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TOWARDS THE SERVICE ECONOMY

INTRODUCTION

In the rococo shelter of Leopoldskron castle in Salisburg, in Austria, I heard talk of the post industrial society and economy. In that summer of 1959, Daniel Bell gave his first conference on the subject during an American studies seminar, part of a series that has continued into our time.

Being a sociologist he did not venture into more specifically economic arguments but concentrated on the fact that the majority of the population by that time were working – increasingly so – in the service field. This observation led him to think that the "working classes" were ever less what the Marxist theories had described and taken as their reference point. As a result factory workers could no longer constitute, if they ever had, the basis for the great social revolution.

I noted these observations while thinking that in human history any political structure ran the risk of deteriorating, thus giving rise to forms of oppression, whatever its original basic ideology. The observation concerning the relative decline in factory manufacturing work was important – I will come back to it more and more often later, especially after my experience in industry and at the Battelle Institute.

After a first book published in 1968 on "Europe and Space"[1], followed a few years later by a contribution to a second book on "Europe and the Oceans"[2], from 1971 onwards I began to hold a course on Politics of Science and Technology and European Integration at the University Institute of European Studies in Geneva. It was the beginning of a university teaching career that lasted twenty eight years (from 1971 till 1999)[3]…

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[1] "L'Europe et l'Espace", Centre de Recherches Européennes, Lausanne, 1968

[2] "L'Europe et les Ressources de la Mer" Witwith the prH. Schwamm and H. Loubergé. edition Georgi, St. Saphorin (Switzerland), 1977

[3] From 2006 I again held courses in English at the IUIES (International University Institute for European Studies) at the Goriza campus of Trieste University.

In 1985, at last I was duly appointed "prof". For over ten years I had given lessons without pay, for two, three hours a week. One had to do something for Europe plus learn to put one's ideas and experiences in order.

Those courses taught me a great deal. Actually I'm not like those teachers who first learn to specialise in a subject from books and then pour their knowledge into their students. Rather I am fundamentally a researcher: first I have to understand, from practical experience, where the most advanced edge of a discipline is to be found and then I investigate beyond that edge, while at the same time making use of books. My references have been experiences lived in industry, technological research and finally my experience of institutions relating to risk management and insurance.

Of course the main task at university level is to frame empirical data, the facts, in an orderly and coherent presentation. This in its turn allows us to give a more thorough meaning or explanation to those same facts. It is a wide ranging task that requires the best balance between the so-called "practical" and what is known as the "university" synthesis. In any case it is very enjoyable. I therefore owe a debt of thanks to my students whom, for many years I have exposed to often unexpected experiences and to whom I have introduced, in research, though without them requesting it, new elements for understanding and judging contemporary economic reality. A battle which I have always considered parallel to that of the construction of the new Europe

1. DIALOGUE WITH THE ECONOMISTS

The University Institute of European Studies had been founded in 1963 by Denis de Rougemont, Director of the European Centre for Culture in Geneva to arrange for a base for education in the Centre's programmes and also to consolidate its financial structure. In 1975 my course became an "Introduction to the Economics of Risk and Uncertainty" and from 1983 it was titled "The Foundations of the Service Economy – Europe's problems and prospects".

In this research-teaching work of course an important number of basic works had to be included. I always read Adam Smith, Marx, John Stuart Mill, Marshall, Schumpeter, Hicks and others, only after having raised, in various ways, numerous questions concerning them: references, observations, suggestions, recommendations, citations. Rather than reading them, I above all entered into dialogue with them. A necessary dialogue if one was to understand the motivations, experiences and historical references of these authors. A method that perhaps does not meet the normal academic requirements, but which, according to me, is useful, if one is to get to know how to obtain the greatest advantage from a daily observation of the "real" economy.

I must also confess that many of my ideas came to me while I was in search of a synthesis as I was talking in front of my students. It was very interesting to reflect, after a lesson, on what I had said during the course… Centimetre after centimetre, I was able to advance a few metres every year, or at least have increasingly bet-

ter structured ideas. After twisting my ideas in every direction I leave it to others to test if they are false or useless. It is pleasing to proceed even when one discovers that an idea or a hypothesis is wrong. These days it makes one shudder when, for example in the physics field, it appears that certain particles such as those of Higgins, considered fundamental by current dominant theories on the formation of the universe, don't actually exist in reality. But the essential thing is to seek.

