

The impact of telecommuting on residential relocation and residential preferences: a latent class modelling approach



Universiteit Utrecht

Dick Ettema

Utrecht University, Faculty of Geosciences
PO Box 80115, 3508 TC Utrecht

d.ettema@geo.uu.nl

Residential Preferences: The Role of ICT

ICT has fundamentally changed the relationship between locations and activities.

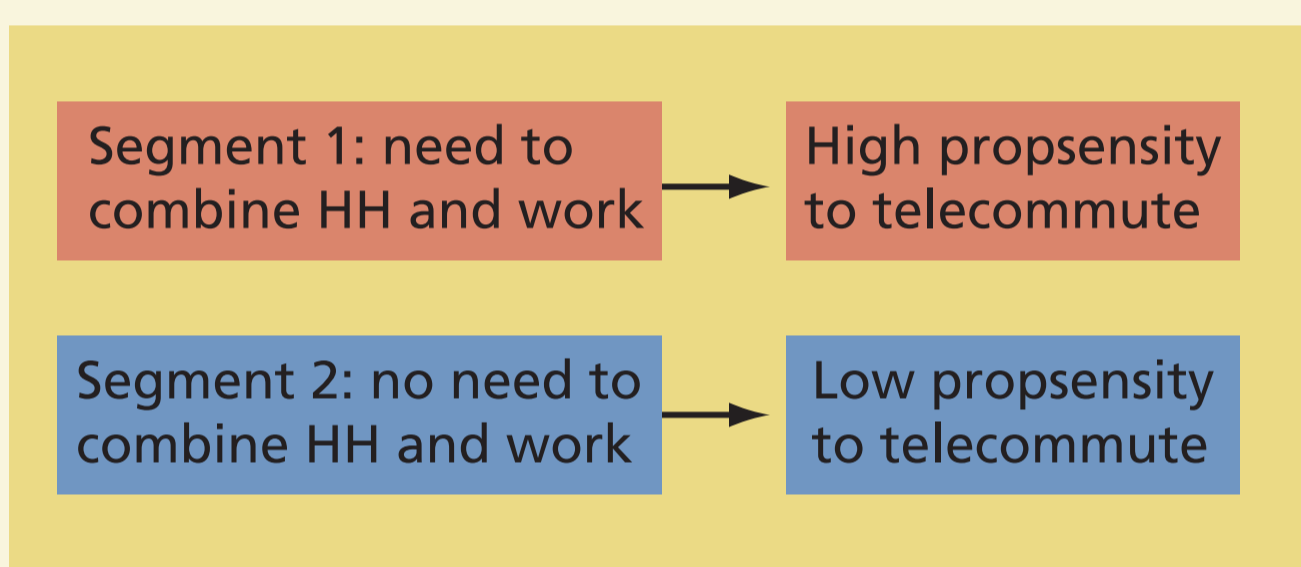
- access to services and information on virtually every location at any time
- increasing options to work and shop in other locations and time slots.

However, the implications of ICT and telecommuting on residential preferences are unclear.

