The Promotion of Indigenous IR&D in Australia and the Effectiveness of the Industrial Research and Development Incentives Scheme *by Price Waterhouse Inc.*
(for the Department of Industry, Technology and Commerce, 2 Volumes, Canberra, 1985).

Regular readers of *Prometheus* will not need to be told that recent years have seen a steady stream of government reports on Australian R & D. In the past, many of these reports were an embarrassment. Report after report extolled the virtues of Australian fundamental science in terms more appropriate to the virginal heroine of a Mills and Boon romance.[1] Occasional attempts by the board of the Australian Industrial Research and Development Incentives Scheme (AIRDIS) to survey industry opinion were noteworthy only for their self-serving flavour.[2] A striking feature of more recent official publications has been their improving quality, and the Price Waterhouse analysis of AIRDIS continues this trend.

The current system of government subsidy to R & D has been in operation for ten years, and is itself a remodelling of an earlier scheme dating back to 1967. In 1984 Price Waterhouse were commissioned to review AIRDIS so as to provide some policy guidance prior to the expiry of the enabling legislation in 1986. That purpose appears to have been usurped by the government's already announced intention of replacing the twenty year old system of direct grant support by the 150% tax concession as the main public incentive for private industrial R & D. The report therefore has to be read more as a valedictory for AIRDIS than as a guide to future policy.

Price Waterhouse put together a strong study team of people noted for their work on Australian innovation, such as T.G. Parry and Peter Stubbs. The result is a genuine contribution to our understanding of the grants scheme. This is because the study not only generated a massive amount of new statistical information about the operation of AIRDIS (the two-volume report contains over 200 statistical tables) but because the evaluation is set in the general framework of the innovation literature of recent years. Thus, a substantial part of the main volume reviews the extensive international literature on theories of innovation, moves on to discuss the specific influences on innovation in Australia, and only then turns to the impact of AIRDIS on Australian R & D.

The literature review is well executed. It covers the main issues of technology and growth, models of innovation, and that old favourite the Schumpeterian controversy about innovation and market structure. There is a decent summary discussion of market failure in R & D. The chapter dealing with the influences on innovation in Australia clearly brings out the special features of the local scene. These include the reliance on overseas technology, and the role of import competition, as well as domestic competition, in framing a sensible test of the Schumpeterian hypothesis for Australia. These chapters read well. Since both Parry and Stubbs write with an easy pen, it is not difficult to guess that these conceptual chapters were primarily their work.

Curiously, the weaknesses of the report lie in the statistical analysis. We have already noted the wealth of data generated in the questionnaire surveys carried out by Price Waterhouse. Despite this abundance of material, there is little quantitative evidence on a key aspect of AIRDIS. A central issue in

measuring the success of public subsidy is whether the subsidy actually increases the value of resources devoted to R & D. Two types of grant have been offered under AIRDIS. Project Grants are awarded on a competitive basis to companies with established R & D facilities to assist them with specific projects. In recent years, projects deemed worthy of support have been subsidised through Project Grants on a dollar-for-dollar basis i.e. the government pays half the cost of selected projects in a firm. For individual projects, therefore, the amount of subsidy received is keyed to a firm's own expenditure. Once we consider a firm's entire R & D budget, no such positive correlation need result. Receipt of a subsidy may increase, decrease, or leave unaltered the total R & D expenditure of the recipient firm. Subsidy may actually reduce a firm's spending from its own resources if the subsidy is granted to a project which the firm would have undertaken anyway. In this case, government finance merely reduces the level of funding required by the company. This line of argument is quite different for Commencement Grants, the other strand of AIRDIS. These grants are paid to eligible companies on the basis of R & D programme, not project expenditure. The question of substitution between subsidy and a firm's own funds does not arise when subsidy is linked to a firm's overall R & D budget: we necessarily expect a positive effect on a firm's own spending.

It follows that a key requirement of tests of the quantitative impact of subsidy is to unscramble the effects of different types of grant. This cannot be done with any confidence using published data. The regular surveys of R & D expenditure conducted by the Australian Bureau of Statistics do not distinguish between different types of grant. The annual reports of the AIRDIS board list Commencement and Project Grants separately, but they are classified according to the International Patent Classification. The only way these latter data can be used in a well-specified model is to reclassify them according to the Australian Standard Industrial Classification and match them up with the industrial data from the ABS surveys. As both Canada and the United States have found, developing an SIC/IPC concordance is fraught with difficulty. With the freedom to undertake a large-scale survey of AIRDIS recipients, one would expect Price Waterhouse to seize the opportunity to address directly the crucial question of the differential impact of Commencement and Project Grants. This appears not to have been done. It is true that respondent firms were asked to judge, for Commencement and Project Grants separately, whether AIRDIS had some influence in their decision to undertake R & D. However, in the econometric analysis of determinants of R & D expenditure, AIRDIS was coded simply as an indicator variable (yes/no) without separating the different types of grant and without even measuring the dollar value of grants. An opportunity was missed to provide quantitative evidence on a vital issue.

The second statistical problem lies in the logistic regressions estimated by the study team. These logit equations are used to estimate the probability of receiving a grant, given such attributes as firm size, industry group, foreign ownership, and exports. This reviewer can generally keep his head above water with econometric analysis, but in this case he found the presentation so terse as to be very difficult to follow. This might not matter but for the fact that "the results of the analysis demonstrated that the terms for industry group, foreign

ownership, and exports were all statistically significant . . . variables" in explaining the likelihood of receiving AIRDIS support (Volume 1, p. A50). This is surely an interesting and important result that cries out for some interpretive analysis. No such analysis is offered. A fairly assiduous search failed to find any sign that these results had been incorporated and analysed in the main text.

It needs to be stressed that despite these deficiencies the report is the most thorough evaluation of AIRDIS that has yet appeared, and it is well worth reading for its many detailed observations on the determinants of industrial R & D in Australia. The overall result is a report built on good conceptual foundations and supported by much worthwhile statistical material, but which in the final analysis has not really used to best effect the opportunity to provide definitive evidence on the quantitative impact of AIRDIS.

K. Gannicott
University of New South Wales

REFERENCES

1. Australian Science and Technology Council, *Basic Research and National Objectives,* Parliamentary Paper 171/1981, Canberra; *Independent Inquiry into the Commonwealth Scientific and Industrial Research Organisation,* (Birch Report), Parliamentary Paper 283/1977, Canberra.
2. Australian Industrial Research and Development Incentives Board, *Annual Report 1977-78,* Parliamentary Paper 308/1978, Canberra.

The Use of Information in a Changing World *edited by A Van der Laan and A.A. Winters*
(North-Holland, Amsterdam, 1984) pp xii + 470, $US 53.75
ISBN 0 444 87554 9.

The way in which various groups gather and use information has been studied in increasing detail for at least the last 40 years. J.D. Bernal probably started the current trend by his analysis in 1946, of the different types of information needed by scientists and applied scientists, and this was followed in the sixties by the Bath Study in Britain and by T.J. Allen's pioneering work on information-gathering in a US research laboratory, in which he used what is now called the 'critical incident' technique. These types of studies have continued to increase in number and variety throughout the world, and have been supported in some cases by special centres for user studies.

This book represents another step along the same road, composed as it is of papers presented at the 42nd Congress of the FID (Fédération Internationale de Documentation) held in The Hague in 1984, the theme of which was the use of information in a changing world. In view of the history of the FID, which was founded in 1895 to foster international co-operation and research in documentation, it is not surprising to find that many of the authors have a strong documentalist background and come from a total of 23 different countries.