Other opportunities to teach and to learn were given me by the Agnelli Foundation in Turin between 1970 and 1975 and by the IRI education Institute in Rome from 1976 till 1979, for a total of about seventy conferences/debates with a public made up essentially of public and private entrepreneurs. At the Agnelli Foundation I had a very special experience working with a group of psycho-sociologists recruited by Giorgio Demarchi, an old Trieste schoolmate. I was part of a group of experts (including Luigi Frey, a key man in Italy in labour economics, and Ettore Massacesi who was to become managing director of Alfa Romeo before it was taken over by FIAT).

Naturally I presented my theme on technology and economic development and the psychologists, with questions but also with silences pressed those present to be aware of the "group dynamic" and how this interfered with the understanding of the argument under discussion. One of them (a figure of authority appointed by the group) immediately agreed with me. Others protested, in order to assert their own area of independence. Still others spoke in order to obtain the maximum approval of the group members. It was interesting and informative to witness how the whole discussion, on a pretty concrete subject was filtered through psychology, individual and social strategy. Apparently rational language became what the "psychs" call "metalanguage", through which transmitted signals or words become the indirect means of establishing one's presence and role in the group.

One day I asked everyone to close their eyes and list aloud what there was in the conference hall. Later, after they had opened their eyes a comparison was able to show that more than half of the objects in the hall had escaped the attention of each one. However the objects noted depended more and more on the character of the specific work of each one. A furniture maker had noticed the kinds of chairs, tables or armchairs, while an amateur painter had especially observed the pictures on the walls. In a word, when it comes to the sea of information that surrounds us, each of us makes use of an "input selector" a very personal selection system. The moral, if there was one, was to understand that we inevitably make choices from among the items of information that surround us. It would be impossible and absolutely intolerable to try to capture it completely, but we have to do our best to be aware of this process, in order to improve the opportunities that we have to understand reality and the quality of our judgement, which can improve but cannot become either perfect or definitive.

In my "education-teaching" there is another essential element to be noted: the contribution. sometimes subconscious, of some people who open doors in your mind, saying a sentence or a word that leaves imprints way beyond their basic meaning. One day, at the Battelle Institute, Emilio Fontela, then head of the economics

department, speaking of service businesses told me: "It's clear that services represent not only a specific economic sector, but they are very important in the industrial sector too.".

This observation was decisive for me and I spent years studying it in depth. It is one of the principle keys to the reading of contemporary economics. For Emilio Fontela it was about an empirical observation that had no particular effect on him. His main area involved simulation models for which the definition of service activity was rather vague. I thank you anyway, Emilio, for the inspiration.

In the following paragraphs I will describe a certain number of points that I consider important, indeed essential, for developing economic research and for reinforcing its capacity for acquiring new data relating to the great changes in society, and to the discoveries and innovations in science and technology.

I invite the reader, particularly if he/she is not an economist, not to be discouraged: at the risk of appearing superficial, I am convinced that every truly clear idea – above all in those disciplines called the social sciences – can be easily illustrated and expressed in very simple language.

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One day at the Battelle Institute Maurice Poull, while explaining the development process of new textile machines, told me "Every machine and every process is based on a key principle; for example, men first learned to light a fire by rubbing two pieces of wood together. They then improved this principle creating different types of matches, and then, for the same use, they invented other implements that, in the presence of gas, produce a spark thus enabling the lighting of fire – in the kitchen or for a pipe – in a very effective way. The same thing happens with textile machines that produce threads and fabrics following processes and principles unchanged over millennia. The quality of the raw materials (cotton, wool) used has improved however and, thanks to improvements in metals, that of the material and of the machines used is also better. These work more precisely and quickly, and do not break. On the other hand historians date the beginning of the Industrial Revolution to the moment when looms and textile machines underwent important innovations. These consisted in the use of water heated in a tightly closed container (like today's pressure cooker): The water, becoming hot and turning into steam increases in volume by about 1,700 times, producing in turn great pressure and hence energy that can be used to move some of the loom's levers, in place of the force used by a human arm. In the case of the cooker this must be dispersed through a valve on the lid to avoid an explosion. Just like with the pressure cooker so it is with the loom; the metal must be well produced, solid and without flaws so as to avoid it breaking, or even worse, exploding. At the beginning of the Industrial Revolution it was not easy to produce containers capable of resisting strong pressure. As a result there were a number of accidents (as can happen even today), and the birth of a specific insurance sector (against the explosions of containers or tanks under pressure)."

