THE AUSTRALIAN NATIONAL UNIVERSITY

FACULTY OF ECONOMICS

DEPARTMENT OF STATISTICS

ANNUAL REPORT 1982

General Comments and Courses

The research and teaching program of the Statistics Department is concerned with mathematical statistics, econometrics, probability theory and operational research. The department can therefore be regarded as multidisciplinary in nature, as it provides courses which in many universities would be found in two or three separate departments. This arrangement has academic advantages but does place considerable strain on staff, particularly in times of contraction such as the present. The department had the services of only one tutor during 1982, instead of two as in the past, and a lectureship which fell vacant at the end of first semester was disestablished.

The Masters by Coursework in Statistics programme was not offered in 1982 but essentially replaced by courses leading to the Diploma in Statistics and the Diploma in Econometrics. Enrolments were encouraging, being respectively fifteen and four part-time students. The aim of the diploma programmes is to provide instruction in subject areas of direct relevance to professional statistical activity.

Following considerable discussion, particularly by the Statistics Department Review Committee, new first year courses were introduced in 1982. They were the full year unit Economic Statistics for students enrolled for the B.Ec. degree and the semester units Statistical Techniques 1 and 2 designed for Arts and Science students. The new arrangements mark the abandonment of the earlier philosophy of offering generalist service courses to all students. It was made clear to the Review Committee in 1981 that the then existing organisation of first year courses suffered from certain disadvantages and it is hoped that these will be overcome by the specialisation of the new units. Experience this year indicates that the reorganisation is generally satisfactory.

Mr R.B. Cunningham joined the university in February as Statistical Consultant to The Faculties and he is attached to the Statistics Department for administrative purposes. His duties are to provide advice on statistical matters to staff and research students from all parts of The Faculties, and he does not participate in the teaching programme of the department. A substantial demand became apparent with some two thirds of the workload emanating from research students. By discipline, Zoology generated most demand followed by Botany, Forestry and Geography. The major statistical areas of application were the design and analysis of experiments, regression, log-linear models of categorical data, and comparison of linear models. Mr Cunningham also continued his work on procedures for forecasting election results.

Research by members of the department was mainly in the fields of applied probability (particularly limit theorems, branching processes and characteristic functions), multivariate analysis, non-standard maximum likelihood, robust estimation methods, changing parameter regressions, non-linear estimation methods and hypothesis testing, time dependent systems of equations, econometric model building, specification testing and model selection.

During the year the work of the department has been stimulated by the presence of ten visitors, three of whom were in association with the Mathematical Sciences Research Centre. The department gains considerable benefits and stimulus from an active visitors' programme.

Enrolments and Examination Results

The level of enrolments in the Statistics Department at 30 April, 1982, measured in weighted student units, has fallen slightly from the previous year. This reflects a definite slowing down in postgraduate enrolments coupled with the decline in first year numbers in the Economics Faculty.

A table of comparative failure rates for students attempting final examinations is presented for the period 1975-1982 below.

Failure Rates, %

	Stats I	Stats II	Stats III	Operational Research
1975	11	10	7	13
1976	14	7	8	6
1977	15	8	5	12
1978	18	17	5	7
1979	18	7	10	12
1980	18	6	10	18
1981	18	13	15	2
1982	20	13	5	9

The figures were drawn from those semester units most closely approximating the old full year units.

In 1982 students taking the full year unit Economic Statistics were divided into Stream A and Stream B on the basis of their mathematical preparation. This streaming of students was done in the same way that students were allocated to either Statistics A03 or Statistics A01 in the past. The fraction initially allocated to Stream B, the less well prepared stream, in 1982 was approximately 2/5 ths.

Graduate Students

During the year there were twenty-seven students enrolled for higher degrees and diplomas; six for the Ph.D., two for the Masters degree by coursework in Statistics and nineteen for Diploma courses.

Staff

Professor and Head of Department to 30.6.82.

- R.D. Terrell, BEc *Adel.*, Ph.D.

Professor and Head of Department from 1.7.82.

