Subject index

acceptability, and equity 645–7
access 628–9
rationing 670
accessibility
and equity 627–30
equity of opportunity 640–43
to spatially dispersed markets 67, 90
accessibility indicators 50, 59
accident costs 453–5
by accident type 454, 455
by road type 456
USA 344–7
accidents 328, 329, 362
change in accident risks 376–7
and congestion 343
Europe 375–9
valuation of accident risks 377–9
action spaces 56
activity models 6–7
activity precedence 230
‘activity-based costing’ 275–6
activity-based demand modeling systems 216–31
agent-based modeling systems 230–31
connecting long-term and short-term choices 239
demand–supply interactions 239–40
generation of disaggregate socio-demographic inputs 238–9
integrated urban modeling system 240
CEMUS 240
integration with other models 238–41
rule-based computational process models 223, 227–30
ALBATROSS 229–30
AMOS 229
CARLA 227
SCHEDULER 229
SMASH 229
STARCHILD 229
TASHA 230
utility maximization-based econometric model systems 216–23
CEMDAP 220–23
criticisms 217
enhanced full individual day pattern 217
FAMOS 223
full individual day pattern 217
Sacramento model 217–20
activity-based transportation models 654–5
activity-travel behavior
activity-travel scheduling models 235
children’s activity-travel behavior 232
interpersonal interactions 231
intra-household interactions 231–2
research synthesis 231–7
social networks 233–4
space-time interactions and restraints 237
spatial dependencies 236
spatial representation and perception 236–7
time-frame of activity-travel analysis 235
time-use in activities 233–4
timing and scheduling 234–6
time-of-day forecasting 234–5
activity-travel scheduling 235
Administrative Behavior 651
administrative and ordering costs 253
advanced telecommunications (ATIC) 440
advanced traveller information systems (ATIS) 586–7, 590–92, 601–602
compared to PITA 604–605
development of 606–607
aesthetic costs 360
affect 652
Africa 106, 108
agglomeration 1, 47, 67, 90
of manufacturing activities 127, 129
and political power 116
agglomeration economies 514–20
agglomeration elasticity estimates 518
applicability of elasticities over different magnitudes of change 519
distance versus generalized cost based elasticities 519
effective density measure 516
imperfect competition effects 520
pass through assumption 519–20
tax wedge effects 520–22
and transport user benefits 515
agglomeration forces 71, 73, 76, 77, 78–80, 81, 82
agricultural location theory 118
air cargo
airfreight volume 812
competition and policy implications 811–14
Europe 813–14
multilateral liberalization 813
air passenger movements (APM) 314
air pollution 320, 329, 330–31, 362
damage costs of emissions 385
Europe 379–83
health and environmental effects 381
monetary valuation of impacts 380–83
values for the assessment of greenhouse gas
emissions 386
air pollution costs
health impacts
USA 347–52
of highway travel 460–62
air transport 15–16, 103
competition and regulation 797–821
liberalization 666
Air Transport Research Society (ATRS) 313
aircraft noise 314–15
aircraft revenue 107
airline performance, and airport policy 814–16
airlines 281, 287–8, 291–2
bilateral air service agreements 807
competition 799–807
deregulation 797
Asia–Pacific region 809
EU 808–809
USA 808
domestic airline mergers 798, 799
domestic regulation, domestic deregulation
and international dimension 808–10
frequency/scheduling competition 800–803
hub-and-spoke network and network
competition 803–806
integration of domestic and international
airline routes 798
international regulatory regime 807
international strategic alliances 798, 799
low-cost carriers (LCCs) 810, 814
mergers and consolidation 798–9
open skies agreements 807
price competition 799–800
models 799–800
seat inventory control rule 806
strategic alliances 810–11
yield management 806–807
‘airport barriers’ 815
airport benchmarking, and efficiency
measurement theory 298–316
airport governance
evolution 781–4
government owned/operated airports 781
government owned/privately operated
airports 781–2
ownership/governance structures 781
partially private for-profit with government
controlling interest 783–4
partially private for-profit with private
controlling interest 784
privatization 781
and regulation 779–96
airport and market power 790–93
airport policy, and airline performance 814–16
airport productivity analysis
and DEA 311, 312–13
first stage 311–12
Global Airport Benchmarking 313–14
new developments 314–15
theoretical and methodological evolution
312–13
airport regulation 784–90, 793
Australia 288–9
Canada 789–90
China 790
cost-side effects 786
dual-till price regulation 785
European Union 787–8
New Zealand 288–9
price monitoring 785
rate of return regulation benchmarks 785
single-till price regulation 784–5
USA 786–7
welfare effects 786
airports 8
delays 315
efficiency 792
liberalization 780
and market forces 792
privatization 793, 815
ALBATROSS model 229–30, 231
‘Almaty Program’ 112
alternative technologies 439–40
alternative-specific variances 172
altruism 404–405, 412
AMOS model 229
applied or computable general equilibrium
models 21, 22–34
base year data set 22–4
commuting 36–7
endogenous travel times and externalities
37–8
equilibriums 29–30
firms 37
firm’s increasing returns technology 30
imperfect competition and prices 31–2
increasing returns to scale and imperfect
competition 30
model of closed perfectly competitive
economy 28
multi-country/region model with trade 32–4
multi-region models 40–41
single-region models 39–40
specification and calibration 24–30
transport, in single region models 34
transport in multi-region models 38–9
travel demand of households 34–6
urban models 41–2
arbitrage 529–30, 544–5
Armington assumption 32–3, 40
ASSET project 392
ASTRA model 50–51
attention, scarcity of 650, 651
attribute processing strategies (APS) 156
‘attributes’ 282, 288
Australia
airport efficiency 313
airport regulation 288–9
airports 783
City Link toll road, Melbourne 569
employer business travel, case study 153–4
public-private partnerships 684, 685–6
rail freight 769–70
rail transport 764
Westlink M7 Toll Road, Sydney 569
aviation see air transport
axiomatic cooperative bargaining solution 264
backhauling 538–9
backyard capitalism 68
