

1. Stratified sampling method

Table S1. The influences of sampling fractions on modelling travel distance corresponding to Figure 8

Convergence degree	Mean value		Median		Probability distribution	
	Minimum	Variance	Minimum	Variance	Minimum	Variance
	sampling fraction		sampling fraction		sampling fraction	
25%	0.005%	0.055	0.015%	0.055	1.43%	0.006
50%	0.005%	0.055	0.035%	0.025	3.05%	0.0025
75%	0.005%	0.027	0.17%	0.006	11.21%	0.0007
90%	0.045%	0.006	1.03%	0.001	44.63%	0.0001
95%	0.18%	0.0014	4.2%	0.0002	76.18%	0.00002
99%	5.22%	0.00004	56.36%	0.00001	98.76%	0.000001

2. Multiple study scopes

Table S2. The influences of sampling fractions on modelling travel distance for Q_j corresponding to Figure 10

Convergence degree	Mean value		Median		Probability distribution	
	Minimum	Variance	Minimum	Variance	Minimum	Variance
	sampling fraction		sampling fraction		sampling fraction	
25%	0.47%	0.0588	0.47%	0.162	17.54%	0.0366
50%	0.47%	0.0588	0.47%	0.162	32.7%	0.019
75%	0.95%	0.0259	1.9%	0.032	65.88%	0.0038
90%	4.27%	0.0055	14.22%	0.0049	91.94%	0.00072
95%	14.69%	0.0014	41.71%	0.0008	98.10%	0.00038
99%	82.94%	0.00005	97.63%	0.00006	99.5%	0.00017

Table S3. The influences of sampling fractions on modelling travel distance for Q_i corresponding to Figure 10

Convergence degree	Mean value		Median		Probability distribution	
	Minimum	Variance	Minimum	Variance	Minimum	Variance
	sampling fraction		sampling fraction		sampling fraction	
25%	0.05%	0.0438	0.05%	0.1402	2.14%	0.0376
50%	0.05%	0.0438	0.05%	0.1402	4.28%	0.0159
75%	0.1%	0.0238	0.24%	0.0297	16.25%	0.0048
90%	0.48%	0.0047	1.33%	0.0057	53.3%	0.0006
95%	1.90%	0.0012	4.89%	0.0015	81.62%	0.0002
99%	32.02%	0.00005	53.78%	0.00006	99.10%	0.00001

3. Multiple data sources

3.1 Mobile phone positioning data

Table S4. The influences of sampling fractions on modelling travel distance for mobile phone positioning data corresponding to Figure 11

Convergence degree	Mean value		Median		Probability distribution	
	Minimum	Variance	Minimum	Variance	Minimum	Variance
	sampling fraction		sampling fraction		sampling fraction	
25%	0.005%	0.1276	0.005%	0.0829	0.14%	0.0859
50%	0.005%	0.1276	0.005%	0.0829	0.31%	0.0308
75%	0.02%	0.0291	0.005%	0.0392	1.29%	0.0085
90%	0.13%	0.0062	0.04%	0.0062	7.29%	0.0018
95%	0.44%	0.0015	1.6%	0.0015	23.53%	0.00047
99%	9.5%	0.00005	2.79%	0.00006	89.20%	0.000014

3.2 Public transit smart card data

(1) Travel distance

Table S5. The influences of sampling fractions on modelling travel distance for public transit smart card data corresponding to Figure 12

Convergence degree	Mean value		Median		Probability distribution	
	Minimum	Variance	Minimum	Variance	Minimum	Variance
	sampling fraction		sampling fraction		sampling fraction	
25%	0.005%	0.0273	0.005%	0.0577	0.17%	0.0419
50%	0.005%	0.0273	0.005%	0.0577	0.4%	0.0229
75%	0.005%	0.0273	0.009%	0.0297	1.57%	0.0061
90%	0.02%	0.0099	0.04%	0.0059	9.28%	0.0009
95%	0.09%	0.0016	0.15%	0.0017	29.43%	0.0002
99%	1.93%	0.00006	2.6%	0.00009	90.85%	0.000006

