

# The Penguin History of Economics

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November 28 - December 4. 2015

What do you expect of a general survey like this of economical history addressed to the layman? You expect a long list of economists passing review and in each case either compared to his (always a man of course) predecessors and seen how he has improved significantly on their work, or shown to have introduced new ideas and avenues of pursuit previously unknown. Or that may be the way to present it, avoiding a mere list of names. Anyway the approach by necessity requires a chronological unfolding, and as such invariably taking as the point of departure the Old Greek, who never cease to be topical.

However, the author warns against such a simple minded view. Economics is not physics, it is a social study, and as such not independent of time, but on the contrary deeply integrated with it and its wider culture. Hence, one presumes that it is not a case of straightforward progress, but a documentation of how the notion of economics have changed over time. It has not until recently been an established discipline with its standards and experts, but one who has traditionally been pursued by amateurs, in fact the notion of an economist is of fairly recent vintage. The author reminds us that Adam Smith was not primarily an economist, he was a moral philosopher and his essays on economical matters were only part of a larger canvas he tried to paint. The same case can also be made with Marx, who may be seen as a sociologist as heart, but one who was unable to ignore economic realities.

So what is economics? The obvious answer is that it is about money. After all to an individual this is what matters. But this is clearly a far too narrow perspective, it is of course possible to think of economics before the introduction of money, i.e. a primitive economy based on barter. We may also think of ecology as a form of economics, but this is too broad as it leaves out the human aspect which makes it to that social science it is. Still it gives a clue to a more conceptual formulation. In fact the definition the author refers to is due to Lionel Robbins to the effect that : *Economics is the science which studies human behavior as a relationship between ends and scarce means which have alternative uses.* General definitions of disciplines are usually not very instructive. A general definition of mathematics is unlikely to capture anything of its importance nor of its fascination. Yet this definition does catch something about what economics is really about, namely the optimal use of scarce resources for definite ends. One would surmise that the ultimate ends are outside economics proper, but once given, it is the business of economics to try and reach them given the scarce resources available, this being the human condition in a material world. The spirit chained by the flesh. Notions as money and other things such as interest, bargaining, production etc, are just emergent features. Yet one may think of it as being still too narrow, and as an alternative he offers Marshall's definition as the study of mankind in the ordinary business of life, which may encompass almost anything.

Now much of history is written from the point of view of the present. Thus history is seen as giving an answer to why things are as they are now. Whatever has no such appli-

cations is deemed uninteresting, a dead end. Thus if we assume our present understanding of what is economics, we go back to what we would like to see as its origin, and anything before or unrelated to it can be disregarded. The author, however, wants to avoid this pitfall, so hence he starts in antiquity.

