

References

- ABT Associates, Inc., 1968, Qualitative aspects of urban personal travel demand (HUD New Systems Studies Publication, Cambridge, Mass.).
- Ackoff, R., 1965, Individual preferences for various means of transportation (University of Pennsylvania, Philadelphia, Pa.).
- Aitchison, J. and J. Bennett, 1970, Polychotomous quantal response by maximum indicant, *Biometrika* 57, 253–262.
- Aitchison, J. and S. Silvey, 1957, The generalization of probit analysis to the case of multiple responses, *Biometrika* 13, 131–140.
- Allouche, J., 1972, Approach to probability distribution of value of walking time and pedestrian circulation models, *Highway Research Record* 392, 121–133.
- Alonso, W., 1968, The quality of data and the choice and design of predictive models, *Urban Development Models*, HRB Special Report 97, 178–192.
- Amemiya, T., 1974, Bivariate probit analysis: Minimum chi-square methods, Report no. 76, unpublished (Institute for Mathematical Studies in the Social Sciences, Stanford University, Stanford, Calif.).
- Amemiya, T. and M. Boskin, 1972, Regression analysis when the dependent variable is truncated lognormal, with an application to the determinants of the duration of welfare dependency, Report no. 75, unpublished (Institute for Mathematical Studies in the Social Sciences, Stanford University, Stanford, Calif.).
- American Transit Association, 1967a, Urban bus design objectives, revised, Washington, D.C.
- American Transit Association, 1967b, Transit fares – U.S. and Canadian cities, Washington, D.C.
- Anderson, T.W., 1958, Introduction to multivariate statistical analysis (Wiley, New York).
- Antle, C., L. Klimko and W. Harkness, 1970, Confidence intervals for the parameters of the logistic distribution, *Biometrika* 57, 397.

- Ashford, J.R. and R.R. Sowden, 1970, Multi-variate probit analysis *Biometrics* 26, 535–546.
- Ashton, W., 1972, *The logit transformation* (Hafner, New York).
- Atkinson, A., 1972, A test of the linear logistic and Bradley–Terry models, *Biometrika* 8, 37–42.
- Barnett, C.A. and P.D. Sallmans, 1967, Report on county-hall journey to work survey 1964 (Planning Department of Greater London Council, London).
- Bartlett, M.S., 1935, Contingency table interactions, Supplement to the *Journal of the Royal Statistical Society* 2, 248–252.
- Bauer, H.J., 1970, A case study of a demand-responsive system, mimeo (General Motors Corporation, Warren, Michigan).
- Beesley, M.E., 1965, The value of time spent in traveling: Some new evidence, *Economica* 32, 174–185.
- Ben-Akiva, M., 1972, Structure of travel demand models (Transportation Systems Division, Department of Civil Engineering, MIT, Cambridge).
- Benshoof, J.A., 1970, Characteristics of drivers' route selection behavior, *Traffic Engineering and Control* 11, 64–607.
- Berkson, J., 1944, Application of the logistic function to bioassay, *Journal of the American Statistical Association* 39, 357–365.
- Berkson, J., 1953, A statistically precise and relatively simple method of estimating the bioassay with quantal response, based on the logistic function, *Journal of the American Statistical Association* 48, 565–599.
- Berkson, J., 1955, Maximum likelihood and minimum χ^2 estimates of the logistic function, *Journal of the American Statistical Association* 50, 130–161.
- Blackburn, A., 1969a, A behavioral approach to impedance, *Studies in travel demand*, vol. 4 (U.S. Department of Transportation, Washington, D.C.).
- Blackburn, A., 1969b, Estimation of the behavioral model, *Studies in travel demand*, vol. 5 (U.S. Department of Transportation, Washington, D.C.).
- Bloch, D. and G. Watson, 1967, A Bayesian study of the multinomial distribution, *Annals of Mathematical Statistics* 38, 1423–1435.
- Block, H. and J. Marschak, 1960, Random orderings and stochastic theories of response, in: I. Olkin, ed., *Contributions to probability and statistics* (Stanford University Press, Stanford, Calif.).
- Bock, R.D., 1970, Estimating multinomial response relations, in:

- Contributions to statistics and probability: Essays in memory of S.N. Roy (University of North Carolina Press, Chapel Hill, N.C.).
- Boskin, M., 1972, A conditional logit model of occupational choice, unpublished (Department of Economics, Stanford University, Stanford, Calif.).
- Boskin, M. and F. Nold, 1974, A Markov model of turnover in aid to families with dependent children, Report no. 125 (Institute for Mathematical Studies in the Social Sciences, Stanford University, Stanford, Calif.).
- Brand, D., 1972a, The state of the art of travel demand forecasting: A critical review (Graduate School of Design, Harvard University, Cambridge).
- Brand, D., 1972b, Theory and method in land use and travel forecasting, Paper presented at the Highway Research Board.
- Brand, D., B. Barber and M. Jacobs, 1967, Technique for relating transportation improvements and urban development patterns, Highway Research Board Record 207, 53–67.
- Brooklyn Polytechnic Institute, 1966, Urban mass transit planning, A short course developed by the institute.
- Brunner, B.A. et al., 1966, User determined attributes of ideal transportation systems – An empirical study (University of Maryland, College Park, Md.).
- R.H. Bruskin Associates, A consumer report... on attitudes of bus riders in metropolitan Chicago (Transit Advertising Assoc., New York).
- Charles River Associates, 1967, A model of urban passenger travel demand in the San Francisco metropolitan area, Prepared for the California Division of Bay Toll Crossings (CRA, Cambridge).
- Charles River Associates, 1968, An evaluation of free transit service, Prepared for the Department of Transportation (CRA, Cambridge).
- Chicago Area Transportation Study, 1968, The Skokie swift: A study in urban rapid transit.
- Coleman, J.S., 1968, The mathematical study of change, in: H. Blalock and A. Blalock, eds., Methodology in social research (McGraw-Hill, New York).
- Cook, P., 1973, The effect of legitimate opportunities on the probability of recidivism, unpublished (Institute of Industrial Relations, University of California, Berkeley).
- Cottingham, P., 1966, Measurement of non-user benefits, unpublished

- (Center for Planning and Development Research, University of California, Berkeley).
- Cox, D.R., 1958, The regression analysis of binary sequences, *Journal of the Royal Statistical Society, Series B* 20, 215–242.
- Cox, D.R., 1966, Some procedures connected with the logistic qualitative response curve, in: F. David, ed., *Research papers in statistics* (Wiley, New York).
- Cox, D.R., 1970, *Analysis of binary data* (Methuen, London).
- Cox, D. and E. Snell, 1968, A general definition of residuals, *Journal of the Royal Statistical Society, Series B* 30, 248–265.
- Cox, D. and E. Snell, 1971, On test statistics calculated from residuals, *Biometrika* 58, 589–594.
- Cragg, J. and R. Uhler, 1970, The demand for automobiles, *Canadian Journal of Economics* 3, 386–406.
- Dawson, F.R.R. and N.D.S. Smith, 1969, Evaluating the time of private motorists by studying their behavior: Report, a pilot experiment, *Road Research Laboratory Research Note* 3474.
- Debreu, G., 1960a, Review of R. Luce, *Individual choice behavior*, *American Economic Review* 50, 186–188.
- Debreu, G., 1960b, Topological methods in cardinal utility theory, in: Arrow, Karlin and Suppes, eds., *Mathematical methods in the social sciences, 1959* (Stanford University Press, Stanford, Calif.).
- Deen, T.B., W.L. Mertz and N.A. Irwin, 1963, Application of a modal split model to travel estimates for the Washington area, *Highway Research Board Record* 38, 97–124.
- Diamond, P. and D. McFadden, 1974, Some uses of the expenditure function in public finance, *Journal of Public Economics* 3, 3–21.
- Domencich, T., G. Kraft, and J. Valette, 1968, Estimation of urban passenger travel behavior: An economic demand model, *Highway Research Board Record* 238, 64–78.
- Ergun, G., 1971, Development of a downtown parking model, *Highway Research Record* 369, 118–134.
- Fan, K., 1956, On Systems of linear inequalities, in: H. Kuhn, ed., *Linear inequalities and related systems*, *Annals of mathematical studies* 38, 99–156.
- Fertal, M., E. Weiner, A. Balek and A. Sevin, 1966, *Modal split* (U.S. Department of Commerce, Bureau of Public Roads, Washington, D.C.).

