

**Research Productivity of Australian Academic Economists:
Human-Capital and Fixed Effects***

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Abstract

The research productivity of an economics department depends upon both the ability of its members to produce publishable research and the extent to which institutional conditions facilitate research. This study uses a Tobit model to estimate both effects in 29 Australian economics departments. We find that the most research-productive departments employ academics with relatively high levels of human capital and provide institutional conditions that are conducive to research. This is particularly true of economics departments at Melbourne, Tasmania, Western Australia and the ANU. The converse is true for the least research-productive departments, where academics have relatively low levels of human capital and work under common institutional conditions that do not promote research.

I Introduction

There is an extensive literature dating back four decades that examines the research output of academic economists in the United States, and there is a growing literature elsewhere. From the several studies that have employed Australian data, most of which rank economics departments according to their research output during particular time periods, the major findings to emerge are as follows. First, a small number of Australian economics departments consistently outperform the others regardless of the measure of research output used and the time period employed in constructing the ranking. Second, in almost all Australian economics departments a small proportion of academic staff account for most of the research output. Although there are several prolific researchers, most Australian academic economists do not publish regularly in prestigious, refereed journals. Third, the presence of just one or two highly productive researchers can have a substantial impact on a department's ranking. Recruiting a 'superstar' can catapult an otherwise mediocre department towards the top of the rankings table; the departure of a 'superstar' can have the opposite effect. Finally, international studies have shown that Australian economics departments have low research output by international standards. Only five or six Australian departments are ranked in the top 200 economics departments world-wide.¹

A question of interest, particularly to those concerned with improving the quality of economics research in Australia's universities, is: 'Why?'. Are Australian academic economists less well trained than their colleagues elsewhere? Are teaching loads higher in Australian universities than in universities in other countries? Are Australian academics required to perform more administrative tasks than their

¹ See Kalaitzidakis, Mamuneas and Stengos (2003) and Coupe (2003).

overseas counterparts? Are teaching and administration favoured over research in promotion decisions? Is tenure granted too easily or for the wrong reasons? The current study is motivated by these issues and a desire to learn more about what makes some Australian economics departments more productive of research output than others. An understanding of these issues is necessary if Australian economics departments are to improve their research performance, and in a global education market there is increasing pressure to do so.

The objective of this study is to examine the effect of two factors on a department's ranking according to research productivity. The first is the human capital embodied in the department's members and the second is the working environment that is shared by all members of the same department. We have constructed a large set of panel data on more than 800 academic economists in 29 teaching departments. This is almost a complete enumeration of academic economists at the level of lecturer and above who were employed sometime during the period 1996 through 2000 in teaching departments of those Australian universities that offer a doctoral degree specialising in economics. Only a few previous studies have attempted to analyse the factors that affect research productivity of Australian academic economists. All were based on small samples of cross-section data obtained from surveys that achieved low response rates. None has attempted to quantify the institutional effects on research productivity.

The remainder of this paper is organized as follows. Section II reviews current knowledge of the factors that influence research output of academic economists, particularly those in Australian universities. Section III describes the conventions used in measuring research productivity in our study. Our data sources are documented in Section IV. The methodology used to measure the impact of human capital and

institutional conditions on research productivity is discussed in Section V. Section VI presents the results of the analysis and Section VII offers some concluding remarks.

II Previous Research Findings

The most recent study of Australian academic economists is by Pomfret and Wang (2003), who rank Australian economics departments according to the total number of publications in 88 top academic journals from 1990 through 2001 and, in addition, identify the top ten departments according to per capita publications, total number of citations and citations per capita.² Pomfret and Wang (2003) note that by international standards, high-quality research output by Australian academic economists is low on average and highly skewed, both at the national level and within departments. The authors found that sixty percent of the academic economists employed in Australian universities in 2002 published nothing in the top 88 journals between 1990 and 2001 whereas a small number of people published more than ten articles. Several explanations are conjectured. First, Australian academics who establish good publication records emigrate or young researchers fail to return to Australia after completing their Ph.D.s overseas. Second, research output is neither valued nor supported as much in Australian universities as it is elsewhere. Third, Australian academic staff face different incentives with respect to producing publishable research than do their colleagues in other countries. These are issues of governance and the extent to which they impact upon research productivity is a question that has motivated the research reported in this paper.

Three earlier studies sought to identify the variables that influence research productivity in Australia. Fox and Milbourne (1999) identified several factors that

² Earlier studies that ranked Australian economics departments are Harris (1988, 1990a and 1990b), Anderson and Blandy (1992), Towe and Wright (1995) and Sinha and Macri (2002).

affect research productivity of individual economists: human capital (in particular, the grade of honours received in the first degree, the possession of a Ph.D., whether the Ph.D. involved coursework as well as a thesis), teaching loads, and access to research grants. These results were produced by a regression analysis estimated with cross-section data that were obtained from a survey of Australian academic economists, conducted by the authors in October 1996. The survey resulted in 150 usable responses, slightly less than one third of the population of interest. Research output was measured in two ways: a narrow definition was based entirely on articles published in 50 top, refereed journals; a broad definition was based on all articles published in refereed journals plus authored research books.³

Fox and Milbourne did not attempt to explain the differences between departments in research productivity – that was not their objective. However, a department's productivity is obviously related to that of its individual members so the inferences are clear. One would expect departments that consistently rank high to employ staff with large amounts of human capital, to have lower than average teaching loads and higher than average success rates in obtaining outside grants. Although the results of Fox and Milbourne's study are informative, their methodology is less than ideal. The assumed exogeneity of teaching loads and research grants is open to question and, despite the authors' claims to the contrary, it seems likely that non-response bias is present in the data.

A decade earlier, Harris (1990a) investigated the factors that affect research productivity of economics departments rather than of individual economists. Harris identified four important explanatory variables: the department's size, the number of

³ Each research book was treated as equivalent to three average-quality, full-length journal articles. The dependent variable was the average number of standard-size, quality-adjusted pages published per annum by each academic economist during a period starting two years after his or her first appointment as lecturer through to the end of 1996.

hours of face-to-face teaching per academic per week, the department's student-to-staff ratio and the number of secretarial staff per lecturer. Department size was observed to have a nonlinear effect, the optimum size being approximately seventeen academic staff. The results were produced using a regression equation estimated with cross-section data. The dependent variable was the average number of publication points earned during the period 1984-88 per member of the department. Publication points were determined by aggregating eight categories of research using a set of weights, which were subjectively determined.⁴ Publications data for the period 1984 through 1988 were obtained from lists of research output published annually in various forms by the universities. Staff lists in annual university calendars were used to identify the academics in each department year by year. Data on the explanatory variables were obtained from a survey of Heads of Departments conducted in May 1988 and the magnitudes of these variables were claimed to be 'typical of the mid-late 1980s'.

