10/1987

THE AUSTRALIAN NATIONAL UNIVERSITY

FACULTY OF ECONOMICS AND COMMERCE

DEPARTMENT OF STATISTICS

ANNUAL REPORT 1986

General Comments and Courses

The teaching and research program of the Statistics Department is concerned with mathematical statistics, econometrics, probability theory, operations research and social statistics. The department can therefore be regarded as multidisciplinary in nature, providing statistics courses of both a theoretical and applied nature to a broad range of disciplines including the social, physical and biological sciences.

The department runs diploma programmes in statistics and econometrics which appear to be satisfying a real need. The majority of the students enrolled in these courses are part-time students mostly employed in areas requiring a working knowledge of statistics/econometrics. The courses seem to be fulfilling their aim of providing appropriate instruction in areas of direct relevance to professional activity.

The two Statistical Consultants to The Faculties, supported by a half-time programmer, are attached to the department for administrative purposes. The Consultants' duties are to provide assistance on statistical matters to staff and students from each of the five Faculties and the Research School of Biological Sciences. In 1986 disciplines providing the greatest number of clients were Research School of Biological Sciences, Forestry, Psychology and Botany.

A new appointment in econometrics was made in 1986 which will strengthen greatly the work of the department in the area of econometric modelling. The appointee had previously been a major contributor to the developments carried out by the Treasury in this area. The department saw the appointment as offering our students the opportunity to undertake courses in applied econometrics under the supervision of an academic with invaluable practical experience in econometric modelling. The appointment may also stimulate applied econometric research in the department of a quite different nature.

The department continues to become computer oriented in an increasing number of courses. In 1987 it proposes introducing Statistical Techniques 1 students to the computer for the purpose of analysing data. It is also planned to have a statistics laboratory containing networked microcomputers operating from the beginning of first semester 1987.

Enrolments and Examination Results

Numbers of enrolments in units offered by the department were generally similar to those in 1985 with three exceptions. There were significant reductions in the number of students enrolled in Statistical Techniques 1 and 2 in 1986, compared with 1985. Indeed, there was a reduction of 19% in Statistical Techniques 1 and 37% in Statistical Techniques 2. This was not unexpected, however, given the downward movement in students enrolled in the Science Faculty in 1986. This reduction in first year science student enrolments in 1986 is expected to flow through to 1987 for those second year statistics courses which are oriented towards science students.

The second year of the new course Statistics C09 has seen an increase in class size of 152% in 1986 over 1985, from 21 to 53 students. It was initially intended to offer this course in alternate years but, due to the increased demand, it is now proposed to offer the course every year while such a demand exists.

The attached tables give statistical information concerning courses conducted by the department during 1986. Failure rates for students attempting final examinations were generally similar to those for the previous year.

Graduate Students

During the year there were thirty students enrolled for higher degrees and diplomas; eight for the PhD, three for the Masters degree by research, one for the Masters degree by research and coursework, three for the Diploma in Econometrics and fifteen for the Diploma in Statistics.

Staff

Reader and Head of Department	- D.F. Nicholls, BSc *New Eng.*, MSc, PhD
Professor of Econometrics and Dean of Faculty	- R.D. Terrell, BEc *Adel.*, PhD
Professor of Mathematical Statistics	- *C.R. Heathcote, BA *W.Aust.*, MA *Melb.*, PhD
Readers	- R.P. Byron, MEc *W.Aust.*, PhD *Lond.*
	- P.G. Hall, BSc *Syd.*, MSc, D.Phil. *Oxon.* (joint appointment with RSSS).
Senior Lecturers	- J.J. Beggs, BEcon *Q'ld*, PhD *Northwestern*
	- T.S. Breusch, BEcon *Q'ld*, MEc, PhD
	- A.D. Hall, BEc *Adel.*, MEc, PhD *Lond.*
	- S. John, BSc *Trav.*, MSc *Kerala*, PhD *Indian Stat. Inst.*
	- J.H.T. Morgan, BA *Cantab.*, MSc *Case Inst. Tech.*
	- T.J. O'Neill, BSc *Adel.*, MS *Stanford*, PhD *Stanford*
	- P. Winer, BSc *Rand*
Lecturers	- M.J. McAleer, BEc *Monash*, MEc *Monash*, PhD *Queen's*
	- C.W. Murphy, BEc *Syd.*, MEc
Senior Lecturer (Statistical Consultant)	- R.B. Cunningham, BSc *New Eng.*, Dip.Ed. *New Eng.*, MSc
Temporary Senior Tutor/Visiting Fellow on Secondment	- P.J. Flynn, BA *Q'ld*, MEc *Q'ld*
Senior Tutor	- Heather M. Anderson, BSc *New Eng.*, Grad.Dip.Ec.
Research Assistant	- Ellen M. Ward, BA *Fordham* (to 27.7.86.)
Programmer	- (from 28.7.86.)
Research Assistant	- I.M. McDermid, BSc (from 9.10.86. to 21.11.86.)

