Introduction: structural dynamics and contemporary growth theory

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1 The scope of growth theory today

The essays collected in this volume address the role of structural dynamics in the context of the current state of the theory of economic growth. Given the many extensions and ramifications of contemporary growth theory, it would seem far too ambitious an undertaking, within the space of an introductory essay, to attempt a comprehensive survey. Instead, our more modest purpose here is to draw attention specifically to developments in the study of structural dynamics. Over the past four or five decades, the theory of economic growth has made enormous progress. Much as in other fields of scientific enquiry, this progress tends to take the form of cumulative knowledge acquisition and formation clustered around a few lines of research. Even so – and notwithstanding the emergence of an overarching and powerful analytical framework – other less well-explored lines of research tend to survive and coexist.

In their introduction to the *Handbook of Economic Growth* (2005, p. xi), Aghion and Durlauf note that 'interest in economic growth has been an integral part of economics since its inception as a scholarly discipline'. In fact, one of the few undisputed facts in the history of the discipline is perhaps that what is at the heart of political economy through the Modern Age (sixteenth to eighteenth centuries) is a focus on aggregate *wealth*. Defining the *nature* of wealth, as well as suggesting *ways to increase* aggregate wealth and to improve its quality, is foremost among the questions addressed by the political economy of the modern age.

The editors are extremely grateful to a large number of colleagues and scholars who have cared to discuss and advise on the project of this book. Much of the work has been done in Cambridge, where the Marshall Library of Economics and Wolfson College have provided the ideal setting for working on the project. In particular they wish to record an obligation to Dr Stephanie Blankenburg, both for invaluable scientific advice and for generous practical help and assistance.

Together with the issue of income distribution, wealth certainly remains the principal problem of classical political economy, especially from Adam Smith onwards. That is why Adam Smith wrote an *Inquiry into the Nature and Causes of the Wealth of Nations*, rather than a treatise on the *principles* of political economy.

Through the modern age political economy can be described as a long series of endeavours to solve what is sometimes called the 'mystery' of economic growth (Helpman, 2004).

In ancient times, wealth would be regarded as instrumental in happiness. With the onset of the modern age, wealth gradually turned into an end in itself, or rather, the end of economic policy, and it was economic policy that emerged as the driving force of economic thought: that is, in fact, the age termed by Schumpeter (1954), when 'the consultant administrators and the pamphleteers' turn into pioneers of economic thought and analysis.

The above transformations took place primarily during the sixteenth and seventeenth centuries and extended well into the eighteenth century. They entailed a transition from an idea of possessive *acquisitiveness*, based on commerce in a zero-sum game (mercantilism), to one of *productivity*, based on primary production and on circulation (physiocracy), to approach, as a further step, a line of thinking concerned with *creativity* founded on learning and on human and social capital, with the rise of the British Classical School. The novelty of this latter approach lies in the much larger space given over to the analysis of the motivations underlying action and institution-building. This strand of reasoning is typically personified in Adam Smith, the unwitting 'founding father' of the Classical School of political economy, although it can be shown that his contribution could hardly be fully understood independently of other currents of the Enlightenment.[1]

The editors of the *Handbook of Economic Growth* argue, furthermore, that 'this ancient lineage is consistent with growth economics representing one of the most active areas of research in economics in the last two decades', although (more surprisingly) 'this activity followed a relatively long period of calm in the aftermath of the seminal theoretical and

[1] While it used to be common procedure to associate Smith's analysis with the Smith–Ricardo–Marx line of descent (emphasizing distribution) or with the Smith–Marshall or even the Smith–Walras–Pareto strand (emphasizing allocation and equilibrium), it is nowadays more common to see Smith as a child of the Enlightenment movement, and in particular of the cross-fertilization of the Italian and Scottish Enlightenment. The latter interpretation places particular emphasis on economic growth, knowledge and learning, and on institutions.

