



Environment Center
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Valuation of transportation noise in TranExt project

A WTA approach

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EXTERNAL COSTS OF TRANSPORT:

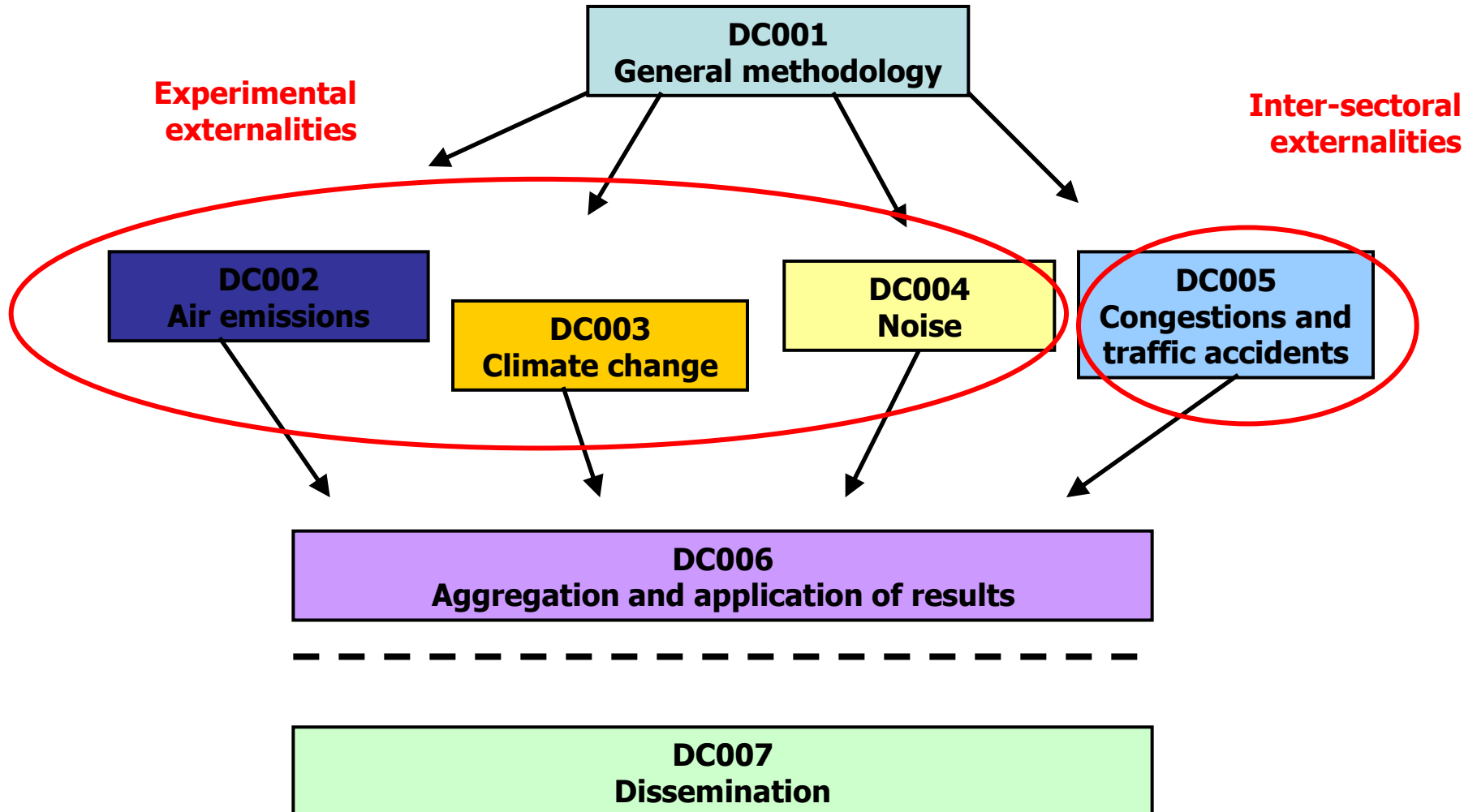
valuation of travel time and traffic noise

Prague, November 16, 2011

Research question

How much people value reduction in transportation-related noise?