Harris' (1990a) study has two major shortcomings. First, the sample size was very small and the data were likely subject to non-response bias. (Eighteen departments were surveyed but responses from only twelve departments were usable.) Second, the use of departmental averages is likely to mask relationships between research performance and certain explanatory variables that were investigated but omitted from the reported regression because their effects were not significant. For example, research funds per capita might have little explanatory power at the department level but at the level of the individual academic, research funds might be important.

⁴ The weights were as follows: ten points for a first-rank journal article, six points for a second-rank journal article, three points for an article in another journal listed in the Social Sciences Citation Index, one point for an article in a journal not listed in the Social Sciences Citation Index, 35 points for a research book, fifteen points for a second-rank book, eight points for a chapter in a research book, and three points for a chapter in a second-rank book.

Harris (1990a) noted that the variation in research productivity was much greater within departments than between departments, suggesting either that some important environmental factors vary within departments or that individual attributes are important in explaining research output. Subsequently, Harris and Kaine (1994) explored whether individuals' preferences and perceptions about various research-related issues were correlated with research performance. The authors concluded that research performance is more a function of individual motivation than of resource support. These results were obtained from a cluster analysis that grouped individual economists into low, medium and high-output researchers, based on the publications-points index used in Harris' earlier papers (1988 and 1990a). Discriminate analysis was then used to characterize membership of these groups. Highly active researchers not only worked longer hours (65 hours per week on average) than those in the other two groups (53 and 55 hours per week) but they also devoted a larger proportion of their time to research (65 percent versus 53 percent and 52 percent). Highly productive researchers also undertook research projects that would further their careers; they interacted with academics outside their own departments and were active in several research-related areas; they felt motivated, found it easy to find research topics, and had little difficulty getting their work published; and they enjoyed the freedom and challenge of their positions. The data used by Harris and Kaine were obtained from a survey of 330 Australian academic economists who were lecturers or above in mid 1987. The 134 respondents were found to be above-average researchers compared with their colleagues in the same department. The small sample size and the data's bias towards more productive researchers are weaknesses of the study.

Several studies have investigated the factors that influence research productivity of academic economists in other countries, particularly the United States.

Research productivity has been found to be related to the quality of the academic's Ph.D. degree (Davis and Patterson, 2001; Broder, 1993; Laband, 1986), whether the academic is employed in a department that offers a Ph.D. program and, if so, the quality of that program (Davis and Patterson, 2001; Conroy and Dusansky (1995), 1995; Broder, 1993; Baumann, *et al.*, 1987), the academic's field of specialization (Davis and Patterson, 2001; Fish and Gibbons, 1989; Baumann, *et al.*, 1987), the student-to-staff ratio and the number of research assistants per academic (Thursby, 2000). There is some evidence that males publish more than females (Fish and Gibbons, 1989; Barbezat, 1992) or at least in more highly rated journals (Broder, 1993). However, Davis and Patterson (2001) found no evidence of gender differences when human capital, type of employer and field of specialization were held constant.

III Conventions Used in Constructing the Data Set

The study reported in this paper concerns the research productivity of academic economists employed in teaching departments in Australian universities that, for several years, have offered a doctoral degree specialising in economics. Members of research institutes are not included because they face quite different conditions than do academics who are required to teach as well as conduct research. We focus on doctoral-granting universities because it seems reasonable to assume that academics in departments offering Ph.D. supervision are expected to undertake research. Four of Australia's 33 doctoral-granting universities had to be excluded from the analysis because we were unable to distinguish the economists from other academic staff employed during the time period of the study, namely 1996-2000. The 2004 web sites of the excluded universities indicate that they each employ fewer than five economists, who are located in schools or faculties containing academics from

other disciplines. It would appear therefore that the exclusion of these four institutions has removed fewer than 20 academic economists from the scope of our study.⁵

In this paper the term ‘economist’ includes econometricians, economic historians and in a few cases academics from the discipline of finance as well as ‘regular’ economists. Although there have been separate departments of economics, econometrics and economic history in the past, in most Australian universities today, academics of all three types co-exist in the same administrative unit. Separate departments of finance still exist in many universities and where this is so we have excluded their staff from our study. At universities where academics from other disciplines such as marketing or business are located in the same department as economists we have identified the two groups and included only the economists in our study. We group ‘economists’ into a single unit for each university, referred to in this paper as a ‘department’.

The economists in our study are lecturers, senior lecturers, associate professors, readers and professors. Emeritus and adjunct academics are excluded. Staff members on leave are included and, even if visiting another university, their research output is attributed to the department in which they are employed. Associate lecturers are excluded from the study for two reasons. The first is practical: staff lists in faculty handbooks and other documents sometimes include associate lecturers, sometimes not. The second reason is conceptual: expectations of associate lecturers are less demanding than of lecturers and above. In general, associate lecturers are not required to supervise honours or postgraduate research projects. Many associate lecturers are enrolled in a Ph.D. degree and their research is focussed on its completion.

⁵ The excluded universities are Charles Sturt University, Charles Darwin University, Swinburne University of Technology and Southern Cross University.

There are two approaches to measuring an individual academic's research output: one is based on the individual's publications; the other is based on citations of the individual's work. Both approaches have practical and conceptual difficulties, which are discussed by Pomfret and Wang (2003, pp.420-423). We use publications data because we are interested in recent research, which necessarily is little cited. Like almost all other studies of academic research output, we use only refereed journal articles because we agree with Neary, Mirrlees and Tirole (2003, p.1241) that "only published journal articles undergo a widely-accepted process of peer review which is the essence of quality control in any scientific discipline". It would also appear that the returns to research that is not refereed, both in terms of academic position (Gibson, 2000) and salary (Sauer, 1988), are low - in other countries at least.

Since the objective of this study is to understand why some economics departments are more research productive than others it is appropriate to measure the flow of research originating in a department over a given time period rather than the stock of research attributable to academics who are members of a department at a given point in time. Our hypothesis is that the flow of research will be influenced by departmental conditions at the time the individual was employed. Not only is research conducted prior to arrival unaffected by conditions in the academic's current department, even research that was done in the current department, but a long time ago, says little about that department's current research environment. For that reason we concentrate on recent research, specifically output published from 1998 to 2002. Like others (Harris, 1988 and 1990a; Fox and Milbourne, 1999) we assume a publication lag of two years: publications are attributed to a given department if and only if the author was a member of the department two years prior to the publication date, that is, sometime between 1996 and 2000.

