2 The Foundations: Classicals and Marginalists

2.1 Introduction

Consideration of economic issues has a long history, and an even longer prehistory. Here we shall take into account only some aspects of the less recent period, focusing attention on the conceptual foundations of the two main alternative approaches that intersect in the course of time. The first, the classical approach, dominated from the second half of the seventeenth century to the mid-nineteenth century (§2.2). The second, the marginalist approach, has dominated from the dawn of the twentieth century to our own time (§2.5). Before considering the marginalist approach, we shall in §2.3 recall the Smithian notion of self-interest and the Benthamite felicific calculus, both useful in evaluating the contemporary economic debate. We shall then go on in §2.4 to illustrate briefly some aspects of such a heterodox author as Karl Marx.

In Chapter 3 we shall consider some authors – Knut Wicksell together with Thorstein Veblen, Max Weber, Joseph Schumpeter and above all John Maynard Keynes – who are difficult to classify but who exert a direct influence on important streams of contemporary economic thought.[1]

The basic notions of the marginalist approach – the opposition between resource scarcity and human needs and desires, recourse to supply and demand in explaining prices – have been present in economic thinking since antiquity, though in a rudimentary form. It was only in the second half of the nineteenth century that the theoretical structure found reinforcement with the notions of marginal cost and utility, although some major problems remain open, as we shall soon see. The classical approach too, which began to develop in the second half of the seventeenth century, reached a solid theoretical structure with David Ricardo but presented

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[1] For a more detailed account of the history of economic thought, the reader may refer to Roncaglia (2005a, 2016a).

serious analytical problems that would be overcome only in the second half of the twentieth century.

The vicissitudes of the two approaches thus intersect: albeit with alternating fortunes, both have been simultaneously present throughout the multicentennial history of economic science. However, it is common practice, and reasonably so, to consider them in sequence, starting with the contributions to the classical approach by authors such as William Petty, Adam Smith and David Ricardo, and going on with the protagonists of the so-called marginalist revolution: Carl Menger, William Stanley Jevons and Léon Walras.

2.2   The Classical Approach

William Petty's (1623–87) contribution is important on two counts. First, we should recall the introduction – under the name of Political Arithmetic or Political Anatomy – of a modern method of analysis, quantitative and objective, that recalls the scientific turn of Baco and Hobbes, but also of Galileo. Second, we should recall his contribution to the definition of the main concepts, from surplus to natural price.[2]

Let us consider the first element:

The Method I take to do this, is not yet very usual; for instead of using only comparative and superlative words, and intellectual Arguments, I have taken the course (as a Specimen of the Political Arithmetick I have long aimed at) to express my self in Terms of *Number, Weight*, or *Measure*; to use only Arguments of Sense, and to consider only such Causes, as have visible Foundations in Nature; leaving those that depend upon the mutable Minds, Opinions, Appetites and Passions of particular Men, to the Consideration of others.[3]

The reference to the 'mutable Minds, Opinions, Appetites and Passions of particular Men' is, by opposition, aimed precisely at the tradition of scarcity and utility, demand and supply, prevailing in what we may call the prehistory of economic science.

Along the same line as Petty's we may then recall Adam Smith's (1723–90) distinction in *The wealth of nations* (1776, pp. 72–81) between natural and market prices: only natural prices constitute the theoretical variable object of analysis, whereas market prices are subject to the contingent effects of occasional vicissitudes influencing the demand for and supply of some commodities, as in the case of the death of the sovereign provoking an increase in the demand for black cloth.[4]

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[2] On Petty, cf. Roncaglia (1977).   [3] Petty (1690), p. 244.
[4] Cf. Roncaglia (1990b) and (2005a), pp. 139–43.

According to the classical economists, demand for the various commodities depends mainly on consumption habits (gradually evolving in the course of time), and not on the pursuit of maximum utility on the part of the consumer. In essence, the classical authors approach the demand side as a separate area; in developing their theory of value they focus attention on the objective data of technology: from Petty's reference to physical costs, possibly summed up in labour alone or in the land–labour combination, to Richard Cantillon's (1697–1734) developments, which attempt to extract from the labour–land combination a land theory of value, up to the labour theory of value developed by David Ricardo (1772–1823), and then taken over, albeit with different implications, by Karl Marx (1818–83).[5]

According to the classical economists, equilibrium prices are not the prices corresponding to equality between demand and supply, but those allowing the economic system to reproduce itself over time. The balancing of supply and demand is a relatively vague notion, connected to actual market price movements; the latter is not a theoretical variable determined by a condition of equilibrium consisting of equality between demand and supply, as is generally the case within the marginalist approach. Among other things, in this second case it is necessary to consider demand and supply as respectively decreasing and increasing functions of price (in the mathematical sense of the term *function*). On the contrary, the notion of stable functional relations connecting market prices to the demand and supply of the different commodities is wholly extraneous to the classical approach of Smith, Ricardo and Marx.

