ACCUMULATION OF KNOWLEDGE
AND INCREASING RETURNS
IN NEOCLASSICAL MODELS

by
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Abstract: In the mid 1980s there was a remarkable revival of interest in growth theory. A relevant strand of new literature is characterized by the departure from the assumption of diminishing returns of capital or, more generally, of the accumulated factor.

In this paper we will see how the neoclassical theorists incorporated the idea of increasing returns in the formal models of economic growth, already an important question in the sixties. The central point is that the recent recognition of the importance of this notion is not new but now depends on the vision of economic growth as driven by knowledge accumulation and no longer by capital accumulation as in the Solovian tradition. (JEL: B13, B22, O40)

Keywords: theory of growth, neoclassical economics, technological change

1. Introduction

In the mid 1980s there was a remarkable revival of interest in growth theory and once again this became a very active area of macroeconomic research. Articles by Romer (1986) and Lucas (1988) provided a starting point for research which, in contrast to the former neoclassical view, called for the endogenous determination of technological change, which implied the endogenous determination of the sources of growth. This new approach, at

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least in the first phase\footnote{The distinction between the two phases is taken up again by Solow (1999). The second phase is the one that focuses attention on the technological innovation resulting from vertical or horizontal product differentiation (Romer, 1990b; Grossman and Helpman, 1991).}, is characterized by the departure from the usual assumption of diminishing returns of capital or, more generally, of the accumulated factor; long-run growth is made possible by the effect of increasing returns to scale due to some form of externality.

In this paper we will argue that the question of increasing returns is not new in the neoclassical tradition, also taking into account the early neoclassical literature on endogenous growth which flourished in the late sixties. The fact that the new theorists of economic growth have identified the dynamic economy of scale to be the engine of growth need not surprise us, since this was the approach prevailing before the affirmation of the neoclassic formulation which was based, on the contrary, on the principle of constant returns and exogenous technical progress.

The paper is structured as follows. Sections 2 and 3 discuss the Solovian view on growth and increasing returns. Sections 4, 5 and 6 present the endogenous models which flourished in the sixties following the Kaldorian insights concerning technological progress. Section 7 considers how the New Growth Theory posed the problem. The final section examines the implication of the discussion in the previous sections.

2. From Dynamics to Growth: The Solovian Perspective

Given the mathematical structure of the neoclassical growth model, a close relationship exists between the concepts of increasing returns and economic growth as an endogenous process. This relationship has been well exploited in the new growth literature. Surprisingly enough, however, the relevance of increasing returns for economic growth, and therefore the role of the cumulative effects on the macrodynamic process, was a well-known element in the early literature.

Solow (1970) offered an exposition of this close relationship, and his work provided the main reference point for the literature in question. In the second chapter of *Growth Theory: An Exposition*, a book intended to summarize the state of the art and to present the main results in a non-specialistic way, following a decade of intense research, Solow introduces the question in the following terms:

There is, of course, one glaring deficiency in this account of steady-state behavior. It accounts for a steady state in which the ratio of employment to