*Study leave until September 1986.

Staff (contd.)

P/T Research Assistant   - M. Christine Keogh, BEc (from 3.11.86.)

Programmer   - J.H.W. Penm, BSc *Nat. Taiwan Normal Univ.*, MSc *Pittsburgh*, PhD *Pittsburgh* (to 15.5.86.)

Visitors

Econometrics

Professor M. Deistler (Institute of Econometrics, Vienna), 2 January - 10 March 1986.

Professor K. Tanaka (Hitotsubashi University), 8 April 1986 - March 1987 on Hitotsubashi Foundation Scholarship.

Assistant Professor M.R. Veall (University of Western Ontario), 14 July - 22 August 1986.

Dr S.E. Satchell (University of Essex), 21 July - 21 August 1986.

Professor A.C. Harvey (London School of Economics), 18 August - 24 October 1986.

Professor K.J. White (University of British Columbia), 1 October - 30 November 1986.

Mathematical Statistics

Professor C.W.J. Granger (University of California, San Diego), last week in January 1986.

Professor J.S. Maritz (La Trobe University), 3 March - 22 August 1986.

Assistant Professor J.S. Marron (University of North Carolina), 14 July - 17 October 1986.

Faculties Research Fund Grants for 1987 were awarded to Professor Heathcote and Dr O'Neill to commence work on the changing pattern of heart disease in Australia; to Dr O'Neill to continue work on the inverse proportional hazards model - a case study; to Professor Terrell to investigate conditional projections in dynamic economic systems and to Dr McAleer to continue his work on Monte Carlo simulations in economic models. Professor Terrell and Dr McAleer have also received ARGS funding for their projects for 1987.

Dr Peter Hall served on the CSIRO Division of Mathematics and Statistics Advisory Committee, Dr Nicholls served on the Associate Diploma Consultative Committee in the School of Administrative Studies at the Canberra College of TAFE and a Review Committee for the Diploma in Statistics course at the Canberra College of Advanced Education.

Dr Peter Hall was awarded the Rollo Davidson Prize and the Australian Mathematical Society Medal. He also delivered the Belz Memorial Lecture for the Victorian Branch of the Statistical Society of Australia.

Mr Cunningham took part in presenting an IDP Workshop in Applied Statistics in Thailand. He has also been appointed Chairman of the Biological Science Section of the Statistical Society of Australia.

Dr Nicholls was one of the organizers of the Time Series Conference held to celebrate Professor E.J. Hannan's 65th birthday in January. He is also a member of the Council of the Canberra Branch of the Statistical Society of Australia, has been invited to organize an Invited Paper Session

on New Developments in Time Series at the International Statistical Institute Conference in Tokyo in 1987 and has been elected Chairman of the Program Committee for the Statistics Conference which is to be part of the National Congress of Mathematical Sciences in May 1988.

The department has continued to play an increasingly active role in off-campus consulting during the year. Consulting work by various members of the department has been carried out for O.T.C., The Australian Electoral Commission, Capricorn Coal Management Pty Ltd, Century Oils Pty Ltd, Department of Employment and Industrial Relations, Department of .The Special Minister of State, the Health Insurance Commission and the Department of Territories.

Research by members of the department was mainly in the fields of applied probability (particularly limit theorems), multivariate analysis, non-standard maximum likelihood, resampling theory, cross validation, image processing, trend estimation, bootstrapping in regressions with dependent variables, 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. Research activity benefited from the visitor and seminar programmes.

Publications

Beggs, J.J. and †Peck, M.J. "Energy conservation in American industry", in Energy Conservation: Successes and Failures, Brookings Institute, Washington D.C. (1986), 59-94.

Beggs, J.J. "A simple exposition of the arbitrage pricing theory approximation", Australian Journal of Management, 11(1) (1986), 87-98.

Beggs, J.J. "Time series analysis in pooled cross-sections", Econometric Theory, 2(3) (1986), 331-349.