The 'objectivism' of the classical approach implies a physical definition of the surplus and analysis of the network of exchanges and distributive relations that, given the technology, allow for the continuous functioning over time (the reproduction) of the economy. This does not necessarily mean following Petty (and especially Galileo)[6] in assuming the existence of laws written into the world that the scientist needs to discover, in the etymological sense of the word, i.e. to unearth them from the covering of contingent elements that hide them from immediate view. For instance, Adam Smith, forerunning methodological views that spread only in recent times, considered the 'laws' a creation of the scientist, 'mere inventions of the imagination, to connect together the otherwise disjointed and discordant phaenomena of nature'.[7]

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[5] Cf. Cantillon (1755); Ricardo (1951–55); Marx (1867–94).
[6] 'This great book which is open in front of our eyes – I mean the Universe – . . . is written in mathematical characters' (Galilei 1623, p. 121).
[7] Smith (1795), p. 105. Cf. Roncaglia (2005a), pp. 118–20.

As for the conceptual foundations, a major step ahead came with the transition from a generic notion of the surplus (or *overplus*) to a precise analytical notion. The generic notion is to be found, for instance, in the Bible, where it says that one has to give to the poor what exceeds one's needs, on the definition of which nothing is said. The analytical notion points to the excess of the quantities produced compared to the quantities of the different commodities used up as means of production and as means of subsistence for the workers employed in the production process. For instance, in an economic system that has as its sole product 500 tons of corn, obtained through the use of 200 tons of corn required to maintain the 400 workers employed in its cultivation and 180 tons of corn utilized as seed, the surplus comes to 120 tons of corn.

The analytical definition of the surplus is a systemic one, in the sense that it relates to the economic system as a whole. It can be utilized with reference to a single productive sector only if we assume that the sector produces the totality of the means of production and subsistence necessary for its own functioning, as we did earlier (and as Petty does in some examples) by referring to corn as seed and as the sole means of subsistence for the production of corn. The definition of the surplus is in any case a physical definition: the surplus consists of a set of commodities, each taken in a quantity equal to the difference between quantity produced and quantity utilized in the entire set of productive sectors of the economy. Only once the problem of value has been solved, by measuring the various commodities in terms of a common unit of measure, such as the labour directly or indirectly necessary to produce each of them, can we express the set of commodities constituting the surplus as a monodimensional magnitude; in this way the surplus corresponds to Marx's notion of plus-value. For the classical economists, who adopt the labour theory of value but are aware of its limits, the basic notion of the surplus is the physical and multidimensional one. Indeed, Smith's definition of the wealth of nations as 'all the necessaries and conveniences of life which it annually consumes' in proportion to the population (Smith 1776, p. 10) is itself a multidimensional physical notion; it is only when we go on to the modern notion of per capita income that the need for a measure of value arises, hence the necessity of a theory of relative prices.

We thus come to the view of the functioning of the economic system as a circular flow of production and consumption that has as reference the yearly sowing–cultivating–harvesting cycle typical of agriculture. The issue taken up by classical economists consists of the analysis of the conditions of reproduction, cycle after cycle, of an economic system based on the division of labour – hence analysis, in distinct steps, of production, distribution, circulation and accumulation of the product.

Within the classical framework, prices are indicators of (are derived from) the relative difficulty of production of the different commodities. The starting point for determining them, for all the classical economists, is given by their physical costs of production. The problem of value consists precisely in finding an analytical mechanism allowing us to move from the multidimensional notion of physical costs to the mono-dimensional notion of value.

It would be superfluous here to retrace the steps of this research. We will confine our attention to the main aspects. The difficulty arises over two circumstances. First, to determine the price of a commodity we need to know its cost of production, but this in turn depends on the prices of its means of production, which are in turn produced, so we have a vicious logical circle. Second, the determination of prices must respect the condition of the uniformity of the rate of profits in the different sectors given the assumption of free competition common to the classical economists.

For a long time the first difficulty was solved through the so-called labour theory of value, which meant reducing the value of the means of production to the quantities of labour directly or indirectly required for their production. However, this solution is not rigorous: it leads to violating the condition of uniformity of the profit rate, as production of the different commodities is commonly characterized by different proportions between fixed and circulating capital, different durability of fixed capital goods and different lengths of the production period. David Ricardo was well aware of this difficulty, to the extent that he considered the solution based on the labour theory of value as approximate and provisional.[8] It was only at the beginning of the twentieth century that authors such as Ladislaus Bortkiewicz and Vladimir Dmitriev addressed their research in the direction of a simultaneous determination of the whole system of prices and of the rate of profits.