After a preamble on the pre-socratics, and an obligatory nod to Plato's Republic, the author goes down to business and discusses Aristotle. He distinguished between three kinds of justice - distributive, rectificatory and reciprocal. To the three are associated the three different kinds of means, geometric, arithmetic and harmonic. Distributive justice concerns distribution (be it from loot or largess), as it should be distributed proportional to merit, while rectificatory should involve the arithmetic, as you should be compensated, while in an interchange one should take the harmonic mean between what the payer is prepared to pay and the seller is prepared to sell for. For if the payer is prepared to pay  $P$  and the seller to sell for  $S$  and typically  $P < S$ . Then the desired mean  $H$  should have the property that the percental increase the payer should be prepared to pay should be equal to the percental decrease of the asking price. Thus  $\frac{H}{P} - 1 = 1 - \frac{H}{S}$  which indeed works out as  $H = \frac{1}{\frac{1}{2}(\frac{1}{P} + \frac{1}{S})}$  i.e. the harmonic mean. We see already here a first instance of mathematical economics with a propensity for elegant formulas and formulations. More seriously the ancients thought about two ways of gaining wealth. One was natural and hence good, and that was by developing your estate through judicial husbandry. The other was unnatural and in the way of cheating, say by exchanging goods or charging interest on loans, and thus considered immoral. And morality has always been a powerful consideration in guidance of economic activity. More specifically, the acquisition of wealth by interchange had no limit, and consequently the nature of it was formal and useless. One could have a lot of coins but yet starve. Thus goods could be used in two ways. To be consumed or to be exchanged. The first was natural and good, the latter specious. Those sentiments are spontaneously embraced by most economical lay people, because the purpose of life is to lead a good and satisfying life, not to accumulate money, i.e. formal wealth. Economic activity should not be pursued for its own sake, its fruits should be applicable to the good life. Those moral strictures were of course not confined to the Greek but were reflected in all ancient cultures. The Jews did not castigate wealth resulting as a divine reward from good stewardship, but wealth pursued intentionally. Thus wealth acquired through commerce, not to mention money lending was unjust. In Christianity, initially a Jewish heresy, the idea of wealth as such being bad, regardless of how it was acquired, through reward or craftiness, started to take root. Although widespread renunciations of worldly goods never took root, human nature being as it is, those should always be secondary to the unworldly ones. In Islam there were even less regulations, at least to be found in the Koran. It stressed taxation as to provide for the poor, thus acknowledging that income was not necessarily awarded according to merit nor need. The taking of interest was likewise prohibited, and as to inheritance it was regulated as optimize justice, thus estates were broken up rather than given to a single beneficiary. Anyway in spite of the lack of any global economic theory there was a local understanding that buying cheap and selling dear, accumulation of wealth would follow automatically, so of course some people got wealthy, be it through trade, confiscation or plunder.

During the Middle Ages there was to be a slight change in attitudes towards commerce,

although of course based on morality. The Arab philosopher Averroes extended the uses of money as explicated by Aristotle. In addition to its roles as means of exchange, measure of value and store of value for future transactions, he also emphasized that in its value as storage for the future it had not to be sold to be used. Thus he understood the unique value of money in economic transactions, and that one could not dispense with it. But in order to function properly and justly, one should demand of it to be constant in value, as for any other unit of measurement (and here he could refer to religious authority) it had to be fixed, if not the fluctuation in value of stored money over time would be unjust. This led him to conclude, unlike the case of Aristotle, that the value of money was ordained and not up to the discretion of the ruler. The sentiment is of course familiar to all of us naive individuals. We want money to be stable and reliable and when changing, especially in an unpredictable way, we feel as if the ground is quaking.

The aversion on interest, especially excessive such, referred to as usury, continued throughout the Middle Ages. The main objection was that the usurer profited on property belonging to someone else. That in fact the usurer sells time, which is the gift of God, and that he does not properly share risks, which is unjust. And once again the sentiments against usury are still very much prevalent and explains much of the (justifiable) resentment the larger public feels towards financial operators. The intellectual elite of the Middle Ages was to be found among the scholastics, and the ubiquitous Thomas Aquinas was not reticent on the matter. He praised private property, arguing that a man takes much greater care of what belongs to him as an individual as opposed to collectively. The fruits of private property on the other hand are public. The intellectual atmosphere among the scholastics was one that idealized poverty, on the other hand if everyone was poor, where would one turn to for relief? Wealth had its uses, it should just not be pursued for its own sake. Those are still attitudes that are still popular, the difference between men and women in modern Western societies and those of the Medieval past, is that the latter were used to scarcity and saw it as normal. Yet one may discern among the scholastics a definite development towards greater sophistication when economic matters were concerned. Another ubiquitous scholastic scholar - Nicole Oresme - argued that while usury is worse than exchange, the debasement of money is even worse, holding forth the overriding need of a stable value of money, which of course begs the question of what really is the value of money. One aspect of this is to relate the value of money, or rather its physical representations - coins - to the scarcity of rare metals such as gold and silver. A topic on which he wrote a treatise. He adhered to the Aristotelean position that the ruler minted coins and set its value and in so doing did a service to the community. He was thus entitled to change the value, but to do so in order to further his own interest rather than that of the community was illegitimate. But he also glimpsed that the value of money was subject to forces outside the control of a single individual, and thus forming the notion of a market. But as the author reminds us, he stayed firmly within the orbit of Aristotelean thought, just as what characterizes the scholastic community. But it also, as in matters of religion, sought rational explanations.

