REGULATORY SYSTEMS DESIGN[1]

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If the broad purpose of regulation is to replicate the results of a competitive market, we need to be clear what are those results. It is a reflection of the difficulty of that task that competition has been given so many labels, ranging from perfect to managed; and can relate to products, processes, locations, firms, nations, technologies and systems.

Modelling in which the collection, processing and use of information is continuous is needed. This approach has to be carried into the design of regulatory systems. In particular, the information processes in which the regulator and firm participate must not be locked away in 'black boxes'. Learning, knowing and having information are complex matters, giving rise to lock-in and diversity, and affecting key concepts like technology, information, cost and profit.

Keywords: Competition, information, new regulatory economics, regulatory systems design.

INTRODUCTION

If the broad purpose of regulation is to replicate the results of a competitive market, we need to be clear what are those results. I suspect it is a reflection of the difficulty of that task that competition has been given so many labels:

> e.g., perfect, pure, imperfect, monopolistic, workable, open, potential, sustainable, dynamic, unfair, free, acceptable, ordinary, derived, direct, indirect, genuine, managed, cannabilistic.

The mode of competition can be vigorous, sustained, muted, fierce even ferocious, cruel, constructive and not ungenerous, creative, unscroupulous and wasteful. It can relate to products, processes, locations, firms, nations, technologies and - of particular relevance for communications - systems.

In the latest announcement of post-1997 policy principles, Minister Michael Lee referred to "full and open competition" of a "substantial kind".[2] This, he stated, would give consumers lower prices and access to an improved range of services, by allowing more industry players and removing obstacles to the use of new technology.

The concept of open competition, which bears a good deal of similarity to the more recent sustainable variety, is not new. Marshall used the term in his *Industry and Trade*.[3] But Marshall was fully aware of the interlacing, interpermeation and intermingling of competition with monopoly, whereas we seem to be still trying to break out of "the perfectly competitive prison".[4]

THE INFORMATION ASSUMPTION

Game theory has taught us about "the infinite subleties of rational behaviour"

and "the informational structure and learning processes on which equilibrium outcomes do in fact depend".[5] Despite that contribution and related efforts in information economics, mainstream economics still lacks a model of the economy in which "information is continuously being collected and processed and in which decisions, based on that information are continuously being made".[6] Such a model has been needed, at least since the monopolistic competition revolution of the 1930s, because that revolution, from the perspective taken in this paper, had more to do with the abandonment of the perfect knowledge assumption than with modification of the number of industry players.[7]

The customary concession is that the statics have to be emphasized and the dynamics neglected. A superb microeconomics text conceded after more than 400 pages that "[w]e have not included the performance of the market mechanism in the dynamic area: how well it allocates resources for growth, whether its allocations to research and development are sufficient and properly structured, how stable the allocation of resources is over time, whether consumers tend to allocate their income over time in optimal welfare patterns, and so forth".[8]

So we tend to get bogged down in a limited kind of world, a world of Ramsey prices and the ECPR (efficient component pricing rule)? The approach remains a marginalist one. The system is OK but control has to be applied at some points. Profit is fine, but there must not be excess profits. The service is good, but we have to be vigilant; we must ensure that those who cannot afford phones, for example, still have access. So now we have the latest half-a-phone system - inward, social purpose calls but no outward, frivolous ones.

REGULATORY SYSTEMS DESIGN

Has the so-called new regulatory economics brought remedies? The Laffont and Tirole bible tells us that "modelling must include a full description of the firm's and the regulator's objectives, information structures, instruments and constraints. Information structures and the set of feasible regulatory schemes must as much as possible reflect real-world observational and contractual costs. Instruments and constraints must fit with property rights and laws, and whenever possible, property rights and laws, should themselves be determined endogenously by the analysis".[9] The three basic problem areas are identified as asymmetric information, lack of commitment and imperfect regulators.

Much of this effort would appear to have been directed to the incentive front rather than dealing with information processes; and it is information processes rather than information structures that are, I believe, important. Nightingale points out[10] that Laffont and Tirole gave scant attention to technological change, and I would add that organizational change, or change in information-handling competence, did not rate an index entry.