- Finney, D., 1971, *Probit analysis* (Cambridge University Press, Cambridge).
- Fisher, F., 1966, *The identification problem in econometrics* (McGraw-Hill, New York).
- Fisher, J., 1967, An analysis of consumer goods expenditures in 1957, *Review of Economics and Statistics* 49, 64–71.
- Fisher, R.A., 1935, The logic of inductive inference (with discussion), *Journal of the Royal Statistical Society* 98, 39–54, Reprinted (without discussion) in: R.A. Fisher, 1950, *Contributions to mathematical statistics* (Wiley, New York).
- Fleet, C.R. and S. Robertson, 1968, Trip generation in the transportation planning process, *Highway Research Board Record* 240, 11–33.
- Freedman, D. and R. Purves, 1969, Bayes method for bookies, *Annals of Mathematical Statistics* 40, 1177–1186.
- Friedman, J., 1974, *Housing location and the supply of local public services*, Ph.D. dissertation (Department of Economics, University of California, Berkeley).
- Gart, J. and J. Zweifel, 1967, On the bias of various estimators of the logit and its variance, *Biometrika* 54, 181–187.
- Gendell, D.S., undated, *Transit planning*, Lecture 3.1 of urban transportation planning short course, U.S. Bureau of Public Roads.
- Gilbert, E., 1968, On discrimination using qualitative variables, *Journal of the American Statistical Association* 63, 1399–1412.
- Goldberger, A.S., 1964, *Econometric theory* (Wiley, New York).
- Goldberger, A.S., 1971, *Econometrics and psychometrics: A survey of communalities*, *Psychometrika* 36, 83–107.
- Goodman, L., 1972a, A modified multiple regression approach to the analysis of dichotomous variables, *American Sociological Review* 37, 28–46.
- Goodman, L., 1972b, A general model for the analysis of surveys, *American Journal of Sociology* 77, 1035–1086.
- Goodman, L. and W.H. Kruskal, 1959, Measures of association for cross-classifications, II, Further discussion and references, *Journal of the American Statistical Association* 54, 123–163.
- Griliches, Z., 1965, *The analysis of specification errors*, mimeo (University of Chicago, Chicago).
- Griliches, Z., 1973, *Errors in variables and other unobservables*, un-

- published (Department of Economics, Harvard University, Cambridge).
- Grizzle, J., 1962, Asymptotic power of tests of linear hypotheses using the probit and logit transformations, *Journal of the American Statistical Association* 57, 877–894.
- Grizzle, J., 1971, Multivariate logit analysis, *Biometrics* 27, 1057–1062.
- Grizzle, J., C. Starmer and G. Koch, 1969, Analysis of categorical data by linear models, *Biometrika* 25, 498–504.
- Gumbel, E.J., 1961, Bivariate logistic distributions, *Journal of the American Statistical Association* 56, 335–349.
- Gupta, S., A. Qureishi and B. Shah, 1967, Best linear unbiased estimators of the parameters of the logistic distribution using order statistics, *Technometrics* 9, 43–56.
- Gurland, J., I. Lee and P. Doland, 1960, Polychotomous quantal response in biological assay, *Biometrics* 16, 382–398.
- Haldane, J., 1955, The estimation and significance of the logarithm of a ratio of frequencies, *Annals of Human Genetics* 20, 309–311.
- Hall, R., 1973, On the statistical theory of unobserved components, unpublished (Department of Economics, MIT, Cambridge).
- Hall, R., 1974, Annotated bibliography on inhomogeneous markoff models and applications to social mobility, Paper for the NSF–NBER Conference on Decision Rules and Uncertainty, March 22–23, University of California, Berkeley.
- Haney, D.G., 1967a, Future urban transportation systems: Desired characteristics (U.S. Department of Urban Development, Stanford Research Institute, Menlo Park, Calif.).
- Haney, D.G., 1967b, The value of time for passenger cars: A theoretical analysis and description of preliminary experiments (U.S. Bureau of Public Roads, Stanford Research Institute, Menlo Park, Calif.).
- Louis Harris and Associates, 1969, How urban Americans view their transportation system (U.S. Department of Transportation, Washington, D.C.).
- Harter, J. and A. Moore, 1967, Maximum likelihood estimation, from censored samples, of the parameters of a logistic distribution, *Journal of the American Statistical Association* 62, 675–683.
- Hartgen, D., 1970, Mode choice and attitudes: A literature review (New York State Department of Transportation, Albany, N.Y.).
- Hartgren, D. and G. Tanner, 1970a, Behavioral model of mode choice,