As we all know the Middle Ages were followed by what we now call the Modern Age. The Renaissance engaging a rediscovery of the ancient world, with Plato once again coming to the foreground. It was a time of modern scientific breakthroughs unparalleled by any

other Civilization proving them to be worthy successors of the Ancient Greek. One would thus expect that there would be a corresponding advance in economic thinking lifting the subject from its ethically based gut reactions. After all without any instructive theory commerce and economic activity had flourished, seemingly indifferent to moral strictures, the taking of interest, if scorned, had not prevented people to act out of economic necessity and profiting from it. Although the author dislikes the term and is careful to distance himself from it, the notion of 'Mercantilism' is often invoked as characteristic of the initial phases of the new modern age. It is intimately tied to the emerging Nation state. The State was seen as a natural unit for economic activity. It was up to the State to build up industry and arrange for high employment. The ostensible object was to have a surplus of export over import and hence to build up reserves of precious metals, easily converted, if needs be to liquid money. The more of a surplus, the more power to the State. This clearly being an idea connected to providing soldes for large armies which spelled physical and hence real power. It set up a competition between Nations, where there were bound to be winners and losers. Obviously international trade was a zero-sum game. Not every nation could have a surplus of export, and what would happen if one Nation became all powerful usurping the powers of every competitor and remaining the sole surviving one. What would then happen to exports?

One of the inspirations for the mercantile approach was of course the riches of precious metals found in the Americas and made Spain a major power, ostensibly the richest of them all. One Spanish thinker on matters economical at the time was Navarrus, whose approach was more pragmatic and descriptive. After all there were business practices that were prevalent and immune to moral condemnation. He advanced the idea that money was a commodity like any other, and thus to become rich on money was not necessarily sinful, in fact it was fully legitimate to take advantage of the natural fluctuations of the worth of money. On the other hand to induce shortages was something quite different. It was also noted that the metals imported to Spain did not remain there, but found their way to commercial centers such as Genoa and Antwerp. To try and prevent this flow was both counter-productive as well as impossible. Money flowed to where it was considered most valuable. Another phenomena which started to appear, but whose history may be worth exploring in greater detail, was inflation. This was different from the normal fluctuations showing no trends. It was also puzzling as it seemed to continue even when there was no real scarcity of goods. But it was also recognized that it was not necessarily a bad thing or a serious impediment to trade, on the contrary it encouraged it, as money was less liable to be hoarded and more liable to be put in circulation. On the other hand for people living on fixed incomes it was disastrous. The value of money does not need to be constant, what is important is that it is predictable. And of course inflation made moot of classical moral arguments against interest. At the time in Tudor England there was a great outcry against enclosure, but rather to legislate against it, the strategy to take was to make sheep farming less profitable by removing tariffs. Thus more and more there was a tendency in a Machiavellian spirit to distance yourself from moral considerations in favor of what was really going on.

Gradually statistical considerations entered economics. To make balance sheets on a global national level not only at a household level. This makes for a more insightful

investigation of what constitutes wealth, realizing that labor is a very crucial aspect of it. In fact the English William Petty (one-time assistant to Hobbes) set out to put a figure on the money value of labor, in particular on populations, coming up with a figure of 80 pounds per head. The actual figure is of course much less interesting than the effort to come up with one, and the opportunity it would provide for criticism and improvement. Thus Nations as self-contained economical entities (unlike households) provide some counterintuitive insights, such that expenditure automatically is equal to income. Lowering the former does hence not increase the latter. The latter is actually the sum of all payments received by all producers, which is of course the same as the sum of all the outlays of all consumers. Furthermore the value of assets are all linked. Such that the ratio of rent to land is the same as ratio of interest to capital. In short a more quantitative description of economic activity was emerging. Of course money is connected to counting more than any other commodity. People often learn how to count by counting money, which from an individual point of view is a rather straightforward thing, but much less so in an integrated system. Now the statistics of Petty was not very solid and much of what he proposed was up to merciless satire (as exemplified by the modest proposal of Swift). And clearly his achievements could not measure up to the standards and darings of contemporary physics to which all scientific activity aspired at the time.

