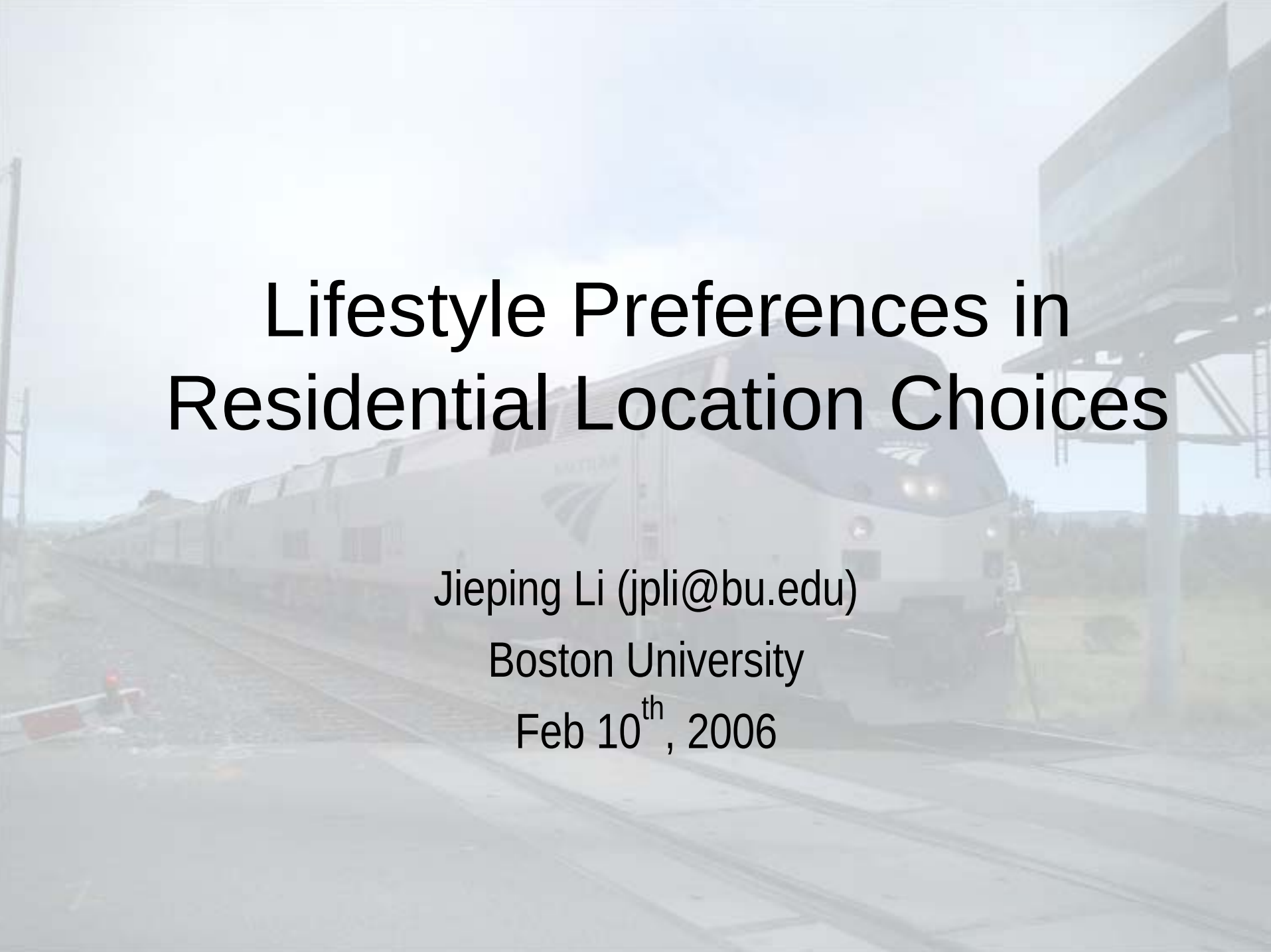

Lifestyle Preferences in Residential Location Choices

Jieping Li (jpli@bu.edu)

Boston University

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Outline

- Motivation
- Approach
- Model Framework
- Empirical Study
- Conclusions
- Future Work

Motivation

Why do people have different location and travel choices?

location choices:

high density urban area,
low density suburban area

travel choices:

drive auto, ride transit, bike, walk

Motivation

What is the behavioral construct for different location and travel behavior?

Lifestyles, “of or relating to a particular way of living” (Oxford English Dictionary), may provide some clue.

Approach

Use latent class choice models to incorporate latent lifestyle variables in residential location choice models.