Baltic Exchange 849
Baltic International Freight Futures Exchange (BIFFEX) 851
bargaining theory 264–5
behavioral mixture models 173–8, 184, 185
conceptual framework 174
Belgium 251, 252
benefit–cost analysis 413
Benthamite social welfare function 634
bid rent 60, 119, 122
bid-rent location models 57–8
‘biform games’ 264
border effects 69, 85–6, 106, 261
bottleneck model 188, 190, 563–4
basic 192–8
cost recovery theorem 198
elastic demand 197–8
equilibrium 190
equilibrium departure schedule 195
extension on parking 735
extensions of 203–209
heterogeneity 206
large networks 208
Nash equilibrium in 193, 194, 203–204
optimal capacity and self-financing 198
optimal tolling 196–7
other congestion functions 209
parking 206
random capacity and demand 205–206
and scheduling preferences 202–203
second best pricing 203–205
self-financing theorem 198, 205
small networks with dynamic congestion 206–208
social welfare function 199
and tolls 203–205, 207
trip-timing 193
within-day dynamics 189
bounded rationality 651–2
boundedly-rational user equilibrium (BRUE) 653
Brundtland Report 429
Build, Operate, Transfer (BOT) projects 711
building and operating concessions 668–9
bus services
liberalization 664
local 14–15
competition 744–59
entry 753–6
random schedules 757
research agenda 757–9
contestability of market 758
cost and production analysis 745–8
competitive tendering 747
efficiency 746
further research 748
incentive contracts 747
methodologies/discrepancies 747–8
private/public ownership 746–7
returns to scale 745–6
subsidies 747
technological characteristics 745–6
demand analysis 748–51
cross-price elasticities/substitution effects 750
further research 752
income elasticities and car ownership effect 751
methodologies/discrepancies 751–2
own price elasticities 749
service elasticities 751
trip purpose/peak and off-peak demand 751
predatory pricing 758
price competition 758

CAA model 214
CAFE standards 371, 438
Canada 298
airports 782, 789–90
Highway 407 ETR, Toronto 569
capacity improvement costs 458
capital, mobility of 72–3
CAPRI project 370
carbon taxes 437
CARE database 377
CARLA model 227, 229
cars
  instruments to correct external pollution costs 332
  scrapping subsidies for 333
CASES project 385, 392
CEMDAP 240, 241
  activity-travel frameworks for non-workers 222
  activity-travel frameworks for workers 220–22
  generation-allocation model system 224–5
  micro-simulation framework 228
  modeling and micro-simulation framework 222–3
  scheduling model system 226–7
CEMSELTTS model 224, 239, 240, 241
CEMUS model 240, 241
central business district (CBD) 118, 119, 121, 122, 128–9
  and congestion 189
certainty effect 652
CESAR system 250
CGEurope model 52–3, 54, 55
Chicago convention 807
children’s activity-travel behavior 232
China 110
  airport regulation 790
  transport modes energy use 428
  choice modeling framework 160–61
  choices, connecting long-term and short-term choices 239
CIF/FOB transport margin 84, 101
city formation 5
  externalities in space 116
  heterogeneity of space 116
  and transport costs 116–287
class membership model 175–6
Clean Development Mechanism (CDM) 384
climate change 329, 362
  Europe 383–6
climate change costs
  studies 471
  USA 352–3, 354
club theory 736
CO₂ emissions 433
  contribution of individual transport modes, UK 431
command and control, scope in transport sector 663–4, 681
communication costs 82, 83
commuters, compensating 639–40
commuting, in model 36–7
commuting cost 119, 120, 123, 124, 128, 129
  compensation
    for commuters 639–40
    for compulsory acquisition 638
competition 2, 72–3, 86, 664–6
  airlines 799–807
  and elastic demand 281
  imperfect 49
  maritime transport 844–68
  ports 822–43
  and price discrimination 554–6
  rail transport 763–78
  and regulation 13–16
  road haulage 664
  competitive tendering 668
  bus services 747
computer aided personal survey instrument (CAPI) 155
concessions 711
  area-based 671
  building and operating 668–9
  congestion 39, 40, 188, 289, 329, 361
  delay costs, USA 342–4, 345
  and departure time 189, 190
  estimates of external costs 376
  Europe 374–5
  information on 593–7
  and negative liberty 625
  in neo-classical model 320–21
  partial equilibrium representation 327–8
  pricing 11–12
  and priority rule 640
  qualitative classification of congestion externalities 434
  research into dynamics 209
  static model of 190–92
see also bottleneck model
congestion pricing 561–82
  Area Licensing Scheme (ALS), Singapore 571–2
  charges 670
  City Link toll road, Melbourne 569
  congestion charge, Stockholm 576–7
  congestion charge scheme design 578
  distributional and acceptability aspects 578–81
  dynamic perspective 562–4
  economic exposition 562
  Electronic Road Pricing (ERP), Singapore 572
  High Occupancy Toll (HOT) lanes, USA 569–71
Highway 407 ETR, Toronto 569
London Congestion Charging Scheme (LCCS) 573–6
M6 Toll, UK 569
Norway, toll rings 568–9
schedule delay costs 563
second-best pricing 564–8
examples 567–8
undifferentiated pricing 565–7
tolls 564
toll construction, costs of new 455–8
consumer choice theory, random utility maximization based 214
consumer surplus
concept in cost–benefit analysis 479
in general equilibrium 483–92
consumer theory 161–2
contingent valuation method (CVM) 407–409
continuous behavioral mixtures 176–8
continuous probability mixture model 172–3
contracting 684
contracting out of services 711
cooperative games 264
core-periphery model 74, 89
welfare analysis 76–8
corrected ordinary least squares 311
cost analysis, origins and purpose 274–6
cost functions
conditional cost functions 279
data anomalies 284
disequilibria in input use 283–4
dummy variables 284
economics of scale and scope 279–81, 288–9
estimation 275
for transport firms 273
frontier estimation techniques 285
industry structure indices 287–91
measures of output 282–3
output aggregation 282–3
returns to scale and density 285–7, 289, 290, 291, 292
and technical efficiency 281
theory 276–81
time trend 283
translog form 287
transport output and cost functions 277–9
cost of travel time variability 201–202
cost–benefit analysis 11, 112, 444, 501, 503
consumer surplus concept in 479
distributional neutrality 643–5
