Valuing externalities of outdoor advertising in an urban setting – the case of Warsaw

Mikołaj Czajkowski, Michał Bylicki, Wiktor Budziński, Mateusz Buczyński

University of Warsaw, Faculty of Economic Sciences

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Outdoor Advertising (OA)

- Outdoor advertising in cityscape
  - Owners rent space
  - Advertising companies use it for information and marketing
  - Externalities
    - Positive – source of information
    - Negative – visual pollution

Regulation of outdoor advertising

- Externalities = market inefficiency
- Various approaches to regulation
  - Metro Manila in the Philippines

  - Sao Paulo, Brazil

Externalities of outdoor advertising

- Existing approaches to regulation not based on proper benefit-cost analysis
  - What is the socially optimal level of outdoor advertising?
  - Valuation of the externalities
  - Inform regulating quantity or imposing Pigouvian tax on ad space

Theoretical model of consumer preferences for OA

- Individual i chooses consumption level C_i maximizing U:

$$U_i = C_i + \alpha_{i1} N - \alpha_{i2} \left(\frac{N}{T} \right)^2$$

  - N – total space used for advertising, T – total available space
  - α_{i1} – positive effects of OA (e.g., information)
  - α_{i2} – negative effects of OA (e.g., visual pollution)

- Budget constraint:

$$W_i + Pn_i = C_i + \lambda n_i^2$$

  - Income (W) is spent on consumption (C)
  - Those who own and rent ad space (n_i) have additional income (Pn_i) and additional costs associated with maintaining ad space (λn_i^2)

Theoretical model of consumer preferences for OA (cont.)

- Assume competitive market with linear demand for OA space – equilibrium amount of space an individual rents is:

$$n_i^* = \frac{aK}{2\lambda + bK}$$

- If individual could pay a fee ($f\gamma$) to the government to reduce advertising to $(1-\gamma)N$ the utility function, budget constraint and the equilibrium OA reduction levels become:

$$U_i = C_i + \alpha_{i1}(1-\gamma)N - \alpha_{i2}\left(\frac{(1-\gamma)N}{T}\right)^2$$

$$W_i + P(1-\gamma)n_i^* = C_i + \lambda\left((1-\gamma)n_i^*\right)^2 + f\gamma$$

$$\gamma^* = \max\left\{\min\left\{\frac{2\alpha_{2i}\left(\frac{N}{T}\right)^2 + 2\lambda\left(n_i^*\right)^2 - f - \alpha_{1i}N - Pn_i^*}{2\alpha_{2i}\left(\frac{N}{T}\right)^2 + 2\lambda\left(n_i^*\right)^2}, 1\right\}, 0\right\}$$

