studies. The 'lessons of history', such as 'don't vote for Hitler', are 'easily understood'[5] Forester said. If only this were really so.

REFERENCES

1. D. Dickson, *The New Politics of Science,* Pantheon Books, New York, 1984.
2. K. Pavitt and M. Worboys, *Science, Technology and the Modern Industrial State,* Butterworths, London, 1977, p. 23.
3. H. Zuckerman, 'Uses and Control of Knowledge: Implications for the Social Fabric', in J.F. Short, Jr. (ed.), *The Social Fabric,* Sage, Beverly Hills, 1986, p. 340.
4. *Sydney Morning Herald,* 5 March 1988.
5. *Griffith Gazette,* 8 April 1987.

John Laurent
Sydney College of Advanced Education.

Pharmaceutical Economics *edited by Björn Lindgren*
(Liber Förlag, Malmo, 1984) pp. 286, ISBN 91-38-61372-7.

This book contains twelve of the papers presented at the 6th Arne Ryde Symposium on Pharmaceutical Economics held in Sweden in September 1982. The symposium was organised jointly by the Department of Economics at the University of Lund and the Swedish Institute for Health Economics.

The papers in this volume have not been classified into any parts or sections and at first glance one might form the impression that there is no underlying theme to the collection, other than relevance to the pharmaceutical industry. To a large extent this is true although the editor, in his introduction, argues that the papers generally deal either with issues concerning the use of existing pharmaceuticals or with the performance of the pharmaceutical industry (p.13). This dichotomy, however, is rather broad and is not very indicative of the contents of the included papers.

Briefly summarising each of the papers in turn, the first by Hay utilises cross-section data from 202 Health Systems Agency regions in the United States (US) for 1978 to investigate the determinants of regional variation in per capita prescribed drug expenditures. Of particular interest is the finding with respect to the substitutability of drugs for other health care services. The hypothesis that higher per capita drug expenditures will result in fewer hospital days per 1,000 population is only weakly supported, and no significant relationship is found between per capita drug expenditures and per capita total health care expenditures.

Zweifel develops an economic model of physician behaviour which generates a number of hypotheses concerned with the substitutability of ambulatory care for hospital care. The empirical investigation uses data on 270 Swiss general practitioners and so incorporates a specific institutional feature of that health care system, *viz.* that physicians in German-speaking regions (except major cities) can sell drugs on their own account. The hypothesis that increased use of these 'sold drugs' would reduce the propensity to hospitalise patients was not empirically supported.

In what is basically a conceptual paper, Pedroni argues that the problem of adverse drug reaction has an economic as well as a medicinal dimension. Her conclusion will come as no surprise to economists: that in general an unqualified ban on sales of drugs that have unexpected adverse reactions is a poor solution. Resricted usage coupled with intensified observation is more likely to be socially beneficial.

Assessing the benefits of medical technologies in terms of improvements in quality of life is the subject matter of the next paper by Leu. The relevance of this paper extends well beyond the bounds of pharmaceutical economics and will be of interest to anyone working with health status indexes or with cost-benefit or cost-effectiveness analysis in health. Leu uses a MIMIC (Multiple Indicators MultIple Causes) model to develop a disability index for people suffering from the skin disease psoriasis. Although relatively widespread, this disease does not usually affect longevity or earnings capacity but can have serious psychological and social effects because of cosmetic considerations. These effects are captured in Leu's empirical estimates of the disability index, produced using data collected from interviews with, and questionnaires complted by, 465 psoriasis patients. Aggregating these patients into various sub-groups produces some interesting between-group comparisons of the extent of impairment. Obvious extensions include measuring **changes** in the index following a treatment program and **valuing** such changes for cost-benefit purposes. It is likely that, in the future, changes in health status which are not reflected in changes in longevity or earnings capacity will increase in importance, a point made by Landefeld in his paper in this book. See below.

Maynard and Hartley address some issues concernging regulation of the pharmaceutical industry with particular reference to the United Kingdom (UK). Five objectives of government intervention in the industry are discussed: pursuit of safety and efficacy; minimising drug costs to the National Health Service; maximising the value of pharmaceutical exports; encouraging competition through anti-trust legislation; and encouraging R & D on pharmaceuticals by granting patent protection. The conflicts and trade-offs involved in pursuing these objectives are analysed, followed by a brief overview of some issues involved in determining whether the pharmaceutical industry is efficient. They suggest that the incomplete evidence which is available indicates that it is not, and conclude with a challenge to researchers 'to investigate the magnitude of this inefficiency and investigate the implications of its reduction on the regulation of the industry' (p. 136).

The effect of different levels of regulatory stringency on the international diffusion of drugs is examined by Parker. The data relate to a range of drugs in 18 countries over the period 1954 to 1978. Five different time lags and two measures of regulatory tightness are used in the study. The US and Japan have the highest mean tightness rating (a value of unity) with Indonesia at the other end of the spectrum (a value of five). Overall there is little evidence that regulatory stringency increases the time taken for drugs to spread around the world. Market size and regulatory stringency are significantly positively correlated but there is no consistent evidence to support the hypothesis that tighter restrictions cause longer delays in the international diffusion of drugs.