We have alluded to Machiavelli above. An English successor was Hobbes, who in his *Leviathan* argued for the need of absolute monarchs, not on divine or moral grounds, but to keep society together, by virtue of a pessimistic view of human nature. Economics was more and more seen as a social phenomenon with its own intrinsic laws. Not immutable as those in physics and mathematics, but based on the vagaries of human passions and predilections. It thus became the business to understand those laws and explain economical behavior as their inevitable result. Thus there arose a tension between normative moral considerations and descriptive social ones, a tension which has prevailed to this day. Concomitant with this insight was the need and the desire to actually intervene, to suggest remedies for an unsatisfactory state of affairs. Thus the notion of an economist as a steward able to provide advice on policy. One of the earliest to do so was the philosopher Locke who also dabbled in economics. As there were laws against usury but not interest, one had the problem of deciding a legal limit on it. How high should it be set? Here we have a concrete problem that had not arisen before. It was observed that wealthy countries like Holland had low interest, while countries worse off had high. Thus it was natural to assume that low interest was conducive to wealth. Locke warned against confusing cause and effect in this case. The low interest he explained was an effect not a cause of wealth. He was also responsible to set a gold standard that would be in effect until the 1920's, so strong was the desire to connect the value of money to something palpable. The notion of money became more and more sophisticated. Notions of rates of circulation of the same entered into discussions, and as Hume reminded people, money had no intrinsic value, its purpose was that of oil to make the machinery, in this case commerce, to turn their wheels more smoothly. He also suggested the metaphor of the sea, all at the same level, hence any artificial setting of the worth of money could only work in an isolated and separated situation, just as you cannot raise the level of the ocean locally without building a dam. Thus the notions of supply and demand and the gradients those made in the economical

landscape became entrenched in economical thinking and the notions of fluid dynamics and equilibria, still very predominate in abstract economical thinking, were already put in place. There was also a further distancing from the moral perspective. Luxuries, which formerly had been scorned as unnecessary and frivolous, now took on a new aspect. Their production was actually beneficial to the economy whose purpose was seen more and more as that of expansion. Any consumption stimulated production and provided money for further production (and consumption). And as Hume remarked, it is in the pursuit of luxuries, the farmer is made to exert himself more than he would have done by being content at mere subsistence. Thus luxuries had the effect of teasing out more productive labor.

The advent of Adam Smith is seen as the ushering of economic thought into the modern age. But as everyone else he did not appear in a vacuum but had many predecessors. He was himself part of the so called Scottish Enlightenment along with Hume and his teacher Hutcheson, and there was already schools of economics which he could study and criticize. In addition to mercantilism we have referred to above there was also the active school of physiocracy with the leading figure of Quesnay. It centered economic activity on agriculture, arguing that this was the only activity that generated more than was put into it. In exchanges there were always some to lose where others gained, and in manufacture all what could be hoped for was to regain expenses. The purpose of the movement was to produce indisputable statistical facts and give advice on policy, the general tenor being *laissez-faire*, the less intervention the better, especially when it came to taxes, where Quesnay purported to demonstrate that the latter by interfering with natural circulation and accumulation could have a deleterious effect.

Smith may be most known for his phrase 'the invisible hand'. The true meaning of it is not, as many people seem to think, that greed and selfishness are good things, Smith was a stern moralist after all, but that the workings of the economy are unplanned and emergent, and local causes bear little resemblance to global effects. This ties of course in with a general philosophy that social life has its own laws and those are made up, as in physics, by simple principles very different from the effects they will bring about. As to those ideas he had of course many predecessors, such as the Frenchman Boisguilbert, who also stressed how selfish motives may work for the best of the community. But he is also known for his advocacy of division of labor to enhance production. Although the word 'advocacy' may be misleading in the context. He noted that in a big market, there would be a much greater tendency of specialization than in a small. In a village everyone had to be able to do a little of everything, not so in a big city. The division of labor and the concomitant mechanization of production became the hall-mark of the 19th century. He was also very much interested in the notion of the price of a commodity, something that would engage Marx later. Smith made a distinction between nominal and real price. The nominal price is determined by exchange, and as in an exchange economy barter is inconvenient, the nominal price is measured in money. The real price is concerned with the toil and labor that goes into acquiring it, and here money is not really the natural measure of worth, however, the nominal price tends or should tend to converge to the real price. This is only possible if there is competition and free markets. If the nominal price of a commodity is too high, people will flock to produce it, as you will get much money