Apparently this is the same direction taken by the theoreticians of general economic equilibrium as originally set out by Léon Walras; however, this latter approach is grounded on a different conceptual foundation, the subjective one of scarcity and desires, and implies a simultaneous determination of prices and quantities produced and demanded (which in equilibrium are required to be equal).

Within the classical framework, the solution finally came with Piero Sraffa (1960), who – as we shall see in Chapter 5 – isolated the problem of determining prices (and their relationship with the distributive variables, wage rate and profit rate) from the task of accounting for levels of production and employment, income distribution and technology.

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[8] Cf. Ricardo [1817] 1951, vol. 1, pp. 30–43.

Relative prices and one of the two distributive variables are jointly determined, taking the second distributive variable and technology as given; in the absence of assumptions on returns, this implies taking production levels as given as well. However, for the entire golden age of the classical approach – from the mid-seventeenth century to the second half of the nineteenth century, from Petty to Ricardo and Marx and their immediate disciples – the issue of value remained a major unsolved problem.

Within the classical framework, the issue of value is considered central, but as a tool with which to tackle the real target of the analysis, namely study of the wealth of nations and the distribution of income, as well as wealth and power among the main social classes: landlords, capitalists and workers.[9] The division of labour takes on fundamental importance for both aspects: the growth of wealth stemming from technological progress and the formation of different classes and social strata.

As far as the first issue – the wealth of nations – is concerned, division of labour favours technological progress through various mechanisms of a dynamic kind ranging from reduction of production costs obtainable when the quantity produced increases ('increasing returns to scale') to the fact that, as stressed by Charles Babbage (1832), subdivision of the work process favours innovations. Intensifying the division of labour is thus considered the main element for growth of per capita income, and hence of the wealth of nations.[10]

As far as the second aspect is concerned, the division of labour raises the need to recognize the existence of a multiplicity of commodities, productive sectors and work activities – hence representation of the productive process as a circular flow of production, exchange and distribution (developed analytically around the mid-eighteenth century in the *Tableau économique*, 1758–59, by François Quesnay, 1694–1774). At the end of each productive process, each sector (and each productive unit) sells its product, except for the part required by itself in the next production period, thus obtaining the money necessary to acquire on the market both the means of production needed for continuing production and the means of subsistence for its workers. The part of the proceeds which remains once production expenses are paid constitutes the profit for the capitalist (or the rent for the landlord).

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[9] Marx is an exception: as we shall see in the text that follows, his theory of value has a direct role for the interpretation of commodity fetishism and for demonstrating workers' exploitation.

[10] National accounting notions, such as those of per capita product or income, became common usage only in a relatively recent stage; however, using them to illustrate to today's readers the thought of the classical economists does not mean distorting interpretation of them.

Within the classical framework, the market is conceived as a web of repetitive flows that, period after period, allow the various sectors to sell their product to other sectors and obtain in exchange the means of production and subsistence necessary to continue the production process. Thus the market is not conceived as a point where supply and demand meet (a specific point in time and space, like the medieval fair or the stock exchange), as instead is the case within the marginalist approach. The classical economists conceive as natural prices – i.e. the prices determined by the theory – those that satisfy two conditions: first, the earnings of each productive sector are sufficient, period after period, to cover acquisition of the means of production and payment of wages to the workers; and second, a rate of profits equal for all sectors obtains (under the hypothesis of free competition; in the more general case in which there are barriers to entry we can have sector profit rates above the competitive rate).

Natural prices are thus of a twofold nature. On the one hand, they are the prices determined by the theory, which isolates the main factors, namely those operating in a systematic way (the relative difficulty of production of the various commodities and the influence of the distributive variables), from contingent and occasional factors affecting current prices (classical economists' market prices). On the other hand, natural prices are the prices that guarantee the continuous reproduction, period after period, of the economic system based on the division of labour, because each sector is able (insofar as it recovers production costs) and has an inducement to (insofar as it obtains a return equal to that of other sectors) to start a new production process. On the first count, natural prices have an interpretative aspect (as the best way to explain what happens in a capitalist economy, on the basis of objective data such as technology and income distribution). On the second count, natural prices have a normative role, insofar as they point to the conditions that must be satisfied, at least as far as exchange relations are concerned, to guarantee the regular functioning of the economy.