The next five papers are all concerned with some aspect of pharmaceutical innovation. Grabowski and Vernon give an explanation of a computer simulation model of pharmaceutical innovation which they have developed and report the results of various experiments. These experiments include varying the probability

of technical success of an R & D project, examining alternative patent lifetimes and generic substitution rates, changing the total drug development and regulatory approval time period, and comparing the effects of various income tax rates. The model is centred around new product as opposed to new process innovation and the authors stress that, in its current stage of development, the model should not be regarded as a planning or forecasting device. The technical appendix referred to in the text of the paper is not included in the book.

Wardell and Sheck are concerned with attempting to measure whether pharmaceutical innovation in the US is declining. They have collected survey data on the number of investigational new chemical entities (NCEs) originated by US-owned firms, and marketed NCEs, the former being NCEs which are entering the clinical research phase and the latter being NCEs approved for sale. The hypothesis is that the number of investigational NCEs can be used to predict trends in the number of marketed NCEs. They find some support for this hypothesis. The data also indicate a recent decline in the number of investigational NCEs which leads the authors to predict that there will be fewer US-originated NCEs appearing on the market in the remainder of this decade.

The paper by Wiggins produces evidence on the effect of US pharamceutical regulations on the introduction of NCEs. Following the 1962 amendments to the US **Food, Drug and Cosmetic Act** imposing more stringent conditions on the granting of marketing approval for NCEs, there was a significant decline in the rate of introduction of new drugs. The cause-effect relationship here has been controversial and various alternative explanations of the decline in NCEs have been put forward. Wiggins sheds some more light on this controversy by using data on new drug introductions disaggregated by therapeutic class. His results suggest that 'regulatory factors are not as important as previous studies have suggested, and that nonregulatory factors are relatively more important' (p. 192).

The main objective of Dao's paper is 'to test the hypothesis that innovation exerts downward pressure on the prices of competing drugs' (p. 208). A supply and demand model of competing drugs is econometrically estimated using data on 19 drug classes for the period 1967 to 1976. The empirical results support the hypothesis: innovation does stimulate price competition.

The last of the five papers dealing directly with pharmaceutical innovations presents estimates of the private and social returns to such innovations. Wu finds that, for the three products studied, the social rate of return exceeds the private rate of return by a substantial margin. Any such study, of course,is always confronted with joint cost problems and the author warns readers several times that the particular method of assignment used in the study must be borne in mind. The paper concludes by drawing out some policy implications of the results.

The final paper in the book by Landefeld deals with the measurement of returns to biomedical research. Over half the paper is devoted to a general discussion of earlier studies in this area, problems of measuring biomedical research and its effect on health, and issues in the economic valuation of health benefits. The remainder of the paper then summarises the empirical results of a major three-year research project in this area directed by Selma Mushkin. A point made in the conclusion on this paper, and addressed explicitly in the earlier paper by Leu, I think warrants emphasis: that future benefits of biomedical research are more likely to manifest themselves in general quality of life improvements, e.g. reduced pain for terminal cancer patients, rather than in

increased longevity. As such, economists need to refine their measures of health status so as to capture these dimensions of the output of biomedical research adequately.

Overall this book contains a very interesting collection of papers. As the foregoing discussion indicates, they address a wide range of issues in pharmaceutical economics and a number of the contributions contain original, previously unpublished empirical work. Most researchers working in this field will find something of interest in this volume.

J.R.G. Butler
Queensland Institute of Technology

Manufacturing Matters: The Myth of the Post-Industrial Economy *by Stephen S. Cohen and John Zysman.*
(Basic Books, New York, 1987), $19.95, ISBN 0-465-04384-4.

Talk today is of a changing world economy in which the very structures of both industrial and national competition are being re-defined. Evidence of such change is all around and is provided by the media on a daily basis. Witness for example how contemporary geo-politics have been altered in the past twenty years by the rise of Japan, the less flamboyant but (perhaps) more impressive emergence of West Germany, the surprising emergence of New England in the United States as a 'high-tech zone' (which even in the 1960s was generally considered to be a moribund area industrially), and the new importance of such states as South Korea. Or consider the fact that trade, in both goods and services, has been replaced by capital movements as a principal force in the world economy, and that production in industrial economies has significantly become uncoupled from employment.

That we are in a period of dramatic change is undeniable. What is much harder, however, is to make sense of these changes. Attempts at such understanding are ongoing and, indeed, there are interpretations of current events to suit every opinion or interest.

At times, for example, import/export patterns are in the spotlight. As imports pour in, production moves offshore and other factories close. What, from a public and business policy point of view, is to be done? To some, the answer is increased protectionism, which is to say that we must protect our economic base by building barricades around the blue-collar production jobs and plants of the past. There are obviously serious questions to be considered in this kind of response. Under such circumstances, for example, would protected industries undertake the massive investments, reorganisations and innovations necessary to keep at the leading edge in technology, incomes, and power? Recent Canadian, British and American experience suggests not. And as Peter Drucker has recently argued, citing the British experience, any country, industry or company that puts the preservation of blue collar manufacturing jobs ahead of international competitiveness will soon have neither production nor jobs.

At other times, interpretations of contemporary economic change have focused on wages. Typically these arguments hold that pay levels must be brought down to match those of Taiwanese or Korean workers. But these levels, which, by the