ESSAYS IN EVOLUTIONARY ECONOMIC THEORY OF THE FIRM

John Nightingale

M. Com (UNSW)

A thesis submitted for examination under the rules of candidature for the degree of Doctor of Philosophy of the University of New England.

March, 1996.

CERTIFICATE

I certify that none of this thesis has beer submitted for any degree, nor is it currently being submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

Signed: _[redacted]

John Nightingale.

ACKNOWLEDGMENTS

Acknowledgments are to be found at the beginning of each paper within this thesis. In addition, I must thank my colleagues at the University of New England for their encouragement in this venture, especially Professor Malcolm Treadgold who initially suggested that the run of papers on Downie and related evolutionary economics topics would constitute a piece of work of the necessary consistency and quality to be put forward as a thesis.

Prior to Malcolm's suggestion, of course, was the spark which lit the bonfire of interest in Downie's work, and specifically, his evolutionary theory of market change. This spark was lit by Professor J. Stan Metcalfe, whose theories I debated with him in the late 1980s, and who I accused of 'appropriating' Downie with no more than a standard acknowledgment. His quick riposte, 'OK then, lets do a paper on Downie, just to see how much there really is in his work', led to all this, and more yet to come.

John Pullen, my supervisor, has provided a steady influence, with tempering critique of all these papers. His suggestions for direction and editorial scissors have undoubtedly improved them, allowing a smoother the path to publication.

The enthusiastic support of my wife, Elsabeth, has made the task less wearing and more sustainable than would otherwise have been possible.

The research programme continues, with further work on Downie as well as applied evolutionary economics, with a small ARC grant in 1995 and 6, and applications for large ARC grants for 1997 currently being assessed. The community of evolutionary economics scholars into which I am now inducted deserves acknowledgment as a potent stimulant to my continuing work in this field, one which I firmly believe has a very important role to play in the future of the discipline of economics.

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PREFACE:
ESSAYS IN EVOLUTIONARY ECONOMIC THEORY OF THE FIRM

The eight papers in the present collection are submitted for examination for the degree of Doctor of Philosophy of the University of New England.

All but one of the papers have been published or accepted for publication either in a learned journal or a collection of papers. The remaining paper is to be submitted to the *Journal of Evolutionary Economics.*

The papers arose initially from a rediscovery of Jack Downie's book, *The Competitive Process*. Within the context of contemporary evolutionary economic theory, Downie's work comprises an early and remarkably prescient account. Neglect of Downie in the past 15 years of resurgence of interest in evolutionary economics is an important oversight by the profession. The purpose of the set is to show that there is indeed an evolutionary research programme in economics, that Downie's book does provide an early account of that programme, and that the programme has considerable power for explanation and policy making in the field that Downie himself was claiming to enlighten, that is, the microeconomics of markets and competition policy.

The first paper, "Situational Determinism Revisited: Scientific Research Programmes in Economics Twenty Years On", was one of the earliest to be completed. Its argument is that there exists an evolutionary economics in the field of theory of the firm and market processes which is in contention with neo-classical theory. The paper takes its shape from the classic paper of Spiro Latsis (1972) in which he uses Lakatos's methodology of scientific research programmes to draw a distinction between the situational determinism of orthodox economics and the alternative, less deterministic theory of the behavioural, or 'Carnegie' school. He noted the failure of the orthodox research programme to satisfactorily explain or predict even the limited range of dimensions which that theory claimed to determine, for market structures beyond the very limited

range of the perfectly competitive model. His argument was that the behavioural school's strength was in explaining behaviour of firms under oligopoly, where situations did not purport to explain outcomes. However, his work has been widely criticised (Blaug, 1980), his alternative denied its place. My contention is that the evolutionary school does provide an alternative well worth investigation. I attempt to draw clear lines between the orthodox and the evolutionary research programmes, using Lakatos's methodology in order to allow analytical distinctions to be made between them. While Lakatos himself has been harshly criticised more recently (de Marchi and Blaug, 1991), I nonetheless hope my use of Lakatos will help the scholar analyse a set of claims of orthodox economics. Those claims are that the mechanical analogy is capable of dealing with time-bound processes as well as equilibria, with irreversibilities as well as the reversible world of comparative statics. I question that claim. The future is not deterministically implicit in the present in evolutionary models. This admission cannot be made by the probabilistic determinism of the most relaxed of orthodox models, as Silverberg & Verspagen have pointed out (1994, p4). They note that orthodox endogenous growth theory relies on the 'future' being implicit in the present, up to a probability distribution, just as it was in neo-classical growth theory.