transport 479–80, 504–506, 513, 523
see also surplus theory
cost–benefit approach, restrictive 21–2
costs 1, 7–10, 62, 82, 252–3
‘activity-based costing’ 275–6
average freight costs 100–101
and city formation 116
components of 273
contribution to trade growth 102
determinants of 104–108
international costs 97
and distance 104, 111
and economies of scale 49
evolution of 107
generalized transport cost 87
and geography 104
impact on international trade 97
and industry share when labor is mobile 74–5
and infrastructure 104–106
input costs 107
and international trade 4, 5, 7–10, 97–8
and location of activities 87–8
lower, and spatial inequality 71–9
and market power 106
measurement and impact 83–8
measuring 100–101
and modal choice 103
and new economic geography 124–8
and non-port city 120–24
policy implication 89–92
responsiveness of trade to 102–103
and spatial inequality 69
and time series 106–107
and trade 98, 100–103
and trade facilitation 104–106
unit cost estimation 275–6
and urban economics 118–20
welfare losses due to under and overestimation 592
‘cost–insurance–freight’ (CIF) price 84
COWI Civil Aviation in Scandinavia, study 370
cross-country growth regressions 112
cross-nested logit models 165–9
CUBE LAND model 58
customs 105
Data Envelopment Analysis (DEA) 285, 298–9, 305–307, 309, 747
and airport productivity analysis 311, 312–13
DBFO model 689
deadweight loss 533
Debt Service Cover Ratios 722
decision-making heuristics 652
decision-making units (DMU) 298, 299, 303
decision-support models 262–3
defense expenditures, USA 358
DELTA model 52, 59
demand
   for buses 748–51
   for freight transport 7
   for rail 716
   for transport 5–7
   for travel 213–31
‘demand chain management’ 251
demand uncertainty 715
demand–supply interactions 239–40
DEMOS model 239
‘Demsetz’ competition 663, 664, 665, 668, 680–81
deregulation 86, 107
   airports 808–809
   road transport 106
destination choice 654
‘Developing a Sustainable Transport System’ 501
discrete behavioral mixtures 175–6
discrete choice, and consumer surplus 493–8
discrete choice analysis 160–63
   random utility model 162–3
discrete choice models
   advances in 160
   choice experiment example 179
   classic 163–9
   continuous probability mixture model 172–3
   cross-nested logit models 165–9
   cumulative distribution function 163
   discrete probability mixture model 172
   empirical application 178–84
   GEV family models 165–9
   logit model 165–9
   mixture models 169–78
   nested logit models 165–9
   probability mixture model 170, 172
   probit model 163–5
discrete choice theory 1, 6
dispersion forces 71, 73, 76, 77, 80
distance
   and trade 69, 99
   and transport costs 104, 111
distance function approach 299–301
DRAM model 57
DRIPS (Dynamic Route Information Panels) 599
DYNACAN model 239
dynamic, meaning of term 188
dynamic congestion models 188, 189
dynamic efficiency and network efficiency 310
dynamic modeling framework 6
dynamic traffic assignment problem 208
ECMT study 370, 775
economic development 1
economic order quantity (EOQ) formula 250
economies of scale 288, 301
   in capacity provision 448–51
   rail services 666–7
   and scope 279–81, 292
   and transport cost 49
economies of spatial scope 280–81
efficiency, and regulation 675–6
efficiency measurement theory 8
   airport productivity analysis 311–15
   application to airport benchmarking 298–316
   basic concepts 299
   conventional methods of measurement 304–308
   corrected ordinary least squares 311
   cost function approach 302
   cost, revenue and profit function approach 301
   Data Envelopment Analysis (DEA) 298–9, 305–307, 309
distance function approach 299–301, 308–309
dynamic efficiency and network efficiency 310
   identifying sources of inefficiency 303
   index number approach 304–305, 309–10
   Malmquist index 303–304
   parametric estimation of production transformation function 311–12
   production with undesirable outputs 308–10
   profit function approach 302–303
   revenue function approach 302
   stochastic frontier analysis 307–308
   Total Factor Productivity (TFP) 304–305
electricity 427
   emission reduction subsidies 330, 332
   emission taxes 330
   emissions from transport 431, 432
   ‘emotional core’ 174
   EMPAL model 56
   energy 62
   final energy demand by sector, EU 425
   fuel efficiency of US cars 436
   institutional issues 432–3
   international markets 433
   policies for altering use 435–40
   fostering alternative technologies 439–40
   role of market 435–7
   speed limits 439
subsidies 437–8
  taxes 437
vehicles standards 438–9
renewable resources 429–30
second best issues 433–4
strategic issues 434
and technology change 426
and transport 425–41
transport modes energy use, China 428
energy markets
and transport 10
transport and distortions in 429–34
energy security 362
Europe 389
energy security/oil-importing costs, USA 357–9
energy use
and congestion 343
and emissions per passenger kilometre 432
and the environment 430–32
‘environmental adaptation’ 652
environmental concerns 369, 662
environmental consciousness, modeling 174–5
environmental costs, of highway travel 460
environmental effects, transport produced 430
environmental externalities 319, 360
environmental impact, transport projects 715
EPA (Environmental Protection Agency) 414, 438, 460
equality 625
equality of opportunity (EOP) 626
transport policy 641–3
equity
and acceptability 645–7
and accessibility 627–30
and compensation for compulsory acquisition 638
of cost sharing of infrastructure 636–7
definition of 624–5
in the design and cost of infrastructure 626–38
and growth 630–36
of opportunity of accessibility 640–43
and transport use 638–40
equity considerations, in transport 625
‘equity weighting’ 383
ESPON program 51, 87, 88
Europe
accidents 375–9
air pollution 379–83
climate change 383–6
congestion 374–5
energy security 389
external costs 369–94
comparison with USA 392–4
noise 386–8
and ports 840–41
road transport emissions, cost factors 382
scarcity 374–5
soil pollution 388–9
values for casualties avoided 379
water pollution 388–9
European Commission 89, 90
European Union 82
airline deregulation 808–809
airport regulation 787–8
external costs 319, 329