At least since Smith's times, in classical economists' minds the notion of the wealth of nations has expressed the degree of development of the economy and corresponded to what today we indicate as per capita income. In Smith's analysis, it depends on labour productivity and the share of productive workers over the total population; in turn, labour productivity, being the more important of the two variables, correlates with the dynamics of the division of labour, which thus constitutes a core element of the classical approach. Smith considers both its positive and its negative implications: increase in productivity, impoverishment of the quality of labour and what was

later to be called alienation. Moreover, various authors, in particular Charles Babbage and Karl Marx, associate with the evolution of the division of labour both the process of mechanization and the evolution in the social structure.

The share of workers employed over the total population is linked to accumulation. In the initial stages of capitalist development the modern core of the economy expands, while the set of traditional activities contracts; we thus have a flow of workers from the traditional to the modern sectors of the economy. The expansion of the modern core of the economy (manufacturing industry, characterized by an increasing use of machinery) finds a limit in the accumulation of capital more than in the availability of workers, as the latter are easily drawn from the declining traditional sectors, and indeed more than in the expansion of demand, favoured by the reduction in the prices of products manufacturing sectors substitute for products of the traditional sector.

Say's law, according to which production creates its own demand, is interpreted in an empirical way by Smith and others, in the sense that progress in productivity is accompanied in the course of time (and with reference to the long period: Smith suggests a centuries-long trend) by an increase in production and not by a fall in employment. Ricardo, on the other hand, interprets Say's law in a more rigid way, as the impossibility of general overproduction crises. Thus Ricardo is able to link income distribution to growth through the assumption that profits are entirely invested while rents go into luxury consumption and wages go into necessary consumption; under certain simplifying assumptions, the profit rate and the rate of growth of the economy are equal.

In short, the main characteristics of the classical school, which was to be superseded by others with the marginalist revolution that began at the end of the nineteenth century, are the notion of surplus; the economy viewed as a circular flow of production, distribution, exchange, consumption and accumulation; the notion of the market as a web of repetitive exchange flows; the central importance attributed to the division of labour and its evolution over time (technical progress) in explaining the wealth of nations; a theory of distribution built on the opposition between the main social classes defined on the basis of their respective role in production (capitalists, workers, landlords); an objective theory of value wired to the difficulty of production and the conditions of reproduction over time in the flow of production; and growth linked to accumulation and hence to income distribution (profits).

2.3 Self-Interest and Felicific Calculus: Smith versus Bentham

Let us now consider an important aspect of the classical approach concerning the motivations for human action, often relegated to a secondary plane when focusing attention on the theory of value. This aspect was developed particularly by Adam Smith, in the context of the Scottish Enlightenment. In a few words, according to Smith the agent is driven by a complex set of passions and interests, among which self-interest dominates. This view is basically different from the marginalist view of the rational *homo oeconomicus* focused on maximizing his own utility under the constraint of his resources; on various counts this latter view draws on Bentham's felicific calculus, on which more in a while.

In *The wealth of nations* (1776) Smith opposes his old master Hutcheson, maintaining that humans are not driven by benevolence towards others but by their own self-interest. Some commentators at the beginning of the twentieth century saw in this thesis a contradiction with the *Theory of moral sentiments* (1759), in which Smith maintains an ethic of 'sympathy', in the etymological sense of the term, from the Greek 'to feel together'; namely, humans are motivated by the desire to be liked by others.

As a matter of fact, neither Smith nor his contemporaries, imbibed by Enlightenment culture, saw any contradiction between the two motivations for human actions. It was quite common at the time to consider human beings as driven by a complex set of motivations, bundled together in two categories: passions (not irrational, but a-rational: love, pride, envy and so on) and interests (rational, as in all cases in which material objectives – personal security, accumulation of wealth – are pursued in a consistent way). The philosopher studying these motivations and simultaneously forging a theory of ethics (namely, studying both how things go and how they should go) stresses within this complex set some dominant motivations. Thus Smith's self-interest is not to be interpreted as an absolute – as unconditional selfishness – but as a motivation dominant yet conditioned by a strong brake, the moral force of sympathy, or in other words the desire to receive the approval of others (or more precisely, in a formulation that Smith developed in his 1759 book and which in many respects antedates Kant's ethics, to obtain the approval of an invisible arbiter, our conscience, which evaluates our actions while taking into account the information we have).

On the other hand, a one-dimensional view of the human being, derived from seventeenth-century sensism (for instance, Hobbes's *De homine*, 1658), was proposed by Jeremy Bentham (1748–1832) with

his felicific calculus. This consists of quantitative evaluation and algebraic summation of pleasures and pains stemming from each action or set of actions (where pleasures obviously have a positive sign and pains a negative sign). Good is whatever gives as a result of this algebraic summation a positive felicific magnitude; bad is whatever gives a negative result, thus reducing the amount of social happiness.