- C.R. Heathcote, BA *W.Aust.*, MA *Melb.*, Ph.D.

Readers

- R.P. Byron, MEc *W.Aust.*, Ph.D. *Lond.*
- D.F. Nicholls, BSc *New Eng.*, MSc, Ph.D.

Staff (contd.)

Senior Lecturers	- S. John, BSc *Trav.*, MSc *Kerala*, Ph.D. *Indian Stat. Inst.*
	- J.H.T. Morgan, BA *Cantab.*, MSc *Case Inst. Tech.*
	- P. Winer, BSc *Rand*
Lecturers	- W.T.M. Dunsmuir, Fellowship Diploma of Maths *RMIT*, BSc *La Trobe*, Ph.D. (to 8.7.82.)
	- A.D. Hall*, BEc *Adel.*, MEc, Ph.D. *Lond.*
	- P.G. Hall, BSc *Syd.*, MSc, D.Phil *Oxon.*
	- M.J. McAleer, BEc *Monash*, MEc *Monash*, Ph.D. *Queen's*
	- T.J. O'Neill, BSc *Adel.*, MS *Stanford*, Ph.D. *Stanford*
Lecturer (Statistical Consultant)	- R.B. Cunningham, BSc *New Eng.*, Dip. Ed. *New Eng.*, MSc
Temporary Lecturer	- Shirley Cassing, BS *Iowa State*, MA *Iowa*, Ph.D. *Iowa* (to 30.6.82.)
Temporary Tutor	- Jane E. Murray, BEc
Research Assistant	- Ellen M. Ward, BA *Fordham*
Computer Programmer	- J.H-W. Penm, BSc *Nat. Taiwan Normal Univ.*, MSc *Pittsburgh*, Ph.D. *Pittsburgh*

* Outside Studies leave during 1982.

Visitors

Associate Professor W.H. DuMouchel, M.I.T. (8.2.82. to 2.4.82.)
 (in association with Mathematical Sciences Research Centre).

Professor J.M. Gani, University of Kentucky (5.7.82. to 6.8.82.)
 (in association with Mathematical Sciences Research Centre).

Dr D.M. Titterington, University of Glasgow (21.7.82. to 6.9.82.)
 (in association with Mathematical Sciences Research Centre).

Professor H.A. Krieger, Harvey Mudd College, California (1.3.82. to 27.7.82.)
 (in association with Department of Statistics, RSSS and CSIRO).

Dr T.J. Valentine, Macquarie University (12.7.82. for 5 months)

Professor B.P. Stigum, University of Oslo (3.4.82. to 23.4.82. and 4.7.82.
 to 20.8.82.)

Mr L.G. Godfrey, University of York (12.7.82. to 26.8.82.)

Professor H.H. Kelejian, University of Maryland (2.9.82. to 28.10.82.)

Professor G.E. Mizon, University of Southampton (12.7.82. to 29.12.82.)

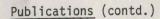Mr D.L. Ryan, University of British Columbia (12.7.82. to 21.12.82.)

Publications

Bera, A.K., "A new test for normality", *Economics Letters*, 9 (1982), 263-268.

Bera, A.K., "A note on testing demand homogeneity", *Journal of Econometrics*, 18 (1982), 291-294.

*Jarque, C.M. and Bera, A.K., "Efficient tests for normality, homoscedasticity and serial independence of regression residuals: some Monte Carlo evidence", *Economics Letters*, 7 (1981), 313-318.

Bera, A.K., Byron, R.P. and *Jarque, C.M., "Further evidence on asymptotic tests for homogeneity and symmetry in large demand systems", *Economics Letters*, 8 (1981), 101-105.

*Jarque, C.M. and Bera, A.K., "Efficient specification tests for limited dependent variable models", *Economics Letters*, 9 (1982), 153-160.

Bera, A.K. and *Jarque, C.M., "Model specification tests: a simultaneous approach", *Journal of Econometrics*, 20 (1982), 59-82.

Byron, R.P., "A note on the estimation of symmetric systems", *Econometrica*, 50 (1982), 436-439.