Hypotheses

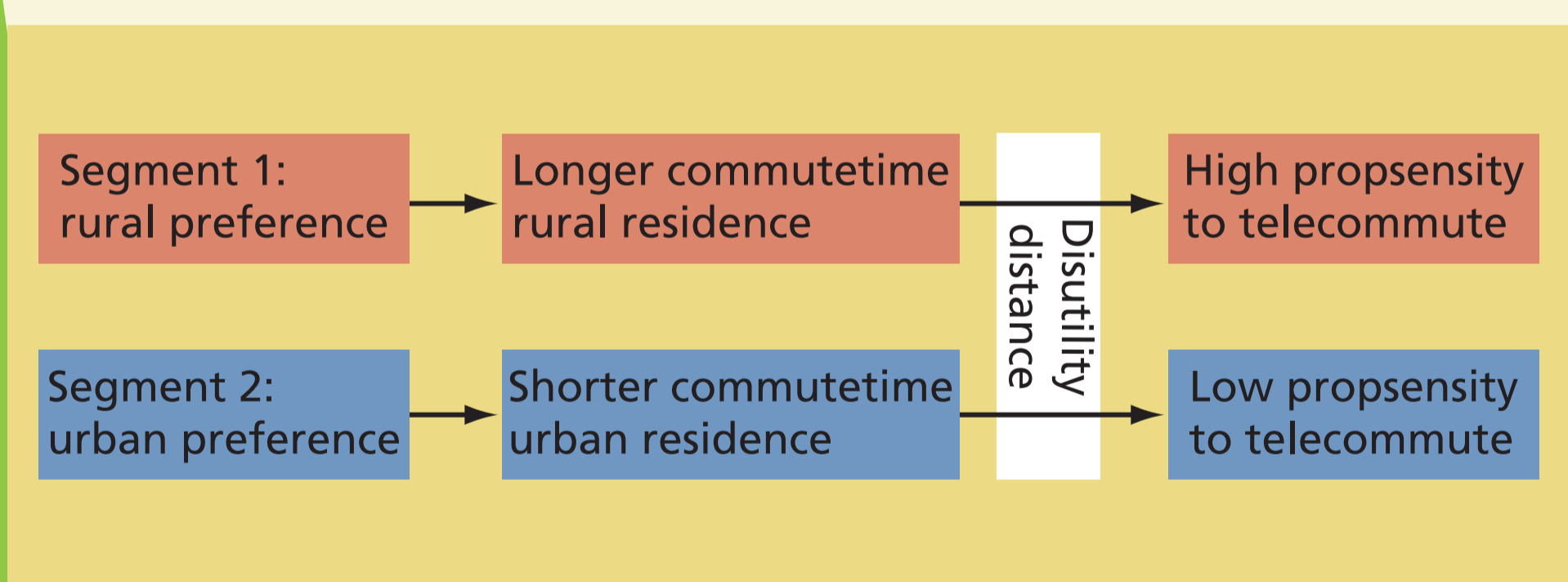
H1: Telecommuting is adopted for organisational reasons and not to avoid travel:

- telecommuters are equally likely to relocate as non-telecommuters
- similar preferences for particular areas.



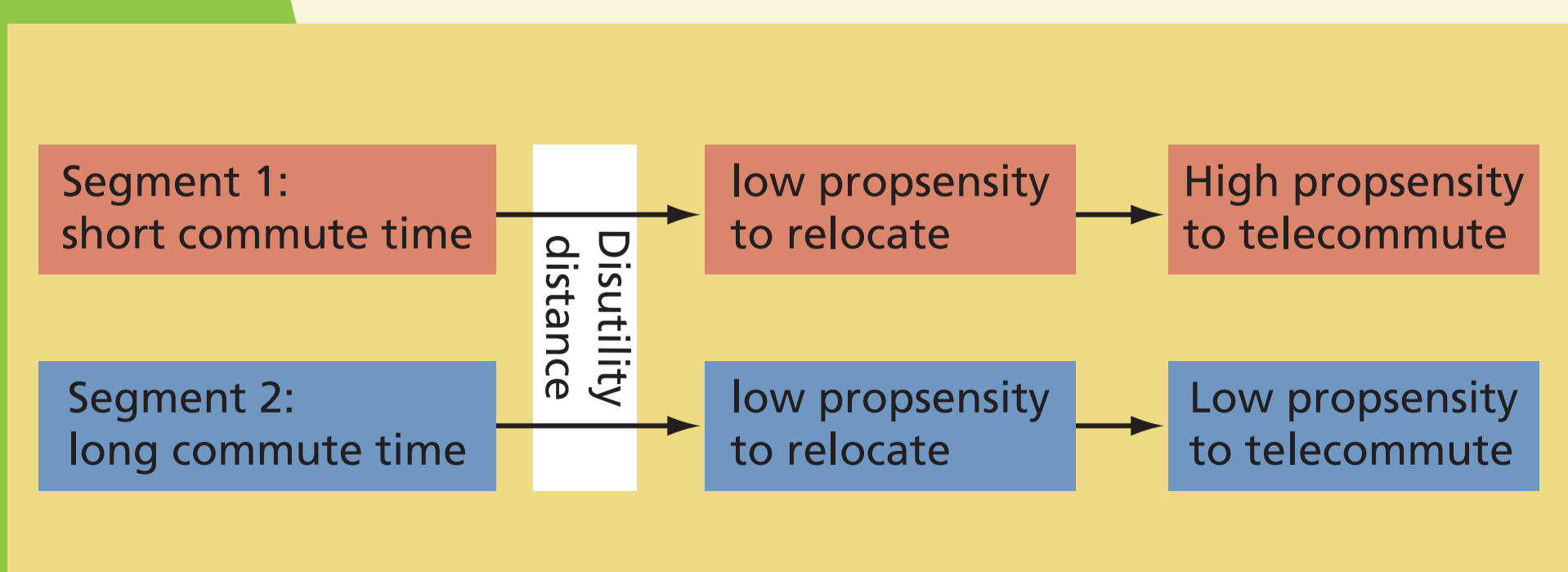
H2: Telecommuting is a tool to reduce the negative effects of a long commute time, in anticipation of a relocation:

- telecommuters are more likely to relocate
- telecommuters have the same residential preferences as non-telecommuters.



H3: Telecommuting is a way to deal with a longer commute time, which allows one to live in a rural environment:

- Telecommuters are not more likely to relocate
- Telecommuters have different residential preferences.



Latent class models

1. A class membership model: probability of being a member of class s

$$P(s | X_n) = \frac{\exp(U_s)}{\sum_{t=1}^T \exp(U_t)}$$

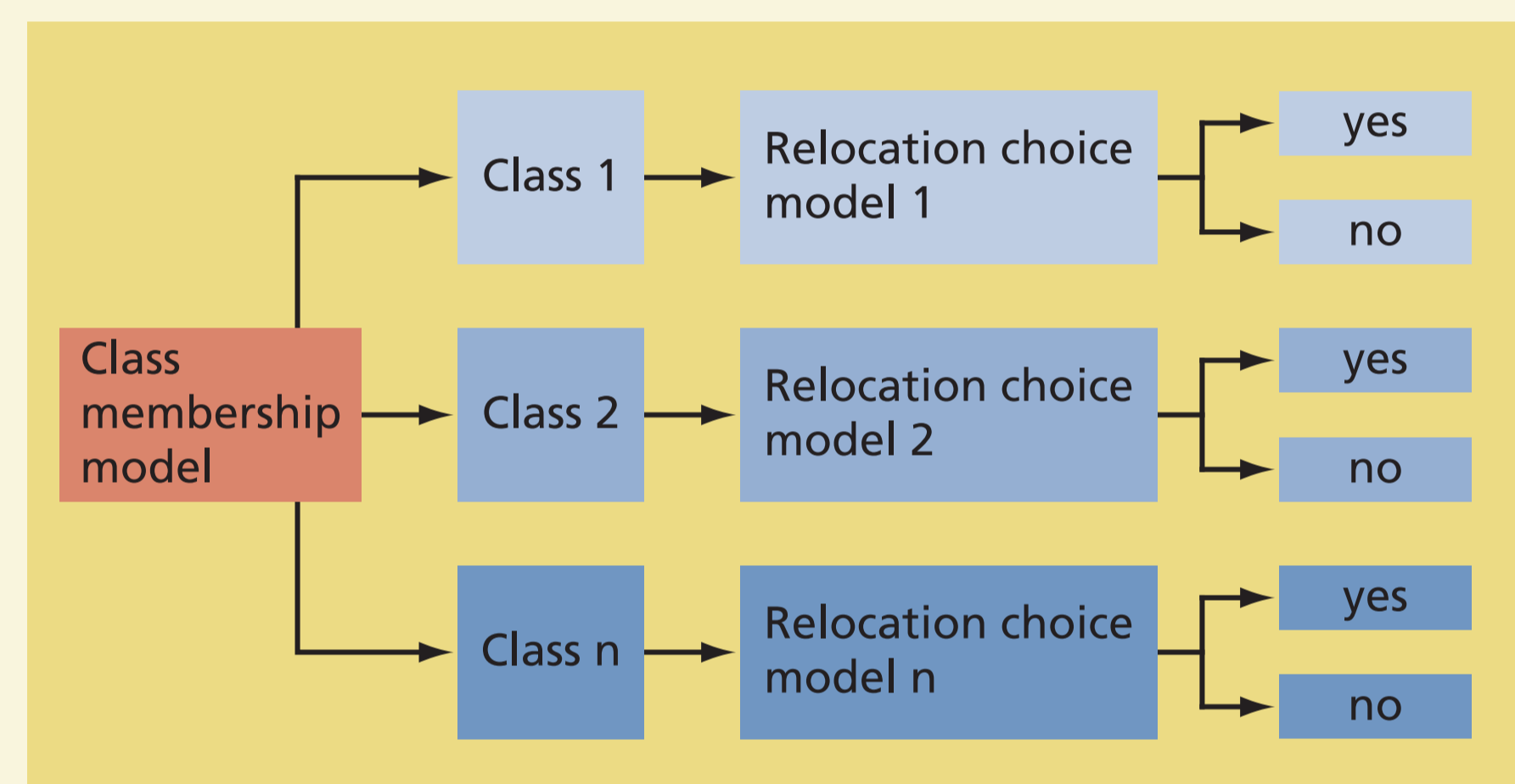
2. A discrete choice model: probability of choosing alternative i , given the membership of a segment s