- preliminary report (New York State Department of Transportation, Albany, N.Y.).
- Hartgen, D. and G. Tanner, 1970b, Individual attitudes and family activities: A behavioral model of traveler mode choice (New York State Department of Transportation, Albany, N.Y.).
- Heanue, K.E. and C.E. Pyers, 1966, A comparative evaluation of trip distribution procedures, *Public Roads* 34, 43–51.
- Heckman, J. and R. Willis, 1974, Estimation of a stochastic model of reproduction: An econometric approach, Forthcoming in: N. Terlecky, ed., *Household production and consumption* (National Bureau of Economic Research, Washington, D.C.).
- Hill, D.M. and N. Dodd, 1962, Travel mode split in assignment programs, *Highway Research Board Bulletin* 347, 1–24.
- Hill, D.M. and N.A. Irwin, 1966, Application of a modal split model for transit planning in cities and large metropolitan areas, Paper presented to the Cleveland Seven County Transportation Land Use Study.
- Hill, D.M. and N.A. Irwin, 1967, Modal split models for interurban travel, in: *Approaches to the modal split: Intercity transportation* (U.S. Department of Commerce, Washington, D.C.).
- Hille, S.J. and T.K. Martin, 1967, Consumer preference in transportation, *Highway Research Record* 197, 36–41.
- Institut d'Aménagement et d'Urbanisme de la Région Parisienne, 1963, *Etude de divers facteurs influant sur la choix entre autobus et métropolitain par les usagers des lignes SNCF de banlieu*, also published in *Transports Urbains* 1, no. 5.
- Jaramillo-Rego, G., 1969, On a Bayesian approach to stochastic demand modeling for public transportation, unpublished Ph.D. dissertation (MIT, Cambridge).
- Jarema, F.E., C.E. Pyers and H.A. Reed, 1967, Evaluation of trip distribution and calibration procedures, *Highway Research Record* 191, 106–129.
- Josephs, J.A., 1967a, A decision theory approach to the Northeast Corridor Transportation Project, in: *Approaches to the modal split: Intercity transportation* (U.S. Department of Commerce, Washington, D.C.).
- Josephs, J.A., 1967b, A discriminant analysis approach to modal split, in: *Approaches to the modal split: Intercity transportation* (U.S. Department of Commerce, Washington, D.C.).

- Kansky, K.J., 1967, Travel patterns of urban residents, *Transportation Science* 1, 261–285.
- Kanwit, E.L. and A.F. Eckart, 1967, Transportation implications of employment trends in central cities and suburbs, Paper presented to the Highway Research Board.
- Karlin, S. and W. Studden, 1966, *Tchebycheff systems: With applications in analysis and statistics* (Interscience, New York).
- Keefer, L.E., 1962, Characteristics of captive and choice transit trips in the Pittsburgh metropolitan area, *Highway Research Board Bulletin* 347.
- Kohn, M., C. Manski and D. Mundel, 1973, An empirical investigation of factors which influence college going behavior, unpublished (Carnegie–Mellon University, Pittsburgh, Pa.).
- Korbel, J., 1966, Labor force entry and attachment of young people, *Journal of the American Statistical Association* 61, 117–127.
- Kraft, G., 1969, Economic aspects of urban passenger transportation, *Highway Research Board Record* 285, 10–19.
- Kraft, G., 1963, Demand for intercity passenger travel in the Washington–Boston corridor, Part V, Northeast Corridor Project (U.S. Department of Commerce, Washington, D.C.).
- Kraft, G. and M. Wohl, 1967, New directions for passenger demand analysis and forecasting, *Transportation Research* 1, 205–230.
- Ladd, B., 1966, Linear probability functions and discriminant functions, *Econometrica* 34, 873–885.
- Lancaster, K.J., 1966, A new approach to consumer theory, *Journal of Political Economy* 74, 132–157.
- Lansing, J.B. and G. Hendricks, 1967a, Automobile ownership and residential density (University of Michigan Press, Ann Arbor, Mich.).
- Lansing, J.B. and G. Hendricks, 1967b, How people perceive the cost of the journey to work, *Highway Research Record* 197, 44–55.
- Lave, C., 1968, Modal choice in urban transportation: A behavioral approach, unpublished Ph.D. dissertation (Department of Economics, Stanford University, Stanford, Calif.).
- Lave, C., 1970, The demand for urban mass transit, *Review of Economics and Statistics* 52, 320–323.
- Lee, T., 1963, Demand for housing: A cross-section analysis, *Review of Economics and Statistics* 45, 190–196.
- Lewis, B.N., 1962, On the analysis of interaction in multidimensional

