

Whither the history of economic thought?

Going nowhere rather slowly?

*Heinz D. Kurz**

Theorien sind gewöhnlich Übereilungen eines ungeduldigen Verstandes, der die Phänomene gern los sein möchte und an ihrer Stelle deswegen Bilder, Begriffe, ja oft nur Worte einschleibt. Man ahnt, man sieht auch wohl, daß es nur ein Behelf ist; liebt sich nicht aber Leidenschaft und Parteigeist jederzeit Behelfe? Und mit Recht, da sie ihrer so sehr bedürfen.¹

(Johann-Wolfgang von Goethe, 1953, p. 440)

1. Introduction

My talk today will be devoted to the history of economic thought. If a presidential address delivered at a meeting of economic theorists was to deal with the history of our subject, this would hardly come as a surprise. It would in all probability be considered a sign of good taste and a welcome opportunity for the speaker to display his erudition. It might also be seen ‘as an innocuous respite from pushing back the frontiers of economic knowledge’ (Winch, 1962, p. 193). And it would, last but not least, be an occasion to recall the advances of the younger generations of economists over and above the older ones and, more generally, to exemplify the ‘progress’ in economic analysis. Seen from the Olympian heights of modern economics our predecessors look like dwarves, still visible, though, but dwarves nevertheless. They populate deep valleys, where there is little light and much darkness. I hasten to add that this picture is, of course, a caricature and that I have myself attended talks at meetings of

*

Address of the author: Department of Economics, University of Graz, RESOWI-Centre 4F, A-8010 Graz, Austria. E-mail: heinz.kurz@uni-graz.at. Presidential address delivered on the occasion of the annual conference of *The European Society for the History of Economic Thought (ESHET)* in Porto, Portugal, 28-30 April, 2006. For valuable suggestions in the preparatory phase of this paper I thank Tony Aspromourgos, Stephan Böhm, Giancarlo de Vivo, Gilbert Faccarello, Christian Gehrke, Harald Hagemann, André Lapidus, Axel Leijonhufvud and Bertram Schefold. I am grateful to Tony Aspromourgos, José Luís Cardoso, Volker Caspari, Daniel Diatkine, Gilbert Faccarello, Duncan Foley, Christian Gehrke, Geoff Harcourt, André Lapidus, Antoin Murphy, Nerio Naldi, Manseop Park, Luigi Pasinetti, Neri Salvadori and Ajit Sinha for valuable comments and suggestions on an earlier draft of this paper. The views expressed in this address are entirely my responsibility.

¹ ‘Theories are commonly outpourings of an impatient mind that would like to get rid of the phenomena and therefore replaces them by images, notions and often merely words. One senses and even sees that this is only a poor substitute; but does not passion and faction spirit always love substitutes? And rightly so, because they are so much in need of them.’

economists in which the heritage of the past was not belittled and there were no signs of complacency or even arrogance. However, I have also experienced the opposite and it seems to me that the overall trend points in this direction. Against this background, a talk on the history of economic thought at a meeting as this one makes one hear the alarm bells ring. Indulging in narcissistic introspection must be motivated by a bleak future of the subject.

There are indeed signs of this sort and they have been with us for a long time.² Historians of economic thought are an endangered species and their natural habitat – faculties of economics – are becoming less and less hospitable. The marginalization of the subject has been going on for quite some time. Yet there are conflicting signals. It was only last year that we were confronted with the shocking news that *History of Political Economy (HOPE)*, a distinguished journal in the field, was being removed from the Social Science Citation Index (SSCI). Shortly afterwards we learned that beginning with 2005 another specialist journal in the field, *The European Journal of the History of Economic Thought (EJHET)*, was to be covered by the SSCI. And in late spring 2006 we were relieved to hear that *HOPE* was reinstated for full coverage. If I am not mistaken, then, this is the first time that two specialist journals in the history of economic thought, *EJHET* and *HOPE*, are being indexed. In a discipline in which indexation in the SSCI has almost become the proverbial golden calf around which the profession dances, it is a question of survival to be included or not. It affects especially our younger colleagues without whom there won't be a future for our subject. With two journals getting coverage, the situation now is much rosier than it was.³ Nevertheless, for reasons that hopefully become clear in what follows, I would not recommend anyone who starts an academic career now to become *only* an historian of economic thought. It seems to me to be much safer to have a second leg in economics. Walking with two legs is not only more comfortable but also less risky than walking with only one.

The composition of my talk is the following. In Section 2 I begin with a short discussion of the aim of economics and the history of economic thought. Then, in Section 3, I summarize some arguments questioning the usefulness of the history of economic thought by our fellow economists. Next, in Section 4, I turn to arguments in defense of our subject. The following two sections are designed to exemplify the usefulness of our subject. The quick reader might

² See, for example, the papers collected in Blaug (1991); see also Winch (2000) and Böhm, Gehrke, Kurz and Sturn (2002).

³ The SSCI and ISI, the private company that elaborates it, has assumed almost a monopoly position in the field. 'Monopoly', Adam Smith was convinced, 'is a great enemy to good management, which can never be universally established but in consequence of that free and universal competition which forces every body to have recourse to it for the sake of self-defence.' (Smith, *WN*, I.xi.b.5) Some competition, I believe, would have a beneficial effect also in the field under consideration.

immediately jump to the concluding section. The first example, in Section 5, shows that there is no presumption that contemporary economic analysis can always be counted upon to contain everything that is worth preserving from past ideas. The section deals with the work of someone whom Paul Samuelson rightly dubbed a ‘giant historian of economics’. It is argued that Piero Sraffa was not only this, he was also a giant of economic theory. It is the unique blend of the two qualities that constitutes his distinctiveness as a scholar. The section deals with Sraffa’s re-interpretation of ‘the standpoint of the old classical economists’. The second example, in Section 6, shows that contemporary economic analysis need not always involve an unambiguous advance compared with older views on a given matter. The case chosen is a widely appreciated contribution to ‘new’ growth theory by one of its champions (Romer, 1990). It is argued that from the point of view of the history of economic thought it may be regarded as an example of ‘recombinant economic analysis’. All the basic ideas underlying Romer’s analysis have been around for quite some time. What is new is the way in which each one is expressed and the manner in which they are combined. Put in a nutshell, what is new is the bold attempt to formalize them within the framework of intertemporal macroeconomic general equilibrium analysis. This comes at a price, and some might argue that the price is very or even too high. Most important, while the classical authors saw that a major problem that the theory of accumulation and income distribution has to deal with is that of a growing heterogeneity and diversity of means of consumption and means of production, neoclassical authors take pains to bypass this crucial problem in terms of quite remarkable assumptions. Section 7 concludes that economics is too important a subject to be left exclusively to our fellow-economic theorists.

As early as 1962 Donald Winch expressed the view that ‘The subject [of the history of economics] can only survive if it establishes itself on a firm and independent footing’ (Winch, 1962, p. 203) – independent, that is, from the economics profession. While I have some understanding of, and sympathy for, this view, I believe that there are strong reasons to try to regain lost territory within the profession. The following therefore contains some suggestions as to how this could perhaps be accomplished.⁴

Before I enter into a discussion of the main argument let me point out that the subtitle of my talk derives from a paper by Michael Ruse on how Darwin’s *The Origin of Species* was

⁴ It goes without saying that I do not dispute in the least the importance of the history of economic thought as the discipline that studies the contributions of economists in their own times and places, of the importance of historical reconstructions, of the study of original sources, archival work etc. However, there is an intertemporal dimension to the problem at hand that is the focus of the following discussion.

received and his ideas developed. Ruse distinguishes between two trends, one ‘bad’, the other ‘good’. The bad one he traces back to Herbert Spencer who tried to make evolution into a doctrine of progress, from the weak to the strong and from the not so good to the better. The main representative of the good trend is said to have been Darwin himself, to whom evolution was ‘a directionless process, going nowhere rather slowly.’ (Ruse, 1988, p. 97) There is a question mark also to the subtitle of my talk, and while I have views on which directions to search for an answer, I do not pretend to be possessed of one.

2. In Quest of Light or Fruit?

The first question we have to address, albeit briefly, is: What is or should be the aim of economics, what the aim of the history of economic thought? In *The Economics of Welfare* Pigou wrote in 1920:

When a man sets out upon any course of inquiry, the object of his search may be either light or fruit – either knowledge for its own sake or knowledge for the sake of the good things to which it leads. ... In the sciences of human society, be their appeal as bearers of light ever so high, it is the promise of fruit and not of light that chiefly merits our regard. (Pigou, 1920, pp. 2-3)⁵

If this is meant to apply to economics, and it is, how much more does it apply to the history of the subject! Recent developments worldwide appear to have shifted the scales even more in favour of the promise of fruit and away from light compared with the time of Pigou. Many universities in Europe are currently facing severe budget cuts and are trying to finance research to a growing extent via grants coming from various sources, both public and private. The reputation of a scholar is measured more and more not only in terms of SSCI citations he or she gets, but also in terms of the funds attracted by him or her. Globalisation and intensified competition have led to a redefinition of the role of universities in society. Politicians request universities to purge their study programs of subjects that are not directly ‘useful to society’. These trends apparently work against our subject. Historians of economic thought have generally greater difficulties to raise research funds. And they cannot credibly portray themselves as being able to solve the problems of the day.⁶

⁵ Nerio Naldi has drawn my attention to the fact that Pigou had presented his above version of the Marshallian view of what economics is about as early as in his Inaugural Lecture, ‘Economic Theory in Relation to Practice’, in 1908 as successor to Marshall’s Chair.

⁶ The question is of course close at hand whether our fellow-economists fare better in this regard. The loss in reputation relative to some other disciplines economics as a whole experienced over the last few decades does not appear to point in this direction. I shall come back to this below.

