



Experiment No. 7

January 13, 2016, 5:25 pm

Calibration Of Singly Constrained Gravity Model (Origin)

Input Values :

Base Year Origin-Destination Cost Matrix		
Origin	Destination	Cost
1	1	0
1	2	10
1	3	25
1	4	14
1	5	8
1	6	19
1	7	25
1	8	23
1	9	27
1	10	24



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1	11	36
1	12	66
1	13	31
1	14	42

Origin	Destination	Cost
2	1	10
2	2	0
2	3	22
2	4	17
2	5	15
2	6	23
2	7	27
2	8	14
2	9	23



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2	10	22
2	11	40
2	12	63
2	13	26
2	14	38

Origin	Destination	Cost
3	1	24
3	2	22
3	3	0
3	4	13
3	5	25
3	6	38
3	7	38
3	8	28



3	9	17
3	10	11
3	11	49
3	12	57
3	13	27
3	14	37

Origin	Destination	Cost
4	1	14
4	2	17
4	3	13
4	4	0
4	5	18
4	6	26
4	7	28



4	8	26
4	9	30
4	10	25
4	11	40
4	12	67
4	13	32
4	14	45

Origin	Destination	Cost
5	1	8
5	2	15
5	3	26
5	4	20
5	5	0
5	6	20



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5	7	21
5	8	28
5	9	32
5	10	29
5	11	29
5	12	65
5	13	36
5	14	47

Origin	Destination	Cost
6	1	22
6	2	23
6	3	32
6	4	22
6	5	21



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6	6	0
6	7	23
6	8	32
6	9	35
6	10	32
6	11	44
6	12	77
6	13	42
6	14	52

Origin	Destination	Cost
7	1	28
7	2	30
7	3	36
7	4	32



7	5	21
7	6	27
7	7	0
7	8	39
7	9	43
7	10	40
7	11	29
7	12	65
7	13	47
7	14	58

Origin	Destination	Cost
8	1	24
8	2	14
8	3	28



8	4	28
8	5	26
8	6	35
8	7	40
8	8	0
8	9	27
8	10	22
8	11	46
8	12	50
8	13	33
8	14	45

Origin	Destination	Cost
9	1	29
9	2	30



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9	3	17
9	4	23
9	5	30
9	6	43
9	7	43
9	8	35
9	9	0
9	10	15
9	11	63
9	12	57
9	13	23
9	14	32

Origin	Destination	Cost
10	1	23



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10	2	19
10	3	11
10	4	25
10	5	25
10	6	34
10	7	39
10	8	22
10	9	15
10	10	0
10	11	53
10	12	60
10	13	25
10	14	35

Origin	Destination	Cost
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11	1	46
11	2	48
11	3	55
11	4	48
11	5	32
11	6	43
11	7	32
11	8	57
11	9	64
11	10	60
11	11	0
11	12	52
11	13	68
11	14	76



Origin	Destination	Cost
12	1	58
12	2	54
12	3	61
12	4	62
12	5	60
12	6	69
12	7	57
12	8	41
12	9	61
12	10	55
12	11	37
12	12	0
12	13	58
12	14	62



Origin	Destination	Cost
13	1	34
13	2	29
13	3	38
13	4	36
13	5	37
13	6	45
13	7	51
13	8	36
13	9	27
13	10	32
13	11	62
13	12	52
13	13	0
13	14	18



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Origin	Destination	Cost
14	1	44
14	2	39
14	3	30
14	4	35
14	5	42
14	6	54
14	7	55
14	8	45
14	9	33
14	10	33
14	11	75
14	12	61
14	13	18
14	14	0



Given Base Year Trip Matrix		
Origin	Destination	No. of Trips
1	1	428.6155
1	2	157.97045
1	3	157.97045
1	4	157.97045
1	5	315.9409
1	6	157.97045
1	7	220.6443
1	8	147.6446
1	9	157.97045
1	10	157.97045
1	11	157.97045
1	12	157.97045
1	13	157.97045



1	14	157.97045
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Origin	Destination	No. of Trips
2	1	153.9845
2	2	1008.029
2	3	801.4462
2	4	93.64287
2	5	76.99225
2	6	76.99225
2	7	76.99225
2	8	433.5992
2	9	75.28658
2	10	1596.431
2	11	76.99225
2	12	76.99225



