A Constructive Approach to Economic Fluctuations

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1 INTRODUCTION

A major goal of this paper is to introduce a constructive approach to the study of economic phenomena. The highlights of this approach are its connections with the recent advances in neuroscience and the earlier research of Turing, McCulloch, Gödel and Church. We claim that the spectacular innovations in computer-neuroscience and biological-neuroscience clarify the limitations of modern economics flowing from both its static foundations and its previous neglect of the interdisciplinary foundations of utility and production theory. It is precisely these two areas of neuroscience which contain the building blocks required for constructing dynamic economic processes of tastes and production. The recent neuroscientific innovations are responsible for this potential construction. Furthermore, an interdisciplinary network among economics and the disciplines comprising artificial intelligence (AI) could enhance the AI disciplines as much as it vitalises economics. We maintain that these gains from trade can be realised only if the static and fragile von Neumann–Morgenstern edifice is replaced by flexible foundations less vulnerable to paradox and more tolerant to the faults and errors intrinsic in human decision-making.

A critical component of this interdisciplinary enterprise is probability theory contained in the ‘general theory of processes’. It not only is the mortar merging economics, computer science, psychology, neuroscience and physics, but provides a new perspective for appreciating the brilliance of the contributions of Adam Smith, Vico and de Finetti and the evolution of economic institutions.

The proposed methodology emphasises the importance of contacts
with empirical phenomena, and contains the process for accomplishing this induction.

Outline of the Paper

In his Hicksian portrait of the diversity and profundity of business cycle theory, K. Velupillai provides an elegant introduction to this paper. We begin by elaborating on Samuelson's insightful piece (1952) and show its relation to the earlier work of Fisher, and the research programme presented here. Section 3 is an attempt to unify the seemingly diverse business-cycle theories presented at this conference, ranging from Goodwin to Prescott, as well as other post-Lucasian contributions. Clearly their economic content varies substantially. Yet they are all variations of Markov processes. Next, the elements of our theory of economic fluctuations are summarised (Section 4) with emphasis on the role of semimartingales. The neuroscience connections are presented in Section 5. The influence of biological-neuroscience on the formation of tastes and the corresponding effect of computer-neuroscience on production processes are outlined, thereby illustrating the constructive approach to economics and exemplifying several of its implications.

2 FROM FISHER TO FRIEDMAN AND SAMUELSON TO CHANCE

It is instructive to summarise earlier economic contributions which are related closely to the theory of economic fluctuations proposed here. These contributions include the seminal research of Arrow, Marschak, Alchian, Coase, Fisher, Becker, Stigler, Lucas, Sargent, Samuelson, Winter, Nelson, Friedman and many others. Obviously, it would be impossible to summarise the pertinent contributions of these economists. Hence, we focus on Fisher, Samuelson and Friedman.

Irving Fisher

Irving Fisher (1867–1947), one of America's most prominent economists, was the last student of J. Willard Gibbs (1839–1903), America's first great scientist. Gibbs's study of thermodynamics led to the