for correspondingly little toil. Thus supply will rise and by the dynamism of the market prices will fall until an equilibrium is reached, because likewise, if the natural price is too low compared to the effort of production, people will move to other things, thereby cutting down supply, and nominal prices will rise. So once again a case of the oceans becoming level. This is what Smith means by the invisible hand, that unregulated markets will take care of themselves. The whole idea has a seductive simplicity, but one should not forget that Smith was a moralist, and he did hedge his pronouncement with moral qualifications, and cannot be made as the pure advocate of free enterprise he is often made out to be retrospectively. For one thing there has to be a government to maintain law and order and thus to secure justice, without which market forces would lead to chaos. He also made a distinction between productive and unproductive labor, the former added to the value of a commodity the latter not. Thus there was a distinction between investment and consumption, the latter was spending on productive labor which would result in enhanced production and hence a return, while the latter would mean destruction of value. Thus savings spent on investment would be the result of parsimony and have a beneficial effect, while spent on mere consumption would lead to profligacy and the reduction of resources. Thus as we see, there is a strong moral element, however in direct compliance with the working of the economy. Now it has been argued that Smith did not have a single original ideal. The relationship between supply and demand, as well as division of labor, go back to antiquity, and many elaborations of those notions can be traced to later predecessors. However, the real achievement of Smith was to create a synthesis in which those ideas appeared with clarity and hence were able to catch the attention of his contemporaries and fire their imaginations. And this is what counts in the history of ideas. It is not enough to have those ideas discovered and reconstructed by hindsight, they have to make their mark in real time and have a real influence in history to really count.

So is Adam Smith the crowning achievement of economics. Does he represent the essential framework as to established economical theory to which every economist of whatever hue has to take into account? Is he the Newton of economics? No one would claim that. He was no Newton, as we have already noted, he cannot be credited to any really original and revolutionary idea. Neither can his synthesis compare to the elegance and power of Newtonian physics. Social science is too messy and self-contradictory. And as noted, economics can never be separated from morality, leading to intractable conflicts and a variety of interpretations and recommendations. Anyway let us continue.

The moral aspect of economics were emphasized by people like Godwin in England and de Condorcet in France. They proclaimed that private property was the root of all evil, and that there should be a fairer and more egalitarian distribution of wealth. We can see them as early proponents of socialism in the modern world. They shared a very optimistic attitude as to the goodness and perfectibility of man. An opposite view was presented by Malthus, who stated that unchecked population would grow geometrically but food supply at most arithmetically, thus the former would inevitable overrun the latter leading to misery and starvation. Thus the state of abject poverty for the great mass of man would be inevitable and he opposed governmental measures to aid the poor as misdirected and futile. As a result he earned the opprobrium of the public and became the very representative for the smug and hard-hearted, and the notion of an economist became

identified by those who calculated without a heart. The remedy Malthus feebly proposed was moral restraint, in effect lowering the birth rate by restrained sexual conduct. How Victorian in retrospect, never mind that Malthus died before the ascension of Victoria, nor that Victorians in general were particularly restrained. Now of course Malthus had a point, one that Darwin in particular appreciated. There are material restraints we can only ignore at our peril, economics after all is born out of the fact of scarcity. And sustained exponential growth, the battle cry of politicians across the spectrum, is a chimera. Cold-hearted or not, people of the ilk of Malthus warn against a sentimental view of life and man.

