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Forum

An Analysis of Publication Performance in a University Department of Agricultural Economics

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The Department at the University of New England is presently planning a series of internal and external reviews of its performance. This note was prepared as part of the background material pertaining to one particular aspect of performance, namely professional publication. It is contributed to this Forum in the belief that the approach and results may be of interest to agricultural economists in other academic and research departments.

Broadly, the approach taken was to quantify publication output and several hypothesised influential factors for the history of the Department, including the period when this recent aggregation consisted of both the Department of Agricultural Economics and the Department of Farm Management. The period reviewed is 1959-1977 and all data are expressed on an annual basis.

1 Performance Measures

Several primary categories of publication were identified and for each, the number of pages (rounded up to an integer value for each individual publication) was counted from the Annual Reports of the University Council. These categories were: (1) *Australian Journal of Agricultural Economics*; (2) *Review of Marketing and Agricultural Economics*; (3) other refereed journals, e.g. *American Journal of Agricultural Economics*, *Journal of Agricultural Economics*, *Econometrica*, *Economic Record*, *Journal of the Australian Institute of Agricultural Science*; (4) professional conference proceedings and unrefereed journals, and (5) books, chapters in books, monographs, bulletins and miscellaneous publications other than theses and dissertations. These categories were in turn aggregated as: $(1 + 2 + 3) =$ Prestige output; $(1 + 2 + 3 + 4 + 5) =$ Total output; $(1 + 2 + 3 + 4) =$ Non-book output. Within these categories, output was counted for the whole Department and also for the lecturing staff (hereafter called 'lecturers') only. The allocation of pages among authors (both within the Department and involving co-authors outside the Department) is done on a simple proportional basis. For the analytical phase, all performance measures were converted to a 'per appointed lecturer' basis, to permit more intertemporal comparability during the growth of the Department. Other possible normalising bases not used include 'per lecturer not on study leave', and 'per member (including junior teaching staff)'.

The crudity and imperfection of simple counts of pages as measures of performance must be immediately confessed. Apart from the arbitrary equal weighting of pages of diverse quality and importance, there are other shortcomings in this procedure, such as not allowing for different sizes of page between different journals, books and bulletins, and the integer rounding

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can result in significant biases for short contributions. However, contributions of less than or equal to two pages have been excluded from consideration.

2 Hypothesised Explanatory Variables

Age: Measurement of age according to stage in the professional life cycle would predispose the best chance of capturing the sorts of effects people have in mind when they speak of age in an academic context. However, this challenging assessment is shirked in favour of the much simpler procedure of computing the age of each lecturer at his birthday during the calendar year and averaging this across all lecturers. A pattern of a generally aging group (trending from about 31 to 41) was identified.

Courses: There has been some discussion that the Department has in recent times been overteaching and attempting to teach too many courses. It is mainly this second issue that is broached by measuring teaching burden as the total number of two-semester or year-long equivalent courses offered (according to the *University Calendar*) expressed on a per lecturer basis, *i.e.* the variable CRSS. This crude measure excludes consideration of lecturers on study leave, and other teaching arrangements including lecturing duties undertaken by various visitors, Research Fellows and Teaching Fellows.

Qualifications: The formal qualifications held by purveyors of qualifications seem reasonable to seize upon in searching for explanators of university staff performance. This aspect could be addressed in a very disaggregated fashion if the analyst felt comfortable with the task of weighting the several tertiary qualifications that have been observed over the years. It could be especially interesting to examine the comparative effects of, say, U.S.A. vs Australia graduate training. However, once again an easy way out was taken. The procedure adopted was to estimate in each year the proportion of lecturers who hold a Ph.D. degree. Thus in what follows, formal qualifications in the Department are measured by 'Ph.D.ness' (PHDN).

Research Support: An obvious way of approaching the measurement of research support (support that must surely have a direct influence on research performance, although perhaps with a complex distributed lag structure) is to account for both internal and external research expenditures. Unfortunately, this is a rather difficult accounting exercise. Instead I resorted to a surrogate that is much more easily counted, namely the numbers of research appointments (Research Fellows, Junior Research Fellows and Research Assistants), once again expressed for the analysis on a per lecturer basis, *i.e.* the variable RESP. Internal Research Grants are thus ignored in this measure.

Teaching Support: If lecturers can't get their research done through research appointments or, indeed, if their research students cause them to reduce their own productivity, a case can be made for a boost to research output coming from an increase in teaching assistance to reduce the burden of teaching commitments. Accordingly, a variable TASS, is defined to capture such an effect and is defined as the number of Tutors and Teaching Fellows employed expressed on a per lecturer basis.