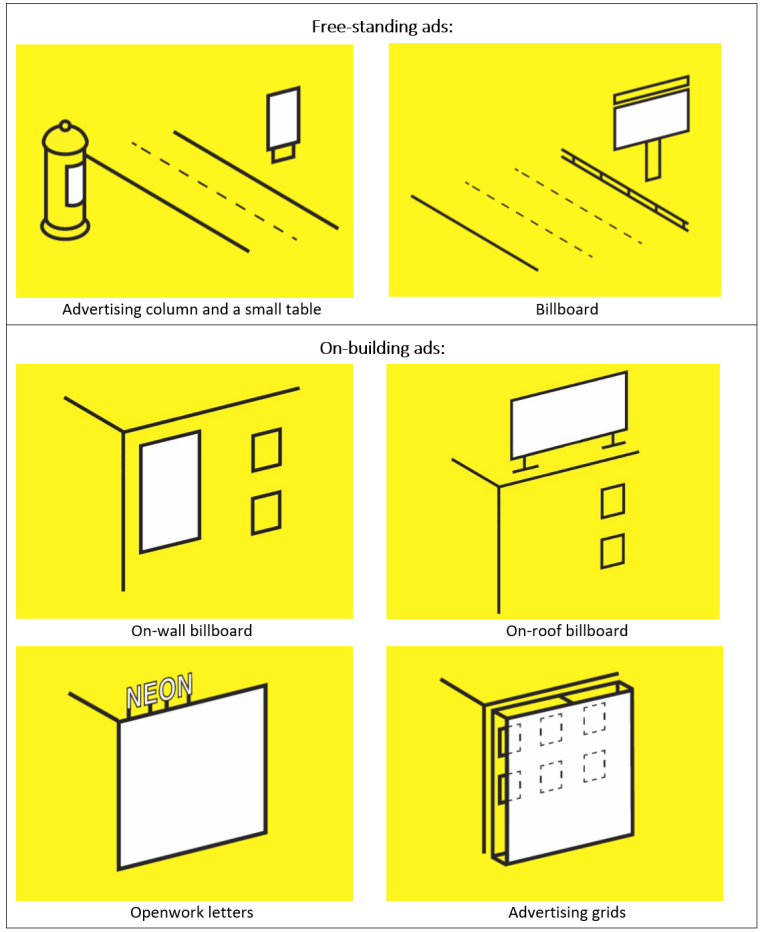
Theoretical model – predictions

- What does it all lead to?
  1. The higher the weight an individual assigns to information function of advertising, the lower his optimal reduction of OA $\left(\frac{\partial \gamma^*}{\partial \alpha_{1i}} < 0\right)$
  2. The more concerned about visual pollution an individual is, the higher the optimal OA reduction levels for them $\left(\frac{\partial \gamma^*}{\partial f} < 0\right)$
  3. For individuals who own space to rent – the more profitable renting the space is, the lower an individual's optimal reduction $\left(\frac{\partial \gamma^*}{\partial P} < 0, \frac{\partial \gamma^*}{\partial \lambda} > 0\right)$
  4. Individuals who rent space to have lower optimal reduction of OA than individuals who do not rent space $\left(\left.\frac{\partial \gamma^*}{\partial n_i^*}\right|_{n_i^*=0} = 4\lambda n_i^*\left(f + \alpha_{1i}N + Pn_i^*\right) - P\left(2\alpha_{2i}\left(\frac{N}{T}\right)^2 + 2\lambda\left(n_i^*\right)^2\right)\Big|_{n_i^*=0} = -2P\alpha_{2i}\left(\frac{N}{T}\right)^2 < 0\right)$

Empirical study

- Case study – Warsaw, the capital city of Poland
  - The Polish government recently passed the 'Landscape Bill', which allows local governments to impose local laws on advertising
  - Current regulations for OA in Warsaw are complicated and not strictly imposed
- Our study – stated preference-based valuation study
  - DCE aimed at valuation of OA externalities
  - A starting point for designing future policies in introducing new limits on OA
- We focused on two types of OA:
  - **Free-standing advertising** (e.g., billboards, advertising columns, small tables and city lights, backlighted boards)
  - **On-building advertising** (e.g., billboards fixed to buildings (on walls and roofs), advertising grids covering a building elevation, openwork letters and signs on the roofs and walls of buildings)
  - '**Annual cost for your household**' – the expected cost of a particular policy associated with a given set of new regulations (higher prices, rents or other increases in the cost of living).

Choice attributes and attribute levels



Attributes	Attribute levels
Free-standing advertising	100% (no change) 75% (small reduction) 50% (medium reduction) 25% (large reduction) 0% (ban)
On-buildings advertising	100% (no change) 75% (small reduction) 50% (medium reduction) 25% (large reduction) 0% (ban)
Annual cost for respondent's household	0 (no change), 10, 25, 50, 75, 100, 200 PLN

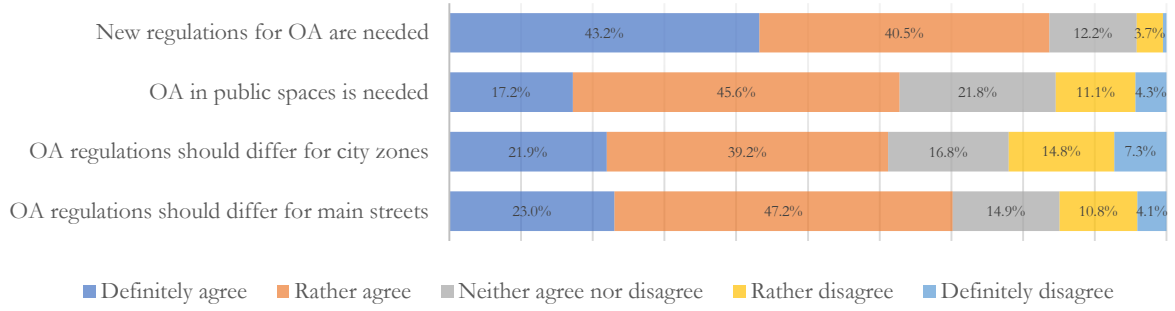
Administration of the study and example of a choice card

- 12 choice tasks per respondent, 2,3 or 4 alternatives per choice task
- CAWI-based, December 2017 to January 2018
- Representative sample of 1250 adult inhabitants of Warsaw
- Response rate 48.7%

