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,

unemployment, on an even narrow definition, was approximately two-and-a-half times as high: the "Full-Employment" of the title seemed illusory. In such a situation it was hard for the editors to conclude that an inability to adapt to technical change was the sole cause of high unemployment, nor that the adoption of their specific recommendations (in Chapter 12, "Policy Conclusions") would eliminate it. In the end, specifically at the beginning of Chapter 12, Freeman and Soete admit the task is of much greater dimension, and propose, in the Keynesian manner, that the U.K. government expand substantially its public expenditures, particularly public investment. It is thus within a programme of increased (and perhaps equally illusory) public expenditure that their adaptive measures are framed.

The measures themselves (pp. 241-256) are not surprising: increased government support for R&D, together with a reallocation of the government's own expenditures on R&D from military to civilian pursuits; emphasis on diffusing new techniques, whatever and wherever their origin; expansion of formal education and of training schemes in technical subjects; strengthening of local and regional authorities (so as to tap local enterprise and facilitate the adoption of advanced methods of longer-distance communication); encouraging of wage flexibility and occupational mobility; and concentrating attention on the growth of new industries, rather than on the preservation of old.

It is the last of these measures that is most strongly supported by the evidence presented in the text. In Chapters 7 and 8, employment trends in U.K. manufacturing industries are analysed, in the light of the volume of capital investment historically carried out (Chapter 7, by John Clark, Pari Patel and Luc Soete), and the numbers of innovations created or utilised (Chapter 8 by Pari Patel and Luc Soete). The conclusion from the former chapter is that total employment in manufacturing is not likely to increase, given expected rates of growth of fixed investment and capital productivity (p. 117); the conclusion from the latter chapter is that only a few manufacturing industries — electronics, computers and pharmaceuticals — have bucked the trend in the past, not so much because their expenditures on R&D have been high but because their rates of output growth have been rapid and the spread of their products has been pervasive (p. 142).

It is well known, and further documented in the latter chapter, that growth of employment in the U.K. service sector, particularly in distribution, banking, insurance and business services, has to some extent offset the fall in employment in manufacturing. A chapter (Chapter 9, by Ken Guy) is devoted to employment in the service sector: a lack of data on output, investment and productivity precludes the sort of quantitative analysis carried out for manufacturing, so reliance is placed on the qualitative results of the individual Gower studies. In stating his conclusions Guy distinguishes between those services which are capital-intensive (utilities, transport and communication — the "network services") and those which are labour-intensive (the remainder). With the exception of communication it is only the labour-intensive services that can be counted on to provide much new employment, and with the exception of private commercial services these sources of new employment (communication, construction, education, health and public administration) are dominated by public policy (p. 188). Which raises the Keynesian spectre again.

In the year that has passed since this book was published registered unemployment in the U.K. has fallen below three million persons; in Chapter 11, John Clark and Christopher Freeman suggest how, by 1995, this number

of jobs might be provided. Employment potential appears in information technology producing and using-services (finance, business, professions, engineering and computers) to the extent of 600,000 jobs; personal market services (including distribution) 1,150,000 jobs; and public services (including construction) 850,000 jobs (Table 11.4, p. 234, median figures). The gap between the total above (2,600,000) and the three million is made up of additional places provided in education, training and community projects. Optimistically, the authors conclude "But given a favourable trend in the world economy we would maintain that the type of increase suggested is certainly not unattainable" (p. 235). The readers of this book will hope that the attainable is attained.

**J.L. Enos**
Magdalen College, Oxford

**The Ends of Science: An Essay in Scientific Authority** *by Barry Redner.* (Westview Press, Boulder, 1987.) pp. xiv + 344, ISBN 0-8133-0452-0

Harry Redner's *The Ends of Science* is a work of enormous scale; it is indeed a *tour de force* on several levels, as the dustcover suggests. Redner undertakes an historical sketch of science, in an encompassing sense that extends through the natural and social sciences into the humanities, which identifies a disjuncture around the time of the two world wars. This disjuncture is identified as, **and** with, a change in the form of the organisation of science. Having established the historical disjuncture in science, and relating the characteristics of the posited modes of science, Redner seeks to identify the extant beginnings of a thoroughgoing scientific reformation in order to suggest parallels and convergences amongst the reforming forces which might permit of their co-operation and co-ordination, and thereby their reformative (revolutionary?) triumph. Indeed the suggestion of both means and avenues of a reformation appears to be the book's *raison d'etre*.

Redner's study is divided into three main parts. Their aims and concerns are first, to establish the existence of, and characterise the transformation of **classical science** into **world science**, second, to establish the interrelationship of knowledge and authority, and third, to trace the development of reformative movements currently at work in the sciences, and to identify their convergences in order to suggest the direction of reform. I shall look at each in turn.

Redner begins (Part I) the task of identifying a disjuncture or transformation in the development of science in the twentieth century by taking a proxy census of participant scientists. Using a series of quotations from practising scientists in a variety of disciplinary fields, a transformation around the time of the two world wars is suggested. The basis of this is the expression of a sense of the end to a golden era of progress. While the disjuncture seems to me to be a real one, I doubt the usefulness of this method of establishing it. Effectively Redner's approach is an attempt to overcome the problem of attribution by employing only the expressive meaning of the participants. I suggest that perhaps a use of Mannheim's 'documentary method' would have been a valuable alternative or supplement. It is all too common for people who have made a major