Cunningham, R.B. and †Malafant, K.W.J., "Forecasting outcomes of Australian House of Representatives elections on election night", *Mathematical Scientist*, 7 (1982), 105-114.

Hall, P., *Rates of Convergence in the Central Limit Theorem*. 251 pp. Pitman, London (1982).

Hall, P., "Cross-validation in density estimation", *Biometrika*, 69 (1982), 383-390.

Hall, P., "On some simple estimates of an exponent of regular variation", *Journal of the Royal Statistical Society*, 44 (1982), 37-42.

Hall, P., "Comparison of two orthogonal series methods of estimating a density and its derivatives on an interval", *Journal of Multivariate Analysis*, 12 No.3 (1982), 432-449.

Hall, P., "Limit theorems for stochastic measures of the accuracy of density estimators", *Stochastic Processes and their Applications*, 13 (1982), 11-25.

Hall, P., "On Starr and Vardi's estimates of the number of transmission sources", *Journal of Applied Probability*, 19 (1982), 52-63.

Hall, P., "On estimating the endpoint of a distribution", *The Annals of Statistics*, 10 No.2 (1982), 556-568.

Hall, P., "Asymptotic theory of Grenander's mode estimator", *Zeitschrift für Wahrscheinlichkeitstheorie und verwandte Gebiete*, 60 (1982), 315-334.

†Csörgő, S. and Hall, P., "Upper and lower classes for triangular arrays", *Zeitschrift für Wahrscheinlichkeitstheorie und verwandte Gebiete*, 61 (1982), 207-222.

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* Former member.
† Not a member of this university.

<u>Publications</u> (contd.)

Heathcote, C.R., "Linear regression by functional least squares", *Journal of Applied Probability*, 19A (1982), 225-239.

†Csörgö, S. and Heathcote, C.R., "Some results concerning symmetric distributions", *Bulletin of the Australian Mathematical Society*, 25 (1982), 327-335.

John, S., "The three-parameter two-piece normal family of distributions and its fitting", *Communications in Statistics - Theory and Methods*, 11 (1982), 879-885.

McAleer, M., "A small sample test for non-nested regression models", *Economics Letters*, 7 (1981), 335-338.

McAleer, M. and †Fisher, G., "Testing separate regression models subject to specification error", *Journal of Econometrics*, 19 (1982), 125-145.

Nicholls, D.F. and *Quinn, B.G., "The estimation of multivariate random coefficient autoregressive models", *Journal of Multivariate Analysis*, 11 (1981), 544-555.

*Quinn, B.G. and Nicholls, D.F., "The estimation of random coefficient autoregressive models II", *Journal of Time Series Analysis*, 2 (1981), 185-203.

Nicholls, D.F. and *Quinn, B.G., *Random Coefficient Autoregressive Models: An Introduction*. 154 pp. Springer-Verlag, New York (1982).

*Quinn, B.G. and Nicholls, D.F., "Testing for the randomness of autoregressive coefficients", *Journal of Time Series Analysis*, 3 (1982), 123-135.

Penm, J.H-W. and Terrell, R.D., "On the recursive fitting of subset autoregressions", *Journal of Time Series Analysis*, 3 (1982), 43-59.

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THE AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF STATISTICS ANALYSIS OF STUDENT PERFORMANCE

FIRST SEMESTER

Subject or Unit		Enrolled as at 30.4.82.	Percentage of Number Enrolled			Percentage of Number Sitting					
			Sitting	Wastage (i.e. 2–3)	Failure	Sitting	High Distinction	Distinction	Credit	Pass	Failure
AO2	No.	2	1	1	–	1	–	1	–	–	–
	%	(100)	(50)	(50)		(100)		(100)			
Stats Tech 1	No.	134	125	9	20	125	17	41	33	14	20
	%	(100)	(93)	(7)	(15)	(100)	(14)	(33)	(26)	(11)	(16)
BO1	No.	98	77	11	11	77	12	16	15	23	11
	%	(100)	(88)	(12)	(12)	(100)	(16)	(21)	(19)	(30)	(14)
BO5	No.	14	8	6	1	8	–	–	3	4	1
	%	(100)	(57)	(43)	(7)	(100)			(38)	(50)	(12)
CO1	No.	17	16	1	1	16	1	4	4	6	1
	%	(100)	(94)	(6)	(6)	(100)	(6)	(25)	(25)	(38)	(6)
CO3	No.	36	31	5	4	31	2	5	10	10	4
	%	(100)	(86)	(14)	(11)	(100)	(6)	(16)	(32)	(32)	(13)
CO5	No.	10	7	3	–	7	2	1	1	3	–
	%	(100)	(70)	(30)		(100)	(29)	(14)	(14)	(43)	
CO8	No.	9	9	–	–	9	4	2	2	1	–
	%	(100)	(100)			(100)	(44)	(22)	(22)	(11)	