empirical work by Robert Solow on the neoclassical growth model. Solow's research set the growth research agenda for over 25 years' (ibid.). Extended periods of 'calm' were, indeed, a feature of the development of political economy throughout the nineteenth and part of the twentieth centuries, as political economy had turned into an allocative discipline. So much so that William Baumol, in a well-known scholarly treatment of the topic (itself a 'classic'), speaks of the *magnificent dynamics* of the Classics. If we are still keen, to the present day, on 'those older dynamic systems', Baumol (1970, p. 13) writes, it is 'simply because, although imperfect, they represent an approach of which there are few recent examples'. As indicated, after the Classical period economics did, in fact, focus largely on resource allocation rather than extended reproduction over time, and the analysis of long-run economic dynamics remained 'out of focus' for quite a long time, with some notable exceptions, among which Schumpeter's *Entwicklung* of 1912 is the best known. In retrospect, this period can also be considered one of prolonged 'incubation' that paved the way for a new avenue of research on economic dynamics. The new start was the product of a whole set of ideas, easily retrievable from a range of well-documented sources, with Solow's 1956/57 model playing a pivotal role in the process. Remarkably enough, however, one finds again Keynes at the source of the initial inspiration. It was in fact Roy Harrod who, as early as 1939, in an attempt to extend the implications of Keynes's *General Theory* to the long run, stressed the importance of concentrating the dynamic economic analysis on the novel concepts of the 'rates of change' of macroeconomic magnitudes. He presented his ideas more extensively in a series of lectures which he delivered at the London School of Economics immediately after the war, and then published in his *Towards a Dynamic Economics* (1948). Meanwhile, the appearance of an independently written contribution by Evsey Domar (1946), more mathematically framed but less complete, led the growth literature to couple their two names as authors of the Harrod–Domar macroeconomic model of growth, which was to become well known. It was from this model that originated the contributions to economic growth of the Post-Keynesian Cambridge economists.[2]

[2] During the 1960s and early 1970s several contributions analyzed the main features of the newly emerging growth theory. We may single out Hahn and Matthews (1964) and Sen (1970) as core historical references. In both cases it was openly acknowledged that it was Roy Harrod who had originally blazed a trail in the field. L. Pasinetti clearly sketched out this genealogy of Cambridge Keynesian contributions, from Harrod to Kaldor, in his book on *Growth and Income Distribution* (1974). It was, however, Solow's 1956/7 model that played a pivotal role in the process of bringing to evidence the way to insert the Harrod–Domar model into mainstream neoclassical economics.

With a view to his pivotal role, Solow's remarks on the latter-day achievements of economic growth theory, read today, are of particular interest. His reflections rightly occupy the opening pages of the *Handbook* (pp. 3–10). To start with (including in the abstract to this contribution), Solow's 'Reflections' (Aghion and Derlauf, 2005, pp. 3–10) express 'surprise at the lack of attention both to multisector growth models and to multi-country models with trade and capital flows'. The '*basic*' neoclassical model of growth is still alive — 'astonishingly'! Solow proudly observes – and in good shape after some 50 years: the '"endogenous growth" models of Romer and Lucas and their many successors are, in fact, entirely neoclassical' (ibid.). On the positive side, Solow stresses that 'progress, in theory and in practical analysis, has come mainly from extending the basic model at the edges' (ibid.). Thus, in his view, 'the territory of growth' has not merely expanded but has done so 'to include more topics in what used to be border areas'. However, '[t]his is not exactly the same thing as "endogenizing" these borderline topics'. Indeed, prominent among the extensions are treatments of 'the influence of background forces like "institutions" on the evolution of technology or total factor productivity. Some of it is in the mood of the "New Growth Theory" but not all of it. Much of it just wants to be explicit about background forces without trying to absorb them into the model' (ibid.).

These are perceptive observations from one of the greatest contemporary masters of economic growth theory. They are all the more interesting as they also touch on a core concern of economic thinking today that goes well beyond the analysis of economic growth, namely the relationship between economics and other disciplines.[3] Regarding growth theory in particular, it is not always clear where the line should be drawn between endogenizing as wide a range as possible of explanatory factors into a unifying analytical framework and a more explicit treatment of background forces.

In the current context, it is of some interest to stay with Solow for a little longer, as he proceeds 'to contemplate a few of the territories into which the theory has not expanded' (ibid.: 4). First among these are

[3] George Stigler once spoke of economics as 'the imperial science' (e.g. Stigler, 1984). For a constructive approach to the issue of interdisciplinary studies, see the recent collection of papers, edited by Arena *et al.* (2009), where it is acknowledged that interdisciplinary studies are justified when they provide the multiplicity of tools and perspectives necessary to tackle specific problems. It is hardly surprising that a large number of breakthroughs in current economic theory appear to have been achieved via tweaks and bridgings at the edges. Cf. also Coase (1977).

