principles. Smith, of course, reckoned without the Industrial Revolution, on the horizon if not already in process at the time he was writing. At the same time he did not look forward explicitly to a day when Western countries might become as populous as China and Bengal were sometimes represented as being, though he did describe all empires as living on borrowed time.38


39 Smith remarked that 'empires, like all other works of men, have hitherto proved mortal' and hence advised that constitutions intended to be 'permanent' should be suited 'not to those circumstances which are transitory, occasional, or accidental, but to those which are necessary and therefore always the same' (WN V.i.3.6). On Bengal and China see WN I.viii.24-5, I.x.14-15.

VIII

Adam Smith's System of Equilibrium Growth

ADOLPH LOWE*

I EMERGENCE OF A THEORETICAL 'SYSTEM'

In tracing the historical development of a science one expects to encounter a more or less steady progress from initial fragmentary insights to an ever more comprehensive body of knowledge in which, first, empirical regularities, then explanatory laws and more inclusive theories, and, finally, a grand synthesis of all the special theories are established. The very contrary is true of the modern history of economics. At its beginning stood the grandiose designs of classical economics, marked by an expanse of substance and a stringency of deductive reasoning that during the subsequent development was achieved again only by the classical heretic Marx. Thereafter theoretical development presents itself under the curious aspect of a progressive erosion of the original system, to be partially reversed only during the present generation.

It is significant that, in the course of this process, the meaning of 'theory' itself has changed. The change was described as early as 1885 in Alfred Marshall's Inaugural Lecture as the difference between a 'body of concrete truth' and an 'engine for the discovery of concrete truth'. The same idea can be expressed as the contrast between the 'magnificent dynamics' (W. J. Baumol) characterizing the work of the classical economists and the 'box of tools' (Joan Robinson) forged and assembled by their neo-classical successors. It was the conviction of the former that the empirical market systems possessed a unique structure and underwent a unique evolution the essential features of which could be depicted in a theoretical system, permitting unconditional predictions of short-term and long-term motion.

As a consequence, these constructs bear a deterministic character so radical that it is difficult to find an analogy for them anywhere in the realm of the natural sciences. There Laplace's vision has come true: they are the product of an 'intelligence' which claims to be able to 'comprehend all the forces by which nature [read 'society'] is animated and the respective positions of the entities which compose it... nothing would be uncertain for it, and the future, like the past, would be present for its eyes.'

In this paper I propose to illustrate this extreme version of a deterministic

* Emeritus Professor of Economics at the New School for Social Research, New York.
1 See Pierre Simon, Marquis de Laplace, Traité de probabilité (1866), vi–vii.
system by examining the treatise that has opened the era of scientific economics: Adam Smith's *The Wealth of Nations*. In doing so we shall discover that, in the nature of the case, such a 'system' not only embraces the micro- and macro-motions of the economic process proper, but it includes as well the political and social processes of civil society at large, and even proclaims certain value judgements as to the desirable course of social evolution.

II THE ENVIRONMENTAL 'CONSTANTS' IN SMITH'S SYSTEM AND THE STATIONARY FEEDBACK MECHANISM

Some constructive effort is required if one tries to distil the essence of an analytical model from the mixture of theoretical propositions, empirical descriptions, historical discourses, and political recommendations with which Smith's *magnum opus* presents itself to the uninitiated reader. The student interested in basic doctrine is compelled to gather the building blocks from widely scattered passages. Moreover, he will quite frequently have to unearth implicit assumptions in order to impart meaning to explicit statements, and conjunctural interpretation cannot always be avoided. But since there is practical agreement on the individual premises and theorems among the experts, the risk of misconstruction is minimal.2

We must begin with describing the ultimate 'data' on which Smith builds his model. In the typical constructs of social—and for that matter, of physical—analysis these data can be divided into constants and independent variables. Thus in the example of the thermostat, the furnace, the pipes, and the 'actuator' fall in the categories of constants, whereas the temperature affecting the actuator and the quantity of fuel in the storage tank belong to the independent variables. It is the singular feature of Smith's model that—with one exception—it does not contain any independent variables. In particular, all extra-systemic factors influencing the stability and growth of the system are governed by intra-systemic processes, so that the very distinction between extra- and intra-systemic motion loses its meaning.

The precise manner in which such reciprocal causation is achieved will occupy us presently. But we must first enumerate the real data, namely those natural, psychological, and institutional factors which affect the processes to be analysed without themselves being affected by them. Their essential characteristic is that, though the result of a long evolution from an original 'rude state of society', they are supposed to have attained their final shape in the competitive organization of the modern Western 'system


of natural liberty' (WN IV.IV.5). Being neither influenced by the ongoing core process nor subject to further historical development, these factors can be treated as genuine 'constants' of the analysis.

