An evolutionary model of international competition and growth

Carolina Castaldi[⋆]

ECIS, Eindhoven Technology University, The Netherlands and LEM, Sant'Anna School of Advanced Studies, Pisa, Italy (e-mail: castaldi@sssup.it)

Abstract. The aim of this paper is to investigate cross-country patterns of economic divergence in an evolutionary perspective. We propose a simple open economy evolutionary model of growth where the growth variables of each country are micro-founded on the dynamics of national firms. The model finds its antecedents in some of the evolutionary models of economic growth developed over the past years. We claim that evolutionary models are able to account for persistent differentiation in the growth performances of countries as a generic property. In fact, the model proposed here does so despite its quite simplified structure.

Key words: Growth – Technological Change – International Technological Diffusion – Evolutionary Models

JEL Classification: O30, O41

1 Introduction

Economists have devoted substantial theoretical and statistical efforts to understanding and modeling the process of international growth. Questions as to why

⋆ I gratefully acknowledge financial support from the Robert Solow Post-Doctoral Fellowship of Saint-Gobain Center for Economic Studies, Paris, France. This work is a development upon my PhD dissertation at Sant'Anna School of Advanced Studies. Giovanni Dosi has provided the main inspiration for this paper. I have greatly benefited from comments and suggestions received at different stages from Giulio Bottazzi, William Brock, Giorgio Fagiolo, Roberto Gabriele, Marco Giarratana, André Lorentz, Stanley Metcalfe, Alessandro Nuvolari, Angelo Secchi, Mauro Sylos Labini and Bart Verspagen. I also wish to thank seminar participants at the ETE workshop 2002 in Jena, Germany and at the International Schumpeter Society Conference 2002 in Gainesville, FL, USA. The current version was improved thanks to useful comments by two anonymous referees. The usual disclaimers apply.

certain countries have achieved a remarkably higher level of economic development than others have made scholars of economic growth struggle for many years. The historical evidence shows persistent variability in the levels of per capita incomes and in the growth rates of countries worldwide. Even in the Post World War II period, commonly regarded as an era of growing uniformity, the hypothesis of global convergence, that is, convergence of the *whole* population of countries toward increasingly similar income levels, does not find support from the evidence (De Long, 1988; Easterly et al., 1992; Temple, 1999; Soete and Verspagen, 1993; Quah, 1996).

Indeed, a diverse body of 'endogenous growth' and 'new growth' models and empirics emerged in the 1980s and developed in the 1990s as an alternative to neoclassical growth theories with the aim of abandoning the assumption of exogeneity of technical progress in favor of including some mechanisms by which technological change is internally generated by the economic system. As presented in Romer (1994), the models developed in these years have been able to account for a set of stylized facts about the properties of technological change. One of the crucial achievements has been the acknowledgment of positive feedback mechanisms in production. More recently, 'new trade' models, such as the ones in Grossman and Helpman (1991), have enlarged the perspective onto open economy settings and studied how increasing returns and imperfect competition may endanger the gains from free trade.

Still, most new growth models have maintained the assumption of perfectly rational and perfectly informed agents, which justifies their concern with equilibrium, 'steady state' outcomes only. The resulting representation of technological change and of its relation with economic growth hides some of the 'dynamic' properties of a process which is in continuous evolution and far from smooth and instantenous in its diffusion. As a corollary, these models are well equipped to account for convergence to different types of steady states, whether single or multiple equilibria, but show relatively more difficulties in accounting for historical divergence.

A growing stream of evolutionary literature, finding its contemporary roots in Nelson and Winter (1982), has provided an alternative approach to model economic growth. The building blocks of evolutionary theories of economic change (as outlined recently in Coriat and Dosi, 1998 and Dosi and Winter, 2002) can be traced to a series of evolutionary models of international growth developed mostly in the 1990s. The most relevant ones are reviewed in Silverberg and Verspagen (1995) and Kwasnicki (2001). Broadly speaking, distinguishing features of these models as compared to new growth models may be found in terms of their ability to capture, *first*, the disequilibrium and path-dependent nature of the process of economic growth, and, *second*, empirically sounder representations of the micro-economic activities of technological change.

The model presented here finds inspiration in one of the few *open economy* evolutionary models, the one in Dosi et al. (1994), which is in turn an extension of Chiaromonte and Dosi (1993). The main driving forces remain learning and market selection. But the process of technological diffusion via imitation acquires properties specific to its international dimension and the 'distance' between technologies used by firms in different countries is higher than the distance between technolo-