- contingency tables, *Journal of the Royal Statistical Society* A125, 88-117.
- Lisco, T., 1967, The value of commuters' travel time: A study in urban transportation, unpublished Ph. D. dissertation (Department of Economics, University of Chicago, Chicago, Ill.).
- Lisco, T., 1968, Northwest Chicago corridor modal split project, Project statement for Chicago Area Transportation Study.
- Luce, R.D., 1959, *Individual choice behavior* (Wiley, New York).
- Luce, R.D. and P. Suppes, 1965, Preference, utility, and subjective probability, in: R. Luce, R. Bush and E. Galanter, eds., *Handbook of mathematical psychology, III* (Wiley, New York).
- Malinvaud, E., 1966, *Statistical methods of econometrics* (Rand-McNally, Chicago).
- Manheim, M., 1970, Fundamental prospectus of systems of demand models, M.I.T. Discussion Paper T70-1 (initial draft).
- Manski, C., 1974, Maximum score estimation of the stochastic utility model of choice, unpublished (Carnegie-Mellon University, Pittsburgh).
- Marley, A., 1968, Some probabilistic models of simple choice and ranking, *Journal of Mathematical Psychology* 5, 311-332.
- Marschak, J., 1960, Binary choice constraints on random utility indicators, in: K. Arrow, ed., *Stanford symposium on mathematical methods in the social sciences* (Stanford University Press, Stanford, Calif.).
- Maxwell, A.E., 1961, *Analysing qualitative data* (Methuen, London).
- Mayer, H.M., 1968, Change of mode commuter transportation in metropolitan Milwaukee, *Highway Research Board Circular* 83, 3-12.
- McCaffrey, R., 1968, Analysis of a freeway bus transit system, *Proceedings of the American Society of Civil Engineers* 94.
- McFadden, D., 1968, The revealed preferences of a government bureaucracy, Technical report W-17 (Institute of International Studies, Universities of California, Berkeley).
- McFadden, D., 1972, Probabilities on preferences and demand correspondences, unpublished (Department of Economics, University of California, Berkeley).
- McFadden, D., 1973a, Conditional logit analysis of qualitative choice behavior, Working paper no. 199/BART 10 (University of California, Berkeley), reprinted in: P. Zarembka, ed., *Frontiers in econometrics* (Academic Press, New York).

- McFadden, D., 1973b, The measurement of urban travel demand, *Journal of Public Economics* 3, 303–328.
- McFadden, D., 1973c, The consistency of individual behavior models with data on population behavior, unpublished (University of California, Berkeley).
- McFadden, D. and F. Reid, 1974, Aggregate travel demand forecasting from disaggregated behavioral models, Working paper no. 228 (University of California, Berkeley).
- McFadden, D. and M.K. Richter, 1970, Revealed stochastic preference, unpublished (University of California, Berkeley).
- McFadden, D. and M.K. Richter, 1971, On the extension of a set function to a probability on the Boolean algebra generated by a family of events, with applications, Working paper No. 14 (Department of Economics, University of California, Berkeley).
- McGillivray, R.G. 1967, Binary choice of transport modes in the San Francisco Bay Area, Ph.D. dissertation (Department of Economics, University of California, Berkeley).
- McGillivray, R.G., 1970, Demand and choice models of modal split, *Journal of Transport Economics and Policy* 4, 192–207.
- McLynn, J., 1971, Some considerations of modal split models for the 1972 transportation needs study (National Bureau of Standards, Washington, D.C.).
- McLynn, J. and R. Watkins, 1967, Multimode assignment model, in: *Approaches to the modal split: Intercity transportation* (U.S. Department of Commerce, Washington, D.C.).
- McMillan, R.K. and H. Assael, 1968, National survey of transportation attitudes and behavior: Phase I summary report, National Cooperative Highway Research Program report 49 (National Research Council, Washington, D.C.).
- Meyer, J.R., J.F. Kain and M. Wohl, 1966, *The urban transportation problem* (Harvard University Press, Cambridge).
- Michaels, R.M., 1965, Attitudes of drivers determine choice between alternate highways, *Public Roads* 33, 225–236.
- Miller, L. and R. Radner, 1970, Demand and supply in U.S. higher education, *American Economic Review* 60, 326–334.
- Miller, L. and R. Radner, 1974, Demand and supply in U.S. higher education, Carnegie Commission on the future of U.S. higher education (McGraw-Hill, New York).