TranExt Research Project



Transportation noise as an externality

- difficulty in arriving at plausible metrics to measure dis-utility
- multiple effects, synergies with other environmental dis-amenities
- objective metrics – decibels – not well understood
- non-linear relations between objective and subjective perception
- substantial share of protesters in previous WTP studies

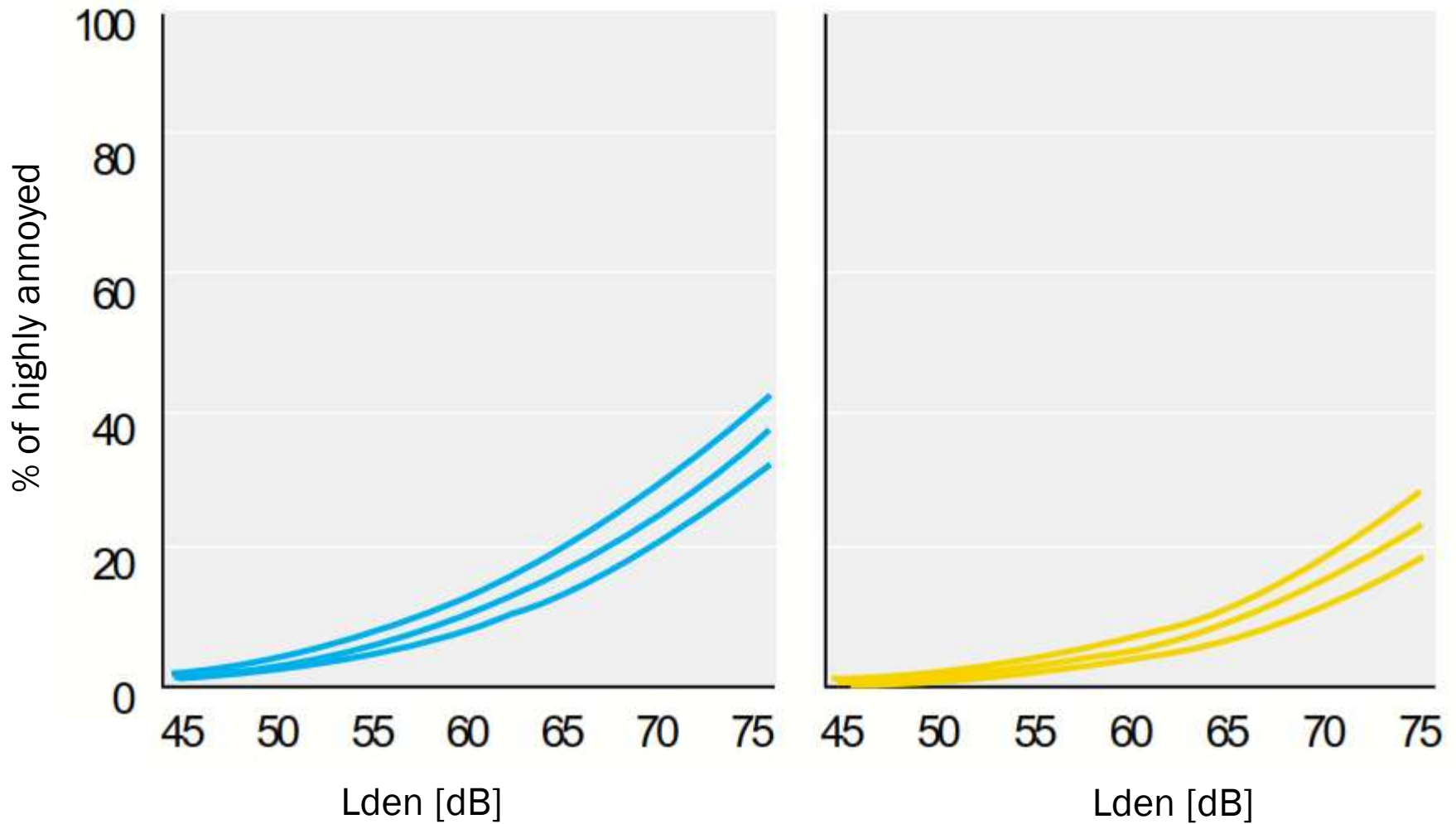
Method

Our survey draws conceptually from Navrud (2000), Bjørner et al. (2003) and Navrud et al. (2006)

- WTP for reduction of noise level to the level that is not annoying
- "noise annoyance" - subjective noise perception (5-point scale)
 - noise annoyance is a function of objective noise level (Miedma and Oudshoorn (2001))

We asked for WTA instead of WTP

How does subjective annoyance relate to objective noise levels?



Willingness to pay vs. willingness to accept

- empirical difference
- theoretical difference
- may activate different psychological mechanism
- has also certain social connotations (justice, legality)
 - our pre-test shows that people are not willing to pay for noise reduction for principal reasons because they:
 - feel that they have right not to be exposed to high noise levels
 - think that noise reduction should be paid for by those who are responsible for the noise

WTA scenario

- Certain measures are being considered that would decrease noise level from road-traffic/ railway-traffic noise in your area
 - for the next 10 years
 - combination of technical measures and traffic regulations
 - only traffic-related noise will be reduced
 - other negative effects of traffic will remain the same
- If you could, what would you choose?
 - decrease of the noise to the level that will not annoy you
 - annual compensation of X CZK for the next 10 years, that is total of 10 times X CZK in 10 years

