

ESTIMATING REMOTE WORK MODELS

Hayden Atchley

INTRODUCTION

- Travel demand modeling
 - Estimate travel behavior
- Steps/sub-models
 - Trip production
 - Trip destinations
 - Mode choice
 - etc.

ACTIVITYSIM

- “Activity-based” travel demand model
- Individual-level modeling
- Decisions made with multinomial logit choice models
 - Equations predict utility of each alternative

$$V_{\text{tr}} = \alpha_{\text{tr}} + \beta_1 \times (\# \text{Jobs}_{\text{dest}}) + \beta_2 \times (\text{Time}_{\text{tr}}) + \beta_3 \times (\text{Income})$$

DATA

- National Household Travel Survey
 - Conducted by Federal Highway Administration
 - Info on individuals, households, trips
- Labeled by region/area type
 - Using Metropolitan Statistical Areas with $< 1M$ population

TWO REMOTE WORK MODELS

WORK FROM HOME

- Work location is at home

TELECOMMUTE FREQUENCY

- How many days traveled to work
- Only those who don't work from home

TWO REMOTE WORK MODELS

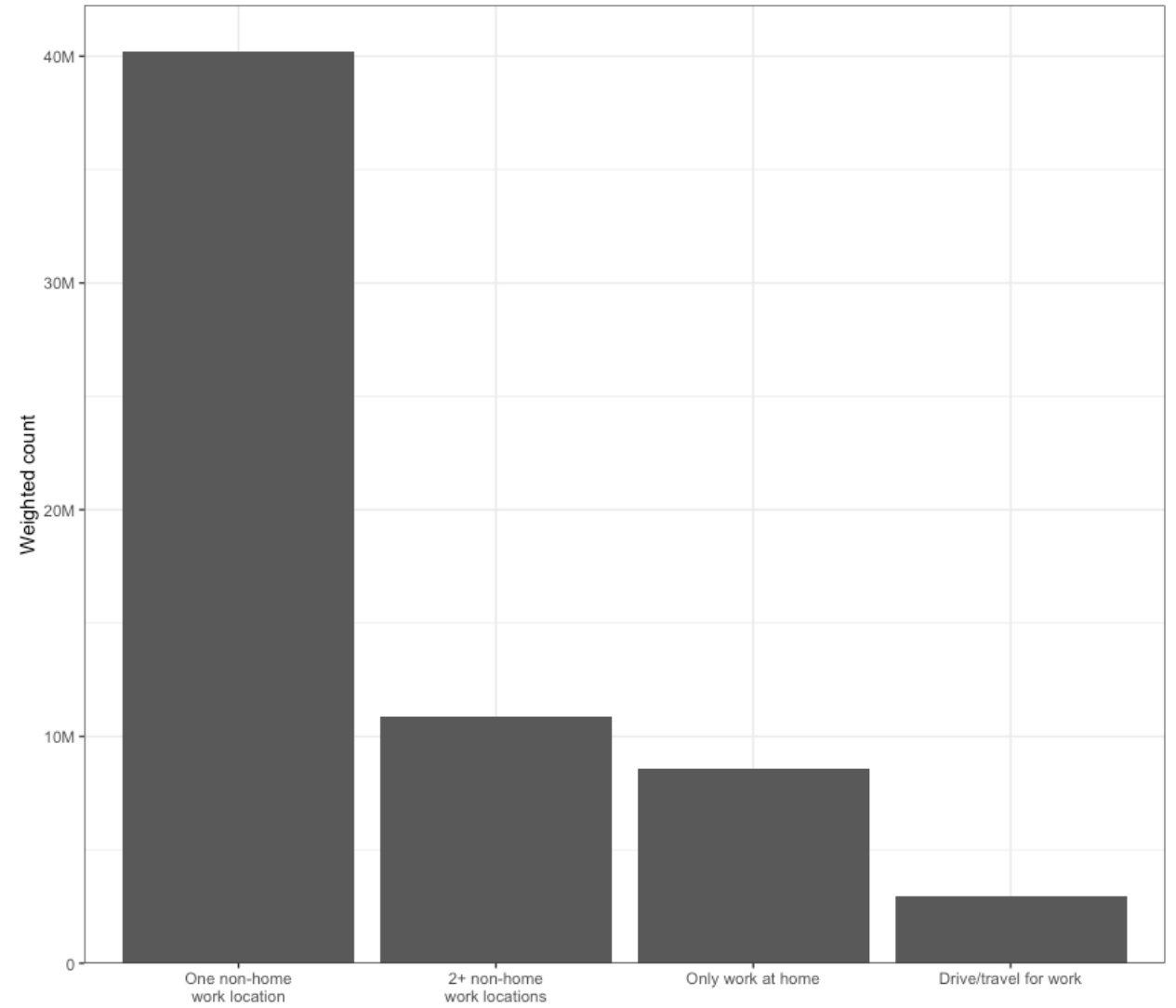
WORK FROM HOME

- NHTS “work location”
 - 1 non-home work location
 - 2+ non-home work locations
 - Only work at home
 - Drive/travel for work