- Mitchell, R.B. and C. Rapkin, 1954, *Urban traffic: A function of land use* (Columbia University Press, New York).
- Mongini, A., 1967, Some aspects of discriminant functions and other interurban modal split models, in: *Approaches to the modal split: Intercity transportation* (U.S. Department of Commerce, Washington, D.C.).
- Morin, D.A., 1968, Letter to the editor, *Traffic Engineering* 38, 62.
- Morrison, D., 1972, Upper bounds for correlations between binary outcomes and probabilistic predictions, *Journal of the American Statistical Association* 67, 68–70.
- Moses, L., R. Beals and M. Levy, 1967, Rationality and migration in Ghana, *Review of Economics and Statistics* 49, 480–486.
- Moses and Williamson, 1963, Value of time, choice of mode, and the subsidy issue in urban transportation, *Journal of Political Economy* 71, 247–264.
- Mosteller, F., 1968, Association and estimation in contingency tables, *Journal of the American Statistical Association* 63, 1–28.
- Joseph Napolitan Associates, 1964, A survey to determine factors which influence the public's choice of mode of transportation, Supplement no. 4 to *Mass transportation in Massachusetts* (JNA, Boston).
- Nash, A.N. and S.J. Hille, 1968, Public attitudes toward transport modes: A summary of two pilot studies (Highway Research Board, National Academy of Sciences, Washington, D.C.).
- National Academy of Sciences, 1960, *Proceedings of the Conference on Transportation Research*, Publication 840 (National Academy of Sciences, Washington, D.C.).
- National Analysts, 1963a, The preference for rapid transit among national capital region commuters to downtown D.C., Volume I of A survey of commuter attitudes toward rapid transit systems.
- National Analysts, 1963b, Characteristics of proposed new rapid transit systems which will maximize riders, Volume II of A survey of commuter attitudes toward rapid transit systems.
- National Analysts, 1963c, Methodological description of the survey, Volume III-B of A survey of commuter attitudes toward rapid transit systems.
- Neidercorn, J.H. and B.V. Bechdolt Jr., 1969, An economic deviation of the "gravity law" of spatial interaction, *Journal of Regional Science* 9, 273–283.

- Nerlove, M. and S.J. Press, 1973, Univariate and multivariate log-linear and logistic models, Report no. R-1306-EDA/NIH, unpublished (RAND Corporation, Santa Monica, Calif).
- Oi, W.Y. and P.W. Shuldiner, 1962, An analysis of urban travel demands (Northwestern University Press, Evanston, Ill.).
- Paine, F.T., A.N. Nash, S.J. Hille and G.A. Brunner, 1967, Consumer conceived attributes of transportation (University of Maryland, College Park, Md.).
- Parks, R.W., 1969, Systems of demand equations: An empirical comparison of all functional forms, *Econometrica* 37, 629-650.
- Peat, Marwick and Livingston, 1969, Evaluation of a bus transit system in a selected urban area, Prepared for the U.S. Bureau of Public Roads.
- Peterson, S.G., 1968, Walking distances to bus stops in the residential areas of Washington, D.C., Ph.D. dissertation (Catholic University of America, Washington, D.C.).
- Quandt, R., 1956, Probabilistic theory of consumer behavior, *Quarterly Journal of Economics* 70, 507-536.
- Quandt, R., 1968, Estimation of modal splits, *Transportation Research* 2, 41-50.
- Quandt, R., 1970, *The demand for travel* (Heath, Lexington, Ky.).
- Quandt, R., 1972, New methods for estimating switching regressions, *Journal of the American Statistical Association* 67, 306-310.
- Quandt, R. and W. Baumol, 1966, The demand for abstract transport modes: Theory and measurement, *Journal of Regional Science* 6, 13-26.
- Quandt, R. and K.H. Young, 1969, Cross sectional travel demand models: Estimation and tests, *Journal of Regional Science* 9, 201-214.
- Quarmby, D.A., 1967, Choice of travel mode for the journey to work: Some findings, *Journal of Transport Economics and Policy* 1, 273-314.
- Rassam, P., R. Ellis and J. Bennett, 1971, The *N*-dimensional logit model: Development and application, *Highway Research Record* 369, 135-147.
- Reichman, S. and P. Stopher, 1971, Disaggregate stochastic models of travel-mode choice, *Highway Research Record* 369, 91-103.
- Rosinger, G., K.F. Connell and J.R. Stock, 1967, Design of urban transportation for the user, HUD new systems study (Battelle Memorial Institute, Columbus, Ohio).