Even without being engineers it is easy to follow the progress made in innovation and technology. The great development of the railways starting from the middle of the 19th century (almost a century after the Industrial Revolution), is linked to the same idea of heating water in a tank, placing it horizontally however, so that the pressure of the steam pushes the wheels of the train through the use of pistons. Thus was born the locomotive. It is thus easy to imagine how much work engineers put into research, development of materials and the the possibilities for assembling them.

Maurice Poull went on: "On the one hand, therefore it was possible to use the mechanical energy (produced by water pressure) and on the other there was the invention of the so-called flying shuttle". This is simply a spool around which the fabric thread was wound. It was pushed with a sharp blow from one side of the loom to the other, a blow struck by an arm or a kind of hammer activated by steam energy. Obviously the spool has to start from the correct direction, but to achieve this it is only necessary to make a guide or use a piece of wood or metal to stop it from going where it should not.

It is soon imagined how, with this system the speed of the machine, and hence of production, can be constantly improved. Productivity increases, in the traditional sense of the term as used by economists.

Once this starting point concerning the improvement in a procedure that uses a known technology is clear one also understands that there can be constant improvements in the kinds of machines, both physically and in terms of performance, in materials used in building machinery and in the textiles used.

Why then did our weaving machine become the symbol of the Industrial Revolution? Because the energy used allowed the fuelling of several machines at a time and from that derives the interest in bringing many machines together in one place. It was to be the birth of the "factory", by now necessary to take the fullest advantage of the possibilities offered by this new phase in technological development. Previously textile production had, above all, been linked to agricultural activity. Work on the farm was done by hand, on one or two machines, when there was time, bearing in mind the need for field work. What happened, starting from the second half of the 18th century has been defined a real technological and social Revolution. The peasant who worked in textiles became a labourer. He could no longer work at home. The working class was born.

Now let us take a step forward. Maurice Poull explained to me: "One can develop a system over the long term. There always comes the moment, however, in which the possible improvements become less – what economists call diminishing returns. One must therefore change both the logic and the system". So Poull tried to develop a spinning system aimed at improving the speed of producing textile threads consequently, based on a new principle. This involved using static energy (the kind that attracts dust to some furniture and surfaces) to place the fibres parallel and, after twisting, to create a textile thread. I have already mentioned that this principle, which had at firstproduced good results, was not a success. At the time another system gained the advantage. This used centrifugal force (the same

force that allows salad to be drained in a basket that spins fast and to squeeze laundry in a washing machine).

Here therefore we have two fundamental elements relating to technological development: improvement of existing principles and tools until they arrive at the point where they show a diminishing of returns which increasingly limits innovation efforts in relation to the results, plus the need to consider completely new principles and systems.

2. PROMETHEUS UNBOUND

It was at this point in 1971 that a book on economic history written by David Landes in 1969 fell into my hands. It was called "The Unbound Prometheus – Technological change and industrial development in Western Europe from 1750 to the Present"[4]. I have never read a book on economics whose analysis corresponded so closely to my own experience of work and daily research. It opened my eyes to another essential point which, strangely seems to me to be still widely underrated in economic analyses.

Until the second half of the 19th century every technological innovation was of the empirical kind, that is they were developed on the basis of practical experience, with no fundamental research involved. The steam engine was invented at a time when it was not yet known that water was composed of hydrogen and oxygen; one simply began to assess empirically the dimension of its transformation into steam following its being heated. The same goes for coal, a fuel used for centuries, with no knowledge of its chemical structure. And so it was for many other materials.

In the 19th century the scientist (or the philosopher who studied "Nature") was a very different being from the engineer (the latter even got his hands dirty). I read that when they told Graham Bell that, thanks to his research the telephone could be produced, he became angry and took it as an affront. A true man of science – a scientist – was not to be confused with the common mortal who made practical things, as if he was also an engineer.

