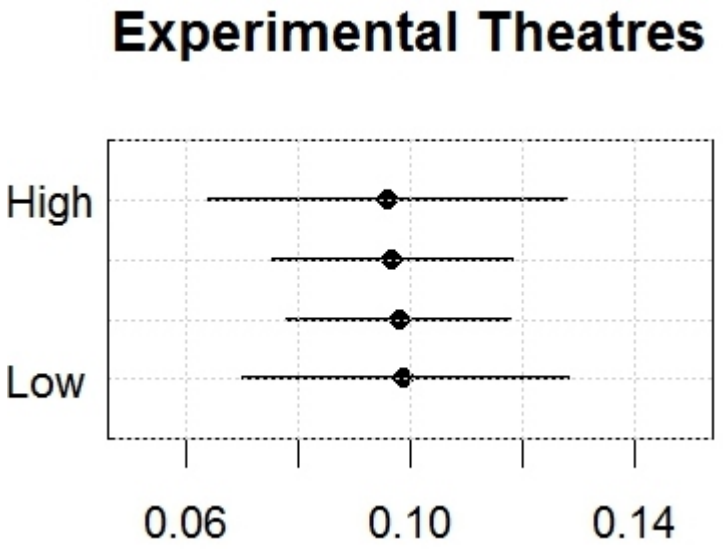

Beliefs over consequentiality may largely be "homegrown"; little room for the researcher to significantly influence them.

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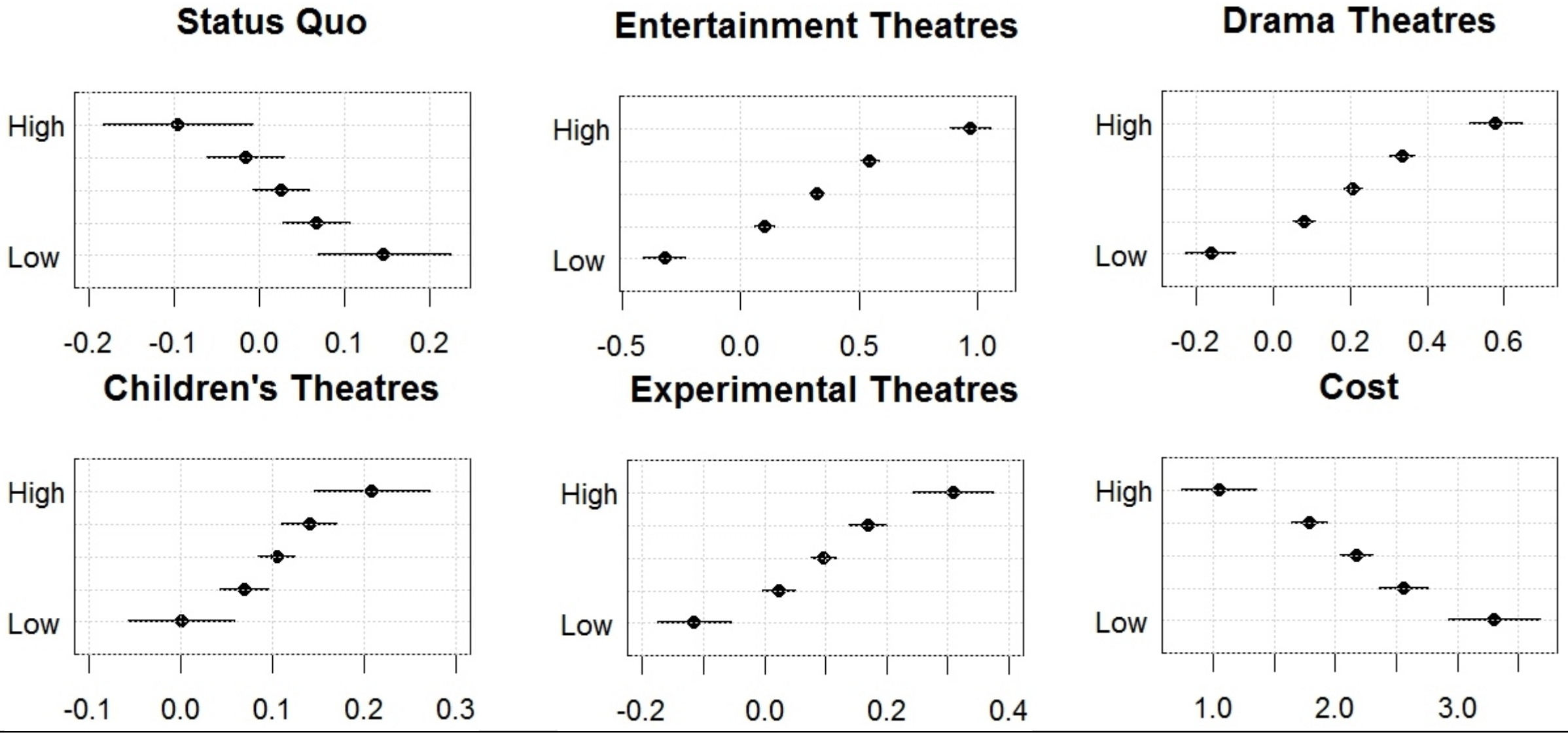
Influence of latent beliefs on WTP