To Bentham's way of thinking, felicific calculus aimed at evaluating the social impact of individual choices and especially of governments' political choices, on which the London philosopher focused attention in his attempts to outline a rational penal code or an ideal prison. Bentham aimed to substitute traditional deontological ethics, within which criteria for ethical judgement are provided by some authority (in particular, by the religious authorities) or by tradition, with a consequential ethics, according to which ethical judgement depends on the consequences of actions, evaluated through felicific calculus.

As we shall see more clearly in §14.2, though sharing Bentham's consequential ethics, John Stuart Mill (1806–73) criticized the one-dimensional view of felicific calculus in his essay *Utilitarianism* (1861), stressing the qualitative differences between different kinds of pleasures and pains, which cannot be reduced to quantitative differences. Moreover, Mill makes a clear distinction between the ethical issue, in which we have to take into account the consequences of our actions though it is impossible to do so in a univocal way, and the issue of consumer's choices, which he saw as associated mainly with habits and social customs – a view substantially shared by the whole classical tradition.

2.4   Karl Marx

Marxism had enormous importance in the political life and the philosophical and social debate of the twentieth century; as far as economic theory is concerned, it can be considered as a modified and in some respects expanded version of the classical approach. After the fall of the Berlin Wall (1989) Marxism lost most of its political and cultural weight, at least in Western countries, accelerating a tendency already initiated with the rise of neo-liberalism.[11]

Karl Marx (1818–83) took over Ricardo's analytical structure: the notion of the surplus, economic development connected to the division of labour (mechanization) and accumulation; subdivision of society into

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[11] The exception of China is actually more apparent than real, as the Chinese authorities' invocation of Marxism is mainly lip-service.

the classes of capitalists, workers and landlords; and labour theory of value for explanation of exchange ratios. Here we shall not consider Marx's political and philosophical views, where the differences with the classical approach are of considerable significance.

The labour theory of value was then extended into a theory of exploitation (and, correspondingly, the notion of the surplus was transformed into the notion of plus-value), with a distinction between labour (the activity of working) and labour power (the person of the worker). As is the case with every commodity, the value of labour power is given by its cost of reproduction, which is in this case the cost of the means of subsistence necessary to keep the worker alive and to ensure the survival of his progeny. If with the labour theory of value we express such means of subsistence in terms of the labour directly and indirectly necessary to produce them, and if this latter magnitude proves lesser than the quantity of labour usually performed by the worker, we have plus-labour. For instance, if eight hours are required to produce the daily means of subsistence and if the working time is ten hours a day, we have two hours of plus-labour. However, the attempts to solve the problem of transforming labour values into prices of production are unsuccessful, as various critics of Marxism were already pointing out at the end of the nineteenth century. Debate on this point continued into the post-war period.

Another aspect of Marx's theory with some relevance in recent economic debate concerns the distribution of income. Here Marx focuses attention on the conflict between capitalists and workers, attributing a secondary role to landlords. In this context he develops the notion of the reserve army of labour which, together with the unemployed, includes workers in the backward sectors of the economy, ready to move as soon as possible into the modern expanding capitalist sector. The expanding and contracting stages of the industrial reserve army account for the alternating vicissitudes of wages and profits. As we shall see, in the contemporary macroeconomic framework, with the so-called Phillips curve, this role is attributed to the unemployed alone. Also, in the marginalist approach unemployment is considered an indicator of the pressure of supply in the labour market, while in Marx's theory the industrial reserve army is, rather, an indicator of the bargaining power of the two social classes, and it is this latter that determines the path of income distribution. What can be explained is the movement of the distributive variables, while their level at any moment in time is not considered as resulting from equilibrium between supply of and demand for labour.

Less relevant for our purpose are the aspects of Marx's economic analysis more closely connected to his political ideas, and in particular the unavoidable breakdown of capitalism and the transition to a socialist

society characterized by state ownership of means of production, and subsequently to a communist society in which humans would be freed from compulsory labour. These are the so-called laws of movement of capitalism: increasing industrial concentration (which in fact took place, at least in the decades following publication of Marx's writings), polarization of capitalists and proletariat (contradicted by the growing importance of the middle classes), and the tendency to a falling profit rate and increasing poverty for workers (which does not take into account the effects of technical progress).

In the second volume of *Capital*, finally, Marx developed a theory of simple and expanded reproduction schemes, in many respects forerunning Leontief's input–output tables, Sir Roy Harrod's model and Piero Sraffa's analysis of prices of production, all of which we shall discuss in the text that follows.