The union between science and technology would come about gradually and stealthily, from the end of the 19th century. Complete integration would take place only during the second world war – what was at stake was important and it was necessary to quickly abandon every cultural prejudice. Only after about 1930 did real professionalisation of research and development work begin and the Battelle Institute was one of the first and principle points of reference.

3. COMBATTING DIMINISHING RETURNS

It should not be thought that the notion of diminishing returns is an exclusively economics one. It is at the heart of our lives, materially, physically and also psychologically.

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[4] David Landes, "The Unbound Prometheus", Cambridge University Press, 1969

Let us think firstly of going on foot and of racing. If we are champions, the fastest we can go is about 100 metres in 10 seconds. To run 200 meters takes more than twice 10 seconds. And so it goes on up till the moment in which, after some tens of kilometres on foot, we will no longer have the strength to move. It is possible to go ever further, but increasingly less efficiently in terms of speed.

This phenomenon of diminishing returns can be overcome by getting a bicycle. This is very efficient for covering the first kilometres, though increasingly less so, especially after 50 or 100 kilometres. And so we can then take advantage of using a car and following the same logic we can try, in exceptional circumstances, to go as far as Cina. For this distance however, a plane is preferable. And to go to the moon there is currently no option but space rockets.

Here then we have a first opening onto the mechanism of diminishing returns and into the possibility of opposing them with new technologies and inventions. It is necessary, however, to draw attention to the fact that every new technology, every new invention is increasingly more specialised. Going on foot allows me to jump over a small wall, to enter the water and learn to swim. Though having a car it is better to opt for a ship on water, or for a submarine for underwater. On the other hand to go quickly to the bakery a kilometre away it is hardly appropriate to use the speed of an aeroplane. There is, therefore a fine balance between the most efficient use of the various means, from our body to aeroplanes, and the effects of diminishing return. The analysis of productivity in economics (how to get more with less) depends on a thorough study of these phenomena, and it is not enough to know how many cars are produced in an hour in a factory.

This problem of returns occurs on the psychological level too: We might enjoy a film, but if we see it for a tenth time, we'll enjoy it less than the first. Let us think of love, at the beginning declared to be for ever but extinguished over time, unless there is an appropriate change in register and the aims of the couple. There is a difficult word to define all of this, entropy. This indicates the tendency of every system, the starry universe included, to be exhausted and to lose its vitality. Georgescu Roegen, an iconoclast economist, with an education in physics, wrote a book on this subject, according to which even the ideas of the Club of Rome on the limits to economic growth seem very modest and inadequate. Entropy (or diminishing returns) occurs faster if we insist on sustaining an accelerated growth. In order to protect the Earth, said Georgescu Roegen, it is necessary to proceed slowly to avoid arriving at the final stage too soon.

Although Georgescu Roegen's book contains many important elements worthy of consideration, and although he once wrote to me to compliment me on my ideas on the subject, I've always thought, and I still think, that if on the one hand entropy exists, just as diminishing returns exist, there is also a positive side of the coin. This is negantropy: it is real scientific discovery, it is the capacity at the individual level, to get back into action so as to seek new ways. Every extrapolation of what exists, including the human species, leads and can lead to the end of everything. What emerges every time, however, is the discovery of new worlds, of mat-

ter and of the capacity of society to organise itself. Uncertainty of the future fortunately, destroys every idea of extrapolation, of a finite world.

A finite world is one whose future we would know. Instead we seek it. We invent it. Of course there will be crises: one day there will be no more petroleum for cars, like there is today, and perhaps there will ten billion and more people on the earth, and maybe there will be a nuclear incident caused by a war or by something else. Today, however, the infant mortality rate continues to fall almost the whole world over; the majority of people have enough to eat and for the first time in history we can think of reducing hunger and injustice to a minimum. The first danger to be faced, much more than entropy, is that of the growth of vulnerability, of risks that man's power is capable of producing catastrophes of planetary dimensions. The political, social, technological, cultural and scientific challenge lies before us. Let us rid ourselves of the determinist and pseudo-scientific extrapolations of the 20th century. They have done enough harm. Let us also get rid of the deceptive certainties, let us use the margins and the possibilities offered by uncertainty, by risks, by life as it is. Let us leave to society the capacity for rebirth despite everything.