THE AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF STATISTICS ANALYSIS OF STUDENT PERFORMANCE

SECOND SEMESTER

Subject or Unit		Enrolled as at 19.7.82.	Percentage of Number Enrolled			Percentage of Number Sitting					
			Sitting	Wastage (i.e. 2-3)	Failure	Sitting	High Distinction	Distinction	Credit	Pass	Failure
AO2	No.	43	31	12	4	31	1	7	7	12	4
	%	(100)	(72)	(28)	(9)	(100)	(3)	(23)	(23)	(39)	(13)
Stats Tech 1	No.	76	61	15	13	61	8	10	14	16	13
	%	(100)	(80)	(20)	(17)	(100)	(13)	(16)	(23)	(26)	(21)
Stats Tech 2	No.	86	80	6	14	80	6	12	19	29	14
	%	(100)	(98)	(7)	(16)	(100)	(8)	(15)	(24)	(36)	(17)
BO2	No.	44	38	6	5	38	5	8	6	14	5
	%	(100)	(86)	(14)	(11)	(100)	(13)	(21)	(16)	(37)	(13)
BO3	No.	33	19	14	2	19	1	3	3	10	2
	%	(100)	(58)	(42)	(6)	(100)	(5)	(16)	(16)	(53)	(10)
BO4	No.	23	25	–	1	25	2	5	7	10	1
	%	(100)	(109)		(4)	(100)	(8)	(20)	(28)	(40)	(4)
BO6	No.	7	3	4	–	3	–	–	–	3	–
	%	(100)	(43)	(57)		(100)				(100)	
CO2	No.	12	7	5	1	7	–	1	1	4	1
	%	(100)	(58)	(42)	(8)	(100)		(14)	(14)	(57)	(14)
CO4	No.	25	16	9	–	16	1	4	7	4	–
	%	(100)	(64)	(36)		(100)	(6)	(25)	(44)	(25)	
CO6	No.	7	7	–	–	7	2	1	1	3	–
	%	(100)	(100)			(100)	(29)	(14)	(14)	(43)	

THE AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF STATISTICS ANALYSIS OF STUDENT PERFORMANCE

FULL YEAR

Subject or Unit		Enrolled as at 30.4.82.	Percentage of Number Enrolled			Percentage of Number Sitting					
			Sitting	Wastage (i.e. 2-3)	Failure	Sitting	High Distinction	Distinction	Credit	Pass	Failure
A01	No.	16	8	8	4	8	1	–	2	1	4
	%	(100)	(50)	(50)	(25)	(100)	(12.5)		(25)	(12.5)	(50)
Eco Stats	No.	235	160	75	37	160*	11	21	34	54	37
	%	(100)	(68)	(32)	(16)	(100)	(7)	(13)	(21)	(34)	(23)

* No result available for 3 special examinations due to sickness.

	Enrolled (as at 30.4.82.)	Sitting	Result
Final Honours Econometrics	4	2	1 H1, 1 H2A
Statistics	1	1	1 H1
Diploma in Econometrics	4	1	1 Pass with Merit, 2 W/D
Diploma in Statistics	12	–	4 W/D, 2 course suspended
Masters Qualifying	–		
Masters Degree	–		
Masters Degree by Coursework	2	1	–
Ph.D.	3	1	–