2.5   The Marginalist Approach

The subjective approach based on equilibrium between supply and demand (i.e. between available resources and the needs and desires of economic agents) did not emerge all of a sudden, with the publication between 1871 and 1873 of the main works of Jevons, Menger and Walras, respectively in English, German and French. Actually, it had a long tradition, having already appeared in classical antiquity and the Middle Ages: a tradition that slowly waxed stronger over time, with development of notions such as work interpreted as sacrifice (already present in the Bible), consumption seen as a source of utility (as early as Aristotle and Thomas Aquinas), intensive rent associated not with extension of cultivation to ever less fertile lands but to use on a given plot of land of ever greater quantities of means of production and labour (Turgot 1766; von Thünen 1826–50) and so on.

The marginalist approach can thus be considered an analytical refinement of the subjective approach already present in antiquity. In it, the value of goods is given by scarcity and utility; the market is conceived of not as a network of exchanges allowing the different sectors to recover the means of production with which to start a new cycle of production again, but as the point where demand and supply meet, as in the medieval fairs and then in the stock exchange; wages, profits and rents are considered remuneration for the productive contribution of the factors of production capital, labour and land; income distribution is thus analysed as a special case of the problem of price determination.

All these elements, long present, towards the middle of the nineteenth century were coordinated into a view of the functioning of the economy

explicitly hailed as differing from the classical one, by authors such as Mountifort Longfield, John Rae, George Poulett Scrope and William Nassau Senior. There were also attempts to find a mediation between this approach and the classical one (as did for instance, at least to a certain extent, John Stuart Mill). Thus, all was ready for the so-called marginalist revolution.

Between 1871 and 1874, as anticipated earlier, appeared the main works by the leaders of the three streams in which we may subdivide the marginalist approach: the *Principles of political economy* (1871) by the recognized founder of the Austrian school, Carl Menger (1840–1921); the *Theory of political economy* (1871) by the British William Stanley Jevons (1835–82); and the *Elements of pure economics* (1874) by Léon Walras (1834–1910), the French founder of the so-called Lausanne school. The three streams show significant differences, which will be considered in the text that follows; however, they also present common basic characteristics, opposed to those characterizing the classical approach.

Common to them, first of all, is the return to the pre-classical paradigm of scarcity and utility. The problem taken up for consideration is that of balancing between scarce available resources and multiplicity of human needs and desires. Two elements were utilized to solve this problem. The first was methodological individualism, i.e. the idea that the individual constitutes the atom on which the theory is built. The second was the analytical notion of equilibrium between demand and supply; with this notion, the analytic requirement of equality between the two variables substitutes the generic classical references to a tendency to a balancing of the two magnitudes. In other words, the analysis starts with the decisions of a rational *homo oeconomicus* confronted with resource scarcity and aiming to maximize his or her utility, considered as a one-dimensional measurable magnitude. Only as a second step, once the equilibrium solution for the individual agent has been determined, does the analysis take into consideration the interrelations between different agents, each of which is supposed not to be influenced by the preferences of the others: a very restrictive assumption, as it denies the social character of the economic agent.

Thus, compared to the classical approach of the circular flow of production and consumption, here we have a view of the economy as a one-way road leading from scarce resources to the satisfaction of human needs and desires; an individualistic framework instead of an analysis based on the social classes of capitalists, workers and landlords; a subjective view of value instead of an objective one; systematic recourse to the condition of equilibrium between supply and demand to solve the

analytical problem of price determination. Compared to the pre-classical subjective approach, we have two new analytical notions, marginal utility and marginal productivity: respectively, the additional utility deriving from consumption of an additional unit of a commodity, and the increment of production deriving from utilization of an additional dose of a factor of production.

Let us now consider characteristics and main developments of each of these streams.

Carl Menger, leader of the Austrian school, had an education in jurisprudence and a diffidence towards the use of mathematics in a social science like political economy. His 1871 volume opens with a long discussion on the notion of goods and the nature of needs; much more than the determination of economic equilibrium (referred to each individual, and only as the sum of individual equilibria to society as a whole), what is considered important is the specification and characterization of the elements concurring in its determination. This explains, among other things, his insistence on the limits of the forces leading towards equilibrium, particularly the limits to knowledge, and on the need to study the economic process in its evolution. The leading role of the market, in fact, consists in providing individual economic agents, especially but not only through prices, with synthetic information on the spectrum of elements influencing demand for and supply of each individual good. As we shall see in the text that follows, these themes were subsequently to be developed by Ludwig von Mises and Friedrich Hayek, and to constitute the elements characterizing the new Austrian school.