'multisector growth models'. As Solow points out, 'Luigi Pasinetti has written extensively on the sort of structural changes to be expected along a trajectory, arising from such inevitable factors as differing income elasticities of demand for different goods' (ibid.). The solid realism of Solow's timely remark is confirmed also by the fact that this is the *only place* where Pasinetti's name – undoubtedly the greatest economist to have focused attention on structural dynamics today – finds mention in the entire two-volume *Handbook* of some 1,800 pages (see in particular Pasinetti, 1981).

Pasinetti's analysis has put an increasing emphasis through his own work on the role of institutions as background forces and significant constraints. For a proper study of institutions Pasinetti has introduced an important 'separation theorem' in his recent book (Pasinetti, 2007, Chapter ix). This emphasis on the role of institutions is bound to call attention, in particular, to the links between economic theory and economic history. It is precisely the intriguing and relevant progress and proliferation of growth theory which brings into focus the question of the relationship between theory and history. Over past decades, the studies of economics and economic history have largely drifted apart. We are now at a stage where *connections* are being rediscovered. In Solow's view, the emphasis on institutions, in particular, opens up 'the possibility – about which I am now more optimistic than I once was – of connecting up growth theory with the problem of economic development, in which issues of institutional change are clearly central' (ibid.: 6).

Not surprisingly, Solow here refers to a number of leading contributors to the new endogenous growth theory, such as Daron Acemoglu, Avner Greif and Alberto Alesina. It is interesting, however, to see how Solow comes back, in a roundabout way, to the issue of 'imperialism', adding that his own 'prejudice' is that 'there may have been a premature tendency to assimilate growth and development, abetted by the vogue of cross-country regressions' (ibid.). Indeed, he finds it reasonable to suggest that a 'detailed analysis of institutions is probably a better method than cross-country regressions'. Such recent extensions of growth analysis sometimes produce a 'breathtaking broad sweep' such as 'the story-line proposed by Daron Acemoglu and colleagues'. Though – as Solow readily admits – 'much of it has the ring of truth' and it is 'irresistibly fascinating', 'I must confess nevertheless to a certain scepticism about firm conclusions at this level of generality, especially when they bear on "ultimate" causality' (ibid.).

This all sits well with Solow's views expressed in Szenberg's (1992) collection of self-portraits of outstanding economists some years ago,

where Solow emphasized that 'it does economics no good to be too ambitious'. In particular, 'economics is foreclosed from a Theory of Everything' and 'not just because it is all so complicated but for deeper reasons'. 'Pretty clearly' – Solow explains – 'economic behaviour depends on the nature of social institutions (. . .). Believers in an economic Theory of Everything would say "Okay, but then we just have to include the choice of social institutions as an endogenous process".' That is precisely what is happening today in large swathes of current political economy. 'I think' – Solow argues – 'the response is wrong, not just hard to carry out, but wrong. Social institutions are not chosen, they evolve' (p. 272).

We very much agree with Solow when he notes that 'economics should not take itself too seriously' (ibid.). This is a point of the utmost significance. As we argue in this introduction, the relevance of structural dynamics today is closely related to the question of the relationship between economic theory and economic history, at a time when the imperialist dream of current political economy acquires a distinctive flavour of *Übermenschlichkeit*. Ways of doing economic history are, no doubt, changing. However, pretending to abolish the border between economic theory and economic history would result in foreclosing a whole territory of reciprocal interaction.

2 Two building blocks of the contemporary analysis of economic growth

We now turn to a more thorough consideration of our argument, and to discuss the question of whether, and if so how, following Solow's contribution to balanced growth, the contemporary theory of economic growth has come to include structural change in its agenda. We distinguish three main stages of the development of economic growth during the last fifty years.

A *first stage* consisted of the development of *optimal growth* models. These models (in particular by Cass, 1965, but also by Koopmans, 1965 and onwards) were credited in the literature with paying greater attention to the nature of the microfoundations of the theory of growth, but above all with advances in transitional dynamics that facilitated the use of numerical simulations and, eventually, econometric calculus. These achievements did, however, also facilitate the tendency 'to assimilate growth and development, abetted by the vogue of cross-country regressions', as pointed out by Solow above. These models did not, therefore, in any real sense, face up to the problems of structural change from an analytical standpoint. Moreover, optimal growth models are by

their very nature normative and thus rather ill-equipped to tackle the empirical features of structural change. As Solow observed, 'it seems to me foolish to interpret as a descriptive theory what my generation learned from Frank Ramsey to treat as a normative theory, a story about what an omniscient, omnipotent, and nevertheless virtuous planner would do' (Solow, 1997, p. 12).