Breusch, T.S. and †Godfrey, L.G. "Data transformation tests", Economic Journal Conference Supplement, 96 (1986), 47-58.

Breusch, T.S. "Hypothesis testing in unidentified models", Review of Economic Studies, LIII (1986), 635-651.

†Wingate-Hill, R. and Cunningham, R.B. "Compression drying of sapwood", Wood and Fibre Science, 18(2) (1986), 315-326.

Hall, P. and *Welsh, A.H. "Adaptive estimates of parameters of regular variation", Annals of Statistics, 13 (1985), 331-341.

†Diggle, P.J. and Hall, P. "On the selection of terms in an orthogonal series density estimator", Journal of the American Statistical Association, 81 (1986), 230-233.

Hall, P. "On powerful distributional tests based on sample spacings", Journal of Multivariate Analysis, 19 (1986), 201-224.

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†Not a member of this university
*Former member

Publications (contd.)

Hall, P. and *Wightwick, J.C.H. "Two-sided bounds and leading term for rates of convergence in the multivariate central limit theorem", Journal of Multivariate Analysis, 19 (1986), 225-239.

Hall, P. "On the rate of convergence of orthogonal series density estimators", Journal of the Royal Statistical Society Series B, 48 (1986), 115-122.

Hall, P. "Clump counts in a mosaic", Annals of Probability, 14 (1986), 424-458.

Hall, P. and *Wightwick, J.C.H. "Convergence determining sets in the central limit theorem", Probability Theory and Related Fields, 71 (1986), 1-17.

Heathcote, C.R. and †Csörgö, S. "Describing symmetry", in I.S. Francis, B.F.J. Manly and F.C. Lam (eds), Proceedings of Pacific Statistical Congress 1985, Amsterdam, North-Holland (1986), 251-254.

Hinde, R. "Population moments and moments of the sample mean", Communications in Statistics: Theory and Methods, 15(10) (1986), 3129-3143.

†Dastoor, N.K. and McAleer, M. "Testing separate models with stochastic regressors", Economic Modelling, 2 (1985), 331-338.

McAleer, M. and †Deistler, M. "Some recent developments in econometrics", in S. Bittanti (ed.), Time Series and Linear Systems, Springer-Verlag (1986), 222-243.

McAleer, M. "Specification tests for separate models: A survey", in M.L. King and D.E.A. Giles (eds), Specification Analysis in the Linear Model, Routledge and Kegan Paul (1986), 146-196.

McAleer, M., *Pagan, A.R. and †Visco, I. "A further result on the sign of restricted least-squares estimates", Journal of Econometrics, 32 (1986), 287-290.

*Bera, A.K. and McKenzie, C.R. "Alternative forms and properties of the score test", Journal of Applied Statistics, 13 (1986), 13-25.

*Bera, A.K. and McKenzie, C.R. "Tests for normality with stable alternatives", Journal of Statistical Computation and Simulation, 25 (1986), 37-52.

Nicholls, D.F., Heathcote, C.R. and Cunningham, R.B. "A statistical procedure for the analysis of riverflow and water quality data", in I.S. Francis, B.F.J. Manly and F.C. Lam (eds), Proceedings of Pacific Statistical Congress 1985, Amsterdam, North-Holland (1986), 103-106.

Nicholls, D.F. "The Box-Jenkins approach to random coefficient autoregression modelling", Journal of Applied Probability, 28A (1986), 231-240.

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Publications (contd.)

O'Neill, T.J., †Tallis, G.M. and †Leppard, P. "The epidemiology of a disease using hazard functions", <u>The Australian Journal of Statistics</u>, 27(3) (1985), 283-297.

O'Neill, T.J. "A comparison of two hazard models", in I.S. Francis, B.F.J. Manly and F.C. Lam (eds), <u>Proceedings of Pacific Statistical Congress 1985</u>, Amsterdam, North-Holland (1986), 441-443.

O'Neill, T.J. "The inconsistency of the misspecified proportional hazards model", <u>Statistics and Probability Letters</u>, 4 (1986), 219-222.

O'Neill, T.J. "The variance of the error rates of classification rules", <u>Computers and Mathematics with Applications</u>, 12A(2) (1986), 273-287.

*Penm, J.H.W. and Terrell, R.D. "The 'derived' moving-average model and its role in causality", in "Essays in Time Series and Allied Processes", <u>Journal of Applied Probability</u>, Special Volume 23A (1986), 99-111.