The counterposition of fruit and light is, however, spurious. Things are invariably more complex. This has been emphasized by Fritz Machlup in his book *Knowledge and Knowledge Production*. He commented on Pigou's above statement thus:

I must confess that I am less mission-oriented than Pigou wanted social scientists to be. I would undertake my inquiry even if it promised nothing but light; but I believe that fruit can grow and ripen only where there is enough light, and that most inquiries that shed light on problems, societal or not, eventually prove useful to society. I fear, however, that a requirement to justify each research project in the social sciences by its 'promise of fruit' can become a stultifying constraint. (Machlup, 1980, p. 11)

We may ask: Is the history of economic thought capable of shedding light on societal problems – in the hope and expectation that in this way it can prove its usefulness? The answer to this question given by some of our fellow-economists is a resounding no. Let us briefly turn to the main reasons put forward by them.

3. Why bother about 'the wrong opinions of dead men'?

The strongest verdict on the history of economic thought, which according to Mark Blaug expresses 'the philosophical overhang of positivism' (Blaug, 2001, p. 146), comes from those who think that economics is, or should be, shaped in the image of the 'hard' sciences, preferably physics. While opinions to this effect have been sounded from an early time onwards, they appear to have gained weight over the years. Here we need not be concerned with whether the image these scholars appear to have of the natural sciences stands up to close examination or whether it reflects a view that is obsolete by now, as some historians of science maintain.⁷ What matters for the purpose of our argument is that the underlying concept of hard science entertained is tantamount to claiming that science is invariably cumulative in the sense that there is progress, progress and only progress; there is never regress. The process of the production and absorption of knowledge is taken to be perfect: whatever is good and valuable will be retained, whereas whatever is weak and erroneous will be weeded out. If this was to be true, there could only be an antiquarian interest in the past: Why bother about 'the wrong opinions of dead men', to use Pigou's famous phrase?

Some such view was and still is widespread in the sciences and in mathematics. In the words of Alfred North Whitehead (1926, p. 162): 'A science which hesitates to forget its founders is

⁷ See in this context Ilya Prigogine's (2005, p. 69) statement: 'In all fields, whether physics, cosmology or economics, we come from a past of conflicting certitudes to a period of questioning, of new openings. This is perhaps one of the characteristics of the period of transition we face at the beginning of this new century.'

lost.’ Essentially the same view has been expressed with regard to political economy as early as the first half of the 19th century by Jean-Baptiste Say. In his *Cours complet d’économie politique pratique* he stressed:

... l’histoire d’une science ne ressemble point à une narration d’évènements. Elle ne peut être que l’exposé des tentatives, plus ou moins heureuses ... pour recueillir et solidement établir les vérités dont elle se compose. Que pourrions-nous gagner à recueillir des opinions absurdes, des doctrines décriées et qui méritent de l’être? Il serait à la fois inutile et fastidieux de les exhumer. ... *Les erreurs ne sont pas ce qu’il s’agit d’apprendre, mais ce qu’il faudrait oublier.*⁸ (Say, 1840, pp. 540-41; emphasis added)⁹

In order to forget the errors made, it is necessary to abandon the history of political economy.

Theorists of knowledge and epistemologists appear to be agreed that it is via making errors and correcting them that man learns (see, for example, Audi, 1998). Therefore, Say’s argument is not compelling. However, is his view of economics as a science tenable? And is the history of economic thought in the long run doomed to death, as he was convinced? Similar views have been expressed time and again. Are we still in a transitory phase, as David Gordon (1965) argued in a paper published over forty years ago? In his view, ‘Economics lies somewhere between the extremes but surely [sic] closer to the natural sciences than to the humanities, and perhaps further in that direction than any other social science.’ (Gordon, 1965, p. 122) He went on to contend that ‘economics has never had a major revolution [sic]; its basic maximizing model has never been replaced.’ (p. 124) The latter is considered ‘our basic paradigm’ which, Gordon contends, has already been postulated by Adam Smith; alas, he forgets to provide any evidence in support of his view.¹⁰ This paradigm is said to have ‘created a “coherent scientific tradition” (most notably including Marx)’ whose ‘persistence can be seen by skimming through the most current periodicals.’ (p. 123) Having become ‘very much like a normal science’, economics, like a normal science, ‘finds no necessity for including its history as a part of professional training.’ (p. 126) Seen in this way, the decline of the history of economic thought is but the other side of the coin whose front side shows the rise of a science to maturity. As Gordon put it: ‘I conjecture that this is a decline from what might be called an “abnormal” level.’ (p. 126)

⁸ ‘... the history of a science does not compare to a narrative. It cannot be anything else other than an exposition of the more or less fortunate attempts ... to collect and solidly establish the truths of which it consists. What could be gained by collecting absurd opinions, the rejected doctrines that merit to be so? It would at the same time be useless and boring to exhume them. ... *Errors are not those that deserve to be learned, but to be forgotten.*’

⁹ Cited after Lapidus (1996, p. 870).

¹⁰ For a refutation of the neoclassical interpretation of Smith, see Winch (1997).

A similar view has been expressed by Paul Samuelson in several contributions, especially in his keynote address at the History of Economics Society meeting in Boston in 1987.¹¹ There he proposed a program for what he dubbed the ‘Whig history of economic science’ (Samuelson, 1987). By this he meant a re-orientation of the history of economic thought ‘toward studying the past from the standpoint of the present state of economic science’ (ibid., p. 52). He motivated his proposal in a way similar to Gordon by asserting that there were no ‘Kuhnian breakthroughs in current economic science’ and that ‘ours is not an age of heady accomplishments and new exciting syntheses’ (ibid., p. 52). Ironically, he tried to exemplify the cumulative character of the normal science of economics with reference to Piero Sraffa’s edition of *The Works and Correspondence of David Ricardo* (Ricardo, 1951-1973) and his reformulation of the classical approach to the theory of value and distribution. As is well known, Sraffa saw his respective analysis explicitly as a return to the standpoint of the classical economists in the theory of value and distribution and as providing the foundations of a critique of the marginalist doctrine (cf. Sraffa, 1960, pp. v-vi). Sraffa thus challenged the cumulative-cum-continuous perspective maintained by the Whig history concept. In numerous papers Samuelson has ever since tried to refute Sraffa’s claim (see, in particular, Samuelson, 1978).¹²

The Whig concept still leaves some room for the history of economic thought, but a fairly small one. As a colleague told me several years ago: ‘Why bother with the history of economics? What is good is all in Samuelson’s *Foundations of Economic Analysis*, and what is not there to be found can’t be any good.’ This view is nicely epitomized by the title of a paper by Kenneth Boulding (1971): ‘After Samuelson who needs Adam Smith?’ The point of view under discussion is reminiscent of a famous remark made on the occasion of a fire destroying a world renowned library: ‘This is no loss, because the books burnt contained either what is in the Koran or what is not in it.’

Before I continue, let me stress that it should come as no surprise that people interested in the history of economic thought often happen to be heterodox economists of various leanings. This fact has been noticed by several observers; see recently Blaug (2001). The negative task reserved to the history of economics by Whiggism of pointing out what from the standpoint of

¹¹ It is interesting to note that Samuelson in his 1962 paper on ‘Economists and the history of ideas’, commenting on the idea of cumulative knowledge, was explicit only in the following regard: ‘mathematical knowledge has been cumulative’ (Samuelson, 1962, p. 5, n.2).

¹² For a recent assessment of Sraffa’s contributions from different perspectives, including Samuelson’s, see Kurz (2000b); for a discussion of Samuelson’s views on the classical authors and Sraffa, see the forthcoming exchange between Garegnani and Samuelson in *EJHET*, Volume 14:1 (2007).

modern economic theory are the errors and misconceptions of past authors is hardly a rewarding enterprise. However, as we shall see below, there is a much wider scope for historians of economic thought than this, and the reason for it is precisely that the foundations upon which much of contemporary economics is built are much less solid than is commonly taken for granted within the profession. By reversing Samuelson's above proposal we could say that a further task of the history of economic thought is to study the present state of economics from the standpoint of past authors. Seen from this vantage point, it should become clear why historians of economic thought are almost *ex definitione* bound to be to a smaller or larger degree heterodox. Ideally, they know better: they know not only contemporary economics, they also know the preceding vintages of economics and thus what has been gained and what lost in the course of time. If you happen to believe in the normal science interpretation of economics, or Whiggism, then you had better believe also in the ultimate demise of the history of the subject and get ready for changing your profession!

After this excursion I now come back to the main argument. A closely related reasoning contra the history of economic thought contends that with the accumulation of 'verified knowledge' ever harder choices have to be made in research and teaching. The history of economic thought has to make room especially for mathematics, statistics and econometrics – indispensable tools without which an access to the superior levels of contemporary knowledge are blocked. The opportunity costs of an hour spent on the history of economic thought are said to increase sharply over time. Therefore the subject is of necessity bound to decline. This is occasionally coupled with a further argument. If studied properly, the history of economic thought is a very demanding and time-consuming subject. To provide only an introduction into it runs the risk of remaining at a superficial and anecdotal level. Therefore it is better to abolish the subject as a whole.

A further reason has not so much to do with the subject as with those who, in the critics' perception, specialize in it. The history of economic thought, the argument goes, is typically studied by people who are not clever enough to do economic theory. It is an abode of the semi-numerates and involves adverse selection. Those striving for intellectual excellence are well advised to avoid the subject. Wrong-headed people are attracted by ideas that have long been shown to be untenable. Young and inexperienced scholars must be prevented from being misled. In order to enhance its status among the sciences, economics ought to leave behind its history. Abandoning the history of economic thought is seen as an act of purification that allows the discipline at large to focus scarce resources on advancing economic knowledge.