2	13	76.99225
2	14	69.80764

Origin	Destination	No. of Trips
3	1	383.5854
3	2	154.99155
3	3	154.9916
3	4	309.9831
3	5	154.99155
3	6	154.99155
3	7	154.99155
3	8	83.12612
3	9	154.99155
3	10	154.99155
3	11	154.99155



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3	12	154.99155
3	13	154.99155
3	14	284.3276

Origin	Destination	No. of Trips
4	1	105.4877
4	2	105.4877
4	3	105.4877
4	4	71.19773
4	5	210.9754
4	6	363.2069
4	7	105.4877
4	8	127.8796
4	9	105.4877
4	10	2009.018



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4	11	105.4877
4	12	105.4877
4	13	105.4877
4	14	42.00857

Origin	Destination	No. of Trips
5	1	185.2548
5	2	185.2548
5	3	185.2548
5	4	185.2548
5	5	257.4337
5	6	185.2548
5	7	370.5096
5	8	184.532
5	9	185.2548



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5	10	185.2548
5	11	185.2548
5	12	185.2548
5	13	185.2548
5	14	185.2548

Origin	Destination	No. of Trips
6	1	143.17185
6	2	285.0876
6	3	143.17185
6	4	64.61918
6	5	286.3437
6	6	77.14922
6	7	143.17185
6	8	36.4499



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6	9	143.17185
6	10	143.17185
6	11	143.17185
6	12	34.0992
6	13	143.17185
6	14	113.2928

Origin	Destination	No. of Trips
7	1	115.23315
7	2	322.3624
7	3	115.23315
7	4	93.00691
7	5	230.4663
7	6	610.409
7	7	746.3546



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7	8	217.1002
7	9	91.68806
7	10	115.23315
7	11	115.23315
7	12	115.23315
7	13	115.23315
7	14	111.8095

Origin	Destination	No. of Trips
8	1	42.93877
8	2	778.9419
8	3	563.5814
8	4	77.34175
8	5	296.5437
8	6	362.968



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8	7	422.5428
8	8	1332.012
8	9	330.249
8	10	1063.762
8	11	389.47095
8	12	48.1849
8	13	410.103
8	14	826.1066

Origin	Destination	No. of Trips
9	1	195.6988
9	2	195.6988
9	3	391.3976
9	4	55.51776
9	5	195.6988



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9	6	195.6988
9	7	178.0494
9	8	271.107
9	9	670.8946
9	10	195.6988
9	11	195.6988
9	12	195.6988
9	13	195.6988
9	14	513.064

Origin	Destination	No. of Trips
10	1	367.0389
10	2	367.0389
10	3	367.0389
10	4	367.0389



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10	5	367.0389
10	6	367.0389
10	7	367.0389
10	8	734.0778
10	9	367.0389
10	10	367.0389
10	11	367.0389
10	12	367.0389
10	13	367.0389
10	14	367.0389

Origin	Destination	No. of Trips
11	1	0
11	2	0
11	3	0



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11	4	0
11	5	0
11	6	0
11	7	0
11	8	0
11	9	0
11	10	0
11	11	0
11	12	0
11	13	0
11	14	0

Origin	Destination	No. of Trips
12	1	0
12	2	0



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12	3	0
12	4	0
12	5	0
12	6	0
12	7	0
12	8	0
12	9	0
12	10	0
12	11	0
12	12	0
12	13	0
12	14	0

Origin	Destination	No. of Trips
13	1	155.0559



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13	2	482.0706
13	3	155.0559
13	4	155.0559
13	5	155.0559
13	6	257.2405
13	7	285.6512
13	8	81.57111
13	9	459.0396
13	10	155.0559
13	11	155.0559
13	12	155.0559
13	13	155.0559
13	14	310.1118

Origin	Destination	No. of Trips
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14	1	127.4274
14	2	127.4274
14	3	96.00859
14	4	30.44989
14	5	127.4274
14	6	108.3454
14	7	127.4274
14	8	237.2254
14	9	318.9888
14	10	127.4274
14	11	127.4274
14	12	28.63854
14	13	254.8548
14	14	155.6117