A *second stage* corresponded to the emergence of *endogenous growth theory* that allows for an explicit treatment of innovations and a better analysis of their *structural* effects. Innovations here are mostly considered to be *incremental*, as, for instance, by Ethier (1982) and Romer (1990). In this line of enquiry, intermediate goods owned by specialized productive units contribute to the division of labour and to productivity increases in final goods production. Thus, the new intermediate goods modify the *organization and degree of specialization of the productive structure* of the economy: Romer (1990), for instance, differentiates between research, intermediate and final goods sectors, and to this limited extent, some notion of *structural analysis and change* is implicitly recognized without, therefore, making this a core point of the analysis. Aghion and Howitt (1992) introduce the possibility of addressing *radical* or (general-purpose technology) (*GPT*) innovations combining, in neo-Schumpeterian fashion, different forms of obsolescence with 'creative destruction'. New products can appear in addition to older ones, but they can also replace these. Over time, all technologies eventually become obsolete and are replaced by successors. Such new technologies are the product of recent innovations that, due to their GPT characteristics, increase productivity at the macroeconomic level. In this kind of model, radical innovations and structural change are therefore closely linked to the emergence of new goods and technologies.

Such advances by endogenous growth theory, and in particular the more convincing attempts by its neo-Schumpeterian branch to inscribe structural change on its agenda, should not, however, distract from certain analytical limitations of contemporary endogenous growth theory – for instance, the enduring role of the representative consumer guided by constant preferences (notwithstanding the occasional introduction of some form of structural dynamics) and the use of *ad hoc* assumptions formally required to generate externalities and, in this way, to account for the relevance of different forms of returns to scale (see e.g. Arena and Raybaut, 2003, Arestis *et al.*, 2007 or Salvadori, 2003). Moreover, the possibility of multiple equilibria reinforces the importance of uneven economic change over time, in particular where a wider range of different types of innovation is taken into account (e.g. Amable, 1996).

3 The present state of structural dynamics

If these first two stages of recent developments in modern economic growth theory have paid only relatively scarce attention to structural dynamics, it is also the case that the *idea of structural dynamics* has never ceased to intrigue economists of all straits, and to captivate their interest and intellectual curiosity. This section focuses on a *third* stage in the development of contemporary growth theory post-Solow, and on the ways in which structural change has made an appearance in, as well as been addressed by, this comparatively recent literature.

Cristina Echevarria (1997) can certainly lay claim to having put structural change back on the agenda of recent growth analysis. Rather than simply ignoring differing existing contributions to the theory of structural change, she distinguishes two traditions of thought on structural change, and highlights their different views on the relationship between changes in the sectoral composition of the national product, on the one hand, and aggregate growth, on the other. Specifically, she argues that a first perspective – which she labels 'the neoclassical view' – held that structural change, understood as the evolution of the sectoral composition of national output, was a relatively 'unimportant by-product of growth' (Echevarria, 1997). The second view – attributed to 'scholars associated with the World Bank, including Baumol *et al.* (1989), Chenery and Syrquin (1975), Kuznets (1971), and Rostow (1971)' – made an original and divergent contribution in that it argued 'that growth is brought about by changes in sectoral composition' (Echevarria, 1997: 431).

Echevarria goes on to propose a kind of synthesis of both approaches based on the idea that the sectoral composition of national output affects per capita income growth rates as well as the structure of economic growth. She also provides a synthesis of the previously mentioned stages of the contemporary theory of economic growth by developing the methods of dynamic general equilibrium (including the use of a collective utility function) within the framework of a Solovian model of sustained growth. The real innovation of her paper consists, however, in the introduction of three different consumption goods demanded by agents on the basis of non-homothetic preferences, namely primary goods, manufacturing goods and services. Each consumption good is produced with different factor intensities, that are compatible with different exogenously given sectoral rates of technological change. This diversity of sectoral productivities affects the change over time of the sectoral composition of national output, and thereby the growth rate of the economy. In Echevarria's model, the equilibrium path has an asymptotic limit in which labour in the three sectors remains constant,