While it cannot be denied that some historians of economic thought do not exactly contribute to the reputation of the field, the same can of course also be said about some economists. In this context two things deserve to be mentioned. First, several of the most important economists ever have also been major historians of economic thought. Think, for example, of Marx, Böhm-Bawerk, and Schumpeter. And some of the most influential economic theorists of the last century have shown a deep interest in the subject. Think, for example, of John Maynard Keynes, Kenneth Arrow, Paul Samuelson or Amartya Sen. Some of the reasons that might explain their interest will be dealt with in the following section. Secondly, a more serious issue is the following one: Despite all the effort put into becoming, or at least behaving, like a normal science, economics appears to have suffered from a significant loss in reputation relative to some other disciplines both in the academic and in the public domain over the last few decades.¹³ While in the past a discipline that was on the rise gave occasion to great hopes as to its capacity to contribute to solving economic and social problems, economics in more recent times has lost much of its former nimbus and is often regarded as barren and irrelevant when it comes to tackling practical problems. The decline in reputation is reflected by the fact that vacant chairs in economics are no more filled and entire departments have been closed down. Historians of economic thought can hardly be blamed for this development, so what has gone wrong? More precisely: What is wrong with contemporary mainstream economics and why does our discipline lose ground relative to other disciplines? And has this anything to do with the marginalization of fields such as the history of economic thought or economic and social history? Is the mathematization of the subject at the cost of other forms of analysis responsible for the decline? Is the decline due to a growing perception that economic theory is ‘ahead of conceptual clarity’ (Aghion and Howitt, 1998, p. 435)? Is this development, *horribile dictu* to some economists, an expression of the fact that economics has failed to live up to the standards of a normal science and therefore was bound to lose in importance? And could things be improved if economics were no longer to follow what some other economists consider to be a will-o’-the-wisp?

These are difficult questions and the profession at large will have to face them. For the purpose of this paper it suffices to stress that the real problem is not so much the history of economic thought as the present state of economics itself. The attack on the former by some representatives of the latter may be seen as a mistaken attempt to put the blame for the decline

¹³ The relative loss in reputation of economics is perhaps best seen in terms of how other scientists assess the achievements of some of the so-called ‘Nobel Prize’ winners; see in this regard Henderson (2005). (While Alfred Nobel funded the prizes named after him, which are awarded by the Royal Swedish Academy of Science, the economics prize is given by the Swedish Central Bank.)

of the discipline as a whole on those whose profession it is to write as dispassionately as possible about its development. It is somewhat reminiscent of the antique habit of decapitating those who brought bad news. To the best of my knowledge this habit never improved the situation of anybody and seriously damaged that of some people.

Finally I should like to draw the attention to an argument that is ambivalent. The growth economist Paul Romer in a contribution to a book about the current state of macroeconomics opined: ‘If you devote too much attention to ancestor worship, you can get trapped and lose the chance to see things from a new perspective.’ (Romer, 2005, p. 679)¹⁴ Romer, to be clear, does not advocate a disregard of the history of economic thought, although he somewhat deridingly speaks of ‘ancestor worship’. He rather expresses the fear that too intensive a dealing with it might block one’s originality. In section 6 below we have a closer look at the new perspective from which Romer sees the problem of economic growth and compare it with that of the classical economists dealt with in the preceding section. While there is some truth in what Romer says in the above, it is also true that a thorough knowledge of the history of economic thought is not without value. First, it prevents one from putting forward spurious claims to originality.¹⁵ Secondly, it prevents resources from being wasted on ‘re-inventing the wheel’.¹⁶ Thirdly, it shows one why certain ideas, or the forms in which they have been presented, of necessity led into dead ends, and how such dead ends can be avoided. Finally, it sharpens one’s perception of what could be fruitful avenues of research and what not.

This brings me to a few further arguments in support of the history of economic thought, arguments against ‘provincialism in time’, as Lionel Robbins (1978, p. 2) succinctly put it.

4. Against ‘provincialism in time’

The first argument is that economics is not characterized by a smooth selection process in the sense described above. Scrutiny shows that it neither preserves all that is good nor eliminates all that is bad. The teleological view of our subject cannot be sustained.¹⁷ Joseph A.

¹⁴ I am grateful to Manseop Park who brought this statement to my attention while I was a visiting professor at Korea University in October 2005.

¹⁵ A malevolent person might contend that those who advocate getting rid of the history of economic thought are motivated by an interest to constrain competition of ideas only to contemporaries and cut out past economists.

¹⁶ In the following (and especially in Section 6) we will encounter such cases.

¹⁷ This has been argued by several historians of economic thought, e.g. Lapidus (1996). Even if there happens to be advancement in some sense, it is not necessarily linear. Cesarano (1983) has put forward

Schumpeter, a foremost economic theorist and a foremost historian of economic thought, apparently was not convinced by the normal science view of economics. How could he otherwise have put forward the paradoxical claim that studying the history of the subject exposes the student to ‘new ideas’ and ‘insights into the ways of the human mind’ (Schumpeter, 1954, p. 4)?¹⁸ A given idea is always new to some specific person or group of persons. Ideas that have been enunciated for the first time years or decades or centuries ago may look strikingly new to the modern economist, and the less the latter knows about the history of the subject the larger the number of ideas that can be expected to look novel to him or her.

There are numerous cases where ideas at first fell flat on the ground and were rediscovered only later. Had there been no interest in the history of economic thought they would have fallen into oblivion forever. They might have been reinvented by some later economist, but why not make use of an idea which, once made available, has the property of being nonrival and nonexcludable and thus enhances our knowledge base? The economics of innovation teaches us that upon their discovery inventions frequently are not implemented because the environment into which they are born is not hospitable, especially because it would not be profitable to adopt them. It is only after the environment has changed or after some complementary invention(s) in the same or some other industry has (have) seen the light of the day that the former invention is effectively applied.¹⁹ I see no reason why a similar mechanism should not be at work in the realm of economic ideas and conceptualizations. It may also be the case that a theory is abandoned, not because it is intrinsically flawed, but because the form in which it has first been put forward does not stand up to close examination and because both its advocates and critics were unable to realize its full potential. In the next section I will exemplify this possibility. The deeper reason for such a possibility is, of course, that in general there is no presumption that the tools available to economists at a given moment of time are always up to the complexity of the concepts entertained by them. In no small part, it seems, debates in the history of our subject reflect tensions between tools and concepts. There is also no reason to presume that such a tension, while a characteristic feature of the past, is absent in the present. Given the complexity of the issues economists are

compelling evidence that in monetary theory evolution follows a cyclical pattern, with certain ideas disappearing and reappearing again over time.

¹⁸ On Schumpeter’s contributions to economic analysis and its history, see, for example, Kurz (2005b).

¹⁹ Think, for example, of Ricardo’s discussion of the case in which improved machinery can be introduced only after money wages have risen due rising food prices because of diminishing returns in agriculture (Ricardo, 1951, Vol. I, p. 395).

typically dealing with one may even be prompted to conclude that economic knowledge always has been and always will remain in the nature of patchwork.²⁰

Here it suffices to illustrate what has just been said with reference to development economics and economic geography. In his Ohlin lectures, Paul Krugman (1995) tells the stories of the rise, fall, and eventual resurrection of these fields and explicitly puts the blame for the fall on ‘the limiting nature of our intellectual style’ (pp. viii-ix). A characteristic feature of this style is that in order ‘to be taken seriously an idea has to be *something you can model*’ (p. 5). This implies that ideas or areas that the currently available technical tools cannot yet reach are ignored. ‘Areas of inquiry that had been filled in, however imperfectly, became blanks. Only gradually, over an extended period, did these dark regions get reexplored’ (p. 3). Krugman had to engage in ‘dabblings in intellectual history’ in order to benefit from the fecundity especially of German contributions to spatial economics from von Thünen to Launhardt and Weber.²¹ The fact that something can be ‘modeled’ does not mean, of course, that the modeling is able to bring to full life a particular idea that has been formulated only verbally. There are cases in which models, while suggestive, are not faithful to the ideas they purport to present in rigorous terms.²²

Whilst it is possible that a theory or idea is prematurely abandoned because of the defective form in which it has been put forward, there is also the possibility that a theory or idea is retained although it is defective in substance, and is known to be so. This is indeed a fact that is much more important than appears to be generally admitted. According to Keynes

The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back.

Keynes continued:

I am sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas. Not, indeed, immediately, but after a certain interval; for in the field of economic and political philosophy

²⁰ Paul Samuelson wrote with regard to economic controversies of the past: ‘The fact that contemporaries quarrel must be understood against the background of an age in which writers imperfectly understood their own theories.’ (Samuelson, 1987, p. 56) I fear that there is no reason to presume that this age is or ever will be over in economics.

²¹ For a summary account of this tradition, see Blaug (1997, chap. 14).

²² As Gilbert Faccarello stressed in private correspondence with me, there is another striking example where ideas we have known for a long time, but which had been lost sight of, all of a sudden reappear in new garb and context. Thus, ‘new Keynesian economics’, championed by Stiglitz, Greenwald, Weiss and others, puts forward an analysis of banking and financial activities in which moral hazard and adverse selection play a crucial role. Much of what is being said now was anticipated by Adam Smith (*WN*, II.ii).

there are not many who are influenced by new theories after they are twenty-five or thirty years of age, so that the ideas which civil servants and politicians and even agitators apply to current events are not likely to be the newest. But, soon or late, it is ideas, not vested interest, which are dangerous for good or evil. (Keynes, 1936, p. 383)

One can only wonder whether the power of vested interests is indeed as small as Keynes seems to imply, and whether interests and ideas can be counterposed.²³ Vested interests typically use the medium of ideas in order to emphasize their legitimacy; therefore the two are frequently in a symbiotic relation with one another. Be that as it may, the important point made by Keynes is the following. There has been a history of economics, yet this history is never over: for better or worse old ideas and concepts are still with us. What has just been said does not only apply to the gullible laymen but also to our fellow-economists including those involved in counseling and advising on policy matters. The specters of the past are still very much alive. It is a myth reflecting both vested and entirely new interests that economics as a whole has successfully grown out of the dark ages and is dealing only with ideas and concepts that are both true and bear fruit.