We define a department's research productivity during a given time period as the average productivity of its individual members. An individual's research productivity is measured by the number of pages published per year as a result of work undertaken during that portion of the period 1996 through 2000 when the individual was employed in the department. Averaging output over a number of years takes away some of the "lumpiness" that appears in annual data as a result of academics taking study leave. For an article with n authors, each author was given credit for an equal proportion ($1/n$) of the article. Page counts are used because 'length is correlated with importance, at least as perceived *ex ante* by editors and referees' (Neary, Mirrlees and Tirole, 2003, p.1241). In computing page counts we adopt the common procedure of adjusting for the different page sizes of journals relative to that of a benchmark journal, namely the American Economic Review. Adjustments for page size of 468 journals were made using the conversion factors used, and generously provided to us, by Sinha and Macri (2002). The page counts of articles from other journals were adjusted using a conversion factor of 0.68.⁶

Although most academics would agree that article quality is closely related to the quality of the journal in which it is published, how to take account of the quality of refereed journals is a contentious issue. The literature contains two approaches to devising weights to reflect the quality of journals. The first approach uses subjective perceptions of journal quality, either of the authors undertaking a particular study (Combes and Linnemer, 2003; Lubrano *et al.*, 2003) or more widely canvassed in a survey of economists (Axarlaglou and Theoharakis, 2003). The second approach is based on the number of citations of the journal's contents. Weights for 159 journals were calculated by Kalaitzidakis, Mamuneas and Stengos (2003), based on 1998

⁶ This is the average page-size conversion factor of all but the 71 journals that were identified by Towe and Wright (1995) as the most prestigious.

citations of articles published from 1994 to 1998 and taking account of the prestige of the journal in which the citation appears.⁷ Other journals receive a weight of zero.

The weights of Kalaitzidakis, Mamuneas and Stengos (2003) decline sharply. The AER is the top journal with a weight of 100. Five journals receive weights between 50 and 100, another eight between 25 and 50, fifteen more between 10 and 25. The remaining 130 journals receive a weight less than ten. Pomfret and Wang (2003, p.432) argue that such weights constitute a poor basis for ranking most Australian economics departments, whose members publish few articles in leading journals. We agree. Furthermore, we contend that any article in a refereed journal is better than no article at all and therefore should contribute *something* in a publication tally. Accordingly, our analysis uses Gibson's (2000) weights of 1.00, 0.64, 0.34 and 0.05 for journals classified into four quality categories, the first three of which are Towe and Wright's (1995) Groups 1, 2 and 3 journals, respectively. The fourth category is a residual category containing all other journals in the EconLit data base. Gibson (2000) derived his set of quality-related weights for Towe and Wright's four quality-related groups using an ordinal-logit model of academic rank with the number of pages in journals of each Group, plus a set of control variables, as explanatory variables. Although this provides a rationale for using Gibson's weights, we acknowledge that our decision to do so is largely a subjective judgement.

In summary, the analysis reported in this paper measures productivity by the number of AER-standard-sized pages, adjusted for quality using the weights of Gibson (2000), referred to henceforth as Q2-pages, per staff per year. Results of analyses based on three alternative measures of research productivity are available

⁷ These weights are updated versions of weights computed by Laband and Piette (1994) and Liebowitz and Palmer (1984). Although they purport to measure journal quality they are more aptly called 'impact factors'. Posner (1999) discusses the reasons for citing and argues that all types of citations reflect the impact of the article being cited, but only certain types of citations reflect its quality.

from the authors on request: (a) the number of AER-standard-sized pages, adjusted for quality using the weights of Kalaitzidakis, Mamuneas and Stengos (2003), called Q1-pages, per staff per year, (b) the number of standard-size pages per staff per year (with no adjustment for quality), and (c) the number of articles per staff per year.

IV Data Sources

To measure the research productivity of a department it is necessary to know the membership of the department throughout the time period considered. Affiliations on published papers can be used to identify total research output of a university but not a department's productivity. The affiliations on published papers tell us nothing about who did not publish. Nor do they distinguish members of teaching departments from members of research institutes or from graduate students in the same university. Furthermore, the affiliation on articles that are published around the time when the author moves from one university to another is an unreliable indicator of where the research was performed.

To establish membership of our 29 departments we used the universities' annual reports, handbooks, calendars *etc.* to construct lists of academic economists year-by-year from 1996 onwards.⁸ If a few cases where such documents were not available we used several alternative sources, including the Commonwealth Universities Yearbook,⁹ staff lists provided to us by department heads, and individuals' vitae posted on various Web sites. Many of the documents we used also

⁸ In most cases the precise dates of arrival and departure are not stated. However, academics typically arrive in a department either at the beginning of, or half way through, a calendar year and leave either at the end, or middle, of a year. In the absence of information to the contrary, we assumed arrivals occurred in January and departures in December. If the date of arrival or departure is stated, for consistency, we adopted the following convention for the purpose of assigning publications to departments: mid-year arrivals are treated as present in their departments from the following January and mid-year departures are treated as present in their departments until the following December.

⁹ Prior to 1999 the Commonwealth Universities Yearbook (CUY) listed academic staff at Australian universities by name, qualification and rank, from associate lecturer through professor. The CUYs of 1999 and later, however, list only senior lecturers and above and simply report the numbers of lecturers and associate lecturers.

gave the academics' qualifications and ranks. ProQuest Dissertations and Theses (wwwlib.umi.com/dissertations), Libraries Australia (accessed through the database Kinetica), library catalogues at individual Australian universities and Edwards and Sullivan (1997) provided supplementary information on academics' qualifications. In several cases we contacted individual academics to obtain missing data.

Our major source of journal publications was the on-line version of EconLit, which we searched by author for every academic on our staff lists. Pomfret and Wang (2003) criticize EconLit for its errors so we scrutinized its output closely. Possibly EconLit's greatest limitation is that it records articles with several authors using the '*et al.*' convention. Consequently, relevant articles will be missed unless the first author is included in the study and a supplementary search is undertaken to reveal the other authors, a practice which we followed in every case. An advantage of EconLit is its coverage, which has expanded in recent years. As of 2004, it referenced articles in over 1,000 journals. We cross-checked our list of publications from EconLit with those compiled by Pomfret and Wang¹⁰ and, where possible, with publication lists contained in annual reports, handbooks, calendars and research reports. We added any references that we had missed, such as those where the first author was not on our staff lists. Despite our best efforts, we acknowledge our fallibility and that of the documents from which we have worked.