4. THE DIMINISHING RETURNS OF TECHNOLOGY

"It's a matter of applying the idea of diminishing returns, in economic terms, to technology", Henri Louberge told me, in 1974, during a discussion in front of a blackboard at the Geneva Association. He was writing his degree thesis that would become a fundamental text of Insurance Economics. He was a collaborator of mine and I felt a little responsible for bringing him to this path. We were completing the first steps of a book written together, inspired by my first experiences, and to be called "Diminishing Returns to Technology".[5]

In February 1975 I took the decisive step of this imitative. I wrote an "Information Letter" for the Geneva Association, the series number of which I have never forgotten, 19. I actually wrote those ten pages in a day, with an emotion that I have never again felt. It was inspiration (or psychogical self exaltation, or diseased euphria, I don't know which): the outside world came to me in muted sounds and colours. In my heart – in my mind – there was a sense of fulfilment that I had never experienced, except once or twice when in love. And I was perfectly sober. After the text was finished this state of mind lasted an hour or two and then I returned to normal. It was the first time that I had produced a synthesis in ten pages of everything that I had known, read and written till that moment, and that seemed important to me. All this thanks to a momentary enthusiasm.

Concerning the content, this idea of diminishing returns of technology seemed absurd to most of those with whom I spoke about it, and especially to economists.

[5] The publisher mistakenly insisted on the title "The Technological Disappointment" (it was more marketable). On the contrary, understanding diminishing returns is the key to advancing research, both applied and fundamenta, in the right direction.

To most of them science and technology constituted a kind of magic wand, a simple expression of human capability and intelligence, without the feeling of needing to know the conditions and limits of discoveries (science) and development (technology). The two were confused (and often still are) with the idea that they are always inevitably interdependent.

The problem is that discovery (which is not that of technological application) is, by definition, uncertain, because at the beginning it is never known if and how something new will be discovered (or not). Basically there is the fact, still widely underrated, that the great economic growth of 6% annually – a unique phenomenon in history – in the industrialised countries, from 1947 till 1973, was the visible and concrete result of the new alliance between science and technology. A unique event in history that took place at the end of the 19th century.

War served as a catalyst for it and from it flowed a tide of extraordinary applications in every sector. When, in 1973 a deep crack was produced in the rythm of gowth, that since then continues for western countries – when everything goes well – at an annual average of 2% an exceptional period came to an end, a period that that had enjoyed the introduction of scientific discoveries in vast fields of technological application. The boom slowed down when diminishing returns intervened, and above all the production structure changed.

Confusing science with technology, some economists believed that it was enough to increase the budget to have results that were quickly usable. In 1973 and the subsequent years (the reader can check by leafing through the *numbers* of the Financial Times of the period), with the petrol crisis in mind science was expected to make it possible to extract petrol from the bituminous shale in Canada or shortly to have reliable and waste free nuclear power plants to continue the production of energy. At the same time, during that period the enormous progress in telecommunications and computer technology were considered secondary, However it was these that came to prevail: they were based on a mature and sufficiently developed science, while many questions are still asked today about how long the petrol reserves will last. The novelty is that this question is no longer put by the Club of Rome, but by the petroleum industry…

The book on Diminishing Returns to Technology came out in English in 1978. It gave rise to discussions in a significant, but all in all, limited number of circles. In the French and Italian editions, because of my inexperience, the publisher wished to impose his commercial view, maintaining that sales would be better if there were a more showy title on the cover. I tried in vain to object. It was a disaster. As a result of a misunderstanding concerning the meaning of "diminishing returns" the book in Italian was published under the title "La Delusione Tecnologica" ("Technological Disappointment"). In French it was still worse: "Technical Society Adrift" The use of the original as a subtitle in no way improved the situation, all the more so as one had to be an economist to really understand it, and "normal" economists – with good reason – did not read books with such an unauthorised title as had been imposed on me. The ways of the Lord, but also of the devil, are infinite.

5. THE NEW ECONOMIC CONCEPTS OF CARL MADDEN

Carl Madden is another personality whose path briefly crossed mine and left profound traces on my mind in its search for an understanding of the world of contemporary economics.