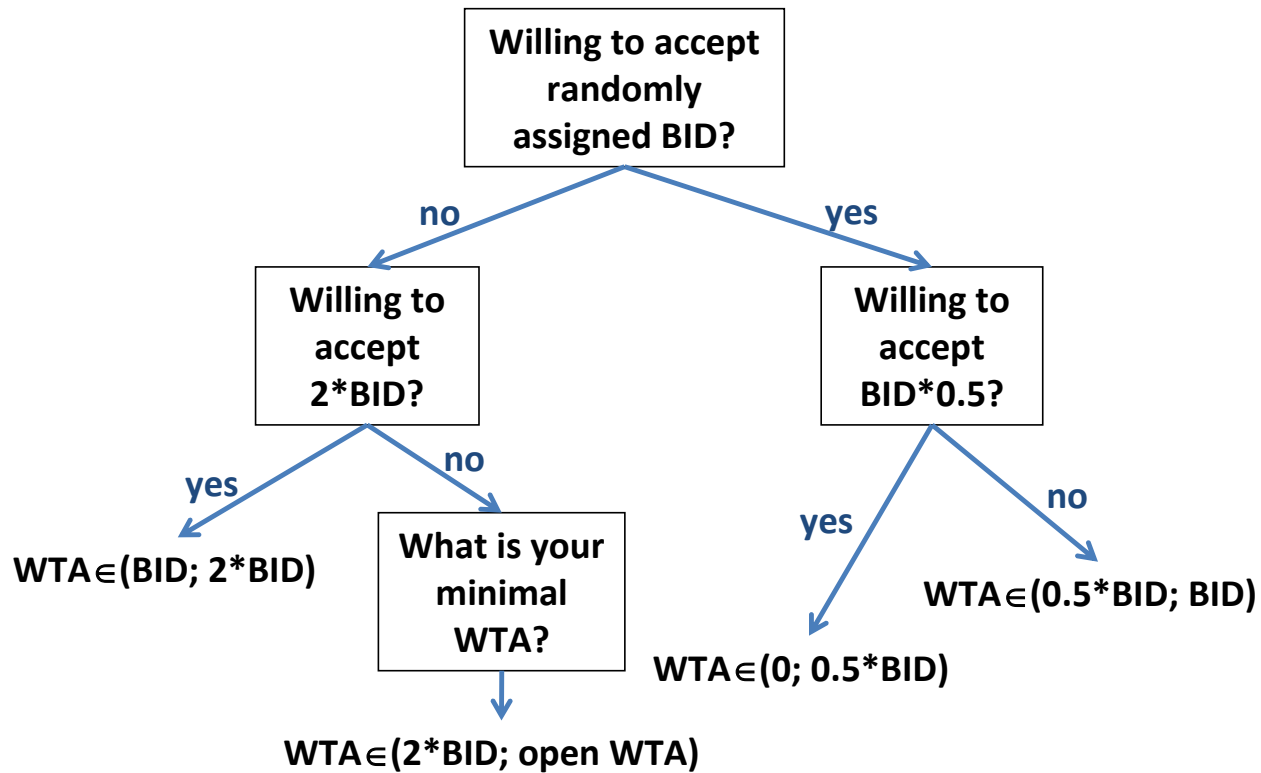
Willingness to accept compensation

- how much would you be willing to accept if the noise level is not reduced
- willingness to accept measures, in our case, equivalent compensation

$$V_{i1}(y_i, q_1; Z, X_i) = V_{i2}(y_i + WTA_i, q_2; Z, X_i)$$

- where q is environmental quality specifically associated with noise level, and $q_1 > q_2$ (i.e., noise level is lower for q_1)
- y is income
- Z is vector of prices, environmental quality related to other effects of transportation and other factors that affect indirect utility function
- X_i is vector of individual-specific characteristics

Elicitation of WTA



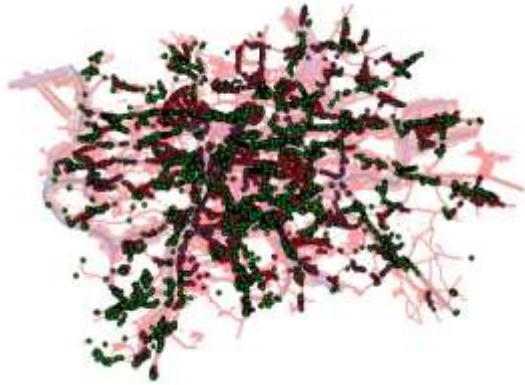
Sampling and data collection

- CAPI
- 2 sub-samples
 - n1 (road) = 363
 - n2 (railway) = 246
- data collection by SC&C in summer 2009
- typological sampling of areas
 - random sample of addresses
 - random selection of households within houses/ block of flats
 - random selection of a respondent within a household