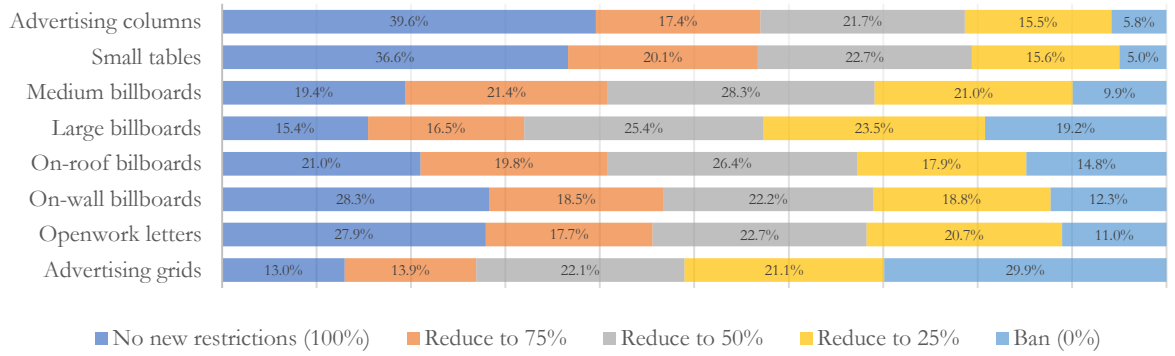
Choice situation 1	Alternative A (Status quo)	Alternative B	Alternative C
Free-standing advertising	100% (no change)	50% (medium reduction)	75% (small reduction)
On-buildings advertising	100% (no change)	0% (ban)	25% (large reduction)
Annual cost for your household	0 PLN (no change)	25 PLN	50 PLN
Your choice:	☐	☐	☐

Respondents' attitudes towards OA regulation

- Generally in favor of regulation:

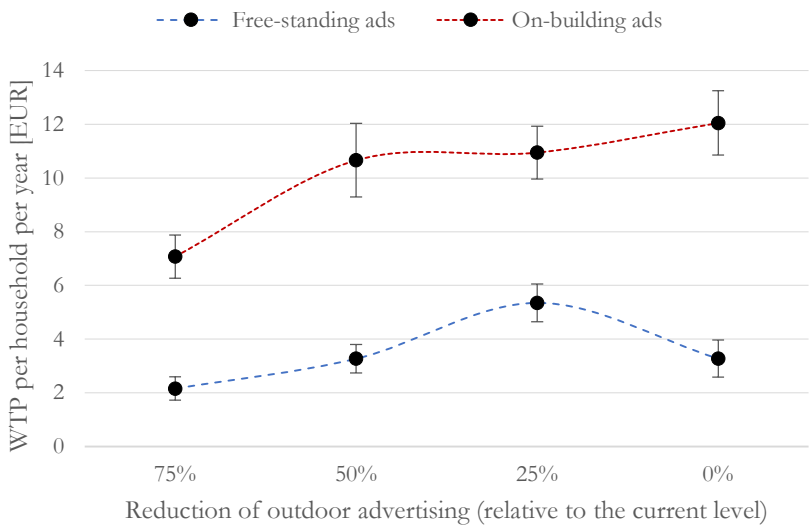


- Preferences quite heterogeneous:



Respondents' WTP for new policy attributes (EUR / household / year)

	MXL	
	Mean (st. err.)	St. deviation (st. err.)
Status quo (alternative specific constant)	-5.94*** (0.27)	13.10*** (0.85)
Free-standing ads – small reduction (75%)	2.16*** (0.22)	8.23*** (0.70)
Free-standing ads – medium reduction (50%)	3.27*** (0.27)	10.86*** (0.69)
Free-standing ads – large reduction (25%)	5.35*** (0.36)	15.01*** (0.80)
Free-standing ads – total ban (0%)	3.27*** (0.35)	15.81*** (0.88)
On-building ads - small reduction (75%)	7.07*** (0.41)	9.35*** (0.56)
On-building ads - medium reduction (50%)	10.66*** (0.70)	17.20*** (0.72)
On-building ads - large reduction (25%)	10.95*** (0.50)	19.96*** (0.80)
On-building ads - total ban (0%)	12.05*** (0.61)	24.21*** (0.76)

