SEMCOG: Southeast Michigan Council of Governments

12th September, 2019

CHOOSER-MOVER HOUSEHOLD LOCATION CHOICE MODEL

PR for Chooser-mover HLCMS.

Test runs: Regional and Large-Area Controlled HLCMS.

Perc Growth MSE	7B: UNIT-LEVEL LCMS	7D: CHOOSER-MOVER REGIONAL HLCMS	7E: CHOOSER-MOVER LA-CTRL HLCMS
zones	555,068	765,908	636,854
large_areas	201	276,306	103
cities	296,566	393,813	206,981
Run 7B vs 7D AND 7E: SEMCOG AS IS AND LARGE-AREA CTRLLED AND UNIT LEVEL ELCMS			

Abs Indicators MSE	7B: UNIT-LEVEL LCMS	7D: CHOOSER-MOVER REGIONAL HLCMS	7E: CHOOSER-MOVER LA-CTRL HLCMS
zones	41,979	32,045	29,879
large_areas	161,430,108	247,000,000	121,000,000
cities	1,155,951	1,159,560	1,029,784
Run 7B vs 7D AND 7E: SEMCOG AS IS AND LARGE-AREA CTRLLED AND UNIT LEVEL ELCMS			

7E vs 7B (Chooser-mover hlcms vs unit-level hlcms, both large-area Controlled): Semcog as is Large area CTRL, unit-level elcms

PERCENTAGE GROWTH	%: MSE(7E) - MSE(7B) / MSE(7B)		POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
zones	15%		-35%	-76%	26%	50%
large_areas	-49%		-76%	-64%	196%	-1%
cities	-30%		-23%	-35%	10%	24%
ABSOLUTE INDICATOR	%: MSE(7E) - MSE(7B) / MSE(7B)		POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
zones	-29%		-65%	-33%	-40%	6%
large_areas	-25%		-67%	-96%	-70%	-2%
cities	-11%		-61%	-23%	-33%	47%

CALIBRATED HLCMS

- Calibration 2:

7C.2 vs 7B (Calibrated vs Unit-level HLCMS) Semcog as is Large area CTRL, unit-level elcms

PERCENTAGE GROWTH	%: MSE(7C2) - MSE(7B) / MSE(7B)	POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
zones	10%	10%	-72%	19%	18%
large_areas	-48%	-76%	-64%	214%	-0%
cities	-43%	-0%	-51%	17%	39%
ABSOLUTE INDICATOR	%: MSE(7C2) - MSE(7B) / MSE(7B)	POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
zones	-20%	-48%	-23%	-40%	6%
large_areas	-20%	-67%	-96%	-69%	2%
cities	10%	-31%	-9%	-33%	56%

- Calibration 3:

7C.3 vs 7B (Calibrated vs Unit-level HLCMS) Semcog as is, Large area CTRL, unit-level elcms

PERCENTAGE GROWTH	%: MSE(7C3) - MSE(7B) / MSE(7B)	POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
zones	46%	88%	27%	12%	-15%
large_areas	-48%	-75%	-64%	215%	-1%
cities	-25%	41%	-31%	13%	36%
ABSOLUTE INDICATOR	%: MSE(7C3) - MSE(7B) / MSE(7B)	POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
zones	-11%	-28%	-1%	-40%	4%
large_areas	-32%	-67%	-96%	-68%	2%
cities	7%	-20%	-1%	-33%	36%

CALIBRATED HLCMS

- Thoughts: the calibration targets, represent a pattern that is different from the targets we are using to calculate the loss.

- The calibration targets are expressed in terms of proportion of growth captured by each city by segment and large area, accounting for expected relocations.

- While loss targets are percentage growth not by segment but by different indicators.

7 -C.1 RUN SEMCOG AS IS WITH LARGE AREA CONTROL, CALIBRATED HLCMS and UNIT LEVEL ELCMS

	MSE_percgrowth
zones	656,581
large_areas	103
cities	158,662

Mean MSE_perc_growth

POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
171,786	384,048	1,010	375,568
94	126	174	32
54,053	324,129	343	90,121

7 -C.2 RUN SEMCOG AS IS WITH LARGE AREA CONTROL, CALIBRATED HLCMS and UNIT LEVEL ELCMS

	MSE_percgrowth
zones	608,109
large_areas	104
cities	167,784

Mean MSE_perc_growth

POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
163,631	186,088	1,077	440,207
96	126	181	32
42,006	354,332	375	87,282

7 -C.3 RUN SEMCOG AS IS WITH LARGE AREA CONTROL, CALIBRATED HLCMS and UNIT LEVEL ELCMS

	MSE_percgrowth
zones	809,508
large_areas	104
cities	222,914

Mean MSE_perc_growth

POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
281,507	851,892	1,015	319,699
96	126	182	32
59,385	498,530	363	85,371

CALIBRATED HLCMS

Investigate:

- The calibration targets and calibration loss function and comparing that with the overall simulation targets and simulation loss function .

- Make calibration context as similar as the simulation context. Calibrate the simulation over multiple time steps rather than in a single time step

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CALIBRATED VS CHOOSER MOVER HLCMS

PERCENTAGE GROWTH	%: MSE(chooser) - MSE(Calib2) / MSE(Calib2)
zones	5%
large_areas	-100%
cities	-66%
ABSOLUTE INDICATOR	%: MSE(chooser) - MSE(Calib2) / MSE(Calib2)
zones	-20%
large_areas	10%
cities	-17%

POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
-40%	-14%	6%	28%
-100%	-100%	-84%	-100%
-80%	153%	-67%	-82%
POPULATION	HOUSEHOLDS	BUILDING TYPES	JOBS & JOB SECTORS
-50%	-32%	-1%	2%
-1%	1%	-6%	-4%
-51%	-22%	-1%	8%

TAKE-AWAYS

- Unit level sample of alternatives in estimation helps improve results in terms of the overall spatial pattern, as it makes the distribution of alternatives in estimation look more similar to the distribution in simulation.

- Chooser-mover household location estimation helps improve the population and household distribution patterns because it recreates the real situation of a mover to chooser among vacant alternatives.

- Calibrated coefficients can help too, but the calibration is sensitive to model structure and the calibration targets used.

Future Steps

- Check prediction vs estimation Sample Size

- ELCM chooser-mover

- Wrap-up email

- ELCM calibration notebook (EDDIE)