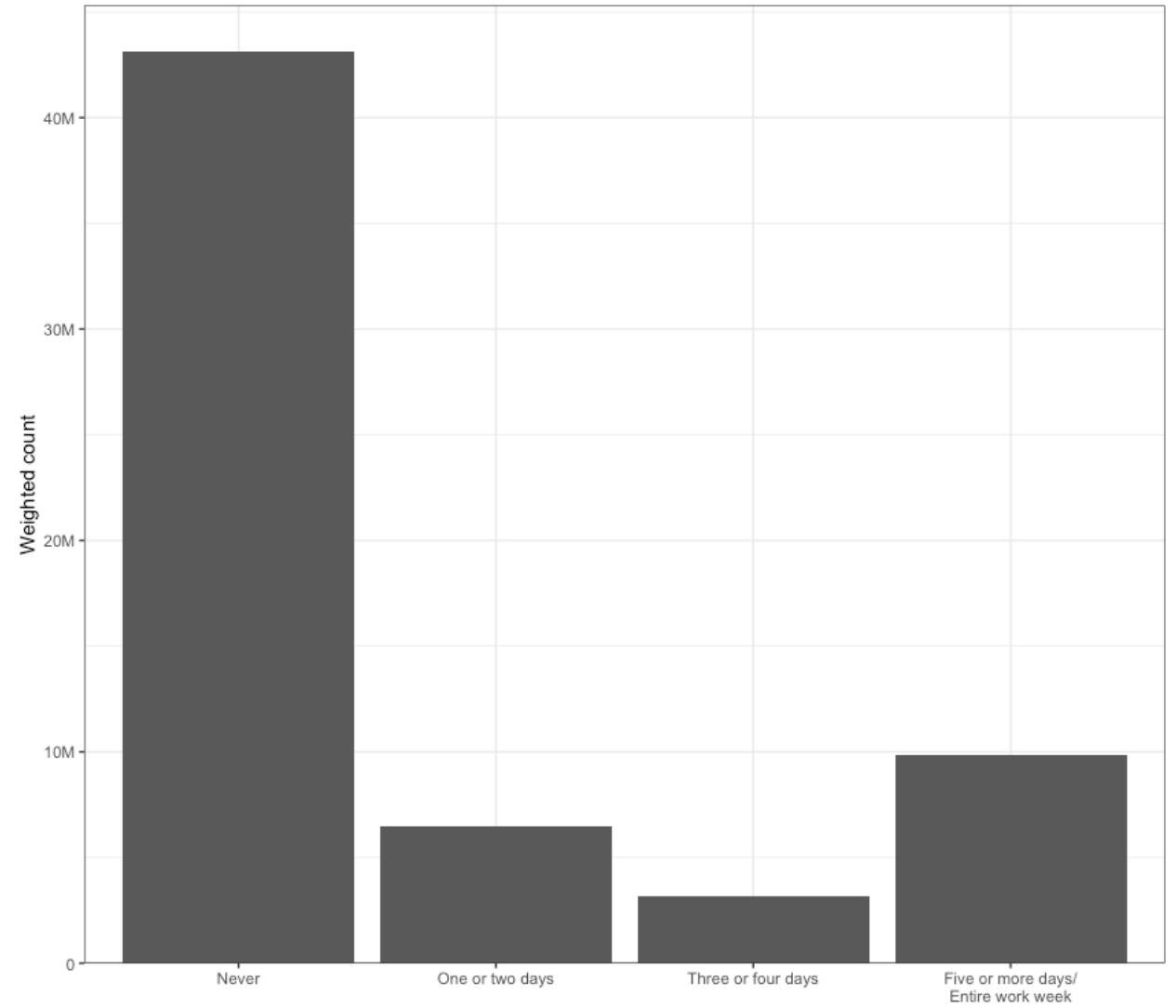
TELECOMMUTE FREQUENCY

- NHTS “days worked from home”
 - Never
 - 1–2 days/week
 - 3–4 days/week
 - 5+ days/week

WORK FROM HOME DISTRIBUTION



TELECOMMUTE FREQUENCY DISTRIBUTION



WORK FROM HOME MODELS

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept (Work from home)	-2.06*** (0.08)	-1.76*** (0.37)	-1.74*** (0.37)	-1.92*** (0.37)	-2.46*** (0.15)	-1.92*** (0.37)
1 adult, child 0-5 (Work from home)	0.17 (0.69)		-0.10 (0.70)		0.49 (0.69)	0.10 (0.70)
2+ adults, child 0-5 (Work from home)	-0.17 (0.17)		-0.21 (0.17)		-0.15 (0.17)	-0.16 (0.17)
Female (Work from home)	0.46*** (0.11)	0.41*** (0.11)	0.41*** (0.11)	0.45*** (0.11)	0.50*** (0.11)	0.45*** (0.11)
1 vehicle(s) in HH (Work from home)		0.00 (0.38)	0.00 (0.38)	-0.24 (0.38)		-0.22 (0.38)
2 vehicle(s) in HH (Work from home)		-0.13 (0.37)	-0.11 (0.37)	-0.71' (0.38)		-0.66' (0.38)
3 vehicle(s) in HH (Work from home)		-0.67' (0.38)	-0.67' (0.38)	-1.40*** (0.39)		-1.37*** (0.39)
HH Income \$50–100K (Work from home)				0.56*** (0.17)	0.26 (0.16)	0.55*** (0.17)
HH Income \$100–150K (Work from home)				0.94*** (0.18)	0.48** (0.17)	0.94*** (0.18)
HH Income ≥ \$150K (Work from home)				1.32*** (0.18)	0.84*** (0.17)	1.31*** (0.18)
R2	0.105	0.115	0.115	0.138	0.116	0.138
RMSE	0.367	0.366	0.366	0.364	0.366	0.364
AIC	2364.7	2340.9	2343.0	2286.5	2340.2	2289.3