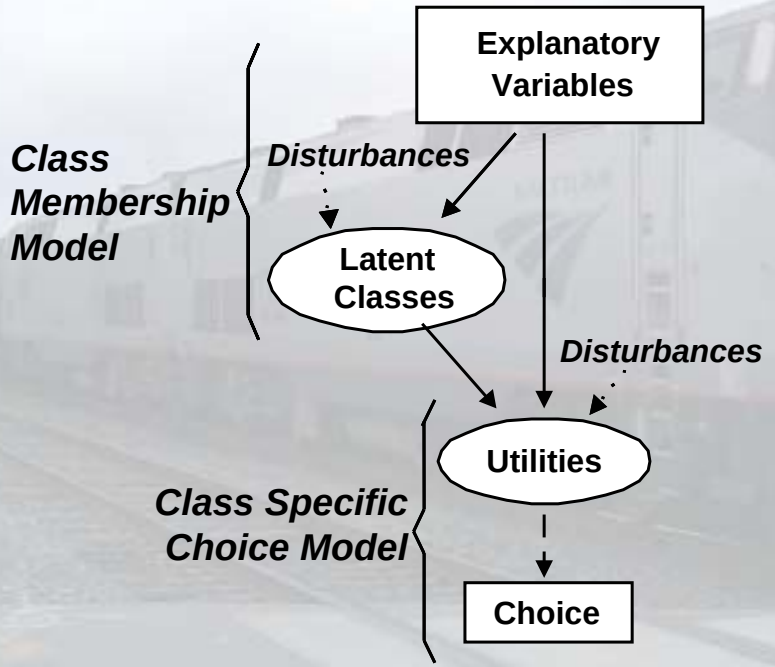
Latent Classes = lifestyles

Choice Model = choice of residential location (varies across lifestyles)

Estimate latent lifestyle classes and class-specific location choice simultaneously.

Model Framework

Latent Class Choice Model



$$P_n(i \mid X_n) = \sum_{s=1}^{S} P_n(i \mid X_n, s) P_n(s \mid X_n)$$

Class-specific Choice Model

Membership Class Model

Empirical Study

Data

- Stated preference survey of residential location decisions,Portland, Oregon (1994)
- Sample size = 507 households with 8 choice experiments per household

Hypothesis

- Assume lifestyle preferences exist and they can be inferred from residential location choices.
- People with different lifestyles will behave differently.

Empirical Study

Model Specification

- Latent Class Choice Model with Error Components
- Estimated with Latent Gold Choice by Statistical Innovations

$$P_n(i_1,...,i_T \mid X_n) = \int \left[\sum_{s=1}^{S} P_n(s \mid X_n) \prod_{t=1}^{T} P_n(i_t \mid X_{nt}, s, \eta) \right] f(\eta) d\eta$$

Empirical Study

Overview of Estimation Results

	Model without lifestyle segmentation	Model with lifestyle segmentation		
Number of classes	1	2	3	4
Number of parameters	37	76	115	155
BIC	-10319	-10281	-10310	-10397
AIC	-10163	-9959	-9823	-9741
rho-bar-squared	0.222	0.237	0.248	0.254