Two particularly astounding examples of the continuing employment of concepts that have long been shown to be untenable in general are the aggregate production function and the concept of capital as a factor whose quantity can be ascertained independently of relative prices and thus income distribution.²⁴ As to the aggregate production function, it has been shown that such a function cannot be derived from microeconomic information other than in excessively special conditions.²⁵ Macroeconomists are (or ought to be) aware of this and some express unease when they use such functions. In the context of a discussion of the role of nonrival goods in economic growth Paul Romer emphasized: ‘After all, if one is going to do violence to the complexity of economic activity by assuming that there is an aggregate production function, how much more harm can it do to be sloppy about the difference between rival and nonrival goods?’ (Romer, 1994, pp. 15-16) Interestingly, the same Romer

²³ See in this context Samuelson’s anti-Whiggish statement: ‘One must never make the fatal mistake in the history of ideas of requiring a notion that it be “true”. For that discipline, the slogan must be, “The customer is always right.” Its objects are what men have *believed*; and if truth has been left out, so much the worse for truth, except for the curiously-undifficult task of explaining why truth does not sell more successfully than anything else.’ (Samuelson, 1962, pp. 14-15)

²⁴ Other examples are close at hand and include Say’s law and the quantity theory of money. As Lapidus (1996) stressed, there is a tendency to preserve bits of theory that are simple to teach to the detriment of others that are more difficult. Pedagogical preoccupations may involve some sort of Gresham’s law in the selection process.

²⁵ Interestingly, Lucas (2002, p. 56) admitted that if the heterogeneity of capital ‘was the issue in the famous “two Cambridges” controversy, then it has long since been resolved in favor of the English side of the Atlantic.’ Paradoxically, he went on: ‘Physical capital, too, is best viewed as a force [sic], not directly observable, that we can postulate [sic] in order to account in a unified way for certain things we *can* observe’ (ibid.).

stated two years later: ‘Only 30 years ago many economists still objected to a mathematical statement of the relationship between output and capital in terms of an aggregate production function and an aggregate stock of capital, $Y = f(K, L)$.’ (Romer, 1996, p. 202) Things have changed since. How is it possible that many of those who advocate the view that economics comes close to the natural sciences at the same time defend the use of analytical concepts that cannot be sustained?

The answer to this question is methodological, not theoretical. The use of the aggregate production function is defended on the ground that what matters is not the realism of the basic premises of a theory, but its predictive power, the ‘realism’ of the results that can be derived with its help. One may adopt whichever premises serve this purpose, irrespective of how unreal, bold or even fancy they may look to the observer. The use of such artificial constructions as the immortal ‘representative agent’ who maximizes his utility over an infinite horizon etc. are all justified in this way. Modern economics is in large parts under the spell of one variant or another of instrumentalist methodology. It was first advocated by young Schumpeter (1908) and then forcefully propagated by Milton Friedman (1953). There are several problems with this point of view that have been laid out in great detail in the literature.²⁶ Here it suffices to point out two things. First, according to instrumentalism a theory cannot be rejected simply on the ground that all the building blocks it employs are questionable or have even been shown to be untenable. However, if this were to be so, how could ‘erroneous’ ideas ever be eliminated from the canon of economics? Instrumentalism, it seems, is at odds with the cumulative science conception of economics and thus the Whiggish point of view. This is supported by a second and closely related consideration. Since there is no generally accepted view as to how to assess the ‘predictive power’ of a theory, economics lacks clear-cut criteria for judging the quality of a theory or deciding which one among several theories dominates over its rivals. This uncertainty as to how to assess the empirical performance of alternative models can be illustrated, for example, by the contention put forward by Mankiw, Romer and Weil (1992) that the conventional Solow approach to economic growth does better than the competing ‘new’ or ‘endogenous’ growth models. While on the surface this may well be so, Felipe and McCombie (2005) have shown that there is no reason to become complacent, for the ‘good fit’ of the Solow model is simply a reflection of the fact that an accounting identity has been tested.

²⁶ For a criticism of instrumentalism in its different forms, see Lawson (1997).

In short, modern economists have no reason to look down on past masters and would often benefit if they knew (or knew better) their works. In the environment depicted, historians of economic thought could perform useful tasks in at least three respects. First, they can be expected to be familiar with the origins and developments of ideas which, while still ruling the world, have ceased to rule the profession. Historians could act as critics, interpreters and intermediaries who bring back to life the historical conditions in which the ideas under consideration emerged, whether vested interests played any role in this, which transfigurations these ideas underwent over time, and what they mean today and why they are still held by some people. Historians could contribute to enlightening both groups of clients, the non-experts and the experts. Secondly, historians of economic thought, at least the generalists among them, should in principle be able to act as intermediaries between economists specializing in different areas within the profession. As Adam Smith knew very well, specialization comes at a price, which he described vividly in terms of the dangers of degradation and deprivation of the ‘labouring poor’. In economics something similar appears to happen: An ever more sophisticated division of labour is reflected in an ever increasing fragmentation of knowledge. The economist who knows everything about a vanishing problem and very little or nothing about the rest is almost proverbial.²⁷ Historians of economic thought, to the extent to which they manage to keep abreast of the broad developments in economic analysis, could perform a useful role similar to Adam Smith’s

philosophers or men of speculation, whose trade it is, not to do anything, but to observe every thing; and who, upon that account, are often capable of *combining together the powers of the most distant and dissimilar objects*. In the progress of society, philosophy or speculation becomes, like every other employment, the principal or sole trade and occupation of a particular class of citizens. (Smith, *WN*, I.i.9; emphasis added)

While historians of economic thought are perhaps not well advised to battle against the tendencies of specialization in the field, they might effectively contribute to mitigating its negative implications. This necessitates, of course, that a sufficiently large number of them care about what is going on in contemporary economics and actively seek discussions with economic theorists. (This may include conversing with oneself.) I am aware of Donald Winch’s warning that this might end up in ‘a dialogue of the deaf’ (Winch, 1997, p. 401). But it might also end up differently. If it does, it might contribute to overcoming somewhat knowledge fragmentation within each subfield in economics and lead to a better mutual understanding and respect of theorist and historian. Both are badly needed. Clearly, not only

²⁷ See in this regard Hayek’s (1937, p. 49) discussion of the division of knowledge which, in his view, ‘is quite analogous to, and at least as important as, the problem of the division of labour.’

the modern theorist is in danger of provincialism in time; the historian of economic thought is exposed to the same pitfall. Provincialism in time ought to be fought on both sides.²⁸

Finally, historians of economic thought ought to perform the role of critics of present as well as of past economists. It would be unfair to pin them down to a criticism of the latter only. Since, as we have seen, modern economics is intimately tied up with instrumentalism, a main task of historians of economic thought is to critically assess this stance and compare it with alternative ones. This ought to be done on a general and abstract level and then exemplified by case studies of modern pieces of analysis. There is a huge amount of work waiting to be carried out!

Modern economic analysis may also be used to sharpen an argument in favour of the history of economic thought. The latter, we have said in the above, is a treasure trove of ideas that can be exploited by the modern economist. We have then cited Adam Smith's reference, in chapter I of book I of *The Wealth of Nations*, 'On the division of labour', to 'philosophers and men of speculation' whose main business it is to 'combine' and recombine existing particles of knowledge in order to create new economically useful particles. The combinatoric metaphor as an abstract description of the innovation process is thus already to be found in Smith (and possibly long before him). It recurs in Schumpeter's 'new combinations' (Schumpeter, 1934, p. 66) and in a somewhat different form in Kenneth Boulding's 'tree of knowledge' (Boulding, 1956, p. 95). More recently Martin Weitzman expressed it with the help of combinatoric mathematics in his concept of 'recombinant growth' (Weitzman, 1998).

We may draw a parallel between knowledge generated in the technical sphere and knowledge generated in economics. We may begin by paraphrasing a consideration Kenneth Arrow (1969, pp. 29-30) originally put forward with regard to technological progress. Ideally, progress in economic theory consists in the first instance in a reduction of uncertainty as to the working of the economic system. The product of economic research is an observation on the world which reduces its possible range of variation. Progress typically proceeds by recombining and developing known ideas: new ideas are produced by means of old ones. This in itself should be enough to make it abundantly clear that economics could not exist without its history. There is simply no idea put forward today that has no ancestors. Not for nothing Pallas Athena, the goddess of the arts and sciences, was imagined to have arisen from the head of Zeus. One would be inclined to say that the history of economic thought is for

²⁸ One is reminded of Keynes's *bon mot*: 'I do not know which makes a man more conservative – to know nothing but the present, or nothing but the past.' (Keynes, 1970, p. 277)

economics what Zeus was for Pallas Athena, if one did not know that the former is true whereas the latter is a myth. Therefore, it is utterly ridiculous to see some contemporary economists portray their own work as if it was a construction *ab ovo*. There is no such thing (see also Blaug, 2001, p. 156). When even gods have ancestors, it should come as no surprise that economists have precursors. To pride oneself for quoting only papers published in the last five years is not a sign of scholarship but of ignorance. I do not want to dispute, of course, the possibility that there are new areas of research which cannot look back at a long history, but more often it is not so. I also do not want to insinuate that whenever an author writes on a particular topic he or she must refer to all the precursors of the argument under consideration. Nothing of this sort is being proposed. It suffices to avoid signs of complacency and arrogance.