The second paper, "Solving Marshall's Problem With The Biological Analogy", the first to be published[1], shows that Downie's theory was both Marshallian in tone and provided a way which Marshall himself might have chosen to press forward toward his Mecca of a biological analogy. The paper claims that Downie solved the problem that Marshall had set himself and failed to solve, that of devising an economic theory based in a biological analogy. Marshall was captive of his 'representative firm' idea, and was unable to see that diversity was the key to the problem. Downie saw that diversity of firm performance lay at the heart of the model. Everything followed from the implications of diversity. The central point I make in that paper, that Downie's theory does what Marshall tried unsuccessfully, seems to me now to be unexceptionable. The novelty of the argument that evolutionary economics is achieving Marshall's failed task

[1]This paper was chosen by Geoffrey Hodgson for his collection *Economics and Biology* (1995).

may simply be the result of the pre-occupation of most writers in this field taking Schumpeter as their mentor. The next paper in the set deals tangentially with the relative importance of Marshall's and Schumpeter's ideas in contemporary evolutionary economics.

My case for Downie is carried most directly in the third paper of the set, (HOPE paper title). In this paper I expound Downie's theory as set out in his only major academic publication, *The Competitive Process* (1958). My argument is that this work comprises the first economic theory which articulates an evolutionary model in the form of population ecology. While there are earlier writings which embody evolutionary ideas, none of those precursors (which Downie does not explicitly acknowledge) allows the reader to see how an evolutionary process creates an historical process of structural change and economic performance. The paper sketches Downie's career, suggests reasons for his interest in the problem of structural change and increasing incomes by effective market processes, and makes the argument that his is indeed a complete, if rudimentary, Darwinian model which fulfils all the requirements of an evolutionary model of population ecology. In reference to the point that evolutionary economics is Marshallian rather than Schumpeterian, the paper makes it clear that the model is Darwinian and gradualist rather than punctuationist. This is reiterated, *inter alia*, in the fourth paper.

The fourth paper, "Anticipating Nelson & Winter: Jack Downie's theory of evolutionary economic change", that presently unpublished, further argues that Downie indeed anticipated the major themes of the resurgent evolutionary theory. That resurgence is generally thought to date from the extended programme of research of Richard Nelson and Sidney Winter, a programme which had its first publications in the early 1960s. However, it was not until the publication of their seminal book, *An Evolutionary Theory of Economic Change,* in 1982, that their ideas came before a larger audience in the profession, and their population ecological modelling, using computer simulation, set the style for many others using that method. My paper has the task of demonstrating

that Downie's model embodies most of the insights and evolutionary mechanisms which are adduced by the later authors.

The following paper, "Information and Coordination in an Effective Competitive Process", suggests that G.B. Richardson's coordination problem was addressed successfully by Downie, and, by implication, by much evolutionary theory of markets. Richardson could not see that a competitive market, atomistic sellers and buyers, could arrive at an equilibrium of supply and demand in the long run. He suggested that forms of collusion or other explicit coordination would be required even in cases where large numbers did not apply. But my argument is that Downie had dealt creatively with that problem by setting the market process in time. He allows that decisions are made sequentially. Firms observe trends in markets. Many forms of informal information transmission take place, from trade journalism to espionage. Coordination therefore takes place over time, may never be perfect, but market signals do get through in some fashion in many markets. A subsidiary line of argument in this paper is that Downie's explicitly temporal setting of his Transfer and Innovation Mechanisms deals rather more simply with Richardson's welfare questions of Market Selection and Market Discipline. However, Downie writes off the significance of allocative efficiency as a goal of welfare economics, on the argument that for all practical purposes cost curves are always downward sloping, and demand curves are always horizontal in the long run, as suggested by J.M. Clark (1940). An implication of Downie's argument is that productive efficiency is guaranteed by the competitive process, and that allocative efficiency can be but a short way from perfection as deadweight loss triangles will be insignificant. Richardson remains in disagreement with this position. (Personal communication referred to in that paper). His argument is that the index number problem combined with the inability of competitive processes to ensure that each and every market can find its equilibrium implies that the welfare optimum can neither be approached nor evaluated: loose arguments such as that of Clark give no way to judge the significance of departures from the optimum.