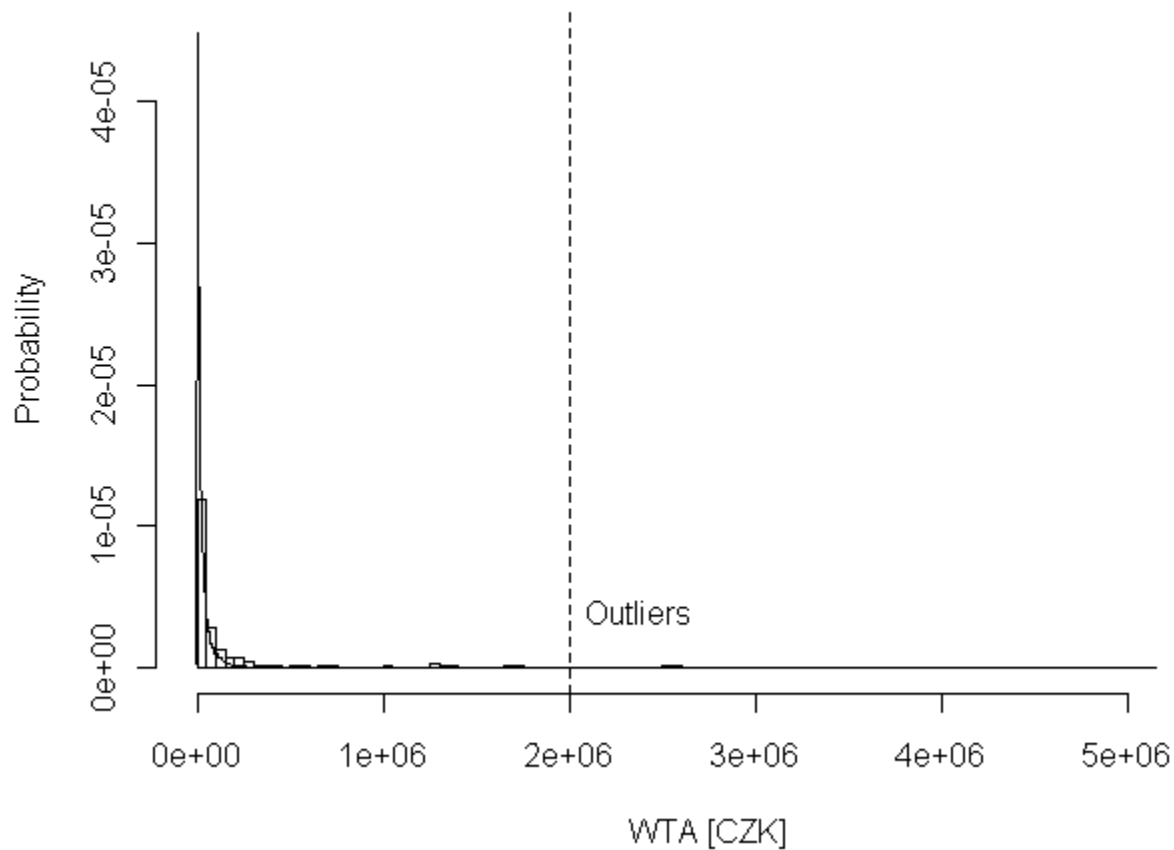
	Road-traffic noise	Railway-traffic noise
Praha	218	135
Vysoké Mýto	40	
Česká Třebová		111
Mníšek pod Brdy	28	
Kopřivnice	77	
Celkem	363	246



An example of an area with high road-traffic noise



Results: histogram of mid-point WTA values



Model of WTA

Assuming that WTA is random variable with cdf $F(WTA, \lambda)$

- λ is a vector of parameters of this distribution

then probability that an individual falls in the interval given by higher and lower bids is:

$$\Pr(WTA_i \in (WTA_L, WTA_H)) = F(WTA_H; \lambda) - F(WTA_L; \lambda)$$

after experimentation, Weibull distribution seems to approximate the observed cdf best