Starting out with the institutional constants, we find a competitive market-place under the protection of a constitutional government whose main duties consist in the preservation of law and order. Among the laws themselves, those assuring personal freedom and freedom of contract are, under the aspect of market transactions, the most important, in addition to those which safeguard private property. Smith is fully aware of the unequal distribution of such property—of the class character of society—as an essential condition for the operation of the economic mechanism as he describes it (WN V.II.27). Social mobility of the factors of production is explicitly postulated (WN I.VII.30; I.XI.1); technical mobility, namely smallness and non-specificity of the basic combination of factors, is implicitly assumed, as we shall have occasion to observe. Finally, division of labour and free exchange are the organizational principles on which the competitive system builds.

These principles are themselves only the institutional crystallization of certain innate human propensities: the 'propensity to truck, barter, and exchange' (WN I.II.1) and the 'desire of bettering our conditions' (WN I.XI.28) which, together with the urge to procreate, form the psychological items in the list of constants. To complete this list we must add the assumption of constant returns on natural resources, that is, an optimistic view of nature's bounty which, for all practical purposes, permits the output of agriculture and of the extractive industries to adjust itself to rising demand without any check on real output and income—at least, until a dimly perceived but long-distant point of resource exhaustion is reached.

On these foundations—active forces emanating from specific human propensities, and particular natural and social constraints—Smith establishes a 'law of motion', which describes the intra-systemic adjustments to changes in the initial conditions, especially to changes in taste. This law, subsequently defined as the law of supply and demand,3 sets forth what, in modern terms, can be interpreted as a negative feedback mechanism that is to assure long-run equality of quantities demanded and supplied at the lowest level of prices compatible with the technical conditions of production. Thus this mechanism serves the maintenance of equilibrium within the economic core process by reallocating a given stock of resources, and can be defined as stationary feedback mechanism. It has been incorporated into all versions of classical and neo-classical theory4 and, noting-

3 Though Smith never formulated the law explicitly, it is fully implied in his discussion 'Of the Natural and Market Price of Commodities' (WN I.VII).
4 See my *On Economic Knowledge* (1965 and 1970), Ch. 4.
standing the work of some forerunners such as Cantillon, is not the least of Smith’s achievements on which his reputation as ‘father of economics’ rests.

III THE DYNAMIC FEEDBACK MECHANISM

However, Smith derives from the same set of constants a second feedback mechanism, which has by no means been generally accepted or even widely recognized. There essential extra-systemic forces are integrated with the motion of the core process. This transforms the stationary setting of the latter into a dynamics of ‘balanced growth’, which extends the range of determinacy far beyond intra-systemic motion.

It is the interaction of two circular mechanisms that regulates in Smith’s system the stimuli which impinge on that motion in so far as they are connected with changes in the aggregate of the factors of production. What, then, is the precise manner in which the ‘constants’ of the system influence these variables of growth, namely, the supply of labour, natural resources, and capital, and also technology or the order in which the productive factors are combined?

In the nature of the economic core process the productive factors are continuously drained off the market by being transformed into outputs, and they must be steadily replenished if the economic circuit is to be maintained, not to say expanded. Now, it is Smith’s contention that three fundamental laws of long-term motion determine the course in which these agents, while producing output, are themselves reproduced on an increasing scale by such output.

(1) There is, first of all, a law which governs the supply of labour. It is based on two complementary hypotheses. On the one hand, competitive forces are at work that tend, over the long run, to reduce the level of real wages to the subsistence level. The causal nexus is the same which later became known as the ‘iron law of wages’. What is meant is that changes in the real wages offered evoke compensatory changes in the size of the working population because ‘demand for men, like that for any other commodity, necessarily regulates the production of men’ (WN I.iii.28).

On the other hand, real wages can and do rise so long as the natural and technical conditions of a country permit a steady increase in its real product. Even then the link between real wages and the size of population is not cut. Only in such a society can demand for labour, as expressed in ‘the funds which are destined for the payment of wages’ (WN I.viii.18), run ahead of supply. And though Smith also in this case expects that an increase in population will occur—infant mortality is likely to fall when real wages rise (WN I.viii.40) and procreation is stimulated since children are an asset in a seller’s market for labour (WN I.viii.23)—a rising wage fund can keep wages above subsistence for an indefinite period.