aesthetic costs 360
climate change 329
congestion 329
definition in neo-classical model 320–25
equity–efficiency trade off 336
in Europe 369–94
accidents 375–9
air pollution 379–83
climate change 383–6
congestion 374–5
energy security 389
external costs per passenger km or ton km 374
Impact Pathway Approach 372–3
indicator to express 371
major studies on 369–74
noise 386–8
scarcity 374–5
water and soil pollution 388–9
landscape effects 389–90
life-cycle impacts 390–91
marginal external cost (MEC) 323–4
noise 329
optimal pollution model 325–6
marginal abatement costs (MAC) 326
partial equilibrium model 327–8
road transport 360
second best world 335–9
optimal tax perspective 337
pure efficiency perspective 338–9
tax reform perspective 337–8
social welfare function 321
time and uncertainty issues 334–5
total and average externality costs 324–5
traffic accidents 329
urban (barrier) effects 390
in the USA 341–63
accident costs 344–7
air pollution costs
health impacts 347–51
other impacts 351–2
climate change costs 352–3
energy security/oil-importing costs 357–9
oise costs 353–5
quality of estimates by transport mode and cost category 341
water pollution 355–7
externalities 320
instruments to correct external pollution costs of cars 332
in the transport sector 328–33
positive 391
externality reduction subsidies 332
externality tax, definition 331
face-to-face communication cost 121–2, 123
FAMOS model 217, 223
FIFI study 370
financial crises 708
firm life cycles (‘firmography’) 4, 46
firms 72–3
spatial fragmentation 82–3
Fisher Ideal index 304
force majeure risks 717
four-step transport model 260
France 69
bus industry 746, 747
parking 737
private highways 684
transport policy 643
franchising, for freight and passenger traffic 770–73
‘free on board’ (FOB) price 84, 101
freight absorption 542
freight costs, and trade flows 102
freight rates 84
freight transport, demand 7
frontier estimation techniques 285
fuel consumption, by main transport modes, USA 427
fuel costs 107, 111
fuel prices 436–7
full marginal costs (FMC) 10
definition of 444
of highway travel 444–66
accident costs 453–5
air pollution costs 460–62
analytical framework 445–51
hypothetical full marginal and average cost curves 446
scale economies in capacity provision 448–51
‘before’ and ‘after’ FMC results 474–5
case study, NJRTM model 462–5
Full Average Cost (FAC) 463
summary and conclusions 466
costs of capacity improvement 458
FUND model 383
game theory 263–4
GATS 2000 813
GDP
per capita 1800–1913 70
share spent on transport 84
and trade 99
general equilibrium
Allias measure in 491–2
compensating variation in 489–91
consumer surplus in 483–92
general equilibrium models
applied or computable 21
for transportation economics 4
generalized extreme value (GEV) 160
models 5
generation models 220
Geographic Information System (GIS) 87
space-time systems 237
geography, and transport costs 104
Germany 107
GEV family models 165–9
Global Airport Benchmarking 313–14
Global Competitiveness Report 105
Global Trade Analysis Project (GTAP) 84–5
governments
influence of 21
institutional role in PPPs 721–2
GRACE project 371, 392
‘grandfathering’ 332, 338
in air transport 666
greenfield projects 711
greenhouse gases 352–3, 386, 430, 431
growth, and equity 630–36
guarantees 719–20
Harmonized System level 101
health impacts, of air pollution 347–51, 381
HEATCO study 259, 371, 375, 378, 392
hedonic regression technique 406
‘herd’ behavior 654
Herfindahl index 31, 859
high occupancy toll (HOT) lanes 216, 655
high occupancy vehicle (HOV) lanes 216, 655
highway construction costs 449–50
highway cost function studies 471
highway travel, full marginal costs (FMC) of 444–66
‘home market effect’ 73
home production theories of time allocation to activities 214
horizontal equity, and public service obligations (PSO) 677–8
human capital approach 401
human life, value of 9–10
hybrid-vehicles 440
‘iceberg’ approach 39
iceberg formulation 84
ILUMASS model 239
ILUTE model 239
IMF Direction of Trade Statistics (DOT) 101
IMPACT survey 371
incentive contracts, bus services 747
incentives, literature on intertemporal incentives problems 700
income distribution, and public service obligations (PSO) 677–8
industrial organization (IO) paradigm 845, 846
Industrial Revolution 70, 116
industry structure indices 287–91
information
imperfect 597, 652
scarcity of 650, 651
information theory 56
information in transport 12, 586
acquisition 587–93
advanced traveller information systems (ATIS) 586–7, 590–92
comparison of options 589–91
compliance 600
demand for information 597–9
dependence 593
information on congestion, feedback effects 593–7
information search option 587, 588
integration of transport modes 600–601
literature review 596–7
multiplicity of information search channels 599–600
travel alternatives 586
travel times, perceived and actual 586
uncertainty on destination quality 601
Infras-IWW study 370, 380, 388, 389, 390
infrastructure 1, 38–9, 48, 92
and cost of operations 275
costs 455
equity of cost sharing in 636–7
equity in the design and cost of 626–38
equity principles in design of 627
fragmentation 360
impact of 504
procurement and financing 684
regulation 667
and trade 99
and transport costs 104–106
infrastructure regulation, subsidiarity chain 667–8
innovation 107
and regulation 676
intercity trade cost 5, 129
International Energy Agency (IEA) 433, 434
international energy markets 433
International Maritime Organisation (IMO) 853
International Ship and Port Facility Code of 2002 854
international trade 97
and transport costs 4, 5, 97–8
interpersonal interactions 231
interregional relationships 68
intra-household interactions 231–2
intracity equilibrium 119
intraregional industry location models 55–60
comparison 60–61
inventory costs 253
inventory management theory 250
‘inventory routing’ problem 260
investments, and regulation 673–4, 676
IRPU/D model 58
irrational behavior 482
isolation effect 652
ISTEA model 214
Italy 73
bus services 746
iterative equilibrium analysis 261
ITLU/P (Integrated Transportation and Land Use Package) 56–7
Japan, railways 773, 776
just-in-time concept 108
justice 640
Kyoto Agreement 384, 385
labor mobility 73–6, 79–80
land 55, 57, 80, 81