$$P(i | Y_i, s) = \frac{\exp(U_i)}{\sum_{j=1}^J \exp(U_j)}$$

Data

2002 Housing Preference Survey:

- over 90,000 respondents
- detailed data on socio-demographics, housing situation and telecommuting
- information on intended relocation and preferred area type

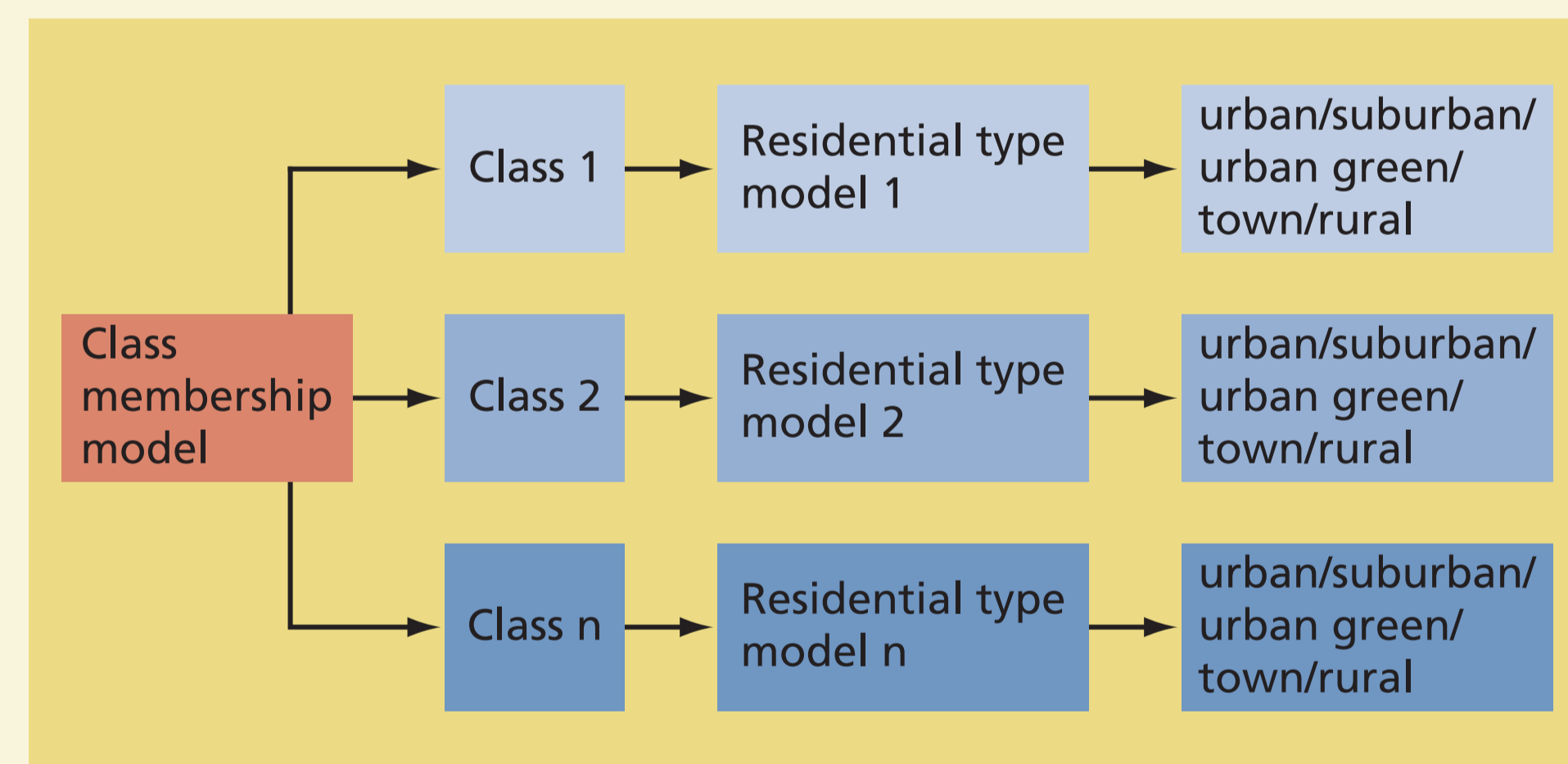


Model 1: Relocation probability

Latent class model of decision whether or not to move

Model 2: Preferred Area Type

Latent class model of decision of residential area type (urban/suburban/urban green/town/rural)



Estimation Results 1: Relocation probability

Class 1

- more distance sensitive and more likely to move
- smallest group, including more younger people

Class 2

- accepts longer commute distance and less likely to move
- largest group, including more people in rural areas, recently moved people and home owners

Conclusion

Different segments of TC exist, supporting different hypotheses (H2 and H3). One segment accepts a longer commute time, another segment is less likely to accept the commute distance and is more likely to move.

	Travel less in peak	Travel more before the peak	Travel more after the peak	Travel more by public transport	Work more at home
Monetary incentive Variables					
Constant	-	+	-	-	-
Household has 2 or more cars	-	-	-	-	+
PT alternative available	+			+	
Can start working earlier	+				
Can start working later			+		
Can leave home earlier		+			
Can leave home later					+
Income > 4500€/month				+	
Single parent		-			
Highly educated					+
Age > 51 years				-	
Regular user of traffic information	+				

Latent class model		
Choice model class 1		
	β	t-stat
Constant	1.508	10.469
Commute distance	0.006	2.081
Commute distance partner	-0.003	-1.172
Partner works	1.372	6.072
Choice model class 2		
	β	t-stat
Constant	1.075	8.323
Commute distance	-0.006	-4.031