We may now, following Weitzman, give the combinatoric metaphor a more precise form. As Weitzman stressed, ‘new ideas’ are not some exogenously determined function of ‘research effort’ in ‘the spirit of a humdrum conventional relationship between inputs and outputs.’

It seems to me that something fundamentally different is involved here. When research effort is applied, new ideas arise out of existing ideas in some kind of cumulative interactive process To me, the research process has at its center a sort of pattern-finding or combinatoric feel. (Weitzman, 1998, S. 332)

According to Weitzman what happens may be compared to the activities in an agricultural research station in which pairs of existing ‘idea-cultivars’ are combined to bring about new ‘hybrid ideas’ (where the word ‘cultivar’ is an acronym for *cultivated variety*). With I as the number of idea-cultivars, the corresponding number of different binary combinations that can be got from I is $C_2(I)$, which is given by

$$C_2(I) = \frac{I!}{(I-2)!2!}$$

For example, with $I = 4$, we have $C_2(4) = 6$; with $I = 5$, we have $C_2(5) = 10$; and with $I = 6$, we have $C_2(6) = 15$, etc. As an example below shows, in economics new ideas may result from reformulating and combining several previously known ideas.

The important message of Weitzman’s otherwise rather mechanistic argument is that the growth in the number of ideas that results from combining reconfigured existing ideas is remarkable and exceeds well exponential growth. Would the entire potential of recombinatory possibilities always be exploited in full, then the growth of the number of knowledge particles would over time increase almost without limit.

If this reasoning were to be applicable to the creation of knowledge in economics, and *cum grano salis* I believe it is, then it follows that it would be self-damaging if economics were to get rid of the history of economic thought. Even a casual comparison of the involved potential with the actual realization of new or improved ideas in economics suggests that the latter falls dramatically short of the former. While in various areas there have been remarkable advances in several dimensions, in others it is quite otherwise. Many of the advances concern the more rigorous formulation and mathematical treatment of known ideas, and the nesting of such ideas. In the following two examples will be provided. The first example concerns Piero Sraffa's rediscovery of the classical surplus approach to the theory of value and distribution, and his demonstration that contrary to the received Marshallian interpretation this approach is fundamentally different from the demand and supply approach of the marginalist authors. Sraffa's work led to a major re-interpretation of the classical economists and a coherent reformulation of their doctrine of value and distribution. Perhaps the most important problem which the economist dealing with the dynamism of the modern economy has to face is that of the growing heterogeneity and diversity of knowledge, commodities, services and labours performed as the economy evolves. How did the classical authors, as interpreted by Sraffa, attempt to come to grips with an economic system that is incessantly in motion and continually changes from within?²⁹

Before we enter into a discussion of the subject matter it should be stressed once again that the following two sections, important as they are in their own right, at least in the present author's view, are in the nature of excurses that put flesh on the bare bones of the main argument. The latter benefits from the following case studies but does not depend on them.

5. Piero Sraffa on the classical theory of value and distribution

According to Paul Samuelson, 'inside every classical writer there is a modern economist trying to get born.' This may well be true. Yet is it of necessity a marginalist economist? Sraffa's answer was in the negative. He explicitly sought to revive the 'standpoint ... of the old classical economists from Adam Smith to Ricardo which has been submerged and forgotten since the advent of the "marginal" method' (1960, p. v). According to him their theory had prematurely been abandoned due to a grave misunderstanding: the defective form in which it had been handed down by the classical economists had erroneously been taken for

²⁹ Here is not the place to enter into a detailed description of the path Sraffa followed in his reconstructive and interpretative work; see therefore Garegnani (2005), Kurz (2005a), Kurz and Salvadori (2005), and Gehrke and Kurz (2006).

a defective substance. Hence for decades the potential of the classical approach had been left undeveloped – a case of crass failure of an allegedly efficiently working selection process.³⁰

What, then, was the *differentia specifica* of the classical analysis? The classical authors, Sraffa insisted, determined the general rate of profits, the rents of land and the corresponding system of relative prices by starting from a given *social surplus product*. The surplus was seen to result from a process of production conceptualized as a *circular flow*. Real wages of labour were considered no less as indispensable inputs than raw materials, tools or machines. Wages and profits were thus treated *asymmetrically* and not symmetrically, as in marginalist theory. With wages taken as a known magnitude in a given situation, profits were determined as a *residual*. The theory of value and distribution was designed to lay the foundation of all other economic analysis, including the investigation of capital accumulation, development, technical progress and economic growth. A growing division of labour was seen to entail an ever growing diversity of commodities. The analysis had to cope with this crucial fact.

Concerned with interspatial and intertemporal comparisons, the classical authors strove to identify an ‘invariable’ standard of value. This standard was designed to provide a measure of the ‘difficulty of attainment’, to use Ricardo’s term, of various commodities at different times and places. As Sraffa shows in his papers, this problem has no general theoretical solution and can only be dealt with in terms of index numbers. We therefore focus attention on the specific analytical structure of the classical theory of value and distribution and whether it is able to cope with the (growing) heterogeneity of commodities.

With the real cost of a commodity consisting of the commodities productively consumed in the course of its production, value was seen to be proportional to what Sraffa called *physical real cost* – a term coined in order to distinguish the classical concept from Marshall’s ‘real cost’ in the sense of psychic costs. But how do different bundles of commodities, reflecting the physical real costs of different commodities, compare with one another? This was the formidable problem the classical economists could not satisfactorily solve. There was an apparent discrepancy between the highly sophisticated concepts they had elaborated (circular flow; uniform rate of profits), on the one hand, and the analytical tools at their disposal, on the other. What classical economists badly lacked was the notion of simultaneous equations and

³⁰ In a recent contribution Mark Blaug (2001, p. 156) maintained: ‘There is nothing predetermined about our current theories and if years ago, economics had taken another turn at a critical nodal point, we would today be advocating a different theory.’ This can hardly be disputed. One such ‘nodal point’, and arguably a most important one, is discussed in the above. Had the classical authors not failed to provide a coherent version of their approach to the theory of value and distribution, the history of economics might have taken a radically different path. ‘Economic knowledge’, Blaug insisted, ‘is path-dependent’ (ibid.).

the mathematics to solve them. As Sraffa showed in terms of his systems of equations elaborated from November 1927 onwards, the classical concepts could be formulated coherently within such a framework. Relative prices and the rate of profits turned out to be fully explained in terms of physical real costs. There was no need to have recourse to demand and supply schedules based on questionable subjectivist concepts. There was also no need to have recourse to the labour theory of value, which was one of the main reasons for the premature abandonment of the classical approach. The latter did not stand or fall with that theory, as its critics maintained.³¹

If the surplus is distributed, in conditions of free competition, in terms of a uniform rate of profits on the value of the ‘capital’ advanced in each industry, this rate is determined simultaneously with relative prices and the value of capital employed in each industry as well as in the system as a whole. From the vantage point of a coherent formulation of the classical approach it followed immediately that it was impossible, in general, to ascertain the ‘quantity of capital’, whether of a single industry or of the entire economy, independently of the rate of profits and relative prices. Therefore, the attempt to explain the rate of profits in terms of the marginal productivity of a given quantity of capital, as in long-period neoclassical theory, was doomed to failure, because it involved a vicious circle. This finding is as true today as it was almost eight decades ago. However, in large parts of the profession it is still ignored.

While in his second or with-surplus equations Sraffa retained the assumption of given inventory wages, he almost in parallel began to investigate the case of a change in wages and its impact on the rate of profits and relative prices. He did this with reference to Ricardo’s respective discussion and more generally in recognition of the fact, analyzed by the classical economists and Marx, that workers could participate in the sharing out of the surplus product. He was especially fascinated by the way Ricardo had done this analytically in terms of what Sraffa called ‘proportional wages’, that is, a given *share* of wages in the social product. Sraffa also became aware of the fact that Ricardo’s argument was not meant to be limited to the case of a given economy at a given time but was designed to cover also the development of the economy over time. More specifically, Ricardo’s demonstration of the inverse relationship between the *rate* of profits and the *share* of wages was seen to encompass the case in which the economic system was subject to technological and organizational change. By construction, the relationship was meant to be independent of the kinds of commodities

³¹ The labour theory of value was not really a way out of the impasse in which the classical authors found themselves, because with a circular flow the quantities of labour embodied in the different commodities can only be ascertained by solving a system of simultaneous equations.

productively consumed and produced. It was on the basis of the new wage concept that Ricardo had felt he could assert his fundamental proposition on income distribution: ‘The greater the portion of the result of labour that is given to the labourer, the smaller must be the rate of profits, and vice versa.’ (Ricardo, *Works*, Vol. VIII, p. 194) According to Ricardo the general rate of profits depends on the share of wages, and on nothing else.

Sraffa was clear already at the beginning of the 1930s that Ricardo’s fundamental proposition concerning distribution was not generally true: it stood or fell with the premise that the social capital consisted only of, or could be entirely reduced to, wages. However, with production as a circular flow this was not possible: however far one went back, there was always a commodity residue left. This Ricardo had overlooked and had therefore arrived at a misleading proposition. Marx had spotted Ricardo’s error and had accused him of identifying the rate of profits with the rate of surplus value. With a circular flow the *maximum rate of profits* (corresponding to zero wages) was finite, not infinite, as Ricardo had implied. Yet once one takes into account nonwage capital, Ricardo’s proposition does not hold true any more: the rate of profits can fall (or rise) even if proportional wages remain constant. It all depends on what happens to the ‘Organic Composition of Capital’ of the economy as a whole.

