insight into the location of high tech activity. The authors have a very rich data base in the county level values of employment in high tech sectors, but the data are not always appropriate for the theories and hypotheses being tested. The dichotomy of the book's intended audience causes some problems in the presentation of the material.

Robert Garhart
College of St. Thomas, St. Paul, Minnesota

Improving Australia's Competitiveness Through Industrial Research and Development. A Report to the Prime Minister, *by the Australian Science and Technology Council*
(AGPS, 1987) pp. vii + 56, ISBN 0-644-6716-0.

The theme of this ASTEC report is that Australia's industrial and economic competitiveness has been eroded by insufficiently well-directed and energetic research and development. The central point is made in Chapter 1. World manufacturing trade has grown almost ten-fold in the past 25 years, while agricultural trade has barely doubled. Australia remains primarily an agricultural and mineral exporting nation and is not participating in this growth of world trade. The solution: "Indigenous R&D will play an important role in increasing Australia's competitiveness, through enhancing industry's capability to develop high growth industries . . ." (p. 19).

It is difficult to know how much poetic and dramatic licence is desirable in major government reports. R&D, like many other forms of expenditure, is undoubtedly a good thing. It **does** promote productivity in industry (mineral, agricultural and manufacturing). The **real questions** concern how much national effort should be placed in R&D, and who should decide the amount, and direction in which it is spent.

Crude comparisons with R&D activity in other countries are the main method for supporting the assertions of the report. This is a most unwise mode of analysis. World trade in manufactures has grown dramatically for many reasons, and among these reasons technological product innovation is probably fairly unimportant. The big changes are due to the expansion and development of the EEC, the continued success of GATT, and the emergence of Japan as a revitalised player on the international scene.

If trade growth is important for economic growth, then Australia must promote policies which free-up the trade in agricultural and mineral products, since these are industries in which the country has most comparative trading advantage. Unfortunately the ASTEC report focuses almost exclusively on manufacturing industry, which is a small part of Australia's present (and prospective) export market.

Clear and dramatic improvements in agricultural and mining productivity have enabled Australia to maintain a major world position in these markets, even in the presence of a hostile trading environment. Continued productivity gains in these areas are essential if this position is to be maintained in the future.

Recent evidence indicates that, in purchasing power terms, Australia has maintained a fairly steady ranking among the leading Western economies since

1950.[1] On balance, the nation is doing many things correctly. The fact that Australia spends less on R&D-per-whatever than many Western economies is not putative evidence that it should spend more. It tells us only that Australia is different. But why is Australia different?

The report identifies some existing public policies which discourage industrial R&D. These include bureaucratic regulatory structures which hamper new product approvals, features of the taxation system, such as those related to stock options, which discourage employee participation in the future profitability of invention, differential tax treatment of private enterprises and quangos, and also certain government procurement policies. In each case the report has made specific recommendations to remove artificial barriers which stifle inventive effort.

The report also addresses a separate set of issues. These concern the ability and/or competence of Australian entrepreneurs. The report asserts that "Australian business in the past has concentrated on incremental improvements of mature products rather than the development of a new generation of products" (p. 21). And that one requires "a company Board with some technical competence. This feature is generally missing in Australian companies, and contrasts with the situation in leading countries, . . ."

Perhaps these statements are simple attempts to jaw-bone corporate management into a more aggressive stance on R&D. Yet no evidence is reported to suggest that either of the above two propositions is true. One suspects that in a market economy, such as Australia's, profit seeking companies and individuals have long ago determined (to a reasonable approximation) the comparative benefits of incremental *versus* radical productive development, and also the appropriate level of technical expertise required of directors on company Boards. Assertions that management (and workers) are incompetent, or not sufficiently aggressive, are cheap shots, and needlessly denigrate the national character. If anecdotal evidence to ASTEC indicates problems, these should be systematically examined. Evidence is needed to establish the general veracity of the claim, and following that, to identify underlying causes, such as, for example, deficiencies in the education system.

The 150 percent taxation concession on R&D expenditure has put Australia at the forefront of nations offering give-away subsidies for R&D. Preliminary evidence (Figure 1.3 of the report) shows a surge in private R&D expenditure since the introduction of the tax subsidy. The report correctly notes that some of the measured rise in R&D is due to altered corporate accounting practices which take full advantage of identifying concessionary R&D expenditure. The taxation concession scheme is being monitored by the Bureau of Industry Economics. It will be some years before the full real impact of the program is known. The ASTEC report recommends that changes to the tax concession scheme be implemented with at least five years of prior notice. This recommendation is important. The planning horizons associated with R&D are frequently long, and are easily discouraged by uncertainty or apprehension about future government tax policy. A long time trial with the scheme can also offer definitive evidence of its efficacy. All too frequently tax concessions for specific industries, or types of investment, are introduced to meet short-term politic-economic exigencies, but are then amended or removed before the policy can be objectively assessed.

The report, like most government papers on this subject, suffers from Rahmanesque technological Portnoyism. New technology is good fun, scientists are good people, so let's all get together and invent new products! The report does not ask how Australia may go about getting the same technology benefits in other ways. What can be done to get overseas technology quickly and cheaply?

The patent system allows foreign inventors monopoly benefits in the Australian market. In return Australia gets a comparatively small monopoly share of overseas markets. It is too much to hope that even the economic pragmatists of the Hawke-Keating government can disband the patent system in the face of the complex political issues, and vested financial interests. But why not weaken domestic patent protection to the limits permissible under existing international conventions? This can be achieved by amending the relevant statue. A less politically costly strategy is to reduce public funding for the Patent Office to the point where the patent approvals process becomes optimally congested. Why are these strategies never discussed?

A second and persistent blind-spot of R&D policy is that of overseas education. Domestic higher education is very heavily subsidised. Australian students choose to stay in this country since the 'private' costs of education are much lower than abroad. Yet the total social costs are not nearly so different for study in Australia, Japan or the US. Australian students in foreign institutions can have direct access to much of the best features of foreign technology (and management). There are quite notable instances of some countries being heavily represented in US and European universities, largely for the purpose of 'learning' technology. The political problem is that no one can decide if the Department of Industry and Technology or the Department of Education makes the running on this issue. If the matter was at least discussed, and given a public profile, there would be some hope of remedial action.

In summary, the ASTEC R&D report has hit on many of the small issues but missed many of the big possibilities for improving Australia's productive competitiveness.

REFERENCE

1. S. Dowrick and D.T. Nguyen, "OECD Economic Growth in the Post War Period", Centre for Economic Policy Research Discussion Paper No. 181, Australian National University, 1987.

John J. Beggs
Australian National University

Technical Change and Full Employment *edited by Christopher Freeman and Luc Soete*
(Basil Blackwell, Oxford, 1987), pp. vii + 279, $A103.00, ISBN 0-631-14099-9.

Over the past several years a group of economists at the Science Policy Research Unit (SPRU) of the University of Sussex has studied technical change and its relations to investment, output, productivity, trade and employment. The group's approach has been both micro-economic (yielding surveys of post-war developments in twenty-two U.K. manufacturing and service industries, collected in six monographs published by Gower Press) and macro-economic (yielding three general volumes on methodology and findings, of which the book under review is the third).

The research underlying these publications begin in 1979, when registered unemployment in the U.K. stood at 1.4 million persons; when it was completed,