land use, low-density 664
land-use transport interaction (LUTI) models 4, 42
landlocked countries 86, 90, 99, 104, 105, 112
landscape effects 389–90
latent class choice model 171, 182
Latin America 685, 764
Leontief technology 39, 51
level-of-service (LOS) conditions 234
liability 330
liberalization 664–6, 681
air transport 666
bus services 664
rail services 665
LIBOR (London Interbank Offered Rate) 722
life-cycle impacts 390–91
local public transport 664–5
location models 62
location theory 630
lock-in effect 76, 116
logistics, definition and evolution of 249–52
Logistics Performance Index (LPI) 99, 105–106
logit captivity model 171
logit mixture models 182
logit models 182, 493–6
logsum variable 493, 494, 495, 497, 498
Maastricht Treaty 685
macroeconomic adjustment costs, USA 358
Malmquist index 303–304, 312, 314
Manufacturing 91
fragmented processes 108
marginal abatement costs (MAC) 326, 385
choice between tax and tradable permits 335
marginal external cost (MEC) 323–4
marginal rate of substitution (MRS) 399
maritime transport 16
competition and regulation 844–68
see also shipping
maritime transport market, conceptual framework 845
market access 72
market competition 664–6
market failures 432, 435, 662
and regulation 622
market power, and transport costs 106
MARPOL 78 854
MARS model 59
Marshallian consumer surplus 482
MASST model 51
MATSIM model 231
MEPLAN model 51, 57
METROPOLIUS model 57, 190, 208
METROPOLIS model 190, 208
MEV models 165–7
MIDAS (Micro-analytic Integrated
Demographic Accounting System) 239
migration 74, 76, 77, 79, 80
minimal efficient dimension issue 670–71
Minimum Standards in Merchant Ships 855
minsum criterion 629
mixed logit (ML) model 146, 147, 171
mixture models 160, 169–78
behavioral mixture models 173–8
continuous behavioral mixtures 176–8
continuous probability mixture model 172–3
discrete behavioral mixtures 175–6
discrete probability mixture model 172
limitations of 173
mixed logit model 171
probability mixture model 170, 171
typology of 171–2
mobility
of capital 72–3
of labor 73–6
Model of Metropolis 56
Modifiable Area Unit Problem (MAUP) 236–7
Mohring effect 391, 662, 665
money-metric utility functions 480–81
monopolies 667
Monte Carlo simulation 4, 46
mortality risk perceptions 412–13
‘multilateral resistance’ 109
multilateral trade 265
multinomial choice sets 616–19
multinomial logit model (MNL) 146
multioutput theory 274–5, 276–7, 288
multiperiod life-cycle consumption models 401
multiregional economic models 46–55, 61–2
comparison 53–5
omissions 54
treatment of dynamics 54–5
multiregional input–output models 51–2
multivariate extreme value (MEV) models 165–7
MUSSA model 57–8
NEEDS study 371, 386, 392
negative liberty 625
nested logit models 165–9, 173, 182, 496–8
Netherlands 510
networks 288, 627
new economic geography 1, 3–5, 48, 67–93,
117, 631
models 124–8
transport in 83
and transport costs 124–8
and urban economics 128–9
New Zealand 152
airport regulation 288–9
rail transport 764
NEWEXT study 371
‘news vendor’ model 250
‘newsboy problem’ 253
NODUS model 261, 262
noise 329
  effects and impact categories 387
  Europe 386–8
  monetary values for different noise values 388
noise costs
  and highway travel 460–62
  USA 353–6
Noise Depreciation Sensitivity Index (NDSI) 460
non-port city
  and transport cost 120–24
non-tradable goods 80–81
Norway, toll rings 568–9
‘number of tills’ problem 674–5
NUTS2 European regions 88
NUTS3 regions 88
OPEC 429, 433
open skies agreements 86, 780, 807
opportunity of accessibility, equity of 640–43
optimal pollution model 325–6
optimal public decisions 10–13
OPUS/Urbansim model 239
original equipment manufacturer (OEM) 265
origin–destination (OD) structure of demand, transport firms 277
output, definition in transportation cost analysis 444
output aggregation 282–3
panel effects 171
parametric estimation of production transformation function 310–11
parking 14, 206
parking economics 726–41
  as an application of transport microeconomic theory 729–36
  cruising for curbside parking 726, 735
  empirical regularities related to 727–8
  fees and regulations 735
  first-best theory 729–31
  literature review 735–6
  long-run analysis 731–3
  off-street parking 727
  on-street or curbside parking 727
  per-unit-time curbside fees 735
second-best theory 733–5
short-run analysis 729–31
social opportunity costs 735
USA 727–8
parking policy 726
curbside parking 736–7
freight delivery 740
local 741
minimum parking requirements and the subsidization of parking 738–9
off-street parking on vacant lots 739
‘park-and-ride’ facilities 739
parking enforcement 740
parking fees and fines 740
parking information systems 740
political economy of 740
private off-street parking operators 737
resident parking policies 740
soft downtown parking freeze 737–8
standardized zoning regulations 739
surface parking at shopping centres 739
surface parking at sites with built structures 739
partial equilibrium approach 522–3
partial equilibrium model 327–8
pass through assumption 519–20
path selection 654
path-dependency 91
pattern-level models 220
pavement resurfacing costs 458–9
PECAS model 52, 57
Personal Intelligent Travel Assistant (PITA) 12, 604
  ‘advice’, the value of being advised what to do 611, 617
  ‘assessment’, value of acquiring information concerning unknown attributes 609–11, 616
  ‘assessment’ and ‘advice’ compared 612 compared to ATIS 604–605
  ‘generation’, value of learning about new travel alternatives 614–16, 617, 621
Global Positioning System 607
historical background 606–607
incident conditions 620–21
investment for 605
multinomial choice sets 616–19
value of information in 616–17
usage rates 620
value of
  information from 607–16
  personalized advice 611
  unreliable information 617–19
value-difference between personalized and not-fully personalized advice 612–13
petrol, lead in 432
Pigouvian taxes 324–5, 334
policies
for altering energy use 435–40
to address externalities in the transport
sector 328, 329, 330, 331–3
transaction and enforcement costs 330
policy implication, transport costs 89–92
policy use of VSL in transport 413–15
political boundaries 433
political risk 717–18
port authorities
degree of involvement 830
role of 839–41