(2) Travel time

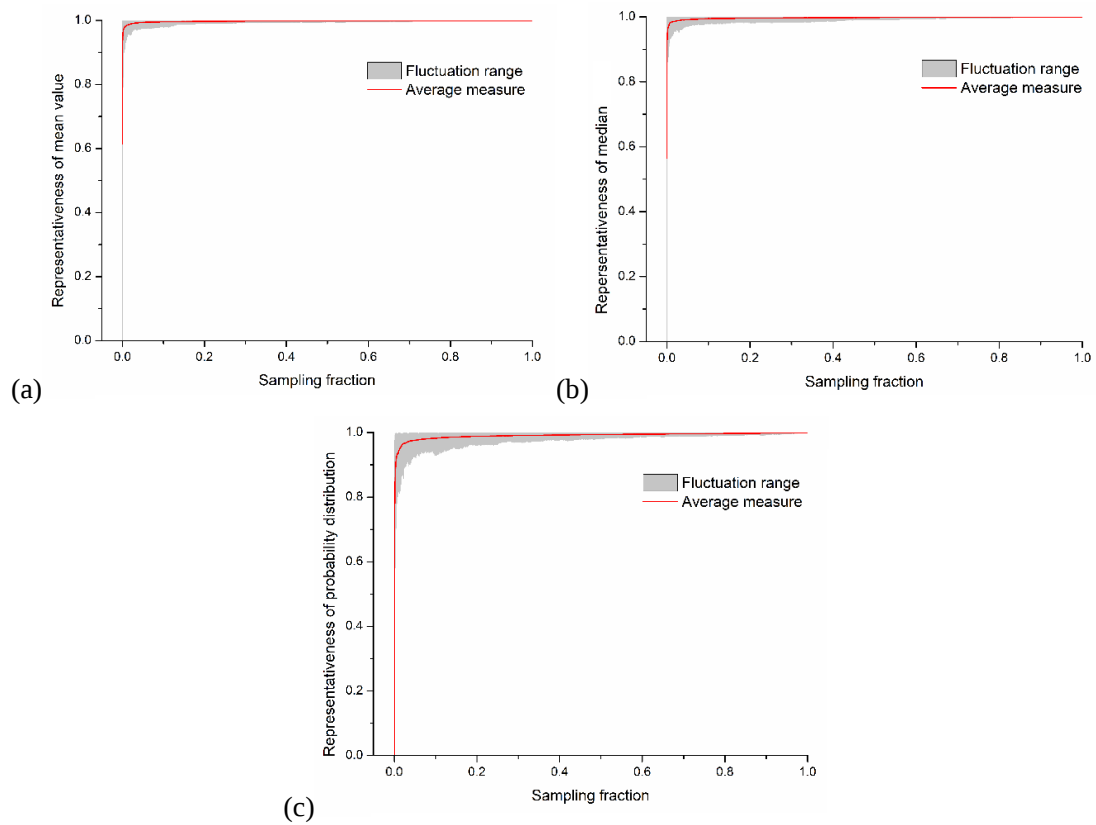


Figure S1. The influences of sampling fractions on modelling travel time using public transit smart card: (a) mean value; (b) median; (c) probability distribution

Table S6. The influences of sampling fractions on modelling travel time for public transit smart card data

Convergence	Mean value	Median	Probability distribution
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degree	Minimum sampling fraction	Variance	Minimum sampling fraction	Variance	Minimum sampling fraction	Variance
25%	0.005%	0.106	0.005%	0.0272	0.05%	0.1038
50%	0.005%	0.106	0.005%	0.0272	0.06%	0.0694
75%	0.005%	0.018	0.005%	0.0272	0.09%	0.0219
90%	0.02%	0.0052	0.03%	0.0049	0.34%	0.0038
95%	0.08%	0.0015	0.12%	0.0012	1.33%	0.0009
99%	2.4%	0.000057	3.35%	0.000055	25.97%	0.000035