Close scrutiny shows that Marx had made some considerable progress over and above the state in which Ricardo had left the theory of value and distribution. First, his concept of ‘constant capital’ expresses the fact that production is a circular flow and that capital cannot entirely be resolved in wages. Secondly, in terms of his labour-value-based approach, Marx had been able, however imperfectly, to see through the complexities of the system under consideration and establish the fact that the rate of profits was bounded from above. In Marx’s conceptualization, the maximum rate of profits, R , that obtained when wages were nil was equal to L/C , that is, the ratio of total living labour expended during a year ($L = V + S$, where V is variable capital and S is surplus value) and social constant capital (C). It was thus equal to the inverse of the organic composition of capital of the economy. Marx considered the maximum rate of profits to be a purely technological datum of the economic system, corresponding to a given state of its technological development.

We may express Marx’s view on the matter by using conventional classical concepts based on normal prices. Let r denote the general rate of profits, P total profits, K total physical capital, W wages, and w the share of wages. Then r is given by

$$r = \frac{P}{K+W} = \frac{\frac{P}{Y}}{\frac{K}{Y} + \frac{W}{Y}} = \frac{1 - \frac{W}{Y}}{v(r) + \frac{W}{Y}} = \frac{1-w}{v(r)+w}$$

where $v(r)$ is the capital-output ratio (or organic composition of capital) that generally depends on the rate of profits. Marx however took v to be a magnitude that is independent of r and equals the inverse of the maximum rate of profits, R . In Marx's view therefore

$$r = \frac{R(1-w)}{1+Rw}$$

This expression shows that the actual rate of profits depends on two magnitudes instead of on only one, as Ricardo had contended: the share of wages, w (or the rate of surplus value), and the maximum rate of profits, R (or the inverse of the organic composition). Both are dimensionless magnitudes. The expression is therefore valid independently of which commodities are being produced and at which ratios they exchange. It confirms Ricardo's conviction that the laws of distribution 'are not essentially connected with the doctrine of value' (Ricardo, *Works*, Vol. VII, p. 194).

The above formula is devoid of any 'commodity fetishism', to use Marx's term. It is the appropriate tool to analyze the process of capital accumulation and economic development. Whatever happens in the course of this process, it will be reflected in changes of R and w , which shape the trend of the general rate of profits. This can be illustrated in terms of a tendency of the rate of profits to fall. Differentiating r partially with respect to R gives

$$\frac{\partial r}{\partial R} = \frac{1-w}{(1+Rw)^2} > 0$$

If the maximum rate of profits falls (i.e., the organic composition of capital rises) and proportional wages happen to remain constant, the rate of profits is bound to fall.

While impressed by Marx's achievements, Sraffa was clear from his work in the late 1920s and early 1930s that the capital-output ratio of the economic system (v) generally depends on the actual rate of profits and therefore cannot be equated with the maximum rate of profits other than in the case in which the actual rate equals the maximum one. Therefore, Marx's above construction was not fully satisfactory. Delving deeper into the matter, Sraffa eventually had to abandon the idea that any actual economic system could ever be expected to exhibit a value of total capital in terms of the product that does not vary with a variation in the rate of profits. He therefore had to construct an artificial system out of his equations for which

this invariance condition held true. This he accomplished in late January 1944 in terms of the device of the ‘Standard system’.³² With wages paid out of the product (rather than out of social capital, as in Ricardo and Marx), and wages and prices expressed in terms of the ‘Standard commodity’, the sought correct expression of the general rate of profits is

$$r = R(1 - w)$$

It applies independently of the heterogeneity and diversity of commodities.³³ And it confirms an intuition of Ricardo’s who in a letter to Malthus of 9 October 1820 had written:

Political Economy you think is an enquiry into the nature and causes of wealth – I think it should rather be called an enquiry into the laws which determine the division of the produce of industry amongst the classes who concur in its formation. *No law can be laid down respecting quantities, but a tolerably correct one can be laid down respecting proportions.* (Ricardo, *Works*, vol. VIII, pp. 278-9; emphasis added)

This, I believe, is Ricardo’s quintessential message: For a system incessantly in motion and permanently changing quantitatively and qualitatively from within, an economic ‘law’ can only be formulated with regard to distributive *proportions* – the constraint binding r and w , with the technological variable R reflecting the surplus generating capacity of the system at a given moment of time.

We now turn to Paul Romer’s 1990 paper on ‘Endogenous technological change’ (Romer, 1990).³⁴ How does he, *inter alia*, try to cope with a growing heterogeneity of commodities?

6. Paul Romer on endogenous growth

Much of recent growth theory centres around the concept of dynamically increasing returns. This involves a revival in new garb of ideas that have been with us for a long time. Romer (1990) combines (a) the endogenous production of new ‘industrial designs’ as in Romer (1986) with (b) the formalization of the role of human capital in economic growth as in Lucas

³² The Standard system allowed Sraffa at the same time to stay in the system that was to be analyzed and yet step outside it and look at it from a detached, ‘objective’ standpoint. More recently, Thomas Nagel in *The View from Nowhere* has investigated the need to apply some such device in response to the following problem: ‘how to combine the perspective of a particular person inside the world with an objective view of that same world, the person and his viewpoint included. It is a problem that faces every creature with the impulse and the capacity to transcend its particular point of view and to conceive of the world as a whole.’ (Nagel, 1986, p. 3) Interestingly, Sraffa gave one of his early manuscripts the title ‘Man from the Moon’; see Kurz and Salvadori (2004).

³³ Both R and the related standard of value suggested by Sraffa depend on the system of production or ‘technique’ under consideration. In case several techniques are to be compared with one another and the same standard of value is used, only one technique satisfies the above formula. See Kurz and Salvadori (1995, chap. 4).

³⁴ It hardly needs to be stressed that some of the observations put forward do not apply to other contributions to new growth theory.

(1988) and (c) a product-diversity specification of physical capital derived from Dixit and Stiglitz (1977). Romer's model can thus be said to illustrate the combinatoric metaphor of knowledge creation. Economic theorists are typically synthesizers and there is no reason *per se* to be dismissed as such.

Romer's argument relies essentially on three premisses (Romer, 1990, p. S72): (i) technological progress is the 'prime mover' of economic development; (ii) such progress is 'in large part' the result of deliberate actions of agents responding to market signals; and, 'most fundamental', (iii) technical instructions of how to use raw materials and other inputs are fundamentally different from other goods. While the development of economically useful knowledge incurs costs, once the knowledge is available it can be used time and again without generating significant further costs.³⁵ Hence the cost under consideration is a type of fixed cost. Differently from human capital, industrial designs are said not to need to be embodied, and differently from ordinary goods they are nonrival and also only partially excludable. Knowledge per capita can be accumulated without limit, and because of its incomplete excludability there will be spillovers which drive the process of growth. The presence of nonrival inputs of necessity involves nonconvexities. Concavities in techniques are disruptive of the received concept of equilibrium and imply a more 'open-ended' vision of economic development and growth. As Romer's paper shows, it takes some considerable effort to tame the model and subdue it again to the equilibrium method.

There are four sectors and four types of inputs in the model. In the research sector new knowledge, which is taken to be cardinally measurable, is generated by means of human capital and already existing knowledge, which is assumed to be available to all researchers. The input proportion of knowledge and human capital in the research sector is taken to be the same for all designs produced. The designs thus cannot be discriminated via their inputs. In the second sector as many monopolistic firms as there are (economically equally valuable) designs produce by means of these designs and parts of the final output provided by the third sector the intermediate products in question. While the available stock of knowledge is nonexcludable in the research sector, the elements it is made up of are taken to be totally excludable in the sector producing capital goods. The input proportion of design and final product is always the same, irrespective of which intermediate product is being produced. Therefore, also specific capital goods cannot be discriminated in terms of their inputs. The intermediate products in which knowledge is embodied are assumed neither to depreciate nor

³⁵ Ricardo, it should be recalled, spoke of improved methods of production as a 'general good'.

to become economically obsolete (ibid., p. S85). Once installed, an intermediate product will be used forever and give rise to a perpetual stream of income – a monopoly rent. New knowledge is never the enemy of old knowledge. The intermediate products are employed in the third sector together with simple labour and human capital in order to produce final output; the latter can be used both as a consumption and as a general kind of capital good. This is said to involve an ‘extreme’ assumption:

Assuming that capital can be accumulated as forgone output is equivalent to assuming that capital goods are produced in a separate sector that has the same technology as the final-output sector. (Ibid., p. 80)

Romer might have added that without this assumption no aggregate production function could be postulated. He might also have added that the other two assumptions of *equal input proportions* are no less extreme than this one and have the effect of removing all signs of diversity of designs and specific capital goods. In the fourth sector human capital is generated in an education process.

New Knowledge, a flow, is produced by means of old knowledge, a stock, and depending on the exogenously given productivity parameter that translates the latter into the former the economy as a whole can grow more or less rapidly. It comes, however, as a formidable surprise that Romer sees no need to say anything about the measurability of knowledge (or of human capital). If knowledge is *not* cardinally measurable, nothing can be said about returns to scale, marginal and average products, growth rates etc. (see Steedman, 2003). Romer simply represents the ‘quantity of knowledge’ available at a given moment of time by the integer A , that is, the number of designs available.