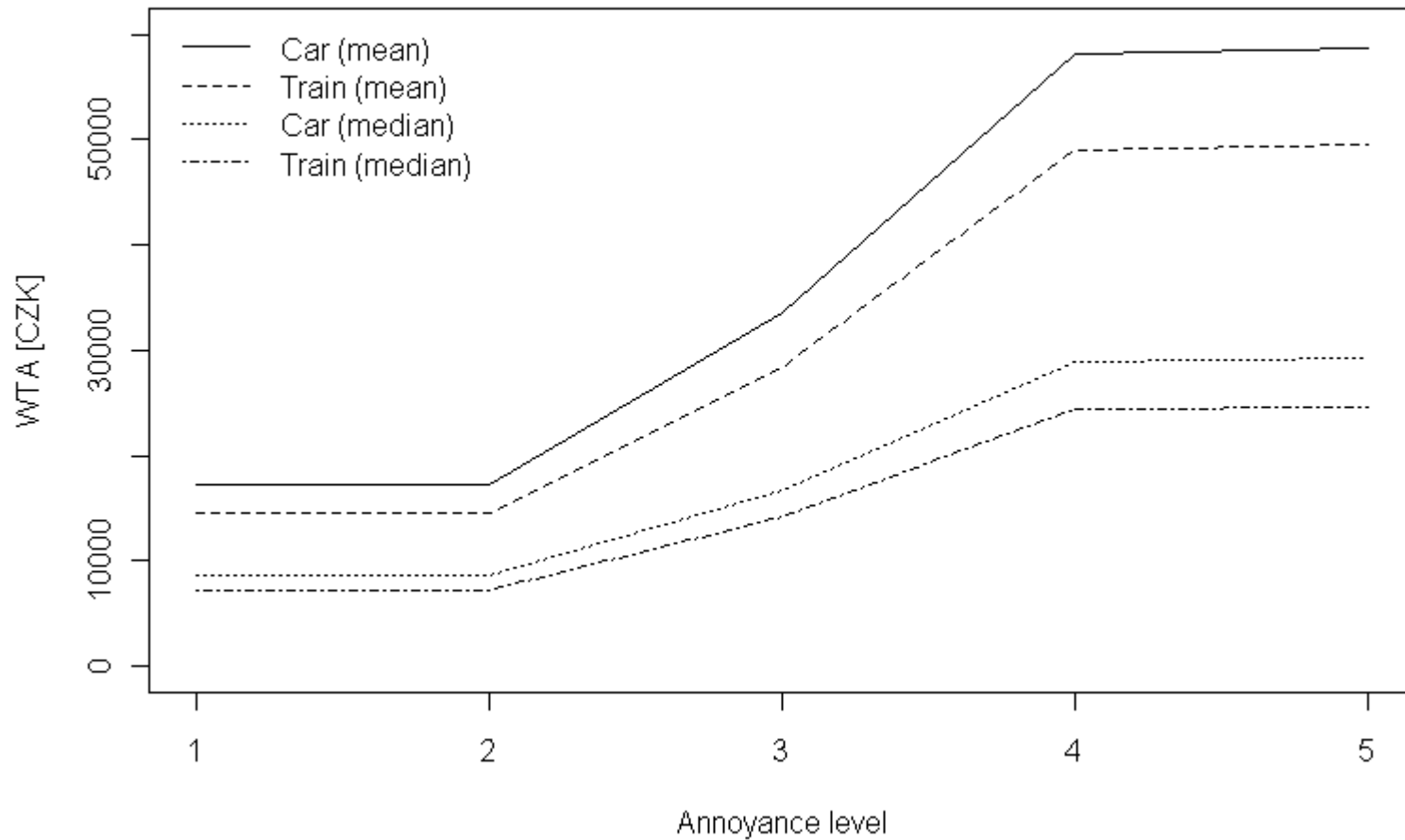
Estimation of mean and median WTA values