Thus at any moment the supply of labour is governed by two balancing forces: the propensity to procreate, which itself is a composite of a biological urge and a calculation about the ‘value of children’, and the available wage fund. The former is, as we saw, a constant, but one which by itself would cause the system to ‘run down’ to a stationary level of labour supply and thus of output. This tendency can be counteracted only by the latter force—the wage fund—which is a variable. How is it determined?

(2) This leads us to a law of accumulation. The funds which govern the demand for labour result from saving, which is the outward expression of another psychological constant: the desire of bettering our conditions. Of course, it is not by saving as such but by the use people make of their savings that conditions can be bettered. Accumulation, which for Smith and all classical writers includes both saving and investment, ‘is the most likely way of augmenting their fortune’ (WN II.iii.28), provided that a ‘neat or clear profit’ (WN Lxi.18) can be earned.

The level of profit and interest, however, is as precarious as the level of wages, because competition among manufacturers and lenders increases with the rise of a country’s capital stock (WN Lix.2; Lxiv.8). Once more the system would ‘run down’ if the tendency of profits to level out were not counteracted by another variable element. As is the case with wages, ‘it is not the actual greatness of national wealth, but its continuous increase’ (WN I.viii.22) that favours profits. Such a rise of ‘national wealth’ (synonymous with what today we call national income) can be stimulated only by a rise in productivity.

(3) In the concept of productivity we encounter the strategic variable of the whole system. Productivity depends, first of all, on a country’s geographic position and its supply of natural resources. The latter, as we have already seen, is treated as a constant over the practically relevant time span. Therefore the true source of a rise in productivity is technical progress. We must not, however, equate Smith’s notions of technical progress with the large-scale innovations which characterize a fully developed industrial system. What he has in mind he defines as progressive ‘division of labour’, so impressively described in the first three chapters of the work. It comprises the economics of specialization, and also the use of such machinery as serves to ‘facilitate and abridge labour’ (WN I.i.5).

Now, it is essential for the understanding of the dynamic mechanism to realize that in this conception technology, and in particular the introduction of machinery, is regarded as a complement of, rather than a substitute for, labour. In other words, far from displacing labour and thus exerting a potential pressure on employment and wages—the major variable in Marxian dynamics—division of labour in this inclusive sense is itself conditional on a prior increase in labour supply. ‘The number of workmen in
every branch of business generally increases with the division of labour in that branch, or rather it is the increase in their number which enables them to class and subdivide themselves in this manner' (WN II.3).

Strange as these ideas may sound to a modern reader, they make good sense as soon as we remember that The Wealth of Nations appeared in the early years of the Industrial Revolution and, in fact, describes the conditions of the small-scale manufacturing system that preceded full-scale industrialization. But this identification of technical progress with labour-attracting forms of specialization has far-reaching consequences for the entire model. Rises in productivity on which, as we saw, a satisfactory level of both wages and profits depends cannot take place spontaneously. They are conditional on a prior increase of aggregate demand since, as the title of the famous Chapter III of Book I puts it: division of labour is limited by the extent of the market. Far from being treated as an independent variable, technical progress for Smith can only develop 'in proportion to the riches and populousness' (WN I.iii.4) of the country in question and in proportion to its trade with other countries. Therefore, and this is Smith's third law of dynamic motion, it is the rate of increase in aggregate demand that governs the rate of increase in productivity.

Smith is quite outspoken as to the principal source of such steady increase in demand. Though he is renowned as the proponent of international division of labour, 'according to the natural course of things ... the greater part of the capital of every growing society is first directed to agriculture, afterwards to manufactures, and last of all to foreign commerce' (WN III.i.8). Thus pride of place belongs to the domestic market, that is, to a steady increase in population equipped with sufficient 'effectual demand'—our argument has turned a full circle.

It may be helpful to retrace the sequence of this circular or rather spiral process and to emphasize once more the strategic spots where the constants exert their recurring influence. We should remember that we contemplate a process in motion. In order to follow up the sequence of events we must break into the chain of interdependent links artificially at some point. The most opportune place to do so is the point where a prior increase in aggregate employment, stemming from the preceding 'turn of the spiral', has raised aggregate demand, thus providing new investment opportunities for further division of labour. These opportunities raise profit expectations and thus demand for savings, in this manner keeping the level of the rate of interest above the minimum and, considering the propensity for 'betterment', stimulating the supply of savings. Such savings offered for investment represent demand for additional labour and maintain real wages above the subsistence level. Under the influence of the propensity to procreate, labour supply responds, even if with a time lag, to the wage stimulus so that the original investment opportunities can be realized through rising employment. This raises payrolls and market demand above the level expected when the spiral under observation first began to turn, creating new investment opportunities and the opportunity for another turn.\footnote{A lucid exposition of the model has been given in W. O. Thwaitt, 'A Diagrammatic Presentation of Adam Smith's Growth Model', Social Research, xxiv (1957), 227–30.}

It should be emphasized that the long-term feedback mechanism, which underlies this spiral process, is 'positive', that is, self-enforcing rather than compensatory. But the 'coupling' is such as to preclude any 'runaway', the bio-sociological period of human maturation setting an upper limit to the rate of change of the system.