While Romer does not allow for a growing variety of consumption goods, he stresses with regard to capital goods: ‘The unusual feature [sic] of the production technology assumed here is that it disaggregates capital into an infinite number of distinct types of producer durables.’ (Ibid., p. S80)³⁶ The final product is assumed to be produced by means of the following extension of a Cobb-Douglas function

$$Y(H_Y, L, x) = H_Y^\alpha L^\beta \sum_{i=1}^{\infty} x_i^{1-\alpha-\beta}$$

where H_Y denotes the amount of human capital employed in the final output sector, L the number of workers employed in it, and $\sum_{i=1}^{\infty} x_i^{1-\alpha-\beta}$ the employment of intermediate products.

³⁶ For the following, see also Park (2006), who argues that in all currently available horizontal innovation models homogeneity masquerades as variety.

Since at a given moment in time there is only a finite number A of them, $x_i = 0$ for all $i > A$. Final output is thus an additive separable function of the various intermediate products.

How heterogeneous is knowledge and are its embodiments in terms of capital goods in Romer's model really? As we have seen in the above, in no case could we infer from the input side alone which product is being generated – be it a particular design, or a specialized intermediate product, or the consumption alias general capital good. The alleged diversity of intermediate products is more apparent than real. Since only the final product enters physically into their production, they all represent unspecifically forgone consumption; and since the knowledge incorporated in them is taken not to become obsolete, they do so in proportion to the amount of forgone consumption. The existing stock of intermediate goods, or knowledge, is thus equal to cumulative forgone consumption. This is confirmed by Romer who defines 'an accounting measure of total capital K as cumulative forgone output.' (Ibid., p. S82) Heterogeneous capital goods can thus be aggregated independently of relative prices and income distribution. *This is only possible because they are not really heterogeneous.*

Romer is aware of the problematic character of the bold assumptions he has piled up, but contends: 'Nonetheless, the general results here should be [sic] robust to more careful modeling [sic] of the nature of the interaction between different specialized producer durables.' (Ibid., p. S85) It is not clear wherein his optimism resides. What is clear, however, is that in order to show that his contention is well grounded, he would have to tackle precisely the problems the classical authors (and Sraffa) struggled with.

The main ideas underlying Romer's model are not new. What is new is the translation of what we knew already rather well into the official language of intertemporal equilibrium macroeconomics. The education as opposed to the experience aspect of human capital is, for example, expressed in Adam Smith's famous statement: 'A man educated at the expence of much labour and time to any of those employments which require extraordinary dexterity and skill, may be compared to one of those expensive machines.' (Smith, *WN*, I.x.b.6) The generation of such expensive human 'machines' presupposes a sufficiently large market and is thus an integral part of an ever deeper division of labour, which involves new methods of production that enhance labour productivity.

Also the idea of the establishment of a research and development industry can be traced back to Smith and, of course, many other earlier writers. According to Smith modern society is characterized by continuous improvements and innovations. 'In the progress of society,' we have heard in the above, 'philosophy or speculation becomes, like every other employment,

the principal or sole trade and occupation of a particular class of citizens.’ (Smith, *WN*, I.i.9) Smith emphasized the uncertainty associated with the introduction of new goods and new methods of production (Smith, *WN*, I.x.b.43), thereby foreshadowing the distinction between inventions and innovations. The concept of ‘learning by doing’ we encounter in Smith’s discussion of gains of specialization and that of ‘learning by using’ in his reference to those people ‘who had occasion to use the machines’ (*ibid.*), and then improved upon them.

The expanding diversity of commodities in general and of means of production in particular is an integral part of the process of economic development and growth. The concept of a growing ‘product-diversity’ in Romer’s model exhibits some startling similarity with the concept of superiority of more roundabout methods of production as it was advocated by representatives of the ‘Austrian school’ of economics. Originally, in Carl Menger, the concept was designed to reinterpret Adam Smith’s idea of a growing division of labour over time, but in Böhm-Bawerk at the latest it degenerated to the static concept of a description of alternative methods of production at a given moment of time when analyzing the problem of the choice of technique. Böhm-Bawerk for this purpose elaborated the concept of the ‘average period of production’ – a device that was meant to allow one to aggregate heterogeneous intermediate products independently of relative prices and thus the rate of interest. The relative scarcity of the resulting ‘quantity of capital’ in the system as a whole was then – in the crowning ultimate step of the analysis – meant to determine the rate of interest. However, as Wicksell had already noted, Böhm-Bawerk’s construction cannot generally be sustained (see Kurz, 2000a).

Seen against this background, Romer’s treatment of the diversity of capital goods can be interpreted as trying to kill two birds with a stone: On the one hand it attempts to capture Smith’s dynamic concept of the division of labour and the differentiation of the means of production that comes with it; on the other hand it purportedly allows one to aggregate heterogeneous capital goods without knowledge of relative prices and thus the rate of profits.

As to the former aspect, one could say that in Romer there is some sort of ‘absolute period of production’, whose ‘length’ is expressed in terms of the number of different kinds of intermediate products, A , actually employed. Over ‘time’, that is, via an increase in A , production is rendered more ‘roundabout’ and thereby ‘superior’, which is reflected in a growing labour productivity and a growing income per capita. Yet, the way in which Romer conceptualizes a ‘lengthening’ of the absolute period of production is rather peculiar. Since, as we have heard, each and every intermediate product is taken to be technically and

economically immortal, it will never be superseded by some other means of production: once produced, it will forever be used. Let us illustrate this by means of an example. If, say, final output happens to be wheat, then wheat in ancient Egypt was produced by means of digging sticks only, whereas today it is taken to be produced by means of digging sticks and ploughs and oxen and tractors and combine harvesters etc. etc., all employed *simultaneously*. This is certainly an extreme conceptualization of a growing capital input diversity which is squarely contradicted by an even casual observation of facts. New capital goods frequently replace old ones in a similar way as new particles of knowledge supersede old ones.

As regards the second aspect, that of aggregating heterogeneous capital, we have already seen that Romer's intermediate products are not really diverse or 'specialized'. They are rather cast from a single die and embody the same substance, forgone consumption. In such fancy circumstances there is no need to use prices in order to render digging sticks, ploughs, oxen, tractors, combine harvesters etc. commensurate. There is no disaggregated physical capital in Romer's model that would deserve the name.

We may conclude that in his model Romer consistently avoids to deal with the endogenously changing variety and growing diversity of consumption and capital goods which reflect an ever changing stock of economically useful knowledge. This problem bothered the classical economists a great deal and made them elaborate concepts that were supposed to be valid independently of the kinds of commodities to be found at a given time and place. Romer postulates instead that the economy produces and consumes always the same multiple-purpose final good. Consumers are taken to maximize a given and invariant utility function. One can only wonder which real good, if any, could satisfy these demanding conditions.

7. Concluding remarks

In this paper it has been argued that economics is not the alleged perfect selection mechanism that preserves each and every economic idea that is valid and useful and jettisons all ideas that are not. The teleological view of the subject cannot be sustained. Therefore the task of the history of economic thought cannot be limited to the study of the past from the standpoint of the present state of economics. Another important and intellectually perhaps more rewarding task is to study the present state of economics from the standpoint of past authors in order to see what has been gained and what lost in the course of the development of the subject. The history of the subject is a treasure trove of ideas. The growth in the number of ideas that results from combining reconfigured existing ideas exceeds exponential growth. Would the

entire potential of recombinatory possibilities always be exploited, then the growth of the number of knowledge particles would over time increase almost without limit. It is safe to presume that the actual advance of knowledge in economics falls considerably short of its potential. Hence the history of economic thought may play a useful role in economics by preserving valuable ideas which otherwise would fall into oblivion. To foster the subject is therefore also in the interest of general economists. In terms of a famous dictum of Adam Smith: ‘It is not from the benevolence of [them], that we expect our [right to exist as historians of economic thought], but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages.’ (Smith, *WN*, I.ii.2)

The paper provides a number of examples to illustrate its main messages. It shows in particular that the classical approach to the theory of value and distribution was prematurely abandoned, because a deficiency in the form in which it has been put forward was mistaken for a deficiency in substance. It is stressed, among other things, that the classical authors were keen to deal with an indisputable fact of development and growth: the changing variety and diversity of commodities. This fact, it is then argued, is given short shrift in Romer’s 1990 model of endogenous growth, appearances notwithstanding. While allegedly concerned with a growing variety of durable capital goods, the assumptions entertained by Romer effectively boil down to postulating homogeneous capital. There are other aspects of the model that are disquieting, including the assumption that ‘knowledge’ is cardinally measurable. This criticism of the model is not meant to dispute Romer’s ability as a model builder: he is doubtless one of the best among contemporary economists. It is rather meant to exemplify what Krugman has called the ‘limiting nature’ of the contemporary ‘intellectual style’ in economics, where an idea gets a hearing only if it is dressed up as a model using an optimizing framework. This, however, very often turns out to be a Procrustean bed into which well-known ideas are forced. The net value added by applying this intellectual style is not always clear, and occasionally it may well be negative.

This should be enough to insist that economics is too important a subject to be left exclusively to our fellow-economic theorists. After all, as Goethe knew, ‘Theories are commonly outpourings of an impatient mind that would like to get rid of the phenomena.’ While theories come and go, the phenomena stay.