while capital in all the three sectors, i.e. total capital, investment and consumption of manufactured goods, grows at the same rate. Therefore, if the proportion of inputs allocated to each sector is constant, the consumption of manufactured and primary goods and of services grows at different rates, in line with diverse forms of technical change as well as, partially, the overall increase of capital. While relative prices compensate for lower or higher growth, the proportions between the three goods or sectors change at a constant rate in real terms. Asymptotically, one sector tends to dominate the whole economy while the two other goods or sectors proportionally decline, although they grow in absolute terms. Structural change therefore is an explicit and core part of the analysis, even if the long-run implication is that it will eventually 'vanish' to make space for the 'neoclassical view' of an asymptotic steady-state equilibrium.

As Ngaï and Pissarides (2007) observe, Echevarria (1997) inspired a wide response, among this in particular Laitner (2000). Laitner's model admits the existence of non-homothetic preferences as one possibility. Consequently, he locates the origin of structural change on the demand-side of the economy. In Laitner's model, structural change is due to the operation of Engel's law and its impact on the economy-wide saving rate. An increase in the average propensity to save follows naturally from an increase in per capita income due to sufficiently pronounced technical progress. Other than in some endogenous growth models, Laitner does not explain an increase in the propensity to save by recourse to collective utility functions and optimization, but he considers the implications of Engel's law for financial variables.

He argues that while abnormal thrift may lead to higher income levels (as in Solow's framework), causality can run the other way round: a higher standard of living can lead to a higher saving rate. In Laitner's model, there are not three but only two goods, an agricultural and a manufacturing good, both of which are consumption goods. Household saving follows the stages of life-cycle behaviour with overlapping generations. Each household lives for two periods, is identical to all others born at the same time, and takes prices as given. While young households will save all labour earnings, retired households will deplete all wealth. This pattern will not vary over time even if incomes change, while the composition of consumption depends on changes in income. On the production side of the economy, aggregate effective labour supply depends on the number of young households and current technology. Finally, the economy is seen to undergo a shift from an initial specialization in agriculture to devoting more and more labour to manufacturing production.

Notwithstanding differences in the detail of their respective analyses, Echevarria, Laitner and, according to Ngaï and Pissarides (2007), Caselli and Coleman (2001) and Gollin *et al.* (2002), all conceptualize some form of structural change within a two- or three-sector economy with non-homothetic preferences, thus locating the origin of structural change in long-run changes in consumer tastes.

A different type of approach has been pioneered by Kongsamut *et al.* (2001, KRX for short). Their originality is twofold: first, KRX reshape Echevarria's distinction between two views on structural change ('neoclassical' and 'scholars associated to the World Bank'). The neglect of structural change in the neoclassical view or, in KRX's terminology, the dominance of 'balanced growth models', is now justified by the compatibility of these models with the 'Kaldor facts' regarding economic growth. KRX remind us that Kaldor emphasized the constancy, roughly speaking, of the growth rate of output, the capital-output ratio, the real interest rate, and the labour income share over time, in particular in the case of the long-period behaviour of the US economy. These 'stylized facts' are taken to provide sufficient justification for the regularities assumed by balanced growth theory and, consequently, for treating the study of structural change as secondary. Kaldor's 'stylized facts' can be found in Kaldor (1961/1989: 230–231). From this, it quickly becomes evident that KRX's interpretation has a distinct 'reductionist' flavour that is rather different from Kaldor's own perception. In fact, Kaldor specified these 'stylized facts' in a paper prepared for the Corfu meeting of the International Economic Association in August 1958, and developed the idea in the context of what Marglin and Schor (1992) refer to as the 'golden age of capitalism', i.e. the period 1945–1970 characterized by historically exceptionally high sustained growth rates and low rates of unemployment in leading Western economies.[4] Moreover, Kaldor (1961/1989: 231) remarked that 'none of these "facts" can plausibly be "explained" by the theoretical constructions of neoclassical theory'.

Second, KRX argue that the 'Kuznets facts' cannot possibly be ignored, that is, 'the massive reallocation of labour from agriculture into manufacturing and services that accompanies the growth process. This reallocation process, often called "structural change", has been documented by authors such as Clark (1940), Kuznets (1957) and Chenery (1960)' (ibid.: 869). KRX do not refer to Echevarria's scholars

[4] Very recently, Jones and Romer (2009) brought out what they called 'the New Kaldor Facts'.