We have at least to try to avoid the causality pitfall.[11] Changes in regulatory procedure may correlate with price reductions and innovation without implying a causal relationship. Rosenberg did well to remind us that we cannot answer the question

whether the AT&T divestiture achieved its objectives, because we cannot observe the path of the industry in which AT&T remained a monopolist.[12]

THE ROLE OF INFORMATION

There are then several reasons for thinking that greater attention needs to be given to the role of information. First, technological information appears to be playing an important part in the course of events in the telecommunications industry.

Secondly, as the new regulatory economics has recognized, asymmetric information is important; but we must not be content with a somewhat static treatment of given asymmetries. We need to go further and ask about the causes of the asymmetries and the courses of action they set in train.

A third consideration is that the search for profit has become a search for information - this is perhaps one way of indicating the real significance of the emergence of the information economy. The information confers competitive advantage, increases market power and brings a weakening of competition.

Given the long-standing industry preference for non-price forms of competition, we might expect the role of information to remain and even be enhanced. When no gateway was available under restrictive practices legislation in the UK, firms resorted to information agreements.[13] More recently, cooperation through alliances and other corporate couplings have been used in similar ways. Of course, in the dynamics of systems competition, such information exchanges may be transitory and length of alliance life may be irrelevant as a criterion of success.

Another important aspect of the role of information is brought out if we consider the implications of the word 'design'. It seems to me fair and reasonable to give credit for a good deal of design effort on the incentive front; but it has not been matched by similar effort in relation to information processes.In a 1979 paper Arrow sketched a picture of optimal organizational design when acquiring and transmitting informative signals. It was his view that "[t]he theoretical problems of designing organizations along these lines [had] barely begun to be analyzed". He added that "even more interesting would be empirical studies of organizations to see to what extent they have been evolving toward theoretically optimal standards".[14]

Both regulator and regulated firm qualify as organizations in Arrow's sense.[15] In each case, they are nested: the regulator within a network of interlinked organizations concerned with state and international policy — as the modified AUSTEL will be linked with the new Australian Competition and Consumer Commission (ACCC); and the firms within the systems structure of both the domestic and international telecommunications and information activities industries.

The role of information, and especially of technology, raises big issues. In very limited time I can do no more than draw attention to the difficulty inherent in the notion of optimal use of information - a notion that intrudes into the regulatory process once we open the door to the creation of or even the adoption of new technology. Optimal use would seem to depend upon the kind of information, who is using it and in what circumstances, and for what purpose. Despite an enormous

literature, limited guidance is available. "[W]e may,...modestly, resolve that in all actions that we decide to take we try to act intelligently, with full consideration of the pertinent knowledge at hand and of the pertinent knowledge available at reasonable cost".[16]

We can try to allow for limited competence in information-handling by confining our attention to specific "batches of knowledge". But we still face problems of the relevant time period, the interdependence of batches of knowledge, and the broader competence issue. We seem to be pushed inevitably toward a satisficing rather than a maximizing stance. Information-handling is a continuing activity and the successful firm emerges as one able to monitor and control its environment, detecting errors of judgement and taking corrective action.

'BLACK BOXES'

In "Looking Forward" from their concluding chapter, Laffont and Tirole acknowledged that they had treated both the firm and the government as black boxes for complex organizations and that informational requirements were a crucial issue.[17] Until both these issues have been disposed of, I am concerned that having concluded, first, that regulatory mechanisms, e.g., along Vogelsang-Finsinger lines, can be designed, and, secondly, that such mechanisms can operate effectively, the problem of information asymmetry can be set aside.[18]

In order now to take this optimistic view, it is necessary to oversimplify many aspects of the information processes. Once we get inside the black boxes, learning, knowing, and having information become complex matters in which information lock-in can be very important.[19] Many other features of information processes need to be explored. Is information used as to rationalize decisions already made? How useful is the information for the decision purposes in hand? Why do information systems fail?[20]

All this contrasts sharply with models which assume the perfect use of perfect information - or even the perfect use of imperfect information. The imperfection of the decision may come from within the decision-maker,[21] determining the extent of informational asymmetry, lack of commitment and imperfection of regulators.