port city model 118–20
port competition
definition of 823–8
port efficiency 828–31
measures of 105
and shipping costs 86
port organization 828–31
port regulation 828
port state control (PSC) 854
ports
additional capacity and scale increases at
landside 838–9
cargo throughput 826
competition and regulation 822–43
container capacity Hamburg–Le Havre
range 838
cooperation
horizontal and vertical 832–3
mergers and concentration 831–6
corporate and ownership structure of major
container ports 831
distribution function 823
efficiency measurement 831
and Europe 840–41
future market power and competition in
836–41
goods-handling function 823
government involvement 828
logistics process 831
maritime aspect 823
privatization 822
regulator’s role 840
and shipping companies 832
strategic cooperation within the maritime
sector 833–4
structural evolution within 832
top global terminal operators 835
world’s largest 824
positive externalities, and public service
obligations (PSO) 678
precautionary principle 383
price discrimination 11, 527–56
and arbitrage 529–30, 544–54
backhauling 538–9
bundling or tying 543
definitions of 528
discriminating with several products 542–4
first-degree 528, 529, 535
informational rents 548
multiple qualities and discrimination 551–4
one good and several groups of buyers
536–8
optimal nonlinear pricing 547–50
perfect 528, 535–6
second degree 528, 529, 538
surpluses and deadweight loss 533
third-degree 529
two-part pricing with heterogeneous
customers 544–7
under competition 554–6
uniform monopoly pricing 530–32
welfare analysis and public policy 532–5
and willingness to pay 529
yield management 540–41
price-cap mechanism 672–3
Principles of Transport Economics 727
priority rule, and congestion 640
Private Participation in Infrastructure Project
database 685
privatization 779, 668
probabilistic choice models 162
probit model 163–5
project appraisal 11
project finance
in public–private partnership (PPP) 711–14
stated choice 142, 156
project financing 668–9
prospect theory 652, 653
public decisions, optimal 10–13
public intervention 13, 661
command and control 663–4
impact of regulation on overall transport
policy 675–6
market competition and liberalization
664–6
reasons for 662–3
regulation 667–75
public policy, and welfare analysis 532–5
public sector, role in PPPs 719–22
public service obligations (PSO) 662
in a dynamic perspective 681
and horizontal equity 677–8
implementation within a regulatory context
679–81
and income distribution 677–81
and positive externalities 678
and problems of political decision making 678–9
and special social groups (disadvantaged people) 678
and vertical equity 677
public transport, local 664–5
public–private partnerships (PPPs) 1, 13–14, 684
applications 694–5
basic model 687–9
concessions 711
contract length 695–8
contracting out of services 711
contractual dynamics, trade off between investment and maintenance 698–700 and costs 708
in developing countries earlier? 710, 714, 720, 722
failure 694
financial risk 716
force majeure risks 717
government support for 685
greenfield projects 711
 guarantees 719–20
institutional role of government in 721–2
literature on 693–4
long-term contracting 686
performance in transport sector 685
political risk 717–18
private finance 686
regulatory and political risks 701–703
rise in transport 709–11
and risk 714–19
risk sharing 718–19
risk transfer 686
role of project finance 711–14
role of public sector in 719–22
Special Purpose Vehicle (SPV) 712
task bundling 686, 689–93
in transport 708–23
unbundling 690–91
putty-clay geography 76
quality, regulation of 674
QUITS study 370

R&D sector 78, 90, 307
RAEM model 53
rail networks, concessions 671
rail services
economies of scale 666–7
liberalization 665
rail traffic 262
rail transport
access charges 775

costs, alternative approaches for 764–7
economies of density 765
franchising for freight and passenger traffic 770–73, 776
Europe 771–2
freight services 766
infrastructure and operations 763
monopolies 766
open access competition for freight and passenger traffic 769–70
scarcity charges 774
vertical separation 767–9, 774
vertical separation model 764
railway management innovation 676
railway organization, approaches to 766
railway rate theory 274
railways 273, 283
— cost analysis 274
— traffic forecasts 716
ramp metering 205
random capacity and demand 205–206
random taste variation 172
random utility discrete choice models 493
random utility maximization based, consumer choice theory 214
random utility maximization (RUM) 651
random utility theory 56, 162–3
RECORDIT study 370, 392
REFIT 392
regional convergence 82
regional development 47–8, 49
regional disparities, growth approach 78–9, 82
regional production function models 49–51
regulation 17, 281, 667–75
and competition 13–16
and efficiency 675–6
financial issues 671–2
impact on transport policy 675–6
infrastructure 667
and innovation 676
of investments 673–4
and investments 676
issues within transport infrastructure sector 670–75
and competition 13–16
and efficiency 675–6
financial issues 671–2
infrastructure 667
and innovation 676
of investments 673–4
and investments 676
issues within transport infrastructure sector 670–75
maritime transport 844–68
ports 822–43
of quality 674
rail transport 763–78
of safety 674
regulatory asset base (RAB) 672
reliability
in freight traffic 510–11, 523
in passenger traffic 509–10, 523
REMI PI+ model 53
research 2, 41, 433
residential location theory 119
resource-based strategic management theory 845, 846
resources, renewable 429–30
retail 56
retailer–wholesaler game 263
revealed preferences 405–407
RICE model 383
ridesharing 655
right-of-way costs 459
risk, and PPPs 714–19
risk aversion 400
road delay, estimation 344
road haulage, competition 664
road transport
deregulation 106
external costs 360
road transport emissions, cost factors, Europe 382
route structure, transport firms 277, 278
-routing and model choices 259–63
‘routing problems’ 258, 259–60
RUBMRIO model 52
rule-based computational process models (CPM) 223, 227–30
RURBAN model 58
Sacramento model 217–20
SACTRA Report 41, 513, 520
safety 9–10
monetary value of increased safety 396
public provision of safety 402–403