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Sum Totals of Origin		Sum Totals of Destination	
Origin	Totals	Destination	Totals
O1	2692.5498	D1	2403.49267
O2	4694.18049	D2	4170.3611
O3	2610.93777	D3	3236.63814
O4	3668.1878	D4	1661.07924
O5	2850.2781	D5	2674.9085
O6	1899.24455	D6	2917.26577
O7	3114.59587	D7	3198.86155
O8	6944.74677	D8	3886.32493
O9	3645.62076	D9	3060.06189
O10	5505.5835	D10	6271.0538
O11	0	D11	2173.7937
O12	0	D12	1624.64614
O13	3116.13201	D13	2321.85315



O14	1994.68752	D14	3136.40436
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Selected Frictional Functions : Power Function [$F_{ij} = C_{ij}^B$]

Solution :

Trip Matrix with respect to Optimal Beta Value (Minimum SSE)		
Origin	Destination	No. of Trips
1	1	0
1	2	278
1	3	216
1	4	110
1	5	178
1	6	194
1	7	213



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1	8	259
1	9	204
1	10	418
1	11	145
1	12	108
1	13	155
1	14	209

Origin	Destination	No. of Trips
2	1	292
2	2	0
2	3	393
2	4	202
2	5	325
2	6	355



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2	7	389
2	8	472
2	9	372
2	10	763
2	11	264
2	12	197
2	13	282
2	14	381

Origin	Destination	No. of Trips
3	1	158
3	2	275
3	3	0
3	4	109
3	5	176



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3	6	192
3	7	211
3	8	256
3	9	202
3	10	414
3	11	143
3	12	107
3	13	153
3	14	207

Origin	Destination	No. of Trips
4	1	214
4	2	372
4	3	288
4	4	0



4	5	238
4	6	260
4	7	285
4	8	347
4	9	273
4	10	560
4	11	194
4	12	145
4	13	207
4	14	280

Origin	Destination	No. of Trips
5	1	170
5	2	296
5	3	230



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5	4	118
5	5	0
5	6	207
5	7	227
5	8	276
5	9	217
5	10	446
5	11	154
5	12	115
5	13	165
5	14	223

Origin	Destination	No. of Trips
6	1	114
6	2	198



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6	3	154
6	4	79
6	5	127
6	6	0
6	7	152
6	8	185
6	9	145
6	10	299
6	11	103
6	12	77
6	13	110
6	14	149

Origin	Destination	No. of Trips
7	1	189



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7	2	328
7	3	254
7	4	130
7	5	210
7	6	229
7	7	0
7	8	306
7	9	241
7	10	494
7	11	171
7	12	128
7	13	182
7	14	247

Origin	Destination	No. of Trips
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8	1	429
8	2	744
8	3	578
8	4	296
8	5	478
8	6	521
8	7	572
8	8	0
8	9	546
8	10	1120
8	11	388
8	12	290
8	13	415
8	14	560



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Origin	Destination	No. of Trips
9	1	220
9	2	383
9	3	297
9	4	152
9	5	245
9	6	268
9	7	294
9	8	357
9	9	0
9	10	575
9	11	199
9	12	149
9	13	213
9	14	288



Origin	Destination	No. of Trips
10	1	362
10	2	629
10	3	488
10	4	250
10	5	403
10	6	440
10	7	483
10	8	586
10	9	461
10	10	0
10	11	328
10	12	245
10	13	350
10	14	473



Origin	Destination	No. of Trips
11	1	0
11	2	0
11	3	0
11	4	0
11	5	0
11	6	0
11	7	0
11	8	0
11	9	0
11	10	0
11	11	0
11	12	0
11	13	0
11	14	0



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Origin	Destination	No. of Trips
12	1	0
12	2	0
12	3	0
12	4	0
12	5	0
12	6	0
12	7	0
12	8	0
12	9	0
12	10	0
12	11	0
12	12	0
12	13	0
12	14	0



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Origin	Destination	No. of Trips
13	1	185
13	2	321
13	3	249
13	4	128
13	5	206
13	6	224
13	7	246
13	8	299
13	9	235
13	10	483
13	11	167
13	12	125
13	13	0
13	14	241



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Origin	Destination	No. of Trips
14	1	121
14	2	210
14	3	162
14	4	83
14	5	134
14	6	146
14	7	161
14	8	195
14	9	154
14	10	315
14	11	109
14	12	81
14	13	116
14	14	0