Occupying the middle ground between the idealistic, not to say utopian, proponents of socialism and the cynics such as Malthus, one finds the liberals, in particular Bentham, who with his utilitarianism, tried to combine a level-headed approach with a heart. Famous was his principle of maximizing the sum of happiness of all individuals in a society. Thus he tried to combine on one hand a sense of community and on the other freedom for the individual, which later would find its formulation in the constitution of the United States, namely the right to pursue happiness. Bentham had many disciples, the most distinguished being James Mill, whose son John Stuart would be the political philosopher *par excellence* in Britain during the 19th century. But to return to Malthus, he had a friend Ricardo, whose ambition was to reduce economics to a deductive science modeled on Euclid. In his 'Principles of Political Economy', Ricardo accomplished this ambition by considering a simplified text-book example, a baby model in contemporary usage. We may restrict ourselves to an agricultural economy whose only purpose is to produce corn to feed the workers who labor to produce it and give rent to the landowners. The engine of the economy is given by the capitalists who make the necessary investments. Now different plots of land have different degrees of fertility. Land is marginal if the cost of production equal the price it carries. To cultivate such land is a matter of indifference, and the landlord can hardly expect to be paid rent for it. Land that yields a surplus will cause a bargain between landowner and capitalists as to how much rent the latter will be prepared to pay. The surplus minus the rent will be pure profit for the capitalist, who has no choice but to invest it. Thus when the accumulated stock of profit is growing, more money will be available for investment and hence an incentive to cultivate more land, which will make a demand for more labor which will mean that wages will grow to the benefit of the workers as well, but as a consequence the rents for landlords will fall. As the workers will have more money, the prices on corn will rise, giving a further incentive, as now formerly marginal lands will make a surplus. But as wages will grow, so will the population of workers, and thus also the supply of labor which will lead to a lowering of the wages, and thus an incentive for landlords to raise their rents. But the lowering of the wages will make for a fall of prices and hence surplus, which will depress wages even more, and rents and profits will go down as well, and hence the ability to invest. Thus production will plummet, the demand for labor decrease, and more land going fallow. What could break this downward spiral? Or more to the point cannot the initial increasing production keep abreast of population growth? But that would of course assume the possibility of sustained exponential growth that Malthus found impossible. Or one can envision a scenario of equilibrium, where the wages of workers are kept at a level of subsistence, below which they would die and



become more precious, and production is constant. In an economy where there is only one commodity there is no need for money. So what is really going on? The workers produce corn, and are paid in corn, but not as much as they produce, the rest is divided between landlords and capitalists. But if workers are paid in corn, what can they do with it except eat it? What would be the point of paying out corn to get corn? In what sense can we say that the more corn the workers earn the more corn are they prepared to pay for the corn they eat? Now of course one may use corn to get corn by sowing it, and then we reduce to problem of how much corn should be eaten and how much corn should be used as seed. If too much is eaten there will be not enough corn the next year, and if too little is eaten one will be too feeble to raise the corn for the next year. Such a simplified model is clearly inadequate, and economy only enters when there is diversified production, say in addition to agriculture also manufactured goods. But then money enters and the need to have a robust theory of value as how to compare the relative worths of different commodities. Problems with which Ricardo struggled. Add to this the option of international trade, as a consequence of which it would be more profitable to grow foodstuff by manufacturing products to be sold on the international market.

Now Ricardo, if rightly criticized, would have a lasting influence on economics, especially in England. From then on mathematics would seriously enter the subject, and there would be in addition to the issue of moralism as to purpose, one of deduction versus empirical study, in practice history as to method. The mathematical attitude was taken up by the French engineers, one example being Cournot who was the first to explicitly present supply and demand curves in a diagram, showing the market price as their intersection. The idea is simple and seductive, but of course in practice those curves are hard to produce and a bit unstable. Navier, known from Navier-Stokes, who argued that public works should not be expected to cover their own costs, as they did give benefits to the community as large. And if there were tolls, those should only cover interest and maintenance, not construction. He also explored other issues relating to costs and engineering projects, especially that of railways. In the same vein another French engineer Dupuit found other uses for the demand curve, namely that subtracted from the area below it the construction cost of a bridge or canal would give a measure of the benefit resulting from the project. In Germany the agriculturist Thünen known from his treatise - *der isolierte Staat* - tackled the problem of how much capital and labor to use as an optimization problem, formulating it algebraically and solving it using differential calculus, leading to the conclusion that the wage to be paid is that of the value of the output of the last worker employed, known as the marginal-productivity distribution theory, and with a clear analog to the case of marginal land discussed above in connection with Ricardo.