regulation of 674
Safety of Life at Sea Convention, 1914 854
SASI model 50
scarcity 650–55
of attention 650, 651
of capacity of transportation facilities 650
Europe 374–5
of goods and services 650
of information 650, 651
scarcity charges, rail transport 774
‘scarcity costs’ 342
schedule delay costs 563
SCHEDULER model 229
scheduling conflict 230
scheduling models 220
scheduling preferences 199–203, 209–10
and the bottleneck model 202–203
Vickrey’s 200–201
‘screening games’ 264
seaport organizational types 829, 830
seaports
definitions of 823–4
and inland ports 823
principal roles of 825
principle activities of 823
see also ports
self-financing theorem 1, 3, 198, 205, 732
service structure, transport firms 277–8
shipping
age of vessels 852
bareboat charter 848
‘common carriage’ principle 858
dry bulk charter rates 851
environmental regulation 864
fleet sizes and vessels ordered 836
and global economic crisis 863–4
liberalization 666
liner conference indices 857
liner market 844, 862–3
anti-trust immunity 860–61, 864
changes in regulation 860–61
key economic features 853–4
key regulatory features 855
price-making and regulation 855–61
recent conference rates 859
open registry countries 852
tanker and dry bulk markets 847–54
economies of scale 848
tanker time charter rates 850
tanker voyage charter rates 849
tramp market 844, 846, 847–53, 862
key economic features 853–4
key regulatory features 855
tramp regulation 853–5
world suborn trade 847
shipping companies, future development 836–7
shipping costs, and port efficiency 86
shipping services, markets for, literature review 845–7
shipping times 108
shopping 56, 654
‘signalling games’ 264
Singapore
Area Licensing Scheme (ALS) 571–2
Electronic Road Pricing (ERP) 572
SMASH model 229
‘snowball’ effect 74, 76, 631
social choice, informational basis of 628, 629
social choice approach 661
social networks 233–4
social surplus 484, 485, 486, 488, 489, 533, 534, 662
social welfare function 321
soil pollution, Europe 388–9
space-economy 68, 71, 81, 83, 90
space–time interactions and restraints 237
Spain 312
   bus industry 746, 747, 750, 751
spatial competition 72, 127
Spatial Computable General Equilibrium (SCGE) 513
   models 52–3, 522
spatial dependencies 236
spatial development, bell-shaped curve 79–83
spatial economics 1, 16
   theories 48
spatial fragmentation, of firms 82–3
spatial impossibility theorem 117–18
spatial inequality 69, 70–71, 71–9
spatial interaction location models 56–7
spatial mobility 641, 643
spatial models of economic development 4, 46–55
spatial representation and perception 236–7
Special Purpose Vehicle (SPV), public-private partnerships (PPPs) 712
special social groups (disadvantaged people), and public service obligations (PSO) 678
speed limits 439
STAN model 261
stand-alone test 633, 634
standard location theory 91
standards 330, 333, 438–9
STARCHILD model 229
stated preferences 407–409
static models, congestion 188–9, 190–92
Steiner tree problem 628, 629
stochastic frontier analysis 307–308
stop-level models 220
Strategic Petroleum Reserve (SPR) 357, 358
structural mixture models see behavioral mixture models
subsidies 12, 330, 339, 360, 434, 438, 679–80
bus services 747
supply chain logistics 263
surplus theory 1, 11, 479–99
   aggregation over individuals 483
   change in net surplus 489
   compensating variation in general equilibrium 489
   consumer surplus in general equilibrium 483–92
   CV (compensating variation) 481–2
   discrete choice and consumer surplus 493–8
   EV (equivalent variation) 481–2
   gross consumer surplus in general equilibrium 485
   gross consumer surplus and real national income 484–5
irrational behavior 482
Marshallian consumer surplus 482, 489
money-metric utility functions 480–81
shadow pricing rules with tax distortion 492
social surplus 484, 488, 533, 537
theoretical foundations 480–83
Sweden 437
   bus industry 746, 750
   congestion charge, Stockholm 576–7
   rail franchising 771–2
   rail transport 767
Switzerland, bus services 746
synthetic population generator (SPG) module 240
'tabu' search 259
tariff and non-tariff costs 67
tariff regulation 669
TASHA model 230
tax wedge effects 520–22
taxes 333, 360
   on emissions 330
   on energy 437
Pigouvian 324, 334
TEA-21 model 214
technical efficiency 281
technical evaluation 662
technological progress 2, 17, 67, 82
technology change, and energy 426
TELUM model 57
TEN-T infrastructure program 41
'territorial justice' 627
A Theory of Justice 626
third country effects 109
Tiebout's conjecture 633
time 86–7
   arrival time, reliability 343
   boarding or disembarking time 343
   time-use in activities 233–4
   value of 5–6, 103
   values for freight, comparison 259
   waiting time 343
   see also valuation of travel time savings (VTTS)
time costs 67
time series, and transport costs 106–107
time-of-day forecasting 234–5
times, maritime shipping 108
tolls 145, 148, 151, 209, 564, 671, 716
   occupancy-specific tolling strategies 216
   optimal coarse toll 204
   optimal tolling 196–7
   see also congestion pricing
Total Factor Productivity (TFP) 298, 304–305
tour-level models 220, 235
tradable emission permits 330, 331–2
trade 108
and distance 69, 99
and GDP 99
and location of economic activity 91
and transport costs 98, 100–103
trade costs 67–9
trade facilitation 99, 104–106
trade flows 98–9, 102
trade-imbalance 110
traffic analysis zones (TAZ) 215, 236
transaction costs 67
TRANSIMS model 231
transit information 620
translog form 287, 290
transport
in computable general equilibrium models 34–42
and distortions in the energy market 429–34
and energy 425–41
and manufacturing 91
in NEG models 83
in spatial models of economic development 4, 46
spatial models of economic development 4, 46
transport firms 273
origin–destination (OD) structure of demand 277
route structure 277, 278
transport improvement, behavioral response to 523
transport logistics 249
administrative and ordering costs 253
average weights 258
bargaining theory 264–5
cost minimization 262
cycle stock 253–4
decision-support models 262–3
example of logistic costs 257
game theory 263–4
in-transit inventory 254
inventory costs 253
logistic costs in transport chain 252–5
