

Online supplement to

“An Investigation of Heterogeneity in Vehicle Ownership and Usage for the Millennial Generation”

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TABLE 1 Descriptive Statistics of the Sample

Variable	Count	%	Variable	Count	%
Age			Education level		
18-20	582	17.6	Less than Bachelor's Degree	1715	51.8
21-24	889	26.9	Bachelor's Degree	1191	36.0
25-29	1526	46.1	Graduate Degree	403	12.2
30-33	312	9.4	Employment Status		
Gender			Employed full-time	1933	58.4
Male	1532	46.3	Employed part-time	569	17.2
Female	1777	53.7	Student	807	24.4
Annual household income			Parent		
Under \$25,000	435	13.1	Yes	604	18.3
\$25,000-\$49,999	921	27.8	No	2705	81.7
\$50,000-\$74,999	800	24.2	Marital Status		
\$75,000-\$99,999	540	16.3	Single	2052	62.0
\$100,000-\$149,999	378	11.4	Married	1218	36.8
\$150,000 or more	235	7.2	Divorced	39	1.2
Has a smartphone			City type		
Yes	2958	89.4	Transit-rich	665	20.1
No	351	10.6	Transit Progressive	1326	40.1
Has a valid driver's license			Transit Deficient	1318	39.8
Yes	3040	91.9	Residential Location		
No	269	8.1	Urban	1572	47.5
Personal Vehicle Ownership			Suburban	1241	37.5
Yes	2618	79.1	Small Town	331	10.0
No	691	20.9	Rural	165	5.0
Main Commute Mode			Residential Tenure Status		
Car	2471	74.7	Home owner	1102	33.3
Transit	439	13.3	Rented	1506	45.5
Non-motorized	399	12.0	Living with parents	701	21.2
Car-dependency indicators			Disagree	Neutral	Agree
I need to drive my car to get where I need to go			11.0%	20.3%	68.7%
I love the freedom and independence I get from owning one or more cars			6.0%	20.6%	73.4%
When making a trip, I prefer to have the flexibility to use a car in case my plans change			5.1%	19.6%	75.3%

TABLE 2 Model Goodness-of-Fit and Structural Equation Estimation Results

Goodness-of-fit								
	Car		Transit		Non-motorized			
Real sample shares	75.7%		13.8%		10.5%			
Predicted shares	75.6%		14.1%		10.3%			
Absolute percentage bias	0.13%		2.17%		1.90%			
Probability of correct prediction for each alternative	76.0%		37.9%		26.0%			
Overall probability of correct prediction			64.8%					
Structural Equation Component								
	Tech-dependency		Pro-car		Pro-transit		Pro-environment	
Variable	Coef	(t-stat)	Coef	(t-stat)	Coef	(t-stat)	Coef	(t-stat)
<i>Education (base: < Bachelor's degree)</i>								
Bachelor's degree	2.692	(2.31)	0.253	(6.14)	--	--	--	--
Graduate degree	2.692	(2.31)	0.253	(6.14)	0.116	(1.79)	--	--
<i>Age (base: 30-33 years old)</i>								
18 to 20 years old	--	--	-0.263	(-3.82)	-0.136	(-2.07)	0.060	(1.53)
21 to 24 years old	--	--	--	--	--	--	0.060	(1.53)
25 to 29 years old	--	--	--	--	--	--	--	--
<i>Male (base: female)</i>	--	--	--	--	0.222	(4.32)	-0.094	(-2.31)
<i>Parent (base: no kids)</i>	--	--	0.285	(4.17)	--	--	0.062	(1.52)
<i>White (Base: Asian, Black, Native Am)</i>	--	--	--	--	-0.372	(-6.50)	-0.369	(-7.29)
<i>Hispanic (base: non-Hispanic)</i>	--	--	--	--	0.368	(5.58)	0.191	(3.26)
<i>City type (base: transit deficient)</i>								
Transit Progressive	--	--	--	--	0.309	(5.66)	--	--
Transit Rich	1.015	(1.83)	-0.252	(-6.22)	0.574	(7.77)	--	--

(--) not statistically significant and therefore removed from the model

TABLE 3 Impact of Latent Variables on Non-nominal Dependent Variables and Correlations Among Latent Constructs