- Sato, N.G., 1967, Methods for estimating trip destinations by trip purpose, Highway Research Board Record 191, 1-38.
- Schwartz, A. and L.E. Keefer, 1960, 1980 transit trips, PATS technical paper no. 8.
- Scott, D., 1964, Measurement models and linear inequalities, Journal of Mathematical Psychology 1, 233-248.
- Shaffer, M.T., 1970, Attitude technique in action, Highway Research Record 305, 112-121.
- Wibur Smith and Associates, 1968, Patterns of car ownership, trip generation and trip sharing in urbanized areas, unpublished.
- Sosslau, A.B. and G.E. Brooke, 1960, Appraisal of sample size based on Phoenix O-D survey data, Highway Research Board Bulletin 253.
- Sosslau, A.B., K.E. Heanue and A.J. Balek, 1965, Evaluation of a new modal split procedure, Highway Research Board Record 88, 44-68.
- Spilerman, S., 1972, Extensions of the Mover-Stayer model, American Journal of Sociology 78, 599-626.
- Stopher, P.R. 1968, Predicting travel mode choice for the work journey, Traffic Engineering and Control 9, 436-439.
- Stopher, P.R., 1969a, A multinomial extension of the binary logit model for choice of mode of travel, unpublished (Northwestern University, Evanston, Ill.).
- Stopher, P.R., 1969b, A probability model of travel mode choice for the work journey, Highway Research Record 283, 57-65.
- Stopher, P.R. and J. Lavender, 1972, Disaggregate behavioral travel demand models: Empirical tests of three hypotheses, Transportation Research Forum, Proceedings of the thirteenth annual meeting.
- Stopher, P.R. and T. Lisco, 1970, Modelling travel demand: A disaggregate behavioral approach - issues and applications, Transportation Research Forum Proceedings 11, 195-214.
- Stowers, J.R. and E.L. Kanwit, 1966, The use of behavioral surveys in forecasting transportation requirements, Highway Research Board Record 106, 44-51.
- Suderth, W., 1971, On a theorem of de Finetti, oddsmaking, and game theory, unpublished (University of Minnesota, Minneapolis).
- Taaffe, E.J., B.J. Garner and M.H. Yeates, 1963, The peripheral journey to work - A geographic consideration (Northwestern University Press, Evanston, Ill.).
- Talvitie, A., 1972, Comparison of probabilistic modal-choice models:

- Estimation methods and system inputs, *Highway Research Record* 392, 111–120.
- Talvitie, A., 1973, Aggregate travel demand analysis with disaggregate or aggregate travel demand models, unpublished (University of Oklahoma, Norman).
- Theil, H., 1969, A multinomial extension of the linear logit model, *International Economic Review* 10, 251–259.
- Theil, H., 1970, On the estimation of relationships involving qualitative variables, *American Journal of Sociology* 76, 103–154.
- Theil, H., 1971, *Principles of econometrics* (Wiley, New York).
- Thomas, T.C., 1967, The value of time for passenger cars: An experimental study of commuters' values, U.S. Bureau of Public Roads report (Stanford Research Institute, Menlo Park, Calif.).
- Thomas, T.C., 1968, Value of time for commuting motorists, *Highway Research Record* 245, 17–35.
- Thomas, T.C. and G.I. Thompson, 1970, The value of time for commuting motorists as a function of their income level and amount of time saved, *Highway Research Record* 314, 1–19.
- Thomas, T.C. and G.I. Thompson, 1971, Value of time saved by trip purpose, *Highway Research Record* 369, 104–113.
- Thurstone, L., 1927a, A law of comparative judgement, *Psychological Review* 34, 273–286.
- Thurstone, L., 1927b, Psychophysical analysis, *American Journal of Psychology* 38, 368–389.
- Tobin, J., 1958, Estimation of relationships for limited dependent variables, *Econometrica* 26, 24–36.
- Transport Research, 1967, A model for estimating travel mode usage in Washington, D.C., Volumes I and V, unpublished.
- Transportation Research Institute, 1968, Study in new systems of urban transportation: Final report (Carnegie-Mellon University, Pittsburgh).
- Tversky, A., 1969, Intransitivity of preferences, *Psychological Review*, 31–48.
- Tversky, A., 1972a, Choice by elimination, *Journal of Mathematical Psychology*.
- Tversky, A., 1972b, Elimination by aspects: A theory of choice, *Psychological Review* 79, 281–299.