(3) Travel Frequency

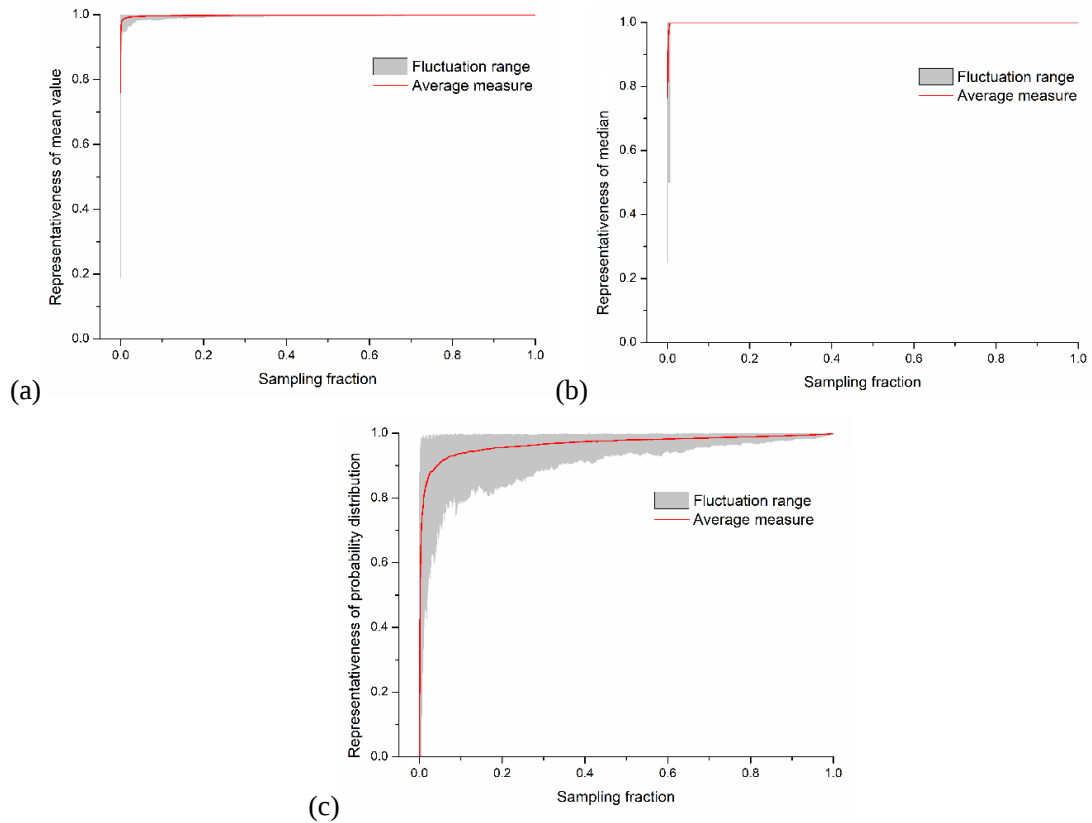


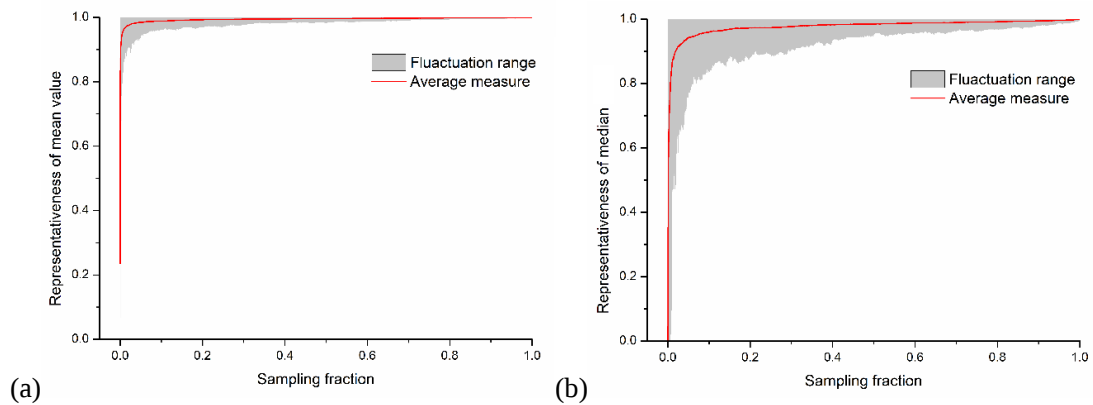
Figure S2. The influences of sampling fractions on modelling travel frequency using public transit

smart card: (a) mean value; (b) median; (c) probability distribution

Table S7. The influences of sampling fractions on modelling travel frequency for public transit smart card data

Convergence degree	Mean value		Median		Probability distribution	
	Minimum	Variance	Minimum	Variance	Minimum	Variance
	sampling fraction		sampling fraction		sampling fraction	
25%	0.01%	0.0324	0.01%	0.0318	0.09%	0.1582
50%	0.01%	0.0324	0.01%	0.0318	0.19%	0.0799
75%	0.01%	0.0324	0.01%	0.0318	0.72%	0.0187
90%	0.02%	0.0031	0.09%	0.032	4.32%	0.0033
95%	0.05%	0.0014	0.21%	0.0187	15.65%	0.0009
99%	1.35%	0.000058	0.46%	0.0028	82.41%	0.000036

(4) Radius of gyration



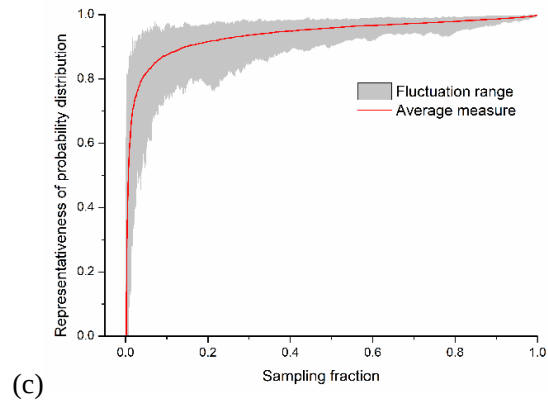


Figure S3. The influences of sampling fractions on modelling radius of gyration using public transit smart card: (a) mean value; (b) median; (c) probability distribution