Minimum Residual = 10282250.068479

Optimal Beta = 0.001

Target Oi	Modelled Oi	Target Dj	Modelled Dj
2692.5498	2692.5498	2403.49267	2460.0176753688
4694.18049	4694.18049	4170.3611	4039.1077692164
2610.93777	2610.93777	3236.63814	3315.1327320186
3668.1878	3668.1878	1661.07924	1662.9141491183
2850.2781	2850.2781	2674.9085	2726.3350472407
1899.24455	1899.24455	2917.26577	3042.7935060452
3114.59587	3114.59587	3198.86155	3237.4457270395
6944.74677	6944.74677	3886.32493	3543.5787054569
3645.62076	3645.62076	3060.06189	3055.8678582184
5505.5835	5505.5835	6271.0538	5891.3593019328
0	0	2173.7937	2371.8940467913
0	0	1624.64614	1773.1896787308



3116.13201	3116.13201	2321.85315	2353.3740445924
1994.68752	1994.68752	3136.40436	3263.7346982298

Beta	Residual SSE
0.001	10282250.068479
0.002	10282250.068479
0.003	10282250.068479
0.004	10282250.068479
0.005	10282250.068479
0.006	10282250.068479
0.007	10282250.068479
0.008	10282250.068479
0.009	10282250.068479
0.01	10282250.068479



0.011	10282250.068479
0.012	10282250.068479
0.013	10282250.068479
0.014	10282250.068479
0.015	10282250.068479
0.016	10282250.068479
0.017	10282250.068479
0.018	10282250.068479
0.019	10282250.068479
0.02	10282250.068479
0.021	10282250.068479
0.022	10282250.068479
0.023	10282250.068479
0.024	10282250.068479
0.025	10282250.068479



0.026	10282250.068479
0.027	10282250.068479
0.028	10282250.068479
0.029	10282250.068479
0.03	10282250.068479
0.031	10282250.068479
0.032	10282250.068479
0.033	10282250.068479
0.034	10282250.068479
0.035	10282250.068479
0.036	10282250.068479
0.037	10282250.068479
0.038	10282250.068479
0.039	10282250.068479
0.04	10282250.068479



0.041	10282250.068479
0.042	10282250.068479
0.043	10282250.068479
0.044	10282250.068479
0.045	10282250.068479
0.046	10282250.068479
0.047	10282250.068479
0.048	10282250.068479
0.049	10282250.068479
0.05	10282250.068479
0.051	10282250.068479
0.052	10282250.068479
0.053	10282250.068479
0.054	10282250.068479
0.055	10282250.068479



0.056	10282250.068479
0.057	10282250.068479
0.058	10282250.068479
0.059	10282250.068479
0.06	10282250.068479
0.061	10282250.068479
0.062	10282250.068479
0.063	10282250.068479
0.064	10282250.068479
0.065	10282250.068479
0.066	10282250.068479
0.067	10282250.068479
0.068	10282250.068479
0.069	10282250.068479
0.07	10282250.068479



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0.071	10282250.068479
0.072	10282250.068479
0.073	10282250.068479
0.074	10282250.068479
0.075	10282250.068479
0.076	10282250.068479
0.077	10282250.068479
0.078	10282250.068479
0.079	10282250.068479
0.08	10282250.068479
0.081	10282250.068479
0.082	10282250.068479
0.083	10282250.068479
0.084	10282250.068479
0.085	10282250.068479



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0.086	10282250.068479
0.087	10282250.068479
0.088	10282250.068479
0.089	10282250.068479
0.09	10282250.068479
0.091	10282250.068479
0.092	10282250.068479
0.093	10282250.068479
0.094	10282250.068479
0.095	10282250.068479
0.096	10282250.068479
0.097	10282250.068479
0.098	10282250.068479
0.099	10282250.068479
0.1	10282250.068479



0.101	10282250.068479
0.102	10282250.068479
0.103	10282250.068479
0.104	10282250.068479
0.105	10282250.068479
0.106	10282250.068479
0.107	10282250.068479
0.108	10282250.068479
0.109	10282250.068479
0.11	10282250.068479
0.111	10282250.068479
0.112	10282250.068479
0.113	10282250.068479
0.114	10282250.068479
0.115	10282250.068479



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0.116	10282250.068479
0.117	10282250.068479
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