Impact of Latent Variable on Non-nominal Indicators			
Latent variable	Indicators	Const (t-stat)	Coef. (t-stat)
	Ordinal		
Pro-car attitude	I need to drive my car to get where I need to go	1.531 (35.81)	0.711 (29.93)
	I love the freedom and independence I get from owning one or more cars	2.396 (37.06)	1.165 (50.16)
	When making a trip, I prefer to have the flexibility to use a car in case my plans change	2.159 (39.56)	0.868 (40.13)
Pro-transit	Riding transit is less stressful than driving on congested highways	1.925 (25.35)	0.872 (33.50)
	I feel safe when riding public transportation.	2.112 (29.45)	0.820 (21.67)
	Proximity to public transportation is important when choosing household location	1.171 (21.14)	0.630 (22.87)
	I like the idea of doing something good for the environment when I ride transit	3.241 (29.67)	0.137 (2.66)
Pro-Environment	I like the idea of doing something good for the environment when I ride transit	3.241 (29.67)	1.075 (15.41)
	If everyone works together, we could improve the environment and future for the earth	2.838 (29.20)	0.610 (31.14)
	I would switch to a different form of transportation if it would improve air quality	2.954 (33.65)	1.079 (47.54)
Tech-dependency	Importance of having access to ICT throughout the day	2.237 (23.53)	0.042 (1.88)
	Count		
Tech-dependency	Number of ICT devices that the individual owns	1.461 (37.94)	0.114 (2.47)
	Number of activities conducted using ICT devices	0.927 (28.38)	0.094 (2.34)
Latent variables correlations		Coefficient	(t-stat)
Tech-dependency and pro-environment		0.354	(2.22)
Pro-car and pro-environment		0.382	(9.25)
Pro-transit and pro-environment		0.724	(15.90)

TABLE 4 Discrete Choice Estimation Results for Driver's License Holding and Personal Vehicle Ownership

Driver's License Holding (base: has a driver's license)	No Driver's License	
Variable	Coef.	(t-stat)
Constant	-3.516	(-12.99)
<i>Age (base: 21-33 years old)</i>		
18 to 20 years old	0.304	(2.00)
<i>Lives in an urban area (base: suburban, small town or rural area)</i>	0.225	(5.27)
<i>Household tenure status (base: owns residence)</i>		
Rent	0.944	(11.26)
Lives with parents	0.944	(11.26)
<i>Single (base: married or living with significant other)</i>	0.296	(2.40)
<i>Student (base: full-time or part-time worker)</i>	0.682	(10.37)
<i>Latent variables</i>		
Pro-environment	0.046	(2.00)
Pro-transit	--	--
Pro-car	-0.627	(-11.14)
Tech-dependency	0.273	(4.01)
Personal Vehicle Ownership (base: has a personal vehicle)	No Personal Vehicle	
Variable	Coef.	(t-stat)
Constant	-3.516	(-12.99)
<i>Age (base: 25-33 years old and non-parent)</i>		
18 to 20 years old (non-parent)	0.676	(10.29)
21 to 24 years old (non-parent)	0.415	(11.06)
<i>Lives in an urban area and is not a parent (base: non-parent, non-urban area)</i>	0.264	(10.86)
<i>Parent 25-33 years old (base: non-parent, non-urban area, non-transit rich city)</i>	-0.214	(-2.69)
Additional effect of being a parent living in a urban area	0.246	(3.43)
Additional effect of being a parent living in a transit-rich city	-0.344	(-3.06)
Additional effect of being a young parent (18-24 years old)	0.171	(2.43)
<i>Student (base: full-time or part-time worker)</i>	0.517	(19.24)
<i>Household tenure status (base: owns residence)</i>		
Rent	0.653	(18.70)
Lives with parents	1.141	(22.81)
<i>Household income (base: >US\$50,000 per year)</i>		
<US\$25,000	0.531	(13.22)
US\$25,000 to 50,000	0.196	(6.89)
<i>No driver's license holding (base: yes)</i>	4.152	(92.67)
<i>Latent variables</i>		
Pro-environment	1.083	(11.58)
Pro-transit	--	--
Pro-car	-1.587	(-9.73)
Tech-dependency	--	--

(--) not statistically significant and therefore removed from the model

TABLE 5 Discrete Choice Estimation Results and Elasticities for Commute Mode Choice

Commute mode choice (base: car)	Transit		Non-motorized	
	Coef.	(t-stat)	Coef.	(t-stat)
Constant	-1.183	(-6.57)	-1.706	(-9.66)
<i>Age (base: non-parent 25-33 years old)</i>				
18 to 20 years old (non-parent)	--	--	0.569	(11.44)
21 to 24 years old (non-parent)	--	--	0.383	(13.79)
<i>Male (base: female)</i>	--	--	0.220	(8.06)
<i>Lives in an urban area in a transit progressive or deficient city and is not a parent (base: non-parents, non-urban area in any type of city)</i>	--	--	0.221	(8.67)
Additional effect of living in an urban area in a transit-rich city	0.579	(9.72)	--	--
<i>Distance home to work (base: > 5 miles)</i>				
< 1 mile	0.112	(3.76)	0.893	(25.97)
1 to 5 miles	0.112	(3.76)	0.467	(13.37)
<i>Parent 25-33 years old (base: non-parent, non-urban area)</i>	-0.084	(-1.80)	--	--
Additional effect of being a parent living in an urban area	0.218	(4.77)	--	--
Additional effect of being a young parent (18-24 years old)	0.166	(3.32)	--	--
<i>Employment status (base: full-time)</i>				
Part-time	-0.104	(-3.06)	--	--
Student	0.496	(10.07)	1.065	(33.53)
<i>Household tenure status (base: owns residence)</i>				
Rent	--	--	--	--
Lives with parents	--	--	-0.638	(-17.91)
<i>Household income (base: <US\$50,000 per year)</i>				
US\$50,000 to 100,000	-0.103	(-4.05)	--	--
US\$100,000 to 200,000	-0.202	(-5.71)	--	--
> US\$ 200,000	-0.202	(-5.71)	-0.245	(-4.10)
<i>No Driver's license holding (base: yes)</i>	1.009	(-5.64)	0.466	(-2.85)
<i>No Personal vehicle ownership (base: yes)</i>	0.039	(-1.94)	0.572	(-17.88)
<i>Household has less vehicles than drivers (base: has more)</i>	0.715	(15.96)	0.638	(15.84)
Additional effect of being a male in a house with less vehicles than drivers	-0.226	(-4.93)	-0.181	(-4.10)
<i>Telecommuter (base: non-telecommuter)</i>	0.125	(4.63)	-0.317	(-11.42)
<i>Receives transit benefits from employer (base: no)</i>	0.690	(17.90)	--	--
<i>Latent variables</i>				
Pro-environment	--	--	--	--
Pro-transit	0.570	(8.65)	--	--
Pro-car	-0.172	(-1.92)	-0.172	(-1.92)
Tech-dependency	0.034	(1.96)	0.020	(1.92)