$$\text{mean}(WTA) = \sigma \Gamma\left(\frac{1}{\theta + 1}\right)$$

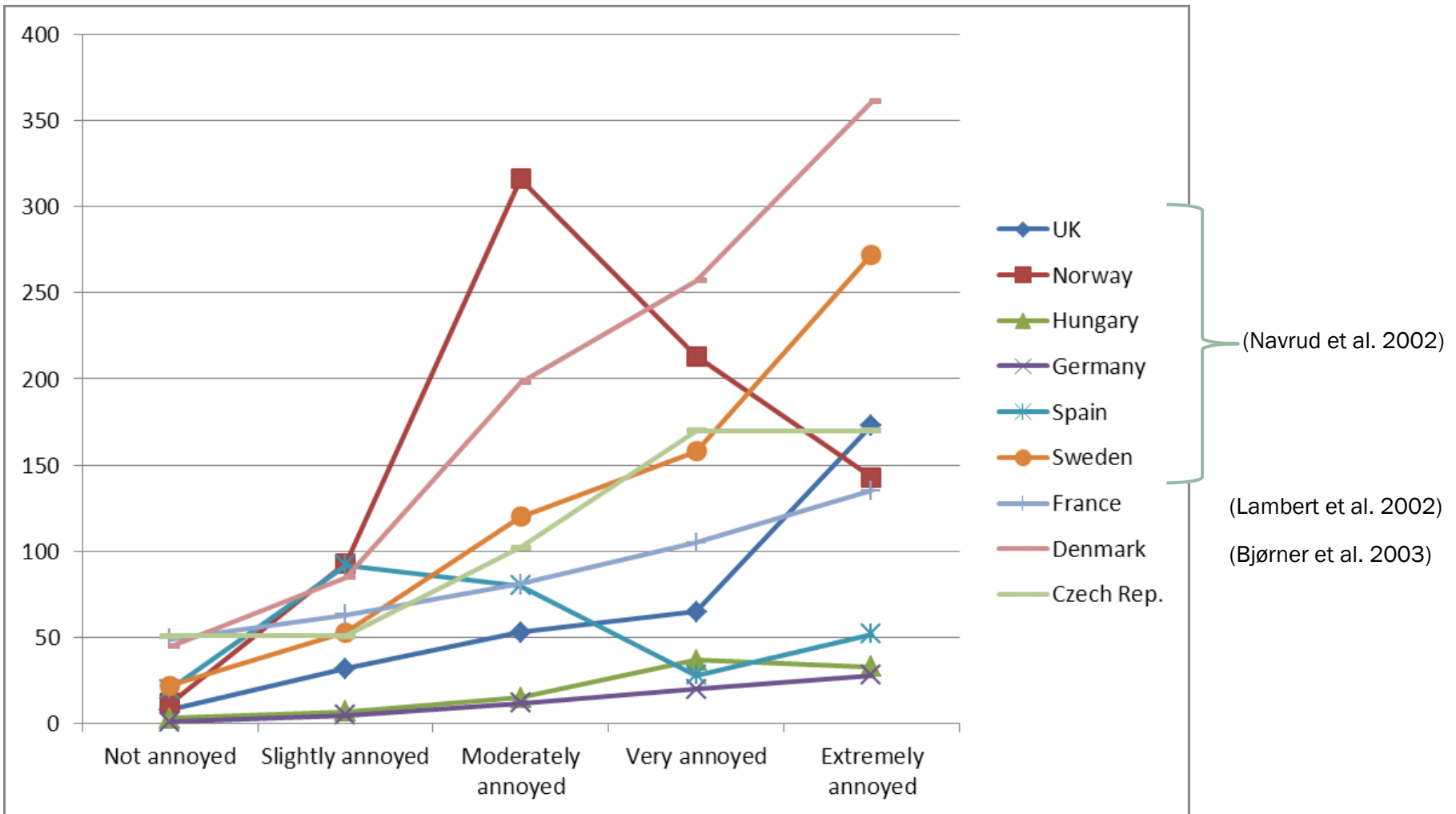
$$\text{median}(WTA) = \sigma (-\ln(0.5))^{\frac{1}{\theta}}$$

where sigma is estimated scale parameter and theta is the shape parameter of the Weibull distribution

