Household Relocation and Cost of Travelling: a CGE Framework for Strategic Transport Appraisal

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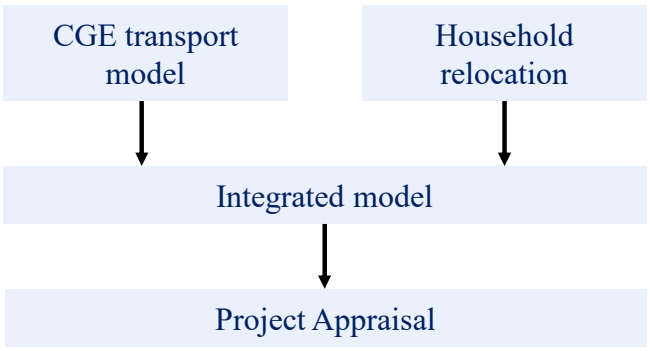
Objective

Include residential relocation into CGE models with detailed transportation behaviour for strategic transport planning.

Background

- CGE transport models for urban planning mostly assume static household location.
- Transport behaviour is highly detailed
- Benefits of policy not properly estimated without household relocation.



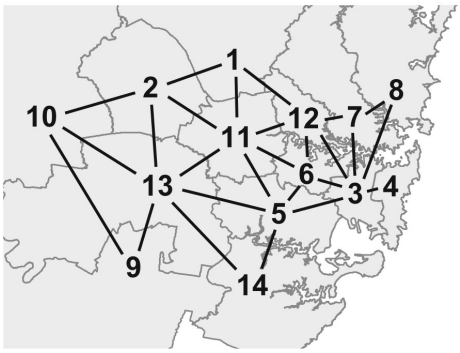
Methodology

We model household location using a logit model approach.

$$\Pr(region = r) = \frac{e^{U_{h,r}}}{\sum e^{U_{h,r}}}, h \in Households$$

Due to lack of data for maximum likelihood estimation (MLE), the model is linearised and the coefficients estimated using ordinary least squares (OLS). Setting region 1 as the baseline region against which preferences are measured:

$$U_{h,r} = \beta_0 + \boldsymbol{\beta X_h} = ln\frac{Pr(region = r)}{\Pr(region = 1)}$$



Case study - 14 region of Sydney, Australia

Case Study

- 14 region model for Sydney, Australia.
- Coefficients of relocation model have highly significant F-statistic (p = 1.077e-07)
- McFadden's r-squared value is low ($r^2 = 0.12$).

	Coefficient	p-value
Intercept	-38.4575	0.000338
$\ln(d_{commute})$	0.5797	0.004857
$\ln(p_f)$	-11.8418	0.000449
$\ln(income)$	-0.3492	0.067718
Multiple R^2	0.12061	
F-statistic	9.983	

Results

- Model without relocation underestimates project benefits.
- Households relocate to take advantage of the changes in commute times.

Total EV (mil AUD)	Stage 2	Stage 3	Stage 4	Stage 5
With relocation	0.0761	179.8525	179.6940	340.3294
Without relocation	0.6848	94.5782	96.5187	189.0389

Future Work

- Testing MLE relocation model
- Testing more regressors to improve r^2
- Integrate firm relocation

Acknowledgements / references

Robson E., Dixit V. (*A General Equilibrium Framework for Integrated Assessment of Transport and Economic Impacts*, 2017)

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