I met him personally only once, during a lunch in Washington in the spring of 1978. I had read his 1976 study, carried out with the Joint Economic Committee for the Congress of the United States[6]. He inspired my report for the Club of Rome (Dialogue on Wealth and Welfare), published in 1980 (1981 in Italian[7]). I have never experienced a similar intellectual affinity with an American economist. I remember some of his thoughts here.

"The idea on the basis of which growth is related to an increase in production per inhabitant is too simplistic. Logic and empirical evidence suggests a new concept. Scientific progress has been the great innovation of the last two centuries, yet economists have neglected the study of science's effect. In the 20th century science itself underwent a revolution… which brought back into discussion yesterday's fundamental scientific hypotheses concerning space-temporal nature, human life and its origins, the nature of organisms, the structure of matter-energy configurations and that of the universe.

Economic evolution is a subject that does not lend itself at all to traditional type discussion. Classical economic science remains dominated by the ideas of the mechanistic type allied to the physics and mathematics of the 18th century. In it economic activity is described in terms of mechanical equilibrium of the forces, of "states of equilibrium"… The content of fundamental economic concepts have to be changed… The concepts of wealth, of profit, cost and productivity must be modified. It is not at all clear that our current concepts relating to fundamental economic contributions – capital, work, land and management – are any more perceptive than the concept the Greeks had of the fundamental elements – earth, air, fire and water.".

Already at that time Madden was stating that the essential in economic development would be increasingly based on the know how and will to take action", what today is called "human capital", and it is a good sign.

I have already mentioned some research proposals for a wider economic analysis on changes and on ongoing progress, such as the distinction between stock and flow in the conception of economic value and the estimate of the uncertainties linked to basic research and on its effects on technology and its economic applications.

In the following paragraphs I will complete my list of research proposals – based on my experiences – which I believe to be reasonable and contemporaneously useful, sometimes even stimulating.

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[6] Madden Carl, U. S. Economic Growth from 1976 to 1986, Volume 8, "Capital formation, an alternative view", Joint Economic Committee, Congress of the United States, Washington, 1976.

[7] Biblioteca della Est Mondadori, Edizioni Scientifiche e Tecniche, Milano, 1979

6. ECONOMIC SCIENCE AND INDUSTRIAL REVOLUTION

The fact that "economics" (or economic science") is a consequence of the Industrial Revolution should not be undervalued. For Adam Smith – the founder of the first modern theory of economic activity – it was clear that the true productive value, that leads to an increase in wealth is the one that derives from what we today call industrialisation, or the manner of industrial production. This observation, which today can appear banal, was not so at that time, when it was clear that agricultural production was at the basis of almost everything that could be done to nurture and maintain a population. And one was never allowed to forget it. For Adam Smith, however the important thing was to draw attention to a change in production possibilities – thanks to the Industrial Revolution then in progess – that would become the key to every policy aimed at seriously increasing the wealth of nations. Agriculture itself would, in time end up being widely industrialised.

Industrialisation went ahead step by step with a great development in trade and, as a consequence with a greatly increased use of money. Although it had been around for millenia, money covered less than 50% of the production and consumption of every society. We are dealing essentially with an agricultural industry that was self producing and self consuming. The power of the nobles who dominated this type of society, was not built on money (which was scorned) but on the sword. Many books give us a distorted version on this subject because the customs of the present are projected on the past.

Adam Smith, then, grasped the opportunity and the experience of the new Industrial Revolution, in which money was becoming increasingly the key element of economic and social organisation. At the centre of his analysis there was a very simple observation. A price was established by the will of someone to sell a product to someone else who wanted to buy it. This price became the reference point for defining the economic value of a piece of goods. It is to the exchange of an item of goods on the basis of a price that reference is made in economics when one speaks of "equilibrium". Equilibrium between supply (the seller) and demand (the buyer).

In a traditional agricultural world in which transactions were limited it was difficult to see a general phenomenon and, in any event, neither Charlemagne nor any of the those who came after him, and created empires, possessed a bank account. At most they had servants, paid, not with a salary but at best with the right to plunder, like armies at war. It was left to peripheral groups – often Jews – to handle the task of dealing with money, an activity unworthy of a real lord. Go today and tell that to the various Rockfellers, Agnellis, Schneiders of our day.

The "scientific" claims of the 18th century adapted perfectly to the price equilibrium discussed by Adam