The following is an excerpt from a draft chapter on economic growth theory for a forthcoming book on macroeconomic methodology.

The December 1989 meetings of the American Economics Association included a session provocatively entitled “The ‘New’ Growth Theory”. A tense Solow chaired the session. In their papers, Lucas and his former student Paul Romer discussed the inadequacy of the standard, Solow growth model and presented alternative models. The discussants criticized that, for all the publicity given to the so-called new models, they really were not new at all. Economics experienced similar arguments about how to model economic growth thirty years ago.

The controversy about growth models began in the 1950s, just when growth became an issue in policy circles. … Meanwhile, Kaldor and Solow were embroiled in the Cambridge-Cambridge controversy over how to model production. Both of these, like most economists, saw that technical progress provided the main explanation for the rapid growth of production, but their models of technical progress differed.

In Kaldor’s theory, technical progress was embodied in capital and, at any time, the growth of demand for capital (up to a certain limit) would induce technical progress. It was as if movements along the neoclassical production function led to a shift in that function. There were, in other words, increasing returns which, as Kaldor announced, in conflicting with the neoclassical “adding up” theorem for a perfectly competitive economy, were sufficient to cause the whole [neoclassical] structure to collapse like a pack of cards (1966, p.297). In light of his theory, Kaldor argued that demand management that promoted capital investment promised to increase the rate of technical progress and the “potentical” rate of growth. Solow agreed that capital investment was needed for progress to occur, but he treated the potential rate of progress as exogenous, which left the neoclassical marginal productivity theory intact. Recognizing the presence of market failure, Solow supported policies to increase investment to ensure that technical progress occur at its potential rate.

Some thirty years later, Solow, having just won the Nobel Prize for founding modern growth theory, remarked at the AEA meetings that growth was about once again to become the topic of the day. … Growth ranked high on the agenda of economists interested in policy issues. Meanwhile, new classical economists, the new creative theorists of economics, reached a stage in the course of their research where growth was an obvious research problem. We find the Lucas proteges demanding, using the jargon of the 1950’s,

What are the engines of growth?
(Rebelo, 1987, p.2).

New classical economics has assumed rational expectations and continuous market clearing. In growth models presented by new classical economists, the economy, peopled by agents who maximize utility and evince perfect foresight, has followed an optimal path. Accordingly, business cycles, which the old neoclassical models represented as deviations from an exogenous trend of output, in the new models has reflected responses of the optimal growth path itself to exogenous shocks — due, perhaps, to technology or demand management. The new classical teaching, in the fashion of Harrod, has integrated the cycle and growth. Using best econometric technique and modern calculus, the new classical economists in the 1980s have focused on tracing and rationalizing, as the textbook of the next generation of graduate students designated,

the basic facts of growth as laid out by Kaldor and Solow and summarized in chapter 1
(Blanchard and Fisher, 1989, p.81).

The new growth theory has resurrected the Kaldor (1958) “stylized facts” of growth (Rebelo, 1987, p.3). In particular, the theory stresses two facts, that rates of economic growth are positive (fact #1) and that countries’ growth rates tend to differ (fact #6). In rationalizing these “well known features”, the new classical theorists have stressed the deficiencies of the neoclassical growth models. Neoclassical economists failed to explain long run growth (fact #1) because they made the source of growth exogenous. The implication of the Solow model that government policy leaves the growth trend unaffected has rendered this model ineffective in long run policy analysis. Neoclassical marginal productivity theory predicted that capital flowed
between developed to the underdeveloped countries, so that cross-country growth rates eventually would converge (in contrast to fact #6). The theory failed to explain the capital flows to and between developed countries, promoting the divergence of country growth rates.

Kaldor and lots of economists since have made such criticisms. And given the shared criticisms, the new classical economists logically have taken up devices common to nonorthodox models. The new classical models "endogenize" growth and contain production functions in which marginal products do not diminish. Unceasing, long run growth is driven by the accumulation of embodied knowledge by forward-looking, profit-seeking agents. In short, the new classical counter to neoclassical growth theory reflects the Kaldor-Solow controversy via the medium of an optimizing model.