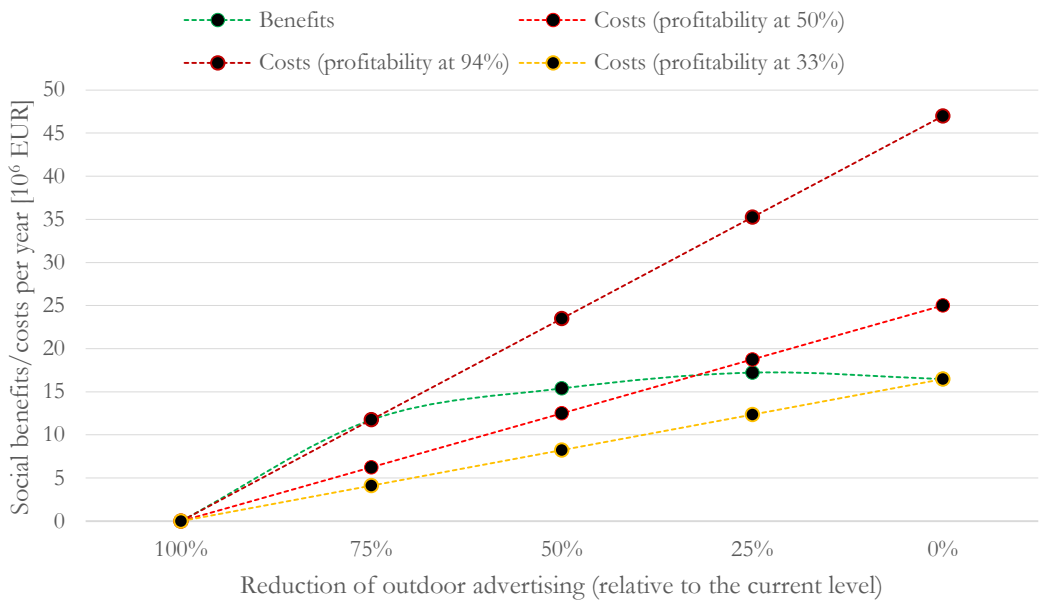


Drivers of WTP for OA reductions

	Mean (st. err.)	St. dev. (st. err.)	Ads useful	Regulation useful	Has free-standing ads	Has on-building ads	Household income
Status quo (alternative specific constant)	-6.25*** (0.28)	12.92*** (0.79)	0.19 (0.18)	-1.48*** (0.18)	-0.39 (0.63)	-0.11 (0.55)	0.29* (0.17)
Free-standing ads – small reduction (75%)	2.48*** (0.29)	8.14*** (0.72)	-1.17*** (0.16)	0.85*** (0.18)	-1.83*** (0.47)	2.00*** (0.42)	0.09 (0.09)
Free-standing ads – medium reduction (50%)	3.56*** (0.28)	10.62*** (0.75)	-1.40*** (0.18)	1.02*** (0.17)	-1.28** (0.55)	1.34** (0.53)	0.69*** (0.18)
Free-standing ads – large reduction (25%)	5.50*** (0.37)	14.74*** (0.86)	-1.55*** (0.20)	1.37*** (0.22)	-2.10*** (0.58)	2.88*** (0.54)	1.01*** (0.18)
Free-standing ads – total ban (0%)	3.56*** (0.40)	15.20*** (0.79)	-2.68*** (0.22)	1.57*** (0.21)	-2.96*** (0.80)	3.19*** (0.70)	1.65*** (0.15)
On-building ads – small reduction (75%)	6.70*** (0.44)	9.94*** (0.71)	0.10 (0.21)	0.34* (0.19)	1.12** (0.54)	-0.03 (0.53)	-0.02 (0.20)
On-building ads – medium reduction (50%)	10.44*** (0.50)	17.77*** (0.90)	-0.44** (0.19)	1.24*** (0.19)	1.49** (0.60)	0.43 (0.51)	0.07 (0.25)
On-building ads – large reduction (25%)	10.96*** (0.49)	20.27*** (0.89)	-0.63*** (0.20)	1.71*** (0.19)	1.55** (0.61)	0.15 (0.55)	0.68*** (0.18)
On-building ads – total ban (0%)	12.25*** (0.49)	24.75*** (0.95)	-1.32*** (0.18)	2.01*** (0.18)	0.79 (0.58)	0.35 (0.54)	0.68*** (0.18)
-Cost*scale	0.98*** (0.09)	2.47*** (0.11)	-0.36*** (0.07)	0.21*** (0.07)	-0.28 (0.19)	-0.33* (0.18)	0.04 (0.07)

Back of the envelope CBA

- Aggregated benefits of introducing new regulations, estimated at 11.7 to 18.1 million EUR per year (smallest to the most preferred reductions)
- Revenues from OA market in Warsaw ~ 50 million EUR / year
  - No data on profits



Conclusions

- One of the very first studies to theoretically consider and empirically estimate the monetary value of externalities associated with advertising signs
- We observe strong support (positive and significant mean WTP) for the regulation and the reduction in OA, relative to the current level
  - This indicates that negative externalities (visual pollution) prevail over positive externalities (information)
  - However, total ban is not necessarily preferred option (positive externalities matter)
- The estimated benefits associated could be used for policy to reach socially optimal level of OA
  - Conducting a benefit-cost analysis (requires knowledge of costs) to introduce command-and-control regulations
  - Using market-based instruments – a Pigouvian tax on OA

Thank you

mc@uw.edu.pl
czaj.org