The capability of using information must figure in the analysis. Such capability is part of the organization's capital, for both regulator or firm. Both parties would seem to endeavour to augment their capability by gorging themselves on information processing equipment; for both, organizational elements are important in their costs; and in a way this part of their capital is technology. These considerations suggest a source of cost differences amongst firms, especially firms from different industries following different technological trajectories. Path dependency may well lead to very different beliefs among participants in the regulatory process. In these circumstances, key concepts like technology, information, cost and profit cannot be as tightly defined as we might wish, in part because of the role of expectations of technological change and managerial preferences.

CONCLUSION

Efforts to explore information asymmetry in the wider sense, examining the outcomes of the processes of acquiring, using and valuing information, the capability of doing those things and of learning in an organizational context, could open up neglected aspects of otherwise tidy procedures. Such extensions of theory may be seen as enrichment, confirming results already obtained. However, developments in information economics have shown that small variations in the information assumptions can at times radically change conclusions.[22]

A move in this direction seems warranted also by developments on the international scene. Global telecommunications - if by global we mean service to half the world's population - is being shaped by international organizational arrangements. It has long been recognized that the strength of multinational enterprises can be traced to information economies, or to organizational efficiency. So I should like to pose the question whether the information perspective is helpful in understanding the emerging international structure of the telecommunications industry. I suspect it will prove to be so; and that we shall find truth in the suggestion that the dynamic industry structure *is* policy.[23]

And now to my very last point. Minister Lee spoke about the benefits to the consumer. But are the telecommunications industry, its technology, its organization and its regulatory bodies designed and developed to meet the needs of the consumer? Telecommunications is a general purpose technology and is an important input to the operations of industry and government as well as a service to households. Business and public services demand dominated in the early days of the telephone in Australia.[24] Is there reason to think there has been any great change domestically or internationally?

NOTES AND REFERENCES

1 A revised version of a paper presented at the Launch and Workshop, Communications Economics Research Program, Curtin University of Technology, 17 August 1995.

2 "A New Era in Telecommunications", Press Release, 1 August 1995.

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4 G.L.S. Shackle, *The Years of High Theory Invention & Tradition in Economic Thought 1926-1939,* Cambridge University Press, 1967, p.69.

5 M. Blaug 'Why I am not a Constructivist: Confessions of an Unrepentant Popperian', in R.E.Backhouse (ed.), *New Directions in Economic Methodology,* London, Routledge, p.128; M. Bianchi, and H. Moulin, 'Strategic Interactions in Economics: the Game Theory Alternative', in N.De Marchi and M.Blaug (eds), *Appraising Economic Theories: Studies in the Methodology of Research Programmes,* Aldershot UK, Edward Elgar, 1991, p.194.

6 J.E. Stiglitz, 'Information and economic analysis: A perspective', *Economic Journal,* Supplement to Vol.95, 1985, p.23.

7 For Shackle, this perspective linked the Keynesian contribution with the analysis of imperfect markets: "Uncertainty was the new strand placed gleamingly in the skein of economic ideas in the 1930s", *op.cit.,* p.6. Knight had argued that "all investment consists, in part, of investment in new knowledge" (F.H. Knight, 'Diminishing returns from investment', *Journal of Political Economy*, 52, 1944, p.40).

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10 J.N. Nightingale, 'The Regulation of Unnatural Oligopoly: Appropriate Criteria for Regulators where the Goals of Regulation are Economic Progress', in D.M. Lamberton (ed.), *Beyond Competition: The Future of Telecommunications,* Elsevier Science Publishers, Amsterdam, 1995, p.249.

11 cf. D. Sappington, and D. Weisman, 'Potential Pitfalls in Empirical Investigations of the Effects of Incentive Regulation Plans in the Telecommunications Industry', Consortium for Research Concerning Telecommunications Policy and Strategy, *Telecommunications Infrastructure and the Information Economy: Interactions Between Public Policy and Corporate Strategy,* March 1995 Conference, Ann Arbor, Michigan.

12 N. Rosenberg, *Exploring the Black Box Techonology, Economics, and History,* Cambridge University Press, 1994, p. 228.