Class-Specific Model Results

	Variable	Class Independent est.	Class Independent z-value	Class 1 est.	Class 1 z-value	Class 2 est.	Class 2 z-value	Class 3 est.	Class 3 z-value
Housing Attributes	Monthly rent ($00) - Low/Mid Income	-0.152	**-11.5**						
	Monthly rent ($00) - High Income	-0.079	**-3.6**						
	Monthly rent ($00) - Income not available	-0.160	**-5.0**						
	Purchase price ($000) - Low Income	-1.007	**-9.8**						
	Purchase price ($000) - Middle Income	-0.928	**-11.2**						
	Purchase price ($000) - High Income	-0.534	**-4.8**						
	Purchase price ($000) - Income not available	-0.783	**-4.4**						
	Single house (v. Duplex)			0.503	**4.3**	0.840	**5.8**	-0.318	**-2.1**
	Condo (v. Apartment)			0.302	1.7	0.468	**2.0**	0.036	0.3
	Residential size (square feet/1000)			1.377	**12.9**	-0.335	**-2.4**	0.049	0.4
	Lot size (square feet/1000)			0.009	0.8	0.059	**3.7**	-0.052	**-3.4**
Neighborhood Attributes	Mostly Owners (v. Renters)			0.226	**2.3**	-0.070	-0.6	0.278	**2.7**
	Mostly Multi-Family housing (v.Single Family)			-0.179	-1.9	0.204	1.6	-0.126	-1.3
	Schools - 75th percentile			0.618	**4.3**	0.381	**2.3**	0.174	1.4
	Schools - 60-75th percentile			0.336	**2.3**	0.294	1.6	0.029	0.2
	Above average safety (v. average)			0.226	**2.4**	-0.235	-1.9	0.295	**2.9**
	Mixed Use (base Rural)			0.133	1.0	-0.160	-1.0	0.261	1.8
	Urban (base Rural)			0.000	0.0	-0.271	-1.6	0.407	**2.8**
	Suburban (base Rural)			-0.199	-1.4	-0.128	-0.7	0.106	0.7
	Local bike path (v. none)			-0.100	-1.0	0.415	**3.2**	0.135	1.3
	Local park (v. none)			0.073	0.8	0.154	1.2	-0.110	-1.2
	Local community square (v. no shops)			0.301	**2.1**	0.115	0.7	0.240	1.6
	Basic plus specialty shops (v. no shops)			0.453	**3.1**	-0.540	**-2.8**	0.374	**2.7**
	Basic shops (v. no shops)			0.198	1.4	-0.170	-1.0	0.404	**2.8**
Transport/ Access Attributes	Walk time to local shops (minutes)			-0.010	**-2.3**	0.006	1.0	-0.019	**-4.1**
	Travel time to work by auto (minutes)			-0.015	-1.5	0.029	**2.1**	-0.014	-1.1
	Travel time to work by transit (minutes)			-0.003	-0.6	-0.021	**-3.5**	0.006	1.1
	Off-street parking available (v. not)			0.633	**5.2**	0.333	**2.1**	0.408	**3.0**
Correlation Terms	Standard deviation on Buy constant	0.932	**6.4**						
	Standard deviation on Rent constant	1.251	**9.3**						
	Standard deviation on Move Out constant	2.166	**16.5**						