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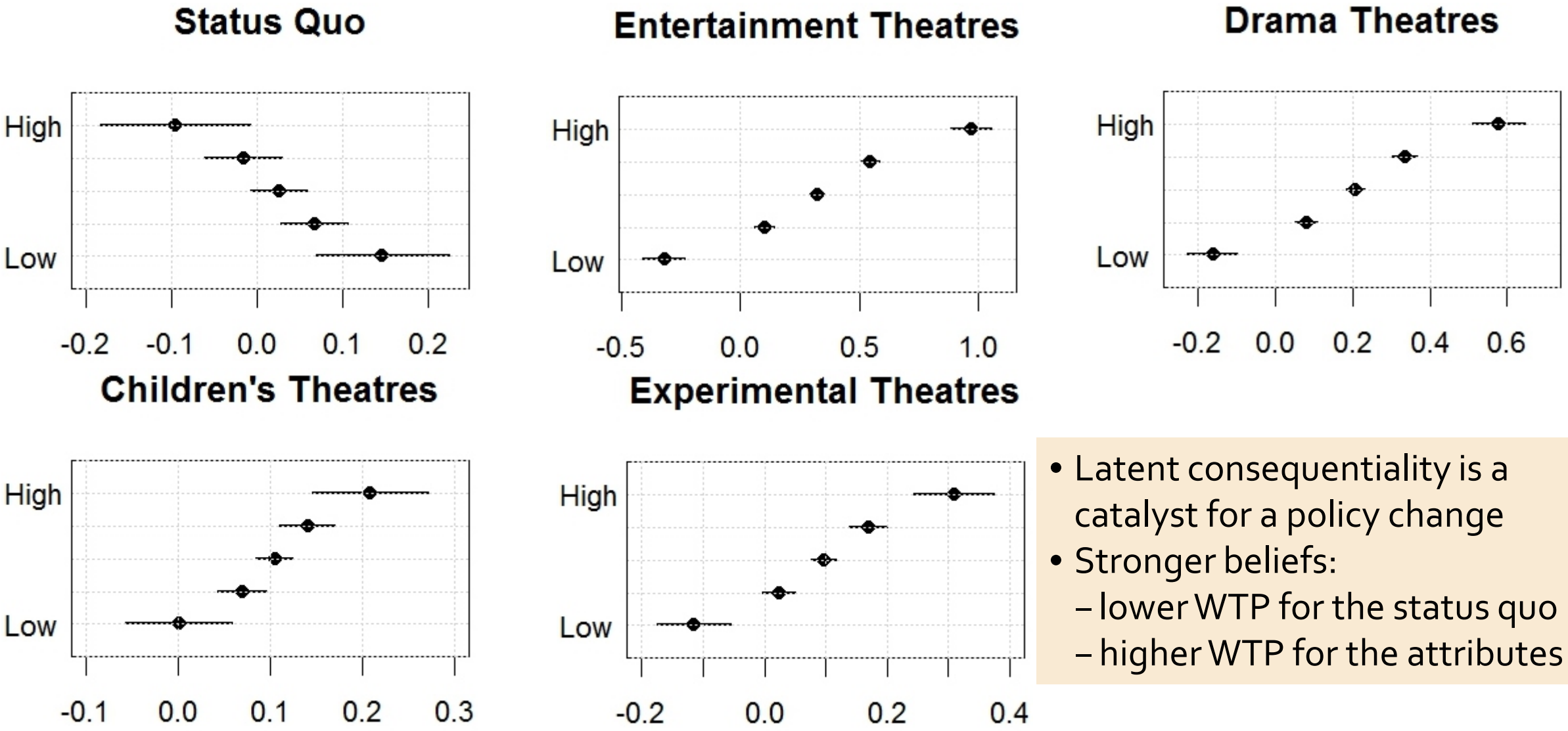
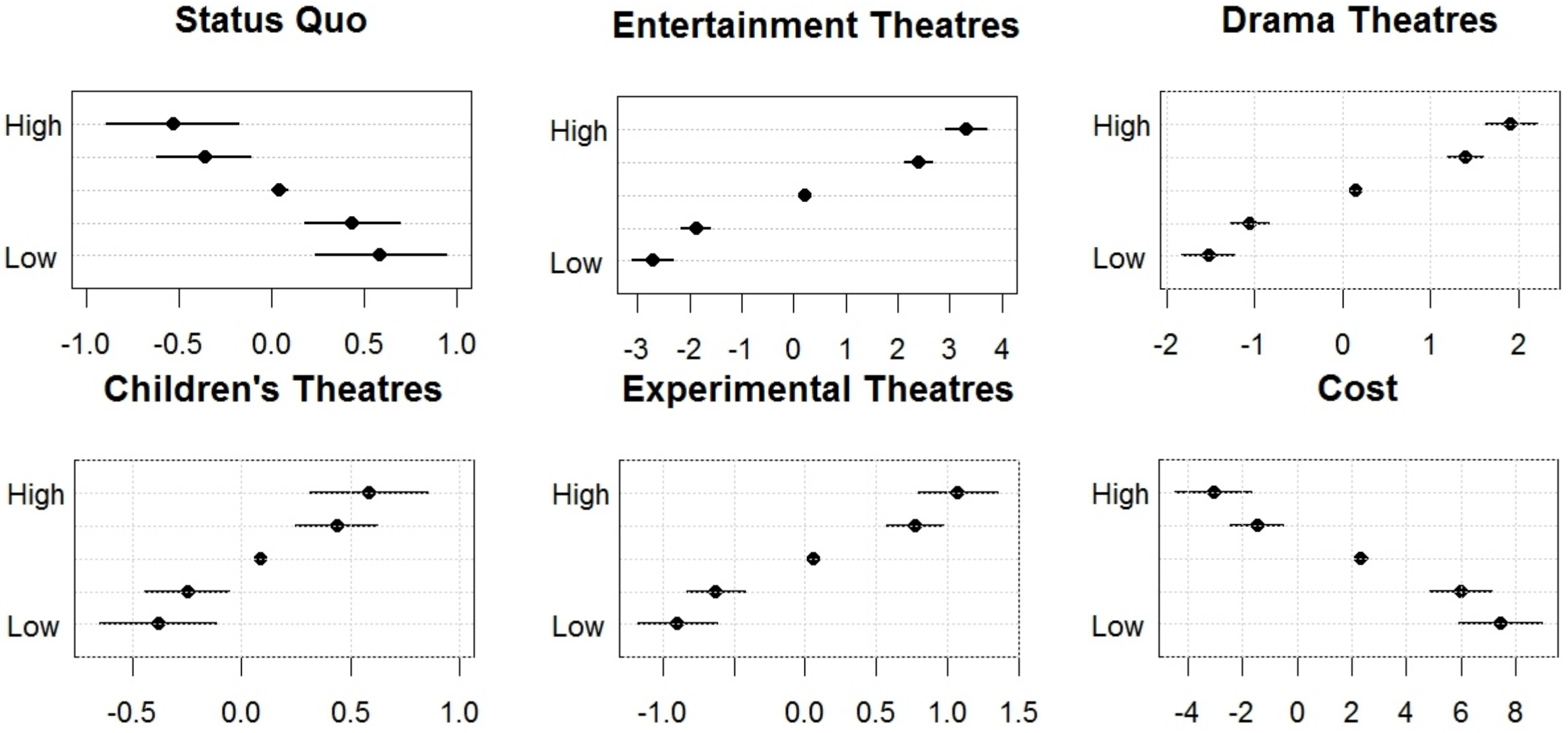