Commute distance partner	0.003	1.795
Partner works	-0.247	-1.6
Class membership class 1		
	γ	t-stat
Constant	-0.540	-1.07
Lives in town or rural	0.829	1.947
Children in household	0.468	1.288
Homeowner	2.002	4.195
Low Income	1.844	1.46
Age < 25	-1.637	-4.093
Relocated < 2 years	1.50750	2.951
GOF	-1070.78	
Adj. R ²	0.45	
Choice model class1		
	β	t-stat
Outer city	0.456	3.184
Commute distance partner	-0.004	-0.994
Partner works	0.316	1.215
Commute distance	-0.005	-1.707
Children in household	0.918	3.045
Urban green		
Constant	-0.036	-0.237
Commute distance partner	-0.009	-1.637
Partner works	0.236	0.827
Commute distance	0.003	1.022
Children in household	1.242	4.124
Town		
Constant	-1.059	-5.122
Commute distance partner	-0.016	-1.468
Partner works	0.352	0.872
Commute distance	0.003	0.958
Children in household	0.855	2.117
Rural		
Constant	-2.373	-7.429
Commute distance partner	0.003	0.508
Partner works	0.243	0.5
Commute distance	0.009	2.312
Children in household	1.705	3.647
Choice model class 2		
	β	t-stat
Outer city	0.496	2.484
Constant	0.005	0.511
Commute distance partner	0.644	1.307
Commute distance	-0.001	-0.363
Children in household	-0.014	-0.036
Urban green		
Constant	0.096	0.45
Commute distance partner	-0.005	-0.529
Partner works	1.395	2.865
Commute distance	-0.003	-0.808
Children in household	-0.005	-0.012
Town		
Constant	1.423	7.816
Commute distance partner	0.002	0.213
Partner works	1.209	2.723
Commute distance	-0.007	-2.111
Children in household	-0.392	-1.116
Rural		
Constant	0.451	2.072
Commute distance partner	0.001	0.085
Partner works	1.845	4
Commute distance	-0.014	-3.167
Children in household	-1.028	-2.342
Class membership class 1		
	γ	t-stat
Constant	1.012	1.385
Rural	-6.240	-4.621
Urban		
Age < 25	0.678	0.817
Low Income	2.283	1.801
Age > 45	2.210	1.286
GOF	-1564.65	
Adj. R ²	0.09	