An important analytical contribution was then offered by one of Menger's pupils, Eugen von Böhm-Bawerk (1851–1914; 1899). He sought to build a more robust theoretical structure than Menger's, and to this end created a bridge with the general equilibrium theory developed by the Lausanne school. In his analytical building, the rate of interest is conceived of as a variable leading to equilibrium the two elements, the marginal productivity of capital and 'abstinence', i.e. the preference for immediate over future consumption. To measure the 'quantity of capital' utilized in the productive process, Böhm-Bawerk resorted to the notion of the average period of production: an average of all the time intervals in which the hours of labour directly and indirectly required to obtain a given final product are locked up. On this theory and its limits we shall be returning in various contexts, as it plays an important role in Hayek's theory, in his debate with Sraffa and in the debates in capital theory.

The second stream of the marginalist revolution is the one originated by the British economist Jevons: a graduate in sciences, well acquainted

with mathematics, he took as his point of departure Bentham's utilitarianism, and hence the one-dimensional measurability of pleasures and pains. And yet, Jevons was not interested in interpersonal comparisons, but in clarifying the way a rational *homo oeconomicus* operates his choices.

To avoid Mill's criticisms, recalled earlier, Jevons took utility as an abstract relationship between a good and a person, not a property intrinsic to the good; for him (1871, pp. 92–3), 'The calculus of utility aims at supplying the ordinary wants of man at the least cost of labour.' Thus his notion of the motivation for human action departed from Smith's: no longer self-interest, but sheer material selfishness dominates the 'rationality' of the marginalist *homo oeconomicus*.

The archetype chosen by Jevons is Robinson Crusoe who, alone on his island, has to decide how much time to allot to rest or to work, and how much to each of the different activities which allow him to obtain the various consumption goods (hunting or fishing, for example) or the capital goods that enhance the efficacy of his work (tools, fences for his goats and so on). The solution to the problem utilizes differential calculus, and the assumptions of decreasing satisfaction for each consumption good, increasing sacrifice for work and decreasing returns for each kind of activity. In equilibrium, the marginal disutility of labour needs to be equal (obviously with an opposite sign) to the marginal utility of each consumption good (which Jevons calls 'final degree of utility'). For instance, in allotting his time to hunting, fishing and rest, Robinson Crusoe will choose in such a way that the last fraction of time allotted to each of the three activities has the same utility. The value of capital goods, too, is determined with a perspective evaluation, on the basis of their marginal productivity (namely the increased production yielded by an additional dose of capital) and of the marginal utility of the additional doses of consumption goods thus obtained. The economy as a whole is not directly the object of analysis; collective behaviour is obtained as the aggregation (sum) of individual behaviours, considered as independent from one another, with a questionable assumption that would, however, remain pivotal in subsequent developments of the marginalist approach.

The third stream of the marginalist approach is that of the Lausanne or general economic equilibrium school, originated by Walras. This stream would remain substantially extraneous to Anglo-Saxon culture up to the post-war period (with the exceptions of an Austrian version exported to London by Hayek at the beginning of the 1930s and of some of Hick's writings, in particular *Value and capital*, 1939) but, as we shall see, it would become synonymous with rigorous economic theory in contemporary economic debate. Walras borrowed from physics the notion of equilibrium between forces; equilibrium for the economic system as

a whole is determined as the solution to a set of equations, increasingly complex as we proceed from a pure exchange system to a system with exchange and production, up to systems including accumulation and, finally, money. Here we shall limit our reference to the pure exchange system; the data of the problem consist in the number of commodities and economic agents, their preferences and their endowments of the different goods. Preferences are expressed as individual demand functions for the various commodities, which Walras derives from utility functions. For each individual there is a budget constraint, ensuring equality between the value of goods demanded on the whole and the resources available to the individual. The set of equations determines equilibrium values for prices and quantities of the various goods exchanged. According to Walras, a process of adjustment (*tâtonnement*) ensures stability of equilibrium. This was for him a crucial tenet, abandonment of which would leave his entire theoretical construct meaningless; however, his attempts failed and subsequent theoretical developments arrived at a negative conclusion.