The new classical economists have acknowledged that their growth theory has not prefigured any basic fact about the existence of growth. The stylized facts are known. The contribution of the theory, so the new classical economists have stressed, consists in replicating, accounting for, and offering an alternative interpretation of the conventional stylized facts about long run growth. The situation on the face of it is like that of the engineer, who prefers the predictions of the most advanced theory of the day. To what extent the new classical predictions of the process of growth are novel is a matter for investigation.

The new classical economists have emphasized that remodelling growth on the basis of a competitive general equilibrium will increase economists' understanding of growth. Indeed, redescription often has amounted to a discovery in the natural science. And the new classical economists, adept in mathematical logic, have invented numerous competing models of a competitive equilibrium with unbounded growth, the results of which are testable. Yet, arguably, such models only increase understanding if one already understands that growth occurs along a Pareto (sub) optimal path. Solow, viewing markets in the short run as imperfect pieces of social machinery with important institutional peculiarities, has considered that the new, dynamic continuous market-clearing models foster misunderstanding (1988, p.311).

From the perspective of the competitive equilibrium paradigm itself, the new classical growth theory has signified a technical victory. The new classical economics has treated the assumptions of the neoWalrasian, competitive equilibrium program — perfect rationality, optimization and so on — so seriously that it exemplifies that research program.

Walras invited economists to treat the competitive price mechanism like any field in mid nineteenth applied physics, namely, as a branch of the mathematics of maximization. Although Elements of Pure Economics presented the price ratios at which agents maximized, Walras did not know enough calculus to suggest mathematically why these formulae solved the problem of maximization subject to constraints. The problem received little attention until the renewed interest in a general theory of equilibrium in the 1930s. Samuelson, Arrow, Debreu and others then spent thirty years finding and applying the tools of vector and differential calculus to show the conditions in which the competitive price equilibrium existed mathematically and was stable at any point in time. 1960 found Samuelson and the next generation of mathematical economists faced with the problem of showing the optimal time-path of the competitive equilibrium. The new classical growth models are in part the outcome of the solution of this mathematical problem.

To have been beset by mathematical difficulties as neoWalrasian economics has been is a commonplace in modern science. Catching the sense of modern science, the philosopher and historian of science I. Lakatos described "(a) model" as a set of initial conditions ... which one knows is bound to be replaced during the further development of the program, and one even knows, more or less, how. ... Indeed, if the positive heuristic is clearly spelt out. the difficulties of the program are mathematical rather than empirical. The gain in eliminating mathematical impediments was an empirical one. A program with heuristic power could (i) generate novel facts, in the sense of explanations of events left unaccounted for by rival theories, (ii) explain the successes of those rival theories and (iii) empirically confirm these explanations. It is from this perspective that the chapter will assess the mathematics of new classical growth theory. Has the mathematics merely acted as a language, translating what economists already knew, or has it given new classical economists the power to think freshly about problems of economic growth? ...

The contribution of the new growth models is to put the old ideas of externalities and specialization into an acceptable formal framework through which to trace out their workings. As Lucas (1988, p.5) stated,

while it is not exactly wrong to describe these differences (in cross-country "knowledge") by an exogenous, exponential trend like A(t), neither is it
useful to do so. We want a formalism that leads us to think about individual decisions to acquire knowledge, and about the consequences of these decisions for productivity.

Mathematics, according to Lucas, is no mere neutral language, as Samuelson has claimed. The formalisms that economists use channel their thinking into certain directions and create a model of the economy based on a particular syntax. Some formalism let economists to say more than others. But, in addition, each imposes its own restrictions (an issue that Lucas ignored) on what economists can and cannot say.

The formalisms of neo-Walrasian growth theory admit an interpretation in terms of realistic, institutional detail about which the conventional, neoclassical model of growth had nothing to say. At the same time, the neo-Walrasian model, of a Hamiltonian function constrained by a production function, restricts economic thinking about growth to an optimizing framework that assumes that the economy at every instant achieves a static equilibrium in which output is determined solely by factors of supply. However radical the models of increasing returns appear in the orthodox framework, they rule out a Kaldorian dynamic equilibrium, not because thinking in terms of static disequilibrium is really wrong, but because the calculus that economists generally have used has not led them to think that way. To this extent, the explanatory power of the neo-Walrasian growth model is inherently limited. While it encompasses the neoclassical growth model, it cannot explain the successes of the Keynesian alternative.

Notes
2. Lakatos, 1980a, p.51.

Bibliography