IV STATIONARY AND DYNAMIC FEEDBACKS IN JOINT OPERATION

In order to comprehend the structure of Smith's model in its entirety, we must now relate the stationary feedback, which maintains taste-adequate equilibrium of goods production for a fixed aggregate of inputs and outputs, with the dynamic feedback which governs the expansion of this aggregate. In this all-inclusive construct the following characteristics stand out.

We note first of all, that the sectoral adjustments of supply to demand, which sustains the equilibrium of the market, are only minor oscillations in a steady process of aggregate expansion. Owing to the mechanism of specialization, reproduction of inputs and outputs coincides with their increase. Therefore—and this distinguishes all classical systems from the models of neo-classical theory—the equilibrium of the aggregate is never truly stationary, but always dynamic, making growth the frame of reference for all sectoral movements. Only in the distant future, when a country has 'acquired that full complement of riches which the nature of its soil and climate, and its situation with regard to other countries, allowed it to acquire' (WN Lix.14), will nature's latent stinginess manifest itself and the system tend toward a stationary state.

No less important than growth as such is its steady nature. Distortions are excluded from the system by the stationary as well as by the dynamic feedback mechanism. The former assures the prompt adjustment of the qualitative order of supply to the one independent variable in the system, consumers' tastes. The latter, by continuously 'transforming' commodity output into factor input and thus into new commodity output, keeps the spiral of expansion closed and at the same time reduces the rate of expansion to the slow growth rate of population. The crucial factor in all this is technology, namely, the small-scale organization of production, the adaptation of machinery to labour rather than the converse, and the unlimited possibilities of rising productivity rooted in progressive division of labour. Without such technical progress the system would run down to a stationary level long before nature itself sets a limit to expansion. But ultimately it is
the labour-attracting character of the postulated technology which assures dynamic equilibrium. There can never be any discrepancy between factor demand and factor supply. Rising productivity by inducing rising employment and income creates its own demand.

It should now be clear why, with the exception of consumers' tastes, Smith's system does not contain any independent variables. Once the dynamic process is set in motion, the linkage of the variables---with the natural, psychological, and institutional constants creates a reciprocity of cause and effect—though at any given moment cause and effect are clearly distinguishable—which excludes any influence from outside the mechanism. This, together with the slow rate of growth, bestows on the system, and thus on the analysis of its movements, a degree of determinacy in which other fields is attained only under strictly circumscribed laboratory conditions. The postulate 'other things remaining equal', conventionally taken as a methodological rule, here gains empirical significance: it describes the actual state of affairs as controlled by a double feedback mechanism. Only changes in taste fall outside their 'loops' but the bipolar nature of these changes evokes a compensatory motion of its own. All other changes are channelled through circular mechanisms and are as strictly calculable.

Still another feature of the model is worth mentioning. The major stimuli directly engaged, there is no room left for 'uncertainty of expectations'. Moreover, prevailing expectations, based on the past and present experience of equilibrium, cannot be other than equilibrating. Consequently the scientific observer can disregard expectations altogether, as Smith and the other classical writers in fact did.

What cannot, of course, be disregarded is the nature of the prevailing action directive. It stands outside the circular mechanisms, but is no less determinate: it forms an essential part of the system's constants. Actually it is the fundamental force which impels and unifies the motions of the socio-economic process. In applying the principle of receipt maximization not only to the commodity market but also to the factor markets and, above all, to the 'production' of men, Smith raises the pecuniary motive which rules the market to the universal motive power in society at large. On empirical as well as philosophical grounds we may have good reasons for repudiating an interpretation of social relations in the image of market relations. But we must realize that only by an all-encompassing hypothesis in which economic relations are presumed to govern the wider social process—a truly materialistic conception of history—did Smith succeed in making the economic process truly 'circular' and thus fully determinate.

V NOMINATIVE ROOTS OF SMITH'S PREMISES

The constants of Smith's model are the data from which the unbreakable spiral of the steady process of growth is derived. But data and resulting process are related in still another and more subtle manner about which a word must be said in conclusion.