V The Econometric Model

A large number of Australian academic economists have zero research output per year so it is appropriate to analyse research productivity using a standard, censored Tobit model (see, for example, Wooldridge, 2002, chapter 16). We hypothesize that an individual's research productivity is affected by two kinds of

¹⁰ We thank Pomfret and Wang for generously allowing us access to their data set.

explanatory variables: the human capital of the individual academic and the department in which the individual is employed. The form of model used here is:

$$Y_{ij}^* = \sum_{j=1}^{29} \alpha_j D_{ij} + \sum_{k=1}^6 \beta_k H_{kij} + u_{ij} \quad (1)$$

$$Y_{ij} = \max(0, Y_{ij}^*) \quad (2)$$

where Y_{ij}^* is a latent variable representing the ‘*desired*’ research output per year of individual i in department j and $-\infty < Y_{ij}^* < \infty$; Y_{ij} is the *observed* research output per year of individual i in department j and $Y_{ij} \geq 0$. The quantity and quality of human capital embodied in individual i in department j are measured using six dummy variables, H_{kij} ($k=1,2,\dots,6$). The departmental effects are measured by 29 dummy variables, where D_{ij} equals one if individual i is in Department j ($j=1,2,\dots,29$), zero otherwise. The random disturbance term, u_{ij} , is assumed to be $N(0,\sigma^2)$ and to be independent of the human-capital and departmental dummies. We have modeled each department’s influence as a fixed effect rather than as a random effect because it seems likely that departments that are more (less) supportive of research would hire staff with higher (lower) levels of human capital. If departmental effects were to be modeled as an unobservable component of the model’s random disturbance term there would be correlation between the disturbance term and the human capital variables.

The parameters, β_k ($k=1,2,\dots,6$), in Equation (1) measure the effect of human capital on the individual’s desired research productivity. The ‘fixed effect’ parameters, α_j ($j=1,2,\dots,29$), measure the effect on the individual’s desired research productivity of Department j , relative to the average effect of all departments (Hsiao, 1986, p.14). The α_j reflect unobserved heterogeneity among departments. Each α_j represents the effect of those working conditions that are common to all academic staff in Department j , conditions such as the importance of research for promotion and tenure, rewards in the

form of money or recognition for publishing, indeed anything that contributes to the environment in which (to paraphrase Harris, 1990a, p.81) the desire to do research does, or does not, flourish. The value of α_j provides information on the extent to which Department j (to paraphrase Pomfret and Wang, 2003, p.439-440) values research output, provides working conditions conducive to undertaking research and uses incentives and sanctions to encourage publishable research.

The parameter vectors, α and β , measure the departmental and human-capital effects on the expected value of the latent variable, *desired* research productivity,

$$E(Y^*|\mathbf{D}, \mathbf{H}) = \alpha' \mathbf{D} + \beta' \mathbf{H} \quad (3)$$

but not on the expected value of *actual* research productivity. The latter is a nonlinear function of the form:

$$E(Y|\mathbf{D}, \mathbf{H}) = \Phi\left(\frac{\alpha' \mathbf{D} + \beta' \mathbf{H}}{\sigma}\right)(\alpha' \mathbf{D} + \beta' \mathbf{H}) + \sigma \phi\left(\frac{\alpha' \mathbf{D} + \beta' \mathbf{H}}{\sigma}\right) \quad (4)$$

where Φ is the cumulative normal distribution function and ϕ is the standard normal density function. The departmental and human-capital effects on the expected value of actual research productivity are non-linear but can be obtained by substituting appropriately chosen values for the dummy variables, \mathbf{D} and \mathbf{H} , into Equation (4).

VI Results

Descriptive Statistics

Productivities of the 29 departments (in Q2-pages per staff per year) are presented in Column 2 of Table 1 and departments are ranked according to this measure of productivity in Column 3. The proportion of academic economists with positive output appears in Column 4 and departments are ranked according to the proportion staff who are ‘research-active’ in Column 5. Column 6 presents the productivity of those academics with positive output and departments are ranked

according to productivity of research-active staff in Column 7. The number of staff present in the various departments for at least one year during the period 1996-2000 appears in Column 8 of Table 1.

The average productivity of the 876 academic economists in our data set is 0.79 Q2-pages per year but 48 per cent of academics published zero Q2-pages during the period 1998-2002. The ten most productive departments are: Melbourne, Western Australia, Tasmania, James Cook, Flinders, NSW, ANU, Adelaide, Deakin and La Trobe. Although these rankings are based on the *flow* of output per capita, seven of the ten top departments in Table 1 are among the top ten departments in the ranking produced by Pomfret and Wang (2003, p.436) that is based on the per capita *stock* of output from 1990-2001. Making “surprise” appearances in our top ten are James Cook¹¹ and Flinders Universities, both of which have one or two highly productive researchers but few staff (40 per cent and 32 per cent, respectively) who are research active. Indeed, the decomposition of Column 2 into the product of Columns 4 and 6 reveals the extent to which a department’s productivity ranking in Column 3 is due to the proportion of research-active staff or the productivity of staff who are research active, or both. For example, New England is the second most research-active department (see Column 5) but its research-active academics have relatively low productivity (ranking 23rd in Column 7). Consequently it ranks sixteenth in overall productivity.¹²

On the assumption that human capital affects research productivity, we classified each academic into one of six groups according to the highest educational qualification held in the last year between 1996 and 2000 that he or she was present in

¹¹ James Cook University was not included in Pomfret and Wang’s (2003) study because it had fewer than eight academic economists in 2002.

¹² There is a positive correlation ($r = 0.24$) between productivity of research-active staff and the proportion of staff who are research active but the Flinders, James Cook and, to a lesser extent, New England are “outliers”.

a department. Groups 1, 2, 3 and 4 consist of academics with Ph.D. degrees from universities with economics departments that were ranked 1 through 50, 51 through 100, 101 through 150 and 151 through 200, respectively, according to Kalaitzidakis, Mamuneas and Stengos (2003). Group 5 is comprised of academics with Ph.D. degrees from universities with economics department that are not ranked in the top 200 world-wide. Many of these unranked universities are located in Australia; only ANU (rank 62), NSW (rank 81), Melbourne (rank 141), Monash (rank 171) and Western Australia (rank 176) made the top 200. Academics without Ph.D.s comprise Group 6, which is the control group.¹³

Twenty per cent of all academic economists in our data set have Ph.D. degrees from the top 50 economics departments (Group 1), the heaviest concentrations being in Melbourne, NSW, the ANU, Tasmania, Western Australia, Macquarie, Sydney and Adelaide (see Table 2). Twelve, five and seven per cent of academics have doctorates from economics departments that are in Groups 2, 3 and 4, respectively. Twenty-six per cent of academics have Ph.D.s from universities whose economics departments that did not make the top 200. Economics departments at James Cook, Queensland, Wollongong, Murdoch, Newcastle, New England and Curtin universities have the largest proportions of staff with Ph.D.s from unranked economics departments. Thirty percent of all academic economists in our data set do not have a Ph.D. qualification. At least 50 per cent of academic economists at RMIT, Edith Cowan, Southern Queensland, VUT, Canberra, QUT and UTS do not have Ph.D.s.