References

- Aghion, P., and Howitt, P. (1998). *Endogenous Growth Theory*, Cambridge, Massachusetts: MIT Press.
- Arrow, K. (1969). 'Classificatory notes on the production and transmission of technological knowledge', *American Economic Review. Papers and Proceedings*, 59, pp. 29-35.
- Audi, R. (1998). *Epistemology. A Contemporary Introduction to the Theory of Knowledge*, 2nd ed., New York and London: Routledge.
- Blaug, M. ed. (1991). *The Historiography of Economics*, Aldershot: Edward Elgar.
- Blaug, M. (2001). 'No history of ideas please, we're economists', *Journal of Economic Perspectives*, 15, pp. 145-64.
- Blaug, M. (1997). *Economic Theory in Retrospect*, 5th edn, Cambridge: Cambridge University Press.
- Boehm, S., Gehrke, C., Kurz, H. D. and Sturn, R., eds (2002). *Is There Progress in Economics? Knowledge, Truth and the History of Economic Thought*, Cheltenham: Edward Elgar.
- Boulding, K. E. (1956). *The Image. Knowledge in Life and Society*, Ann Arbor: The University of Michigan Press.
- Boulding, K. E. (1971). 'After Samuelson who needs Adam Smith?', *History of Political Economy*, 3, pp. 225-37.
- Cesarano, F. (1983). 'On the role of the history of economic analysis', *History of Political Economy*, 15(1), reprinted in Blaug (1991).
- Dixit, A. and Stiglitz, J. (1977). 'Monopolistic competition and optimum product diversity', *American Economic Review*, 67, pp. 297-308.
- Felipe, J. and McCombie J. S. L. (2005). 'Why are some countries richer than others? A skeptical view of Mankiw-Romer-Weil's test of the neoclassical growth model', *Metroeconomica*, 56, pp. 360-392.
- Friedman, M. (1953). 'On the methodology of positive economics', in M. Friedman, *Essays in Positive Economics*, Chicago: University of Chicago Press.
- Garegnani, P. (2005). 'On a turning point in Sraffa's theoretical and interpretative position in the late 1920s', *European Journal of the History of Economic Thought*, 12(3), pp. 453-92.
- Gehrke, C. and H. D. Kurz (2006). 'Sraffa on von Bortkiewicz: Reconstructing the Classical theory of value and distribution', *History of Political Economy*, 38(1), pp. 91-149.
- Goethe, J.-W. von (1953). *Schriften zur Kunst, Schriften zur Literatur*, Vol. 12 of the *Hamburg Edition*, Hamburg: Christian Wegner.
- Gordon, D. F. (1965). 'The role of the history of economic thought in understanding modern economic theory', *American Economic Review*, 55, pp. 119-127, reprinted in Blaug (1991).
- Hayek, F. A. von (1937). 'Economics and knowledge', *Economica*, new series, IV, pp. 33-54.
- Henderson, H. (2005). 'Prix Nobel d'Économie: L'imposture', *Le Monde diplomatique*, February.
- Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*, London: Macmillan. Volume VII of *The Collected Writings of John Maynard Keynes*, managing eds A. Robinson and D. Moggridge, London: Macmillan.

- Keynes, J. M. (1970). *The Collected Writings of John Maynard Keynes*, managing eds A. Robinson and D. Moggridge, London: Macmillan, Volume IX.
- Krugman, P. (1995). *Development, Geography, and Economic Theory*, Cambridge, MA, and London: MIT Press.
- Kurz, H. D. (2000a). 'Wicksell and the problem of the "missing" equation', *History of Political Economy*, 32, pp. 765-88.
- Kurz, H. D. ed. (2000b). *Critical Essays on Piero Sraffa's Legacy in Economics*, Cambridge: Cambridge University Press.
- Kurz, H. D. (2005a). 'The agents of production are the commodities themselves: On the classical theory of production, distribution and value', *Structural Change and Economic Dynamics*, 17(1), pp. 1-26.
- Kurz, H. D. (2005b). *Joseph A. Schumpeter – Sozialökonom zwischen Marx und Walras*, Marburg: Metropolis.
- Kurz, H. D. (2006). 'Über das Wachstum im Wissen vom Wissen im Wachstum. Eine kritische Bestandsaufnahme der neueren wachstumstheoretischen Literatur', paper given at the annual meeting of the historians of economic thought of the Verein für Socialpolitik, Graz, 19-20 May, 2006. To be published in the proceedings of the meeting.
- Kurz, H. D., and N. Salvadori (1995). *Theory of Production. A Long-period Analysis*, Cambridge, Melbourne and New York: Cambridge University Press.
- Kurz, H. D., and N. Salvadori (1998). "'Endogenous" growth models and the "Classical" tradition', in H. D. Kurz and N. Salvadori (eds), *Understanding 'Classical' Economics. Studies in Long-period Theory*, London, pp. 66-89.
- Kurz, H. D. and N. Salvadori (2004). "'Man from the Moon". On Sraffa's objectivism', *Economies et Sociétés*, 35, pp. 1545-57.
- Kurz, H. D. and N. Salvadori (2005). 'Representing the production and circulation of commodities in material terms: On Sraffa's objectivism', *Review of Political Economy*, 17(3), pp. 413-441.
- Lapidus, A. (1996). 'Introduction à une Histoire de la Pensée Economique qui ne verra jamais le jour', *Revue économique*, 47(4), pp. 867-92.
- Lawson, T. (1997). *Economics and Reality*, London: Routledge.
- Lucas, R. E. (1988). 'On the mechanics of economic development', *Journal of Monetary Economics*, 22, pp. 3-42.
- Lucas, R. E. (2002). *Lectures on Economic Growth*, Cambridge, MA, and London: Harvard University Press.
- Machlup, F. (1980). *Knowledge and Knowledge Production*, Princeton, NJ: Princeton University Press.
- Mankiw, G., Romer, D., und Weil, D. (1992). 'A contribution to the empirics of economic growth', *Quarterly Journal of Economics*, 107, pp. 407-437.
- Mill, J. (1826). *Elements of Political Economy*, 3rd edn, London: Baldwin, Cradock, and Joy.
- Nagel, T. (1986). *The View from Nowhere*, Oxford and New York: Oxford University Press.
- Park, M. (2006). 'Homogeneity masquerading as variety: the case of horizontal innovation models', forthcoming in *Cambridge Journal of Economics*.

- Pigou, A. C. (1920). *The Economics of Welfare*, London: Macmillan.
- Prigogine, I. (2005). 'The rediscovery of value and the opening of economics'. In K. Dopfer (ed.), *The Evolutionary Foundations of Economics*, Cambridge: Cambridge University Press, pp. 61-69.
- Ricardo, D. (1951-1973). *The Works and Correspondence of David Ricardo*, 11 vols, edited by Piero Sraffa with the collaboration of Maurice H. Dobb, Cambridge: Cambridge University Press. In the paper referred to as *Works*, vol. no.
- Robbins, L. (1978). *The Theory of Economic Policy in English Classical Political Economy*, 2nd ed., London: Macmillan.
- Romer, P. M. (1986). 'Increasing returns and long-run growth', *Journal of Political Economy*, 94, pp. 1002-1037.
- Romer, P. M. (1990). 'Endogenous technological change', *Journal of Political Economy*, 98, pp. S71-S102.
- Romer, P. M. (1994). 'The origins of endogenous growth', *Journal of Economic Perspectives*, 8, pp. 3-22.
- Romer, P. M. (1996). 'Why, indeed, in America? Theory, history, and the origins of modern economic growth', *American Economic Review. Papers and Proceedings*, 86, pp. 202-206.
- Romer, P. (2005). 'Interview with Paul M. Romer', in B. Snowdon and H. R. Vane, *Modern Macroeconomics. Its Origins, Development and Current State*, Cheltenham: Edward Elgar, pp. 673-94.
- Ruse, M. (1988). 'Molecules to men: evolutionary biology and thoughts of progress', in M. H. H. Nitecki (ed.), *Evolutionary Progress*, Chicago, IL: Chicago University Press.
- Samuelson, P. A. (1962). 'Economists and the history of ideas', *American Economic Review*, 52, pp. 1-18.
- Samuelson, P. A. (1978). 'The canonical Classical model of political economy', *Journal of Economic Literature*, 16, pp. 1415-34.
- Samuelson, P. A. (1987). 'Out of the closet: a program for the Whig history of economic science', *History of Economics Society Bulletin*, 9, pp. 51-60.
- Say, J. B. (1840). *Cours complet d'économie politique pratique*, 2nd edn, vol. 2, Paris: Guillaumin.
- Schumpeter, J. A. (1908). *Das Wesen und der Hauptinhalt der theoretischen Nationalökonomie*, Leipzig: Duncker and Humblot.
- Schumpeter, J. A. (1934). *The Theory of Economic Development. An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, Cambridge: Harvard University Press. Reprint 1983: Transaction, Inc.
- Schumpeter, J. A. (1954). *History of Economic Analysis*, London: Allen and Unwin.
- Smith, A. (1976). *An Inquiry into the Nature and Causes of the Wealth of Nations*, two vols. In *The Glasgow Edition of the Works and Correspondence of Adam Smith*, eds R. H. Campbell and A. S. Skinner, Oxford: Oxford University Press.
- Sraffa, P. (1960). *Production of Commodities by Means of Commodities*, Cambridge: Cambridge University Press.

- Steedman, I. (2003). 'On "measuring" knowledge in new (endogenous) growth theory', in N. Salvadori (ed.), *Old and New Growth Theories. An Assessment*, Cheltenham: Edward Elgar, pp. 127-33.
- Weitzman, M. (1998). 'Recombinant growth', *Quarterly Journal of Economics*, 113, pp. 331-360.
- Whitehead, A. N. (1926), *Science and the Modern World*, Lowell Lectures 1925, Cambridge: Cambridge University Press.
- Winch, D. (1962). 'What price the history of economic thought', *Scottish Journal of Political Economy*, 9(1), pp. 193-204.
- Winch, D. (1997). 'Adam Smith's problems and ours', *Scottish Journal of Political Economy*, 44(4), pp. 384-402.
- Winch, D. (2000). 'Does progress matter?', *European Journal of the History of Economic Thought*, 7(4), pp. 465-84.