- Latent consequentiality is a catalyst for a policy change
- Stronger beliefs:
  - lower WTP for the status quo
  - higher WTP for the attributes

Influence of perceived consequentiality on WTP



Robustness of our results

Other model specifications

Model modification	**Results**
Levels of communicated consequentiality as independent interactions in the discrete choice part (dummy variables instead of a continuous variable)	Results do not change.
Communicated consequentiality as an explanatory variable(s) in the structural equation, instead of interactions with the attributes	Communicated consequentiality strengthens latent beliefs, and indirectly, through latent beliefs, increases WTP.
Communicated consequentiality as an explanatory variable(s) in the measurement equation	• Communicated consequentiality do not explain the differences in the self-reported consequentiality beliefs. • The survey scripts do not affect the stated beliefs. • The Likert-scale question may not capture the latent beliefs.
No variables in the structural equation	• Results do not change. • Socio-demographic characteristics are not the drivers of the found relationships.

Conclusions

- Latent consequentiality beliefs have a significant effect on WTP.
- Communicated consequentiality significantly influences WTP.

The importance of the theoretical assumption on survey consequentiality is empirically confirmed.

- Communicated consequentiality has no significant effect on perceived consequentiality
  - Need to develop other / more precise follow-up questions?
  - Need to develop more convincing consequentiality scripts?
- Overall, we propose the econometric framework for the analysis of links between:
  - perceived consequentiality,
  - communicated consequentiality,
  - respondents' preferences,
  - their socio-demographic characteristics.

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