¹³ Kalaitzidakis, Mamuneas and Stengos (2003) rank departments on the basis of quality-adjusted pages in the top 30 journals during the period 1995 to 1999. Most of the academics in our study received their Ph.D.s prior to 1995 so our representation of the quality of the Ph.D. assumes that the four groups of departments have remained stable over time.

Econometric Analysis

The standard, censored Tobit model described by Equations (1) through (4) was estimated using panel data, the number of observations in each of the 29 departments being those listed in Column 8 of Table 1. Maximum likelihood estimates of the parameters, standard errors and P-values are given in Table 3. The coefficients attached to the human-capital dummies have appropriate positive signs and are highly statistically significant. All but four of the coefficients attached to the departmental dummy variables are significantly different from than zero.¹⁴

In-sample, predicted productivities of the individuals in each department were averaged and are listed in Column 3 of Table 4. Average errors in predicting the departments' productivities are given in Column 4. The Tobit model over-predicts productivity in most departments and in all departments combined but the correlation coefficient between the ranks of the 29 departments based on actual productivity and predicted productivity is large ($r = 0.92$).

The effects on research productivity of working conditions common to all staff within each of the 29 departments are conceptualized as follows:

Step 1: Consider an individual in Department j .

Step 2: The individual's predicted research productivity in his or her own department is found by substituting the individual's own human-capital dummy variables into Equation (4) and setting $D_j = 1$ and $D_k = 0$ ($k \neq j$).

Step 3: The individual's predicted research productivity in another department (say, Department q) is found by substituting the individual's own human-capital dummy variables into Equation (4) and setting $D_q = 1$ and $D_k = 0$ ($k \neq q$). This step is repeated for all other departments.

¹⁴ Our data are not a random sample, so we do not pursue aspects of statistical inference further. The model is used for descriptive purposes.

Step 4: The individual's counterfactual research productivity is calculated as his or her predicted research productivity averaged across all departments other than his or her own department.

Step 5: The effect of Department j on an individual who is in that department equals the individual's predicted research productivity in his or her own department (from Step 2) minus his or her counterfactual research productivity (from Step 4).

Steps 1 through 4 are repeated for all individuals in Department j .

Step 6: The overall effect of Department j on research productivity equals its average effect on all individuals employed in that department.

The above six-step procedure is repeated for all 29 departments to produce a set of departmental effects on research productivity.

The counterfactual may be viewed as a 'fictitious' department that is an average of all but the individual's own department. In this fictitious department the individual's human capital is unchanged. Therefore, the difference between the individual's predicted and counterfactual research productivities measures the effect on his or her research productivity of the other variable in Equation (4), namely the dummy variable representing his or her own department.

Counterfactual productivities are given in Column 5 of Table 4. The departmental fixed effects on research productivity are given in Column 6 and departments are ranked according to departmental effects in Column 7. Twelve of the 29 universities have positive departmental effects, indicating that conditions that are common to all staff in each of these departments augment research productivity to a greater degree than would occur if those individuals were to be located in the fictitious counterfactual department. For example, on average, academics in the economics department at the University of Melbourne produce an estimated 1.61

Q2-pages per year more than they would if they were to be located in the counterfactual department. Seventeen universities have negative departmental effects in Table 4, indicating that if their staff were to be located in the fictitious counterfactual department they would, on average, be more productive. For example, we estimate that, on average, academics in the economics department at the University of Canberra would produce 0.56 more Q2-pages per year if they were to be located in the counterfactual department. Some of the universities have small departmental effects in absolute terms indicating that their academic economists are approximately as productive as they would be in the fictitious counterfactual department. For example, it is estimated that academics in the economics department at the University of New England produce, on average, 0.03 fewer Q2-pages per year than they would if they were to be located in the counterfactual department.

The ten departments with the largest departmental effects are Melbourne, Tasmania, Western Australia, ANU, James Cook, Flinders, Deakin, Adelaide, NSW and Queensland, nine of which are among the ten most productive departments. Our results do not disclose what it is about these departments that makes them more conducive to research than other departments but we do know that it is something that is shared by all departmental members. Case studies of the policies and working conditions under which these departments operate might be revealing. The ten departments with the smallest departmental effects are Canberra, Macquarie, ADFA, Southern Queensland, Newcastle, VUT, Edith Cowan, QUT, Wollongong and Western Sydney, eight of which are among the ten least productive departments. This does not imply that these are unpleasant departments in which to work; only that their environments are not conducive to research. Case studies of their policies and working conditions might also be informative.

The estimated effect of human-capital on productivity varies by department because of the nonlinear nature of Equation (4). In Department J, the effect on productivity of a Ph.D. from a university in Group K is obtained as the difference between the productivity of an academic in Department J with the stated qualification, namely $E[Y \mid D_J = 1, D_j = 0 (j \neq J), H_K = 1, H_k = 0 (k \neq K)]$, and that of an academic in the same department with no Ph.D., namely $E[Y \mid D_J = 1, D_j = 0 (j \neq J), H_k = 0 (\text{all } k)]$. Columns 2, 3, 4, 5 and 6 of Table 5 give the effect on each department's productivity of a Ph.D. from one of the universities in Groups 1, 2, 3, 4 and 5, respectively. For example, an academic at Adelaide with a Ph.D. from a Group 1 university is predicted to produce 1.45 Q2-pages per year more than an academic in the same department without a Ph.D.. The last line, labeled "All Departments", is a weighted average of the departments' human-capital effects, the weights being the proportions of staff in the 29 departments with Ph.D.s from universities in a given group. Thus, on average, academics with Ph.D.s from Group 1 universities are estimated to produce 1.16 Q2-pages per annum more than academics without Ph.D.s. Similarly, academics with Ph.D.s from universities in Groups 2, 3, 4 and 5 produce an estimated 1.02, 0.88, 0.48 and 0.72 Q2-pages per annum, respectively, more than academics without Ph.D.s.