13 D.P. O'Brien, and D. Swann *Information Agreements, Competition and Efficiency,* Macmillan, London, 1968.

14 K.J. Arrow, 'The Economics of Information', in M.L. Dertouzos and J. Moses (eds), *The Computer Age: A Twenty-Year View,* MIT Press, Cambridge, Mass., 1979, pp.311-312.

15 See K.J. Arrow, *The Limits of Organization*, Norton, New York, 1974.

16 F. Machlup, 'Optimum utilization of knowledge', *Knowledge, Information, and Decisions. Society,* 20, 1992, p.10.

17 *op cit.,* pp. 667-669.

18 Some authors see the task as unfinished. e.g., "At a conceptual level the theory or regulatory mechanism design is a useful guide to reasoning about applications and about the tradeoffs among the possible responses to incentive problems. The application of these principles, however, is only beginning and can be expected to involve a range of practical complications that may make precise calculations difficult" (D.P. Baron, 'Design of Regulatory Mechanisms and Institutions', in R. Schmalensee and R. Willig (eds), *Handbook of Industrial Organization*, Vol.2, North Holland, Amsterdam, 1989, pp.1437-1438.

19 Arrow 1974, *op.cit.*, p.49.

20 See, for example, C.U. Ciborra, *Teams, Markets and Systems Business Innovation and Information Technology*, Cambridge University Press, 1993, Part II; C. Sauer, *Why Information Systems Fail: A Case Study Approach*, Alfred Waller, Henley-on-Thames, 1993; S. Macdonald, 'Learning to Change: An Information Perspective on Learning in the Organisation', *Organization Science*, 6, 1995, pp.1-12. Such research points to the urgent need for an economically significant taxonomy of information (See D.M. Lamberton, 'Threatened Wreckage or New Paradigm?', in D.M. Lamberton (ed.), *The Economics of Communication and Information*, Edward Elgar International Library of Critical Writings in Economics, Cheltenham UK, forthcoming.

21 See R.A. Heiner, 'Uncertainty, Signal-detection Experiments, and Modelling Behavior', in R.N. Langlois (ed.), *Economics as a Process Essays in the New Institutional Economics,* Cambridge University Press, 1986, pp.59-115. As Peter Earl notes the errors "do not have to be laid at the door of transactions costs, search costs or problems of asymmetric access to information" ('Review of *Economic Psychology: Intersections in Theory and Application* by A.J. MacFayden and H.W. MacFayden', *Prometheus*, 6, 1988, p. 144). See also D.M. Lamberton, 'Australia: Regulation and the Diffusion of Telecommunications Technology', in Marcellus Snow (ed.), *Economic Policy Toward Telecommunications in Industrialized Democracies,* Longman, New York, 1986, ch.7. A Theoretical Perspective.

22 As argued cogently by J.E. Stiglitz, 'The Invisible Hand and Modern Welfare Economics', in D.Vines and A. Stevenson (eds), *Information, Strategy and Public Policy*, Blackwell, Oxford, 1991, pp.12-50.

23 cf. D. Allen, 'Dynamic Industry Structure as Policy? Europe and World Telecommunications', *9th European Communications Policy Research Conference,* 19-21 October 1994. Allen cites Cawley that three alliances: BT-MCI's Concert, DBP Telekom-France Telecom-Sprint, and AT&T's World Partners including Unisource, together have 54% of the world's international traffic (R. Cawley, 'Global Telecommunications Service: The Changing Face of the Trans-Atlantic Telephone Market',

22nd Annual Telecommunications Policy Research Conference, Maryland USA).

24 A. Moyal, *Clear Across Australia A History of Telecommunications,* Thomas Nelson, Melbourne, 1984, Chapter 4. It would seem that this situation was unchanged in 1982, when a 'List of Telecom Australia's Top Customers Ranked in Order of Annual Billed Revenue' was published. Government departments/agencies (22 places) dominated the list. For the top 20, airlines and banks were in places 6,7,8,9,11 and 16, with Myer at 15 and BHP at 19 (*Financial Review*, 18 January, 1982, pp.1,16, 18).