Table S8. The influences of sampling fractions on modelling radius of gyration for public transit smart card data

Convergence degree	Mean value		Median		Probability distribution	
	Minimum	Variance	Minimum	Variance	Minimum	Variance
	sampling fraction		sampling fraction		sampling fraction	
25%	0.01%	0.3117	0.04%	0.1724	0.33%	0.0609
50%	0.01%	0.3117	0.1%	0.1209	0.70%	0.0223
75%	0.02%	0.0255	0.47%	0.0425	2.63%	0.0072
90%	0.14%	0.0061	1.93%	0.0064	14.6%	0.0012
95%	0.55%	0.0012	7.11%	0.0013	41.35%	0.0003
99%	12.7%	0.00006	71.04%	0.00005	94.13%	0.00001

(5) Movement entropy

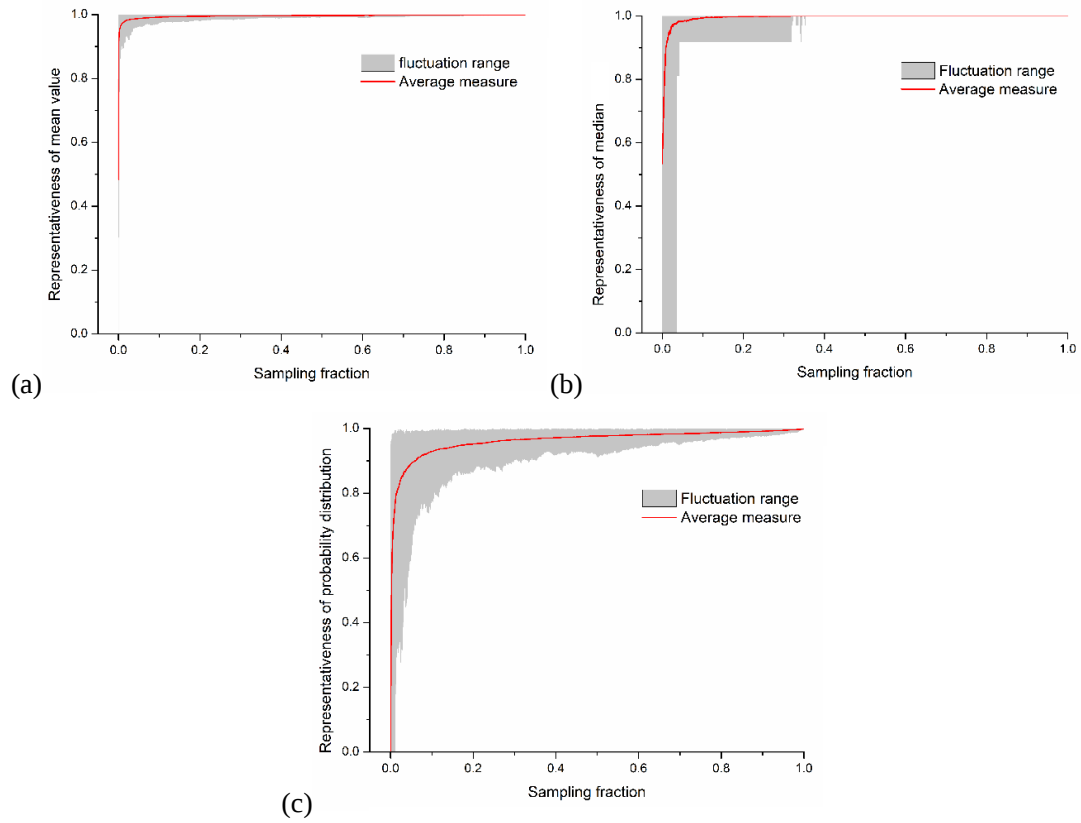


Figure S4. The influences of sampling fractions on modelling movement entropy using public transit smart card: (a) mean value; (b) median; (c) probability distribution

Table S9. The influences of sampling fractions on modelling movement entropy for public transit smart card data

Convergence degree	Mean value		Median		Probability distribution	
	Minimum sampling fraction	Variance	Minimum sampling fraction	Variance	Minimum sampling fraction	Variance
25%	0.01%	0.025	0.01%	0.1214	0.11%	0.1814
50%	0.01%	0.025	0.01%	0.1214	0.25%	0.0845
75%	0.01%	0.025	0.44%	0.1529	0.99%	0.0215
90%	0.07%	0.0043	0.90%	0.0646	6.02%	0.0028
95%	0.24%	0.0013	2%	0.0216	18.09%	0.00075
99%	6.75%	0.00005	8.36%	0.0007	85.57%	0.00003