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THE AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF STATISTICS ANALYSIS OF STUDENT PERFORMANCE

FIRST SEMESTER

			Percentage of Number Enrolled							Percentage of Number Sitting				
1	2		3		4		5		6		7		8		9		10	11		12	
Subject or Unit	Effective enrolments		Sitting		Wastage		Did not sit Failure (ABS/N) (W/N)		Sat Failure		High Distinction		Distinction		Credit		Pass with Merit	Pass		Fail	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No. %	No.	%	No.	%
Stat Tech 1	127	100	106	84	18	14	3	2	10	8	17	16	32	30	25	24	-	22	21	10	9
Stats B01	142	100	135	95	3	2	4	3	19	13	16	12	28	21	31	23	-	41	30	19	14
Stats C01	31	100	33	106	-2	-6	-	-	7	23	2	6	5	15	8	24	-	11	33	7	21
Stats C03	70	100	63	90	6	9	1	1	11	16	5	8	7	11	13	21	-	27	43	11	17
Stats C08	8	100	7	88	-	-	1	12	-	-	-	-	5	71	2	29	-	-	-	-	-
Ecomet B05	20	100	11	55	8	40	1	5	1	5	1	9	3	27	5	46	-	1	9	1	9
Ecomet C05	14	100	11	79	3	21	-	-	2	14	-	-	1	9	3	27	-	5	46	2	18
Ecomet C05H	2		5		-3		-		-		-		2		2		-	1		-	

THE AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF STATISTICS ANALYSIS OF STUDENT PERFORMANCE

SECOND SEMESTER

1	2		3		4		5		6		7		8		9		10		11		12	
			Percentage of Number Enrolled										**Percentage of Number Sitting**									
Subject or Unit	Effective enrolments		Sitting		Wastage		Did not sit Failure (ABS/N) (W/N)		Sat Failure		High Distinction		Distinction		Credit		Pass with Merit		Pass		Fail	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Stat Tech 1	51	100	44	86	-	-	7	14	11	22	4	9	7	16	7	16	-		15	34	11	25
Stat Tech 2	87	100	62	71	19	22	6	7	12	14	3	5	3	5	9	15	-		35	56	12	19
Stats B02	84	100	79	94	5	6	-	-	15	18	2	3	8	10	24	30	-		30	38	15	19
Stats B04	48	100	45	94	3	6	-	-	7	15	2	4	4	9	11	24	-		21	47	7	16
Stats C02	22	100	20	91	2	9	-	-	3	14	1	5	2	10	10	50	-		4	20	3	15
Stats C09	53	100	44	83	6	11	3	6	7	13	5	11	4	9	14	32	-		14	32	7	16
Ecomet B03	38	100	33*	87	5	13	-	-	7	18	7	21	8	24	4	12	-		6	18	7	21
Ecomet B06	8	100	6	75	2	25	-	-	2	25	-	-	-	-	1	17	-		3	50	2	33
Ecomet C06	14	100	10	71	4	29	-	-	2	14	-	-	1	10	4	40	-		3	30	2	20
Ecomet C06H	1		3		-2		-		-		-		-		2		-		1		-	

*1 result deferred.

THE AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF STATISTICS ANALYSIS OF STUDENT PERFORMANCE

FULL YEAR

				Percentage of Number Enrolled										Percentage of Number Sitting									
1	2		3		4		5		6		7		8		9		10		11		12		
Subject or Unit	Effective enrolments		Sitting		Wastage		Did not sit Failure (ABS/N) (W/N)		Sat Failure		High Distinction		Distinction		Credit		Pass with Merit		Pass		Fail		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No. %		No.	%	No.	%	
Eco Stats A	253	100	213	84	30	12	10	4	24	9	14	7	32	15	64	30	-		79	37	24	11	
Eco Stats B	142	100	87	61	47	33	8	6	27	19	-	-	2	2	10	11	-		48	55	27	31	

	Enrolled	Sitting	Result
Final Honours - Statistics	4	4	3 x H2A, 1 x H2B
Econometrics	1	1	1 x H2A,
Econometrics/Accounting	1	1	-
Diploma in Statistics	10	1	1 x PM
Diploma in Econometrics	3	1	1 x PM
Masters Degree by Research	3	1	1 MSc awarded
Masters Degree by Research & Coursework	1	-	-
PhD	7	2	1 awarded