Table 5 shows that academics with Ph.D.s are more research productive on average than their less qualified colleagues. It is also clear that productivity increases as the quality of the Ph.D. increases, the one exception being that academics with Ph.D.s from the unranked universities that form Group 5, many of which are Australian universities, are more productive than academics with Ph.D.s from Group 4 universities, which were ranked 150-200. It is also apparent from Table 5 that the effect of a Ph.D. of a given quality varies across the 29 departments in the study. Furthermore, human-capital effects tend to be largest in those departments with the

largest concentrations of high quality Ph.D.s, such as ANU, Melbourne and NSW, and smallest in those departments with the smallest representations of high quality Ph.D.s, such as Edith Cowan, Southern Queensland and VUT.

The total effect of human capital on the expected productivity of a given department, $E(Y|D,X)$, is calculated as the difference between the predicted research productivity of each academic in that department and the predicted research productivity of a department member with no Ph.D degree, averaged across all academics in the department. These effects are presented in Column 7 of Table 5 and departments are ranked according to them in Column 8. The ten departments with the largest total human-capital effects are Melbourne, Tasmania, Western Australia, the ANU, NSW, Adelaide, Queensland, James Cook, La Trobe and Curtin, eight of which rank in the ten most research-productive departments overall. The ten departments with the smallest total human-capital effects are Edith Cowan, Southern Queensland, VUT, Canberra, RMIT, QUT, ADFA, Newcastle, Macquarie and UTS, nine of which rank in the ten least research-productive departments overall.

There is a strong positive correlation ($r = 0.92$) between the departmental effects (Column 6 of Table 4) and the human-capital effects (Column 7 of Table 5). Most of the research-productive departments achieve that status because they employ academics with relatively large amounts of human capital *and* they provide institutional environments that are conducive to research. In fact, Melbourne, Tasmania, Western Australia and ANU rank first through fourth according to both departmental effects and human-capital effects. James Cook has the fifth largest departmental effect, the eighth largest human-capital effect and ranks fourth overall. Departments with low research productivity employ staff with relatively low levels of human capital and provide institutional environments that are not conducive to

research. However, there are a few exceptions. Departments at Deakin, Flinders and Sydney universities do not have especially large human-capital effects, compared with other departments, but Deakin, Flinders have relatively large fixed departmental effects and consequently rank among the ten most productive departments, whereas Sydney has a small departmental effect and consequently ranks fourteenth most productive.

A sensitivity analysis was conducted with three unusually productive researchers excluded from the analysis. One was employed by both James Cook and the ANU, one was employed at Flinders, and the other was employed at Melbourne University. The results appear in Table 6. Melbourne continues to be the most research-productive department and maintains its first-rank position according to both departmental and human-capital effects. The changes to the ANU are small: it drops behind Adelaide in terms of actual productivity but continues to have the fourth largest departmental effect and drops from fourth to fifth rank according to the human-capital effect. The changes to Flinders and James Cook, on the other hand, are substantial. In terms of actual productivity, Flinders drops from fifth to seventeenth position, James Cook drops from fourth to fourteenth position (see Column 3 of Tables 1 and 6). With their superstars omitted James Cook and Flinders rank 21st and 22nd, rather than fifth and sixth, in terms of their departmental effects (see Column 5 of Table 6 and Column 7 of Table 4) and seventeenth and 22nd, rather than eighth and thirteenth, in terms of their human-capital effects (see Column 7 of Table 6 and Column 8 of Table 5).

The relative positions of the other 25 departments are little affected, and the correlation between the department effects and the human-capital effects remains strong and positive ($r = 0.94$), when the outliers are excluded. Therefore, the

conclusions remain unchanged: the most (least) research-productive departments have large (small) human-capital effects and large (small) fixed departmental effects.

VII Conclusions

The research productivity of an economics department depends upon both the ability of its members to produce publishable research and the extent to which institutional conditions facilitate research. An individual's research ability is primarily dependent upon the quantity and quality of his or her human capital although other idiosyncratic – and often unobservable – characteristics, such as motivation, innate ability, and preference for research versus teaching, also contribute. Some departmental conditions vary among staff as, for example, when teaching loads or administrative loads are not equally distributed. But other institutional conditions are common to all staff, and include factors such as the importance of research in promotion and tenure decisions, recognition or monetary rewards for publishing, the degree of teaching, administrative and research support that is available to all staff, and the extent to which bureaucratic procedures and workplace rules impinge upon academics' time.

This paper reports separate estimates of the effect of human capital and the effect of common departmental conditions in 29 Australian economics departments. Our results reveal that the departments that rank highly employ staff with relatively high levels of human capital and provide institutional conditions that are conducive to research. The converse is the case for the least research-productive departments. Four departments (Melbourne, Tasmania, Western Australia and ANU) have large and positive departmental effects implying that they provide an environment that encourages research. A department aiming to increase its research productivity can hire highly qualified people or improve its research environment (or both).

Departments wishing to pursue the latter course might wish to examine the policies and practices of the departments that this study has identified as being particularly effective in eliciting research from their academic staff.

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Table 1: Descriptive Statistics: Research Productivity, 1998-2002
(Productivity equals Q2-pages per staff per year*)

University department	Productivity	Rank based on column 2	Proportion of staff with output >0	Rank based on column 4	Productivity given positive output	Rank based on column 6	No. of staff present during 1996-2000
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Adelaide	1.32	8	0.61	10	2.17	7	28
ADFA	0.18	23	0.30	23	0.60	21	23
ANU	1.51	7	0.77	3	1.94	8	31
Canberra	0.05	28	0.21	27	0.22	28	14
Curtin	0.78	12	0.75	6	1.04	16	16
Deakin	1.09	9	0.64	9	1.72	10	22
Edith Cowan	0.09	26	0.12	29	0.77	17	25
Flinders	1.74	5	0.32	22	5.49	1	19
Griffith	0.17	24	0.60	12	0.28	27	10
James Cook	1.76	4	0.40	19	4.39	2	10
La Trobe	1.01	10	0.59	14	1.72	9	41
Macquarie	0.24	20	0.35	21	0.71	18	26
Melbourne	2.68	1	0.84	1	3.19	3	50
Monash	0.71	13	0.47	17	1.51	11	77
Murdoch	0.62	15	0.50	15	1.24	12	14
Newcastle	0.14	25	0.39	20	0.36	26	28
New England	0.42	16	0.82	2	0.51	23	39
NSW	1.57	6	0.65	7	2.40	6	49
Queensland	0.85	11	0.77	4	1.10	13	35
QUT	0.19	22	0.28	24	0.69	19	32
RMIT	0.28	19	0.26	25	1.09	14	46
Southern Qld	0.01	29	0.20	28	0.06	29	5
Sydney	0.64	14	0.60	11	1.05	15	53
Tasmania	1.94	3	0.77	5	2.52	5	13
UTS	0.22	21	0.45	18	0.48	24	40
VUT	0.08	27	0.22	26	0.37	25	54
Western Aust	2.00	2	0.65	8	3.10	4	17
Western Sydney	0.31	18	0.47	16	0.66	20	34
Wollongong	0.33	17	0.60	13	0.55	22	25
All Departments	0.79		0.52		1.54		876

* Q2-pages are AER-standard-size pages published in refereed journals and adjusted for quality using the weights of Gibson (2000).