management science and mathematical economics 258–66
optimizing total logistic costs of a transport chain 255–8
organizational problems 266
routing and model choices 259–63
safety stock 254–5
transport costs 252–3
transport microeconomic theory 729–36
transport output and cost functions 277–9
transport policy 40
coordination 81
distributional impacts 39
equality of opportunity (EOP) 641–2
equity dimensions 624–48
impact of regulation 675–6
subsidiarity chain in 663
transport projects, review of impacts 501–24
agglomeration economics 514–20
appraisal framework 502–506
direct transport benefits for business and freight 506–13
factor costs 503
freight related transport quality improvement 505
impacts by stakeholder 502
market prices 503
Present Value of Net Social Benefit 502–503
reliability in freight traffic 510–11, 523
reliability in passenger traffic 510–11, 523
transport cost–benefit analysis 504–506, 523
value of small time savings 511–12
value of travel time savings, on employers’ business 506
value of travel time savings for freight 508–509
wider impacts 513–22, 523–4
measurement 522–3
transport use, and equity 638–40
transportation behavior 653–5
transportation demand management (TDM) 13, 606, 650, 651, 655
Transportation Economics 727
transportation patterns, using BRUE 653
TRANUS model 51–2, 57
travel alternatives, variability and availability 586
travel choice, prospect theory in 653
travel demand, in model 34
travel demand analysis 213
activity-based approach 213–14
activity-based demand modeling systems 216–31
trip-based versus activity-based 214–16
trip-based versus activity-based level of aggregation 215–16
travel demand management policies 213
travel time as a commodity 136–9
and congestion 343, 375
travel time costs 452–3
travel times, perceived and actual 586
‘travelling salesman’ problem 260
Treaty of Rome 840
TREMOVE study 371
TRENEN study 370
UK 70–71
airport privatization 780, 782–3
airports, price-cap regulation 787
bus industry 746, 751
CO₂ emissions contribution of individual transport modes 431
Isle of Sky bridge 684
London Congestion Charging Scheme (LCCS) 572–6
London Underground 685
M6 Toll 569
privatization 668
rail freight 769
Railtrack 767, 772
Value of Time Studies 144
uniform monopoly pricing 530–32
unit cost estimation 275–6
UNITE project 370, 388, 391, 392
unobserved taste heterogeneity 171
urban (barrier) effects 390
urban economics
and new economic geography 128–9
non-port city, and transport cost 120–24
port city model 118–20
and transport costs 118–20
urban land market 57
urban land market theory 55
urban modeling system, integrated 240–42
urban transport, marginal separation costs 390
urbanization 116–17
UrbanSim model 58–9
US Census Bureau 101
US Import Waterborne Databank 101
US-GTAP transport margins 87
USA 81, 684
accident costs 344–7
air pollution costs
health impacts 347–51
other impacts 351–2
airline deregulation 808
Airline Deregulation Act 797
airport regulation 786–7
airports 781–2
bellwether deregulation 797
climate change costs 352–3
climate change damage costs by mode 354
congestion delay costs 342–4
defense expenditures 358
energy security/oil-importing costs 357–9
Energy Tax Act (1979) 437
external costs 341–63
comparison with Europe 392–4
fuel consumption, by main transport modes 427
fuel efficiency of cars following ‘oil crises’ 436
High Occupancy Toll (HOT) lanes 569–71
macroeconomic adjustment costs 358
noise costs 353–6
Ocean Shipping Reform Act 1998 858
Oil Pollution Act of 1990 854
Open Shipping Reform Act of 1998 857
parking 727–8
railways 763, 773
Shipping Acts 857
Staggers Act 763
transport policy 642–3
water pollution 355–7
wealth transfer cost 358
user behavior, psychology and rationality in 650–55
user costs 451–5
utility maximization 651
utility-based location models 58–9, 58–61
value
of human life 9–10
of time 5–6
'value chain' analysis 251
'value of life' 396
value of reliability gains (VRG) 155, 156
value of small time savings 511–12
value of a statistical life (VSL) 396–7
age 411
altruism 404–405, 412
background risk 411
baseline risk 411
distributional effects 403–404
empirical estimates 409, 411
empirical estimates in road traffic 410
health status 411–12
mortality risk perceptions 412–13
policy use in transport 413–15
preference elicitation 405
public provision of safety 402–403
revealed preferences 405–407
scale sensitivity 412
stated preferences 407–409
statistical versus identified lives 404
VSL model 398–402
wealth level 411
and welfare economics 402–405
value of travel time savings (VTTS) 6, 36, 39, 135–57
adjusting behavioral values for non-resource and equity impacts 142–3
aggregate summary 152
empirical elements 141–5
empirical evidence 148–56
employer business travel in Australia, case study 153–4
on employers’ business 506–508
for freight 508–509
Hensher formula 139–40
issues in estimation 146–8
leisure 143
marginal utility of time and money 144
mixed logit (ML) model 146, 147
multinomial logit model (MNL) 146
non-urban empirical evidence 152–3
opportunity cost 136, 141
production cost approach 139–41
stated choice 142
symmetry vs asymmetry 148–52
theoretical frameworks 135–41
travel time as a commodity 136–9
unconditional choice probability 147
updating over time 143–6
urban empirical evidence 148
value of transferring time 141

Variable Factor Productivity 313
vehicle costs, studies 471
vehicle operating costs 451–2
vehicle standards 438–9
vertical equity, and public service obligations (PSO) 677
virtual links 261

WACC (weighted average cost of capital) index 672–3
Wardrop conditions 594
water pollution
Europe 388–9
USA 355–7
water pollution costs studies 471
wealth transfer cost, USA 358
weight to value ratio 85
welfare analysis, and public policy 532–5
welfare economics 1
and VSL 402–405
white noise 307
willingness to accept 151, 399
willingness to pay 9, 38, 256, 265, 413
data from CVM surveys 408
indicators for models 151
and price discrimination 529
and safety 378, 379, 396, 397, 409
in VSL model 399
World Conference on Transportation Research 2007 654
*World Development Indicators* 105
World Economic Forum 105
yardstick competition 669
yield management 253, 540–41, 806–807

Zero Emission Vehicle (ZEV) program, California 440