Though the growth process once it is set in motion pursues its course with the inexcusability of a law of nature, Smith is interested not only in the reciprocal 'causes' of the growing 'wealth of nations' but also in its 'nature'. More precisely, he by no means accepts the outcome of the secular process of production with indifference. Rather he singles out two specific goals as the 'distinct objects' of a 'political economy', understood as 'a branch of the science of a statesman or legislator'. These goals are 'first, to provide a plentiful revenue or subsistence for the people... and, secondly, to supply the state or commonwealth with a revenue sufficient for the public services' (WN IV.1). In other words, the effectiveness of the growth process, in terms both of aggregate output and of its distribution among the social strata involved in its production, is subject to a value judgement, the criterion of which is the welfare goal just stated.

Now, and this is the miracle performed by the 'invisible hand', the spiral of unplanned economic growth, which the initial set of natural, psychological, and institutional constants releases, propels society toward this very goal: maximum wealth through the steady increase of the annual produce of land and labour, benefiting equally those who live by rent and wages. Thus the dynamic laws which map out the path of economic evolution are themselves the vehicles which carry society toward what for Smith is the 'good life'.

But this coincidence between that which 'inevitably occurs' and that which is 'good' is not assured by just any set of data. It is clearly restricted to the framework of constants as outlined above. True, some of these constants, namely the natural and psychological ones, are regarded by Smith as unalterable, describing the external and internal endowment of man. But this is by no means the case with the institutional constants which are summarized by him in the concept of a 'system of natural liberty' (WN IV. ix.51). Outside this form of political organization even the psychological propensities remain dormant, and the force symbolized in the pecuniary incentive, which alone can steer the process of development in the proper channels, will be frustrated. Inexorable as is the process of growth, the political and social conditions from which alone it can take off and by which it is sustained are not themselves preordained. They are the product of history, but of a history in which human choices in the form of political decisions play a decisive role.

How central this idea is for Smith can be gauged from the fact that one-third of the book is devoted to a description and critique of the possible

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4 It should be noted, however, that Smith has considerable doubts as to the possibility of harmony between the 'general interest' of society and the sectional interests of 'those who live by profits'.

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alternatives to the institutional order of natural liberty. Mercantilism, and
the ancient and modern systems devoted to the one-sided furthering of
agriculture are denounced because each is 'subversive of the great purpose
which it means to promote' (WN IV.ix.50). Only the co-operation of free
men left to themselves in pursuing their interests under a government pro-
tecting law and order will succeed in promoting that purpose: steady
increase in wealth and welfare.

In speculating about the origin of the spatio-mathematical order of
the universe, the metaphysicians of the seventeenth and eighteenth centuries
came up with an engineering model which helps to elucidate the synthesis
of 'determinism and freedom' in Smith's doctrine. Once the world machine
has been constructed its motions are found to be fully determined by the
laws of Mechanics, and to proceed in full autonomy. But the divine
engineer or heavenly clockmaker who established the initial conditions and
gave the system the initial push was a free agent, not himself subject to
mechanical laws. By the same logic the determinist motion of Smith's model
presupposes a prior free decision on the part of the political sovereign in
favour of one rather then another set of institutions.

But what is the criterion for his choice? In deciding against the arbitrary
'preferences' and 'restraints' which dominated the political systems of the
past in favour of a system of natural liberty the sovereign adopts the macro-
goal of maximizing welfare by maximizing wealth. The reason why a
system of natural liberty is the suitable means for the attainment of that
socio-economic end is its consequences for individual economic behaviour.
It activates the dormant force of receipt maximization for the motion of
economic growth through which alone the welfare goal can be approximated.

Thus we arrive at the important conclusion that Smith's theoretical
construct rests on a normative foundation. Steady progress toward maxi-
mization of wealth benefiting all major strata of economic society is postu-
lated as the macro-goal to the attainment of which the productive effort is
directed. The spiralling path of growth, the laws of behaviour which impel
its pursuit, the pecuniary incentive which shapes such behaviour, and last
but not least, the institutional environment in which alone such behaviour
and motivation can assert itself, all these events and underlying forces are
more than just factual occurrences. They are at the same time the means to
an end, an end which the philosopher Smith prescribes to the economist
Smith as the terminus ad quem for his inquiry, and which the economist
Smith enjoins the 'statesman or legislator' to adopt, as maxims for his
political decisions. 

¹ It need hardly be mentioned that the source upon which the philosopher Smith draws
is the Natural Law doctrine in the peculiar synthesis of Stoic and Epicurean elements,
which is achieved in his Theory of Moral Sentiments (1759).