The final three papers are somewhat different from the other five, and from each other. Paper number six, "Evolutionary Processes And Revolutionary Change In Firms And Markets: An Economist's Perspective', was written for a volume intended for students of both economics and marketing. Its aim is to show that economic theory contains ideas of relevance to the study of marketing and management. The focus of marketing students is on the conditions under which a firm can successfully insert its offering into a market which may be mature, replete with competitive offerings. Evolutionary theories of competitive behaviour allow the student to see how it is that the insights of economic reasoning, for example, the analysis of cost and demand, the profit motive, competitive interaction in a market, do apply directly even where the static equilibrium of orthodoxy cannot be used as a tool of analysis. These theories of the firm and the market are in the classical mould, of productive abilities, competency or capability. The close relationship between these ideas and those of the resource based strategic management literature is obvious. Indeed, it might be difficult to separate them conceptually. Both evolutionary economics and strategic management theories examine the implications of knowledge, competence and market opportunities to explain the directions taken by organisations and by self-organising industries or markets. While economists are generally more interested in explanation, relative to providing advice to managers, this distinction must be somewhat artificial, as economists are not unknown as policy advisors and private consultants.

The next paper, "The Regulation of Unnatural Oligopoly: Appropriate Criteria for Regulators where the Goals of Regulation are Economic Progress," uses a certain amount of the material of the previous paper, introducing a common set of ideas to another audience. The purpose in this paper is to argue that an evolutionary perspective is an appropriate one within which to analyse the regulation of a market dominated by an overwhelmingly powerful player, be it a monopolist or the dominant of a small set of players. The example is that of telecommunications, the paper having been prepared for the 10th International Conference of the International Telecommunications Society. I

regard this paper as a research proposal for an investigation of regulatory practice and outcomes in telecommunications[2].

The final paper, "A Research Agenda on Market Structures in Telecommunications", stands further apart from the previous ones. It should properly be considered more an Appendix to my thesis. This paper is an illustration of the way in which I apply my theoretical preconceptions, as developed in the thesis, in a review of a field within industrial economics. It was the result of a workshop on the research agenda in telecommunications studies held following the ITS conference at which the previous paper was given. My task was not merely to summarise discussions on Market Structures at the workshop, but to provoke further discussion and comment amongst members of the ITS to whom the workshop volume is to be marketed. The paper is a platform for my views as an evolutionary economist on the study of market structures in a rapidly evolving sector. The telecommunications sector is undergoing continuing rapid change, with no hints of arriving at any settled state. Markets are defined and redefined by innovative technologies interacting with the ingenuities of both users and sellers. It is clearly experimental, and will continue to be so for some decades yet. Equilibrium analysis is the least appropriate way to approach the study of such market structures. Thus the paper is an example of my own expectations of a research programme.

As a whole, I hope the set of papers has strong threads of common ideas and common purposes. To summarise once more, the initial motivation was the pathbreaking work of Jack Downie in creating a model which I assert to be within a framework of ideas now emerging as a general 'Universal Darwinism' (Plotkin, 1994). Major threads are the direct implications of Downie's work, and those of the same school as Nelson & Winter (1982), for the development and use of economic ideas. Downie's own motivation for

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[2] It has been used as such in an application for an Australian Research Council Small Grant, and is currently being used again, along with some preliminary results of the Small Grant work, to apply for a large grant from the same body. An ARC Large Grant application has been submitted. An ARC Collaborative Grant, with Telstra, is subject to negotiation currently. The research envisaged under these proposals takes the work far beyond the scope of the present set of papers.

writing his book, the investigation of the significance of anti-competitive practices for economic performance, makes the use of evolutionary economic theory for the evaluation of competition policy the more striking. Finally, the research agenda implied by an evolutionary perspective may well be rather different from that of a more orthodox perspective, and may be the only worthwhile perspective in the context of rapidly evolving industry structures. Thus, I would argue, the eight papers have a unity of method and purpose which entitle them to stand together as a thesis to be nailed to the door of the cathedral of the discipline.

Blaug, M. 1980.*The Methodology of Economics*, Cambridge: Cambridge University Press.

Clark, J.M. 1940. Toward a concept of workable competition. *American Economic Review* 45 (June): 241-56.

de Marchi, N. and Blaug, M. 1991. *Appraising Economic Theories: Studies in the Methodology of Research Programmes*, Aldershot: Edward Elgar.

Hodgson G. M. (ed). 1995. *Economics and Biology*, in the series *The International Library of Critical Writings in Economics*-Series Editor: Mark Blaug, Cheltenham, Edward Elgar.

Nelson, R.R. 1961. Uncertainty, Learning and the Economics of Parallel R and D. *Review of Economics and Statistics*. 43: 351-364.

——— and S. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, Mass: Belknap Press of the Harvard University Press.

Silverburg, G. & Verspagen, B. 1994. 'Collective Learning, Innovation and Growth in a Boundedly Rational, Evolutionary World", *Journal of Evolutionary Economics*. 207-226.

Plotkin, H. 1994. *The Nature of Knowledge*. London: Allen Lane, The Penguin Press.