p-value stars: 0.1 ' 0.05 * 0.01 ** 0.001 ***

TELECOMMUTE FREQUENCY MODELS

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept (1–2 days/week)	-2.00*** (0.09)	-2.83*** (0.73)	-3.03*** (0.74)	-2.59*** (0.18)	-3.15*** (0.73)	-2.65*** (0.18)
Intercept (3–4 days/week)	-2.46*** (0.11)	-3.36*** (0.93)	-3.16*** (0.91)	-2.94*** (0.23)	-3.32*** (0.90)	-2.96*** (0.23)
Intercept (5+ days/week)	-1.72*** (0.08)	-0.89** (0.32)	-1.20*** (0.33)	-2.06*** (0.14)	-1.34*** (0.33)	-2.07*** (0.13)
Children 0-5 (1–2 days/week)	-0.31 (0.20)	-0.31 (0.20)	-0.31 (0.20)	-0.27 (0.20)	-0.28 (0.20)	
Children 0-5 (3–4 days/week)	-0.16 (0.26)	-0.15 (0.26)	-0.14 (0.26)	-0.09 (0.25)	-0.06 (0.26)	
Children 0-5 (5+ days/week)	-0.08 (0.15)	-0.11 (0.15)	-0.12 (0.16)	-0.06 (0.15)	-0.07 (0.16)	
Female (1–2 days/week)	0.28* (0.12)		0.30* (0.12)	0.36** (0.12)	0.34** (0.12)	0.35** (0.12)
Female (3–4 days/week)	-0.31* (0.17)		-0.32* (0.17)	-0.25 (0.17)	-0.29* (0.17)	-0.25 (0.17)
Female (5+ days/week)	0.50*** (0.10)		0.44*** (0.10)	0.56*** (0.10)	0.49*** (0.10)	0.55*** (0.10)
1 vehicle(s) in HH (1–2 days/week)		0.91 (0.75)	0.94 (0.75)		0.77 (0.74)	
1 vehicle(s) in HH (3–4 days/week)		1.00 (0.95)	0.96 (0.92)		0.76 (0.92)	
1 vehicle(s) in HH (5+ days/week)		-0.19 (0.33)	-0.15 (0.34)		-0.35 (0.34)	
2 vehicle(s) in HH (1–2 days/week)		1.00 (0.74)	1.07 (0.75)		0.56 (0.74)	
2 vehicle(s) in HH (3–4 days/week)		0.74 (0.94)	0.67 (0.91)		0.20 (0.92)	
2 vehicle(s) in HH (5+ days/week)		-0.49 (0.33)	-0.39 (0.33)		-0.96** (0.34)	
3 vehicle(s) in HH (1–2 days/week)		0.97 (0.74)	1.05 (0.75)		0.37 (0.74)	
3 vehicle(s) in HH (3–4 days/week)		0.73 (0.94)	0.65 (0.92)		0.06 (0.92)	
3 vehicle(s) in HH (5+ days/week)		-0.94** (0.33)	-0.83* (0.34)		-1.57*** (0.35)	
HH Income \$50–100K (1–2 days/week)				0.28 (0.20)	0.34* (0.20)	0.30 (0.20)
HH Income \$50–100K (3–4 days/week)				0.47* (0.26)	0.61* (0.26)	0.47* (0.26)
HH Income \$50–100K (5+ days/week)				0.08 (0.15)	0.44** (0.16)	0.09 (0.15)
HH Income \$100–150K (1–2 days/week)				0.74*** (0.20)	0.84*** (0.21)	0.74*** (0.20)
HH Income \$100–150K (3–4 days/week)				0.21 (0.29)	0.44 (0.30)	0.21 (0.29)
HH Income \$100–150K (5+ days/week)				0.33* (0.16)	0.88*** (0.17)	0.33* (0.16)
HH Income ≥ \$150K (1–2 days/week)				1.29*** (0.20)	1.40*** (0.21)	1.31*** (0.20)
HH Income ≥ \$150K (3–4 days/week)				1.07*** (0.27)	1.30*** (0.29)	1.08*** (0.27)
HH Income ≥ \$150K (5+ days/week)				0.97*** (0.16)	1.52*** (0.17)	0.98*** (0.16)
R2	0.097	0.099	0.103	0.114	0.126	0.114
RMSE	0.585	0.584	0.584	0.582	0.580	0.582
AIC	5526.3	5528.0	5506.9	5439.2	5384.1	5435.8

p-value stars: 0.1 * 0.05 ** 0.01 ***