Table 2: Descriptive Statistics: Human Capital

University department	% with a PhD from universities ranked 1-50	% with a PhD from universities ranked 51-100	% with a PhD from universities ranked 101-150	% with a PhD from universities ranked 151-200	% with a PhD from unranked universities	% without a PhD
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adelaide	0.32	0.18	0.07	0.04	0.18	0.21
ADFA	0.09	0.17	0.04	0.04	0.30	0.35
ANU	0.39	0.29	0.00	0.03	0.13	0.16
Canberra	0.07	0.21	0.07	0.00	0.07	0.57
Curtin	0.06	0.19	0.06	0.13	0.44	0.13
Deakin	0.14	0.00	0.18	0.14	0.23	0.32
Edith Cowan	0.04	0.04	0.00	0.12	0.12	0.68
Flinders	0.16	0.11	0.05	0.00	0.26	0.42
Griffith	0.10	0.20	0.00	0.10	0.20	0.40
James Cook	0.00	0.20	0.00	0.00	0.60	0.20
La Trobe	0.27	0.17	0.02	0.05	0.29	0.20
Macquarie	0.35	0.04	0.04	0.04	0.27	0.27
Melbourne	0.46	0.08	0.06	0.10	0.18	0.12
Monash	0.23	0.03	0.06	0.25	0.19	0.23
Murdoch	0.07	0.07	0.07	0.07	0.50	0.21
Newcastle	0.11	0.07	0.00	0.00	0.50	0.32
New England	0.21	0.13	0.10	0.00	0.46	0.10
NSW	0.45	0.31	0.04	0.00	0.12	0.08
Queensland	0.14	0.11	0.09	0.06	0.54	0.06
QUT	0.06	0.03	0.00	0.03	0.34	0.53
RMIT	0.02	0.02	0.04	0.09	0.09	0.74
Southern Qld	0.00	0.00	0.00	0.00	0.40	0.60
Sydney	0.34	0.11	0.08	0.02	0.32	0.13
Tasmania	0.38	0.08	0.23	0.00	0.15	0.15
UTS	0.10	0.18	0.00	0.00	0.23	0.50
VUT	0.04	0.06	0.02	0.06	0.24	0.59
Western Aust	0.35	0.18	0.00	0.24	0.12	0.12
Western Sydney	0.03	0.15	0.00	0.09	0.38	0.35
Wollongong	0.12	0.16	0.00	0.04	0.52	0.16
All Departments	0.20	0.12	0.05	0.07	0.26	0.30

Table 3: Tobit Estimation of Research Productivity
(Productivity equals Q2-pages per staff per year*)

Dummy Explanatory Variable (1)	Coefficient (2)	Standard error (3)	P-Value (4)
Adelaide	-1.66	0.61	0.007
ADFA	-3.68	0.77	0.000
ANU	-1.26	0.57	0.028
Canberra	-4.49	1.15	0.000
Curtin	-1.85	0.76	0.016
Deakin	-1.34	0.67	0.045
Edith Cowan	-4.32	0.93	0.000
Flinders	-1.30	0.76	0.086
Griffith	-2.35	0.97	0.015
James Cook	-1.39	1.01	0.167
La Trobe	-1.98	0.53	0.000
Macquarie	-3.73	0.72	0.000
Melbourne	0.08	0.48	0.863
Monash	-2.51	0.45	0.000
Murdoch	-2.46	0.86	0.004
Newcastle	-3.52	0.70	0.000
New England	-2.30	0.53	0.000
NSW	-1.75	0.51	0.001
Queensland	-1.86	0.55	0.001
QUT	-3.26	0.66	0.000
RMIT	-2.75	0.56	0.000
Southern Qld	-4.22	1.89	0.026
Sydney	-2.64	0.50	0.000
Tasmania	-0.79	0.83	0.339
UTS	-2.75	0.55	0.000
VUT	-3.95	0.59	0.000
Western Aust	-0.92	0.76	0.227
Western Sydney	-2.77	0.60	0.000
Wollongong	-2.71	0.66	0.000
Group 1 PhD	3.03	0.36	0.000
Group 2 PhD	2.78	0.40	0.000
Group 3 PhD	2.51	0.54	0.000
Group 4 PhD	1.64	0.49	0.001
Other PhD	2.20	0.33	0.000
Estimate of sigma	2.71	0.09	0.000
Log-likelihood	-1297.05		
Correlation between observed and predicted QA2 pages of the 876 individuals	0.400		
N	876		

* Q2-pages are AER-standard-size pages published in refereed journals and adjusted for quality using the weights of Gibson (2000).

Table 4: Department Fixed-Effects
(Productivity equals Q2-pages per staff per year*)