- Tversky, A. and J. Russo, 1969, Substitutability and similarity in binary choices, *Journal of Mathematical Psychology* 6, 1–12.
- Uhler, R., 1968, The demand for housing: An inverse probability approach, *Review of Economics and Statistics* 50, 129–134.
- U.S. Department of Commerce, 1960, Federal transportation policy and program (Government Printing Office, Washington, D.C.).
- U.S. Department of Commerce, 1964, Traffic assignment manual (Government Printing Office, Washington, D.C.).
- U.S. Department of Housing and Urban Development, 1968, Tomorrow's transportation: New systems for the urban future (Government Printing Office, Washington, D.C.).
- U.S. Department of Transportation, 1967, Guidelines for trip generation analysis (Government Printing Office, Washington, D.C.).
- U.S. Department of Transportation, undated, Urban mass transportation demonstration project, Allegheny County, Pennsylvania – Final report.
- University of Maryland, Department of Business Administration, 1966, User determined attributes of ideal transportation systems: An empirical study, unpublished.
- Urban, F.M., 1910, Die psychophysischen massmethoden als grundlagen empirischer messungen, *Arc. Ges. Psychol.* 16, 168–227.
- Varian, H., 1974, A note on conditional logit models and the independence of irrelevant alternatives, Department of Economics, MIT, unpublished.
- Vitt, J.E. et al., 1970, Determining the importance of user-related attributes for a demand-responsive transportation system, *Highway Research Record* 318, 50–65.
- Wachs, M., 1967, Relationship between drivers' attitudes toward alternate routes and driver and route characteristics, *Highway Research Record* 197, 70–87.
- Wachs, M., 1970, Basic approaches to the measurement of commodity values, *Highway Research Record* 305, 88–98.
- Walker, F., 1968, Determinants of auto scrappage, *Review of Economics and Statistics* 50, 503–506.
- Walker, S. and D. Duncan, 1967, Estimation of the probability of an event as a function of several independent variables, *Biometrika*, 167–179.
- Walker, W., 1967, Speed and travel time measurement in urban areas, *Highway Research Board Bulletin* 156, 27–44.

- Wallace, J.P. III, 1969, Some applications of marketing research techniques to the new mode demand forecasting problem, Paper presented at the Conference on Methods and Concepts for Forecasting Future Transportation Systems, University of Pennsylvania, unpublished.
- Warner, S.L., 1962, Stochastic choice of mode in urban travel: A study in binary choice (Northwestern University Press, Evanston, Ill.).
- Watson, P., 1972, Choice of estimation procedure for models of binary choice: Some statistical and empirical evidence, Northwestern University, unpublished.
- Watson, P. and R. Westin, 1973, Transferability of binary choice models: An empirical test, Northwestern University, unpublished.
- Webster, F.V., 1968, A theoretical estimate of the effect of London car commuters transferring to bus travel (Road Research Laboratory, Crowthorne, England).
- Weiner, E., 1969, Modal split revisited, *Traffic Quarterly* 23, 5–28.
- Weiner, E., undated, Improving bus transit as a mode of transportation, Notes for urban transportation planning short course (U.S. Bureau of Public Roads, Washington, D.C.).
- Weiner, E., undated, Outline for transit planning, Notes for urban transportation planning short course (U.S. Bureau of Public Roads, Washington, D.C.).
- Wigner, M., 1973, Disaggregated mode choice models of downtown trips in the Chicago region, Chicago Area Transportation Study CATS 341–05, unpublished.
- Wohl, M. and B.V. Martin, 1967, *Traffic system analysis* (McGraw–Hill, New York).
- Worrall, R.D., undated, A longitudinal analysis of household travel, Prepared as part of the National Cooperative Highway Research Program Project 2–8, unpublished.
- Zeckhauser, R., 1968, Optimal mechanisms for income transfers (RAND Corporation, Santa Monica, Calif.).
- Zellner, A. and T. Lee, 1965, Joint estimation of relationships involving discrete random variables, *Econometrica* 33, 382–394.
- Zinnes, J., 1969, Scaling, *Annual Review of Psychology* 20, 447–478.

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