Now the 19th century complicated economic life as industrialized production entered the scene seriously. In addition by creating out of the landless laborers a proletariat, it made social issues even more urgent, and thus kept the moral dimension of economics alive. On the more technical side was monetary policies. What was the value of money, by now less linked to coins, with some perceived intrinsic worth, than to bank notes and issues of credits, with none. Money was a matter of trust, and thus there was a hierarchy of banks, with the Bank of England topmost. The only thing that could restore confidence in bills, was that at a time of crisis, regional banks did not issue them, but that the supreme bank

increased its output for the financial benefit of the community at large. Thus was born the idea of a Federal Bank. The ultimate link between money and gold bullions was seen as the large resort, but what happened when the price of gold, incidentally set by Newton, fell? There was obviously too little money.

We have already referred to John Stuart Mill, who also wrote on economics, in addition to a host of other things, including logic. He made a kind of synthesis between Smith's more catholic approach to economics and the more technical by Ricardo, keeping the framework of the latter. His synthesis was to be until the end of the century the standard text-book on economics. Mill considered himself as socialist, although by contemporary standards a strange kind as he opposed state ownership of the means of production. His attitude was liberal and he claimed that socialism, according to his conception preserved incentives, while communism destroyed them.

While Mill nowadays is mostly forgotten, Marx became even more of a presence in the 20th century than he had been in his own, one reason, beside the obvious one of the Russian Revolution, was that much of his major writing was not become known until long after his death. He was an impressive systemizer and writer, and his *magnus opus* - Das Kapital - was planned as a three volume work, going from the abstract to the progressively more concrete. Initially only to explain the larger picture but then to be able to explicate more and more fine-grained detail. Only the first of the volumes was published during his life time, the rest under the editorship of Engels. As with Mill he based his economics on Smith and Ricardo, he followed the latter especially, in his distinction between the value of a commodity and its price, a problem that had preoccupied Ricardo, and which he took as his basis for explaining how the worker could be exploited by the capitalist. While Mill, along with the classical economists, had tended to view economical laws as laws of nature, Marx thought of them as within control by humans, although of course on the other hand he wrote about the forces of history, against which individuals battled in vain. Thus in particular the capitalist system with its intrinsic contradictions was possible because the means of productions, including the labor of the workers could be owned by private individuals. Once this state of affairs was abolished a new truly communist society could be built. Now, like Smith, economics was just one aspect of a more comprehensive project, in the case of Marx a wide-ranging sociological one. and it may be as a sociologist he will mainly be remembered by posterity.

At the end of the 19th century economics became an academic discipline with journals and specialized experts. Gone were the glorious days of generalist amateurs such as Smith, Ricardo, Mill and Marx. One of the effects of this development was to make it more scientific, meaning more mathematical, after all economics abounded in quantitative data, the challenge was not to find it but to make proper use of what existed. Among the pioneers were the British Jevons and the French Walras differing in methods and approaches but coming to very similar conclusions. Jevons was a meteorologist and had written extensively on the scientific method. He was also a utilitarian and sought to quantify pleasure through the indirect method of noting how consumers chose between different commodities. The economic actor seeks to maximize his utility, and as noted before once utility has been quantified this can be formulated mathematically and solved by differential calculus. Walras was mainly interested in markets with many interrelated commodities setting up

equations making that precise, and then showing that they had a solution, which would correspond to an equilibrium, and continuing to show that this equilibrium was stable, i.e. not too sensitive to the initial conditions imposed. He was well aware that no one explicitly solves these equations in real life but that the state of equilibrium nevertheless is attained by a piecemeal process, similar to the one a liquid maintains an equipotential level. Once again we see that this is very modern and much in the spirit in which economists work to this day. The crucial thing is how accurate and relevant the mathematical models are, as we have already noted, supply and demand curves with their characteristic shape are great in theory but problematic in practice.