University department	Actual productivity	Predicted productivity	Prediction errors	Counter-factual productivity	Department effect, Col 3 – Col 5	Rank
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adelaide	1.32	1.41	-0.09	1.09	0.32	8
ADFA	0.18	0.42	-0.24	0.91	-0.49	27
ANU	1.51	1.77	-0.27	1.17	0.60	4
Canberra	0.05	0.21	-0.16	0.77	-0.56	29
Curtin	0.78	1.23	-0.45	1.02	0.20	11
Deakin	1.09	1.31	-0.21	0.87	0.44	7
Edith Cowan	0.09	0.15	-0.06	0.58	-0.43	23
Flinders	1.74	1.29	0.44	0.85	0.44	6
Griffith	0.17	0.80	-0.63	0.85	-0.05	14
James Cook	1.76	1.41	0.35	0.96	0.45	5
La Trobe	1.01	1.21	-0.20	1.07	0.14	12
Macquarie	0.24	0.48	-0.24	1.04	-0.56	28
Melbourne	2.68	2.74	-0.06	1.13	1.61	1
Monash	0.71	0.83	-0.13	0.95	-0.12	16
Murdoch	0.62	0.85	-0.23	0.95	-0.10	15
Newcastle	0.14	0.46	-0.32	0.91	-0.45	25
New England	0.42	1.10	-0.69	1.13	-0.03	13
NSW	1.57	1.60	-0.03	1.28	0.32	9
Queensland	0.85	1.32	-0.47	1.11	0.21	10
QUT	0.19	0.40	-0.20	0.71	-0.32	22
RMIT	0.28	0.38	-0.10	0.53	-0.15	17
Southern Qld	0.01	0.18	-0.17	0.64	-0.46	26
Sydney	0.64	0.97	-0.33	1.16	-0.19	19
Tasmania	1.94	2.06	-0.13	1.14	0.92	2
UTS	0.22	0.61	-0.39	0.80	-0.19	18
VUT	0.08	0.24	-0.15	0.67	-0.43	24
Western Aust	2.00	1.91	0.10	1.10	0.81	3
Western Sydney	0.31	0.64	-0.33	0.85	-0.21	20
Wollongong	0.33	0.83	-0.50	1.04	-0.21	21
All Departments	0.79	1.01	-0.21	0.95	0.05	

* Q2-pages are AER-standard-size pages published in refereed journals and adjusted for quality using the weights of Gibson (2000).

Table 5: Effects of Human-Capital
(Productivity equals Q2-pages per staff per year*)

University department	Effect of a PhD from a Group 1 university	Effect of a PhD from a Group 2 university	Effect of a PhD from a Group 3 university	Effect of a PhD from a Group 4 university	Effect of a PhD from a Group 5 university	Total effect of human capital	Rank
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Adelaide	1.45	1.28	1.11	0.62	0.92	0.96	6
ADFA	0.68	0.58	0.48	0.24	0.39	0.31	23
ANU	1.62	1.44	1.25	0.72	1.05	1.21	4
Canberra	0.45	0.38	0.31	0.15	0.24	0.15	26
Curtin	1.37	1.21	1.04	0.58	0.86	0.83	10
Deakin	1.59	1.41	1.22	0.70	1.02	0.77	12
Edith Cowan	0.49	0.42	0.34	0.17	0.27	0.09	29
Flinders	1.61	1.42	1.24	0.71	1.03	0.74	13
Griffith	1.17	1.02	0.87	0.47	0.72	0.51	18
James Cook	1.57	1.39	1.21	0.69	1.01	0.88	8
La Trobe	1.32	1.16	1.00	0.55	0.82	0.84	9
Macquarie	0.66	0.56	0.47	0.24	0.38	0.38	21
Melbourne	2.16	1.94	1.71	1.03	1.46	1.62	1
Monash	1.10	0.96	0.82	0.44	0.67	0.58	17
Murdoch	1.12	0.98	0.84	0.45	0.68	0.58	16
Newcastle	0.73	0.63	0.53	0.27	0.42	0.33	22
New England	1.19	1.04	0.89	0.48	0.73	0.81	11
NSW	1.42	1.25	1.08	0.60	0.90	1.17	5
Queensland	1.37	1.20	1.04	0.58	0.86	0.92	7
QUT	0.82	0.71	0.59	0.31	0.48	0.25	24
RMIT	1.01	0.88	0.75	0.40	0.61	0.16	25
Southern Qld	0.52	0.44	0.36	0.18	0.29	0.12	28
Sydney	1.05	0.91	0.78	0.42	0.64	0.73	14
Tasmania	1.82	1.62	1.42	0.83	1.19	1.34	2
UTS	1.01	0.88	0.75	0.40	0.61	0.39	20
VUT	0.59	0.51	0.42	0.21	0.33	0.15	27
Western Aust	1.77	1.57	1.37	0.80	1.16	1.23	3
Western Sydney	1.00	0.87	0.74	0.39	0.60	0.42	19
Wollongong	1.02	0.89	0.76	0.40	0.62	0.60	15
All Departments	1.16	1.02	0.88	0.48	0.72	0.67	

* Q2-pages are AER-standard-size pages published in refereed journals and adjusted for quality using the weights of Gibson (2000).

Table 6: Sensitivity Analysis (Outliers Excluded from the Analysis)
(Productivity equals Q2-pages per staff per year*)

University department	Actual productivity	Rank based on column 2	Department effect	Rank based on column 4	Total effect of human capital	Rank based on column 6	No. of staff present during 1996-2000
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Adelaide	1.32	5	0.40	7	0.93	6	28
ADFA	0.18	23	-0.39	27	0.27	23	23
ANU	1.31	6	0.51	4	1.07	5	30
Canberra	0.05	28	-0.45	28	0.13	27	14
Curtin	0.78	10	0.25	8	0.75	9	16
Deakin	1.09	7	0.47	5	0.74	10	22
Edith Cowan	0.09	26	-0.34	23	0.08	29	25
Flinders	0.32	17	-0.33	22	0.29	22	18
Griffith	0.17	24	-0.02	12	0.44	16	10
James Cook	0.59	14	-0.24	21	0.40	17	9
La Trobe	1.01	8	0.21	10	0.80	8	41
Macquarie	0.24	20	-0.48	29	0.35	19	26
Melbourne	2.42	1	1.43	1	1.53	1	49
Monash	0.71	11	-0.06	14	0.55	13	77
Murdoch	0.62	13	-0.03	13	0.54	14	14
Newcastle	0.14	25	-0.37	26	0.29	21	28
New England	0.42	15	-0.01	11	0.72	11	39
NSW	1.57	4	0.42	6	1.13	4	49
Queensland	0.85	9	0.25	9	0.85	7	35
QUT	0.19	22	-0.24	20	0.23	24	32
RMIT	0.28	19	-0.09	15	0.15	25	46
Southern Qld	0.01	29	-0.37	25	0.10	28	5
Sydney	0.64	12	-0.13	17	0.68	12	53
Tasmania	1.94	3	0.98	2	1.31	2	13
UTS	0.22	21	-0.13	16	0.35	20	40
VUT	0.08	27	-0.34	24	0.13	26	54
Western Aust	2.00	2	0.93	3	1.20	3	17
Western Sydney	0.31	18	-0.14	18	0.37	18	34
Wollongong	0.33	16	-0.16	19	0.53	15	25
All Departments	0.73		0.07		0.61		872

* Q2-pages are AER-standard-size pages published in refereed journals and adjusted for quality using the weights of Gibson (2000).