(--) not statistically significant and therefore removed from the model

TABLE 6 Pseudo-elasticities for Age, Geographic and Parenting Effects on Driver's License Holding, Personal Vehicle Ownership and Commute Mode Choice

	Driver's License		Personal Vehicle		Car Commute		Transit Commute		Non-motorized Commute	
	Coef.	(t-stat)	Coef.	(t-stat)	Coef.	(t-stat)	Coef.	(t-stat)	Coef.	(t-stat)
Age Effects										
Age 18 to 20 (base: ≥ 25 years)	-7.3%	(-3.68)	-14.1%	(-8.09)	-6.8%	(-3.57)	-10.2%	(-2.33)	90.8%	(6.64)
Age 21 to 24 (base: ≥ 25 years)	-0.5%	(-1.21)	-6.1%	(-7.42)	-4.1%	(-3.91)	-3.5%	(-2.08)	49.5%	(5.53)
Young parent (base: old parent)	-5.9%	(-3.71)	-21.9%	(-6.64)	-15.0%	(-4.55)	-5.8%	(-0.93)	169.6%	(7.11)
Geographic and Land Use Effects										
Urban (base: non-urban area)	-1.9%	(-0.86)	-4.2%	(-2.32)	-5.4%	(-4.54)	18.3%	(5.23)	19.2%	(2.47)
Transit-rich city (base: transit progressive or deficient cities)	-3.4%	(-4.85)	-2.4%	(-3.52)	-11.5%	(-2.36)	84.3%	(5.02)	-10.0%	(-1.54)
Transit-rich city and urban (base: transit progressive or deficient cities and urban)	-3.6%	(-4.63)	-2.5%	(-3.53)	-19.5%	(-2.92)	141.3%	(6.51)	-15.1%	(-2.32)
Urban and transit-rich city (base: non-urban area and transit-rich city)	-2.3%	(-0.85)	-4.4%	(-2.30)	-16.5%	(-4.19)	68.6%	(7.26)	7.8%	(1.02)
Parent in urban area (base: parent in non-urban area)	-1.6%	(-0.84)	-6.0%	(-3.34)	-7.7%	(-4.49)	40.5%	(7.93)	13.7%	(1.81)
Parent in transit-rich city (base: parent in transit progressive or deficient cities)	-1.2%	(-3.79)	-0.4%	(-1.04)	-3.8%	(-2.10)	25.8%	(3.72)	-3.7%	(-1.14)
Parent in urban area in a transit-rich city (base: parent in urban area in progressive or deficient cities)	-3.0%	(-4.19)	-0.1%	(-0.07)	-22.7%	(-3.19)	159.0%	(6.76)	-19.2%	(-2.98)
Parent in urban area in a transit-rich city (base: parent in non-urban area in a transit-rich city)	-1.9%	(-0.85)	-5.8%	(-3.29)	-20.6%	(-4.25)	94.2%	(6.44)	1.0%	(0.12)
Parent in urban area in a traditional city (base: parent in non-urban area in transit progressive or deficient cities)	-4.5%	(-2.07)	-4.5%	(-2.36)	-25.3%	(-3.50)	175.2%	(6.53)	-2.1%	(-0.19)
Parenting Effects										
Parent (base: non-parent)	2.8%	(3.08)	2.8%	(2.29)	-0.3%	(1.24)	7.2%	(1.24)	-7.0%	(-2.73)
Young parent (base: young non-parent)	4.1%	(2.83)	6.5%	(2.71)	0.6%	(0.46)	5.2%	(0.81)	-4.9%	(-2.39)
Parent in transit-rich city (base: non-parent in transit-rich city)	4.9%	(4.35)	7.4%	(5.55)	8.8%	(1.86)	-26.2%	(-4.77)	0.1%	(0.01)
Parent in transit-rich city (base: non-parent in transit progressive or deficient cities)	1.5%	(1.64)	4.5%	(3.68)	-3.9%	(-2.02)	35.4%	(3.79)	-10.1%	(-2.65)