Walras's successor to the Lausanne chair, Vilfredo Pareto (1848–1923), an engineer by training, brought forward the mathematical analysis of general economic equilibrium, following the logic of rational mechanics manuals. Instead of (measurable) marginal utility, he proposed the notion of 'ophelimity' – an ordinal notion conceived of as a means to get away from the utilitarian philosophical tradition. He also proposed the notion known as 'Pareto optimum' – a set of solutions to the economic variables such that no change from it may improve the situation of an individual agent without at the same time worsening the position of at least another agent – and demonstrated that competitive equilibrium corresponds to this optimum. However, Pareto did not succeed in demonstrating the existence, stability and uniqueness of the competitive equilibrium, and hence of any such optimum. Possibly it is precisely the growing consciousness of the limits of pure economic theory, the more evident the more rigorous it becomes, that gave a decisive push to a shift of Pareto's interests in the direction of sociology in the last stage of his research activity (the *Trattato di sociologia generale* was published in 1916).

We may possibly see as a fourth stream of the marginalist approach, although it only came twenty years after the first three, the one inaugurated by Alfred Marshall (1842–1924), whose *Principles of economics* (1890) dominated economics teaching for a long time, both directly and as a model for other textbooks. His target was a syncretic approach: the subjective theory of value and the notion of equilibrium between supply and demand were taken up from the founders of marginalism and their forerunners; attention to production and the distinction

between increasing, constant and decreasing returns were taken up from the classical approach, and in particular John Stuart Mill.[12] On this basis Marshall proposed models of equilibrium for the firm and the industry, for the short and the long period. Translated (by Jacob Viner and Arthur Pigou) into the schemes of U-shaped average and marginal cost curves, these analytical models, dominant in elementary microeconomics textbooks to this very day, are widely utilized, notwithstanding their limits, in applying economic theory to the analysis of actual industrial economics issues. Wittingly or unwittingly, in the post-war period economic theory was imbibed with Marshallian culture, especially in the fields of application of the pure theory of value. Marshall dominated British economic culture through his pupils and his textbook, but also through the British Economic Association and the *Economic Journal*, both founded in 1890.

Two other characteristics of Marshall's thought exerting a strong influence on subsequent economic culture are the method of short causal chains, which would be taken up and modified by Keynes, and the attempt to incorporate elements of Darwinian evolutionary thought into economic analysis, subsequently taken up by the evolutionary stream.

The method of short causal chains corresponds to Marshall's diffidence towards general economic equilibrium (of which Marshall provided an – at the time – adequate presentation in an appendix to the *Principles*). General equilibrium may in fact be misleading when confronted with the complexities of the real world, from which it isolates only a few economic aspects for analysis. Thus Marshall prefers the method of partial equilibriums, i.e. determining equilibrium – for the short and the long period, for the firm and the industry – by considering demand for and supply of each commodity as independent from what is simultaneously taking place in the markets for other commodities.

Marshall also utilized an evolutionary notion of the firm, as from the fifth edition of the *Principles* (1905), so as to develop the notion of a life cycle of the firm. This notion is utilized to solve (or, better, to circumvent, as we shall see in §5.3 when considering Sraffa's criticisms) the problem of compatibility between the assumptions of perfect competition and of increasing returns to scale, which are very important in reality. Evolutionary Darwinism had a strong influence on the *Principles*, accompanying the static view inherited from the founders of the marginalist

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[12] The term 'neoclassical economics' was originally (by Veblen) attributed to Marshall precisely because of his syncretic approach; subsequently it was utilized (for instance by Hicks and Stigler) to refer to marginalist theory in general; Samuelson described the subject of his textbook as a 'grand neoclassical synthesis' (Samuelson 1948a) as from the third edition, 1955. Cf. Aspromourgos (1986). Here we shall utilize the term for Hicks–Modigliani–Samuelson's macroeconomics (illustrated in Chapter 7).

approach and implicit in the notion of equilibrium between demand and supply. Thus, in a complex interplay of text and footnotes, statements and qualifications, we can find in Marshall's text both the view then developed by Pigou and Viner and bequeathed to the textbook vulgate, and the germs of an evolutionary view. Within this latter, the notion of equilibrium tends to acquire dynamic connotations, in the attempt to keep in account both the irreversibility characterizing the actual movements of firms and industries along demand and supply curves, and the margins of manoeuvre available to firms even under competitive conditions. It is an evolutionary view stemming more from Lamarck than from Darwin's original contribution: under the influence of the sociologist Herbert Spencer (1820–1903), Marshall sought to take into account the heredity of the characteristics acquired in life by an organism in response-adaptation to the environment it inhabits. This line of reasoning, with the connected view of competition as a process of selection of the best firms, exerts a strong influence over a heterodox stream of contemporary economic research, namely the evolutionary approach. Marshall's influence on subsequent economic thought is in any case remarkably extensive, while his writings on the quantity theory of money, on the trade cycle with the interaction between real and monetary phenomena, on monetary institutions, etc., are also rich in seeds taken up by successive generations of economists.