Size of Department: The literature on research output contains references to the notion of a 'critical mass' of interactive personnel being necessary for a 'take off' in research productivity. I personally doubt that such an effect has been of any importance in the Departmental history. However, to keep an open mind on the question, and to keep open an option on a possible perverse 'diseconomy of size' effect, the total number of lecturers employed, LECT, was introduced as a potential explanatory variable.

3 Hypotheses

Many sets of hypotheses could be crystallised from the foregoing discussion of potential explanatory variables. For brevity and hopefully succinctness, a protestant approach is taken to stating hypotheses and potentially interesting nestings of hypotheses are circumnavigated. The most general hypotheses investigated can be summarised symbolically as:

$$\text{Total}_D, \text{Non Book}_D, \text{Prestige}_L = f(\text{AGE}, \text{CRSS}, \text{PHDN}, \text{RESP}, \text{TASS}, \text{LECT})$$

where the subscripts D and L denote whole Department and Lecturers only, respectively. The signs of the hypothesised effects are indicated below the respective variables.

4 Results

The results for the initial composite hypothesis are presented in Table 1.

Table 1: Regression Statistics for the Three Key Performance Measures

	Total _D	Non-book _D	Prestige _L
Intercept	254.	275.	18.8
AGE	-6.9 (-1.7) ^a	-6.7 (-1.8)	-0.6 (-0.9)
CRSS	-11.1 (-0.3)	-26. (-0.8)	6.1 (1.1)
PHDN	134. (2.6)	146. (2.9)	13.0 (1.5)
RESP	-4.7 (-0.2)	-7.1 (-0.4)	5.4 (1.7)
TASS	23. (0.6)	23. (0.6)	14.2 (2.0)
LECT	-2.0 (-0.4)	-4.8 (-1.0)	-1.4 (-1.7)
\bar{R}^2	0.33	0.34	0.46
$\hat{\sigma}$	23.2	22.0	3.8
d	2.6	2.4	2.3

a, Throughout, numbers in parentheses are respective *t* statistics for the partial null hypothesis that the respective coefficient is zero.

If success is appraised by the discovery of ‘significant’ effects (say where the *t* statistics exceed 2.0 in magnitude), then the data of Table 1 add up to a significant disappointment. The only effect that shines through as a consistent and important effect is the Ph.D.ness of the Department.

In spite of their statistical insignificance, other variables generally had the hypothesised signs excepting REsearch People (twice) and number of LECTurers (all 3 regressions).

A variety of time trends is embodied in these variables. On the basis of a 10 per cent significance level for a two-tailed test for simple linear trends, the variables of Table 1 can be grouped as:

Positive trend — Total_D, AGE, PHDN, RESP, TASS, LECT

No significant linear trend — Non-book_D, Prestige_L, CRSS

Negative trends in the underlying data were very sparse. The only significant negative trend was for total Departmental publication in *Review of Marketing and Agricultural Economics*. The trend of CRSS was negative (but only at the 30 per cent level of significance).

5 Discussion

The picture that has emerged from the above results is of an aging but progressively better qualified Department that is maintaining its output of professional writing with a tendency to increase output in books and

related publications. This can be summarised in a second-round regression (necessarily subject to pretest bias) involving the two most significant variables from Table 1:

$$\text{Total}_D = 205 - 6.1 \text{ AGE} + 123 \text{ PHDN} \\ \quad \quad \quad (-2.3) \quad (3.9) \quad \quad \bar{R}^2 = 0.48, \quad d = 2.4$$

The AGE and PHDN effects have operated historically in opposing directions. It is uncertain how these effects might operate in the future. Since the Department is nearly saturated with Ph.Ds, this effect may no longer continue to balance the negative effect likely to be associated with the seemingly inevitable aging of the Department.

The findings of non-significance may be worthy of comment. The CRSS effect was consistently negative thus adding some support to the idea of 'overtaching'. The ambiguous performance of the RESP variable raises some doubts about the virtue of employing people on outside funds as a means of improving output — although investigation of lag structures may resolve these doubts. Likewise, employing more junior teaching staff doesn't seem to have an important influence on research productivity. Finally, the size (LECT) effect seems, if anything, to be generally negative. Perhaps in agricultural economics the 'critical mass' of people is a very small mass of 2 or 3? Whatever the explanation, the observed negative effect may offer the consolation that a future period of negative growth may be characterised by an increase in productivity!