The next character on the stage was Marshall, whose influence through his text-book would be paramount in Britain until the late 50's. Trained as a mathematician he was suspicious of the mathematical components in economics but his approach was nevertheless mathematical. In fact he had come into the subject by translating Mill's work and ideas on political economy into mathematics. He rejected the mechanical metaphors of Jevons and Walras and replaced them with more appropriate biological ones, especially evolutionary. In his published work he always relegated mathematical formulas and computations to an appendix in order not to scare away the practical businessmen he hoped to reach. His general principle was that if a piece of mathematics could not be translated into ordinary language it should be rejected as irrelevant and unrealistic.

By the 20th century the subject of economics would be so specialized with different schools that a survey as up to now would be too tedious with an abundance of names each one clamoring for attention. So let me concentrate on Keynes, who deservedly or not stands out, at least in the view of the lay public. He effected a revolution, at least so he maintained himself, and as expected people took him on his word. His great work was his 'The General Theory of Employment, Interest and Money' in which he relegated so called classical theory (the precise meaning of which he left to the discretion of the reader) to a special case. According to Ricardian orthodoxy employment can be reduced to a classical case of supply and demand. If there is too little employment it simply means that wages are too high and the obvious remedy is to cut them. Not so, Keynes argued, that only works in special cases. Keynesian theories became very popular as they offered a means to escape hard-hearted Malthusian considerations and provide policies in which the government could step in beneficially and improve employment to the delight of everybody. The actual book was hard to understand, and mathematics was part of the problem, at least to many classical economists. A certain Hicks actually cleaned up the mathematics and reduced it not only to a few equations (which had been done previously by Champernowne) but to a diagram of two curves, one the so called LM curve showing the equilibrium between rate of output and interest rates, the other the so called IS noting when investment was equal to savings. The point of interest was their intersection which would vary of course depending on the shapes of the curves. In this way one could investigate different scenarios, and the whole of forbidding Keynesian theory seemed to be captured by the interaction between those two curves. Keynes was also the one to emphasize the lack of long term information we have relevant to predict the profitability of particular investments. The great danger was that if investments were taken over by speculators whose only interest was short term profits. As to the originality of Keynes it is not different from that of

other great economists. Ideas were in the air, it was mainly a matter of making a lucid or at least provocative synthesis of them and present them with sufficient dramatic flair. Keynesian policies were already implemented as Roosevelt came to power in the early 30's, before Keynes' book.

The recent development of economics has been in the direction of mathematical sophistication. While the mathematical tools initially were traditional with the advent of von Neumann and Morgenstern game theory entered in the late 40's. Initially scorned by economists, who in general were dismissive of mathematical techniques, in spite of the increased mathematization of the subject, (to a large extent one suspects due to mathematical incompetence, not improved by dismissive remarks on that score by von Neumann, who held much of classical economic theory in contempt), and thus mostly embraced by mathematicians. This has of course changed with the further professionalization of the discipline. Although there is a great deal of consensus on the basics of economics, going back to the time of Smith, there are of course different schools, inevitable as the subject is not only one of scientific ambition, in the words of R.G. Collingwood, a spectacle, but also one of social self-reference with moral and political implications, one only needs to be reminded of Marxian economics. But there are also other heterodox versions, Hayek a conservative being one example, emphasizing a more historical approach reviving earlier strands.

The book has a clear didactic ambition, putting economic theory in its historical, social and cultural context. Yet one does not really get any sense of a conceptual development of the subject, nor that any real revolutions have gone on. Nothing compared to the case of natural science be it physics, chemistry or biology. But it is a social science after all, and the standards and expectations are different. In the end the book degenerates to long lists of names as if to be scrupulously fair to any contributor.

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