Empirical Study

Class-Specific Location Choice Behavior

top 10 most important variables

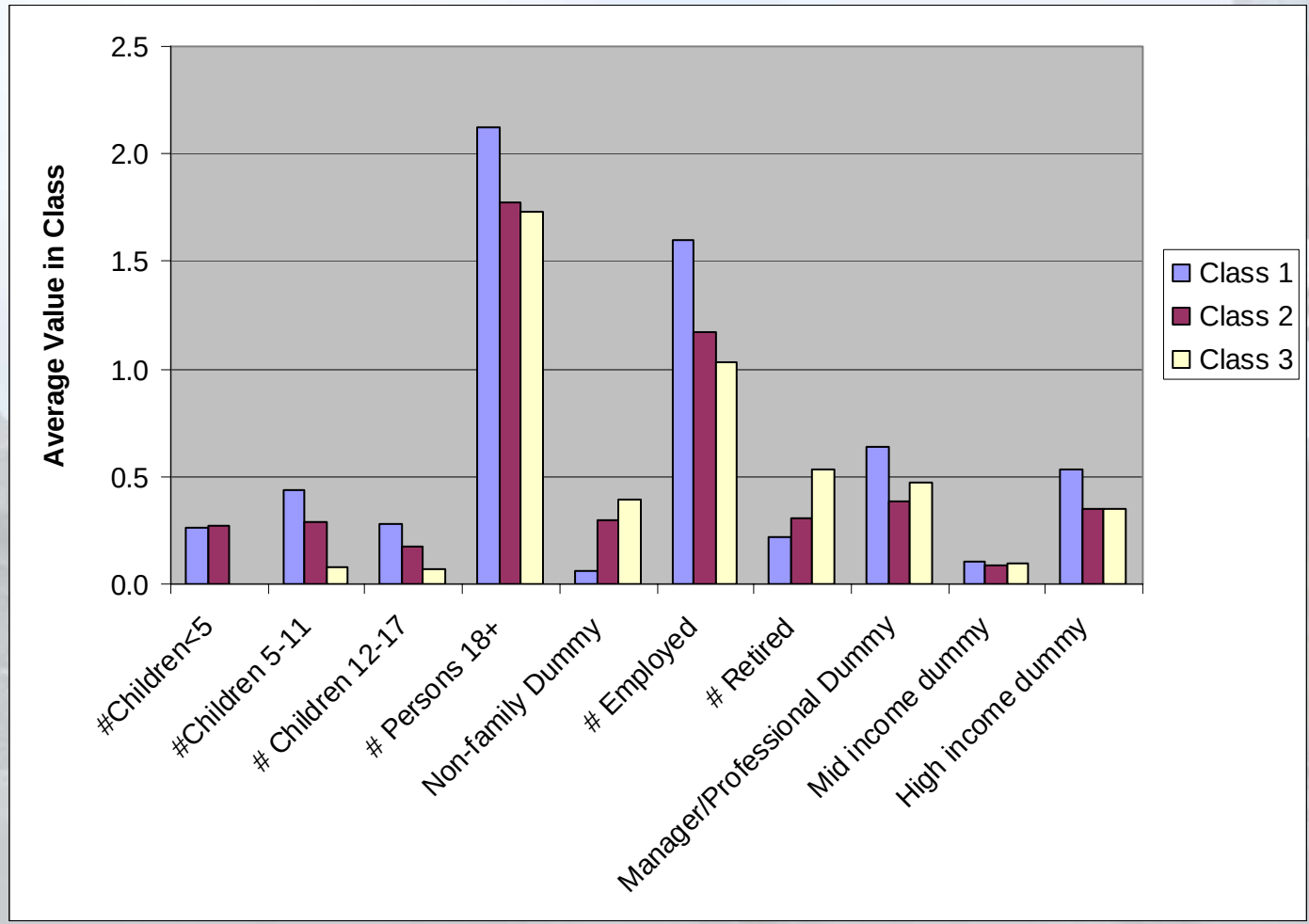
for each of 3 lifestyle classes

Rank	Class 1	Class 2	Class 3
1	Larger residence	Lower travel time to work by transit	Smaller lot size
2	Off street parking	Larger lot size	Shorter walk time to local shops
3	Schools in 75 percentile	Single house on lot	Urban setting
4	Single house on lot	Larger residential size	Off street parking
5	Basic plus specialty shops nearby	Longer travel time to work by auto	Basic shops nearby
6	Lower travel time to work by auto	Don't want basic shops nearby	Basic plus specialty shops nearby
7	Lower walk time to local shops	Condo (rather than apartment)	Shorter travel time to work by auto
8	Schools in 60th percentile	Bike path nearby	Longer travel time to work by transit
9	Condo (rather than apartment)	Schools in 75th percentile	Single house on lot
10	Community square nearby	Off street parking	Above average safety

Membership Class Model Results

		CLASS 1 43%		CLASS 2 30%		CLASS 3 27%	
		Affluent, more established families		Younger, Less affluent families and non-families		Older, non-family, professionals	
	Variable	est.	z-value	est.	z-value	est.	z-value
	Intercept	-1.673	-1.9	1.513	1.6	0.161	0.2
Household Structure	Number of Children under 5 years old	1.273	1.0	1.431	1.1	-2.704	-1.0
	Number of Children from 5 to 11	0.426	**2.4**	-0.117	-0.5	-0.309	-1.2
	Number of Children from 12 to 17	0.300	1.1	0.097	0.4	-0.398	-1.0
	Number of persons 18 and over	0.444	1.5	-0.163	-0.5	-0.282	-0.9
	Non family dummy	-0.706	-1.7	0.124	0.3	0.582	1.7
Employment	Number of employed persons	-0.096	-0.5	-0.048	-0.2	0.145	0.5
	Number of retired persons	-0.480	-1.4	0.076	0.2	0.404	1.3
	Dummy if at least one "Manager/Professional"	0.131	0.6	-0.571	**-2.1**	0.440	1.6
	Maximum number of work hours	-0.002	-0.3	-0.004	-0.4	0.006	0.9
Age (Head of HH)	Piecewise linear age of HOH: age 20-35	-0.030	-0.6	0.040	0.9	-0.010	-0.2
	Piecewise linear age of HOH: age 36-60	0.020	1.1	-0.058	**-2.7**	0.037	1.8
	Piecewise linear age of HOH: age 61 plus	0.035	0.9	0.003	0.1	-0.038	-1.5
Resources	Dummy for medium income	1.607	**4.4**	-1.026	**-3.7**	-0.581	-1.9
	Dummy for high income	2.183	**4.6**	-2.151	**-3.7**	-0.032	-0.1
	Dummy for income not reported	1.760	**3.4**	-0.904	-1.9	-0.855	**-2.2**

Profiling of Lifestyle Preferences



Visualization of Three Lifestyles

Class 1:
suburban, school, auto
affluent, more established, families

Class 2:
transit, suburban, school
less affluent, younger families

Class 3:
high density,urban activity, auto
older, non-family, professionals

Conclusions

- Lifestyle critical behavioral construct in location behavior. This provides behavioral foundation to understand the self selection process in residential choice.
- Lifestyles can be modeled as latent variables. Latent variables contribute to explaining the unobservable factors.
- Latent class models and stated preference data indicate potential to understand the relationship between built environment and travel behavior.

Future Work

- Estimate a joint latent class model using both SP and RP data provided in the same 1994 Portland household and activity survey.
- Incorporate additional measurements of lifestyles to enrich the estimation, such as psychometric indicators.

Thanks!

Welcome your questions and ideas!

jpli@bu.edu

(All the photos used in this presentation are from the internet.)