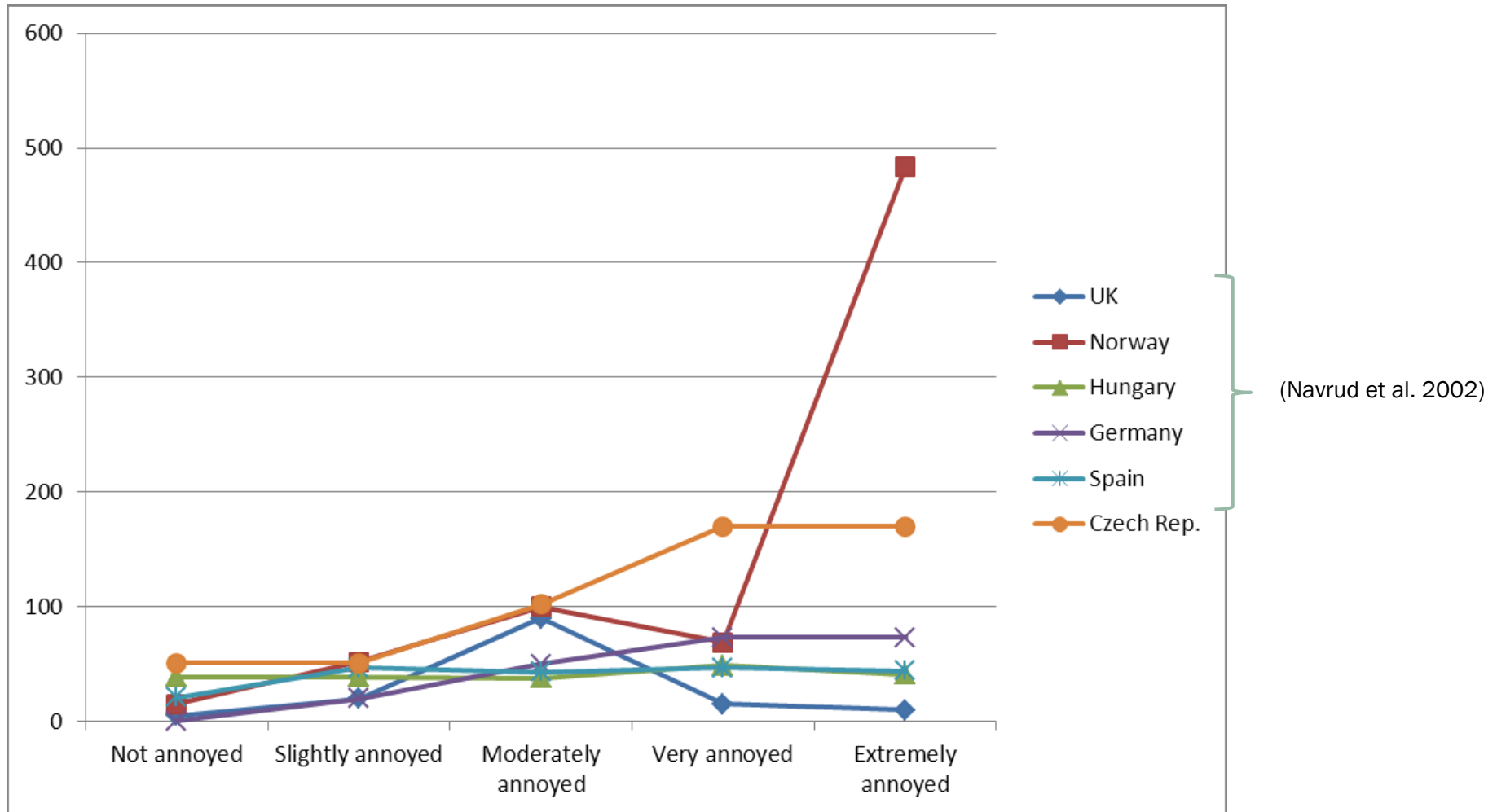
Mean and median WTA values



WTP/WTA for eliminating of noise annoyance caused by road transportation (in 2005-PPP €/ p.c./p.a.)



WTP for eliminating of noise annoyance caused by rail transportation (in 2005-PPP €/ p.c./p.a.)



Conclusions

- the median WTA ranges between 900 CZK and 3000 CZK per year (€ 51-170) depending on the noise annoyance levels
- WTA increases with annoyance level
- the WTA values are comparable to values estimated through WTP in other studies
- need to deal with outliers/extreme values
- WTA format seems to reduce protest answers by a large amount

Acknowledgement

This research was funded by the Czech Ministry of Transport grant no. CG712-111-520 Quantification of external costs of transport in the Czech Republic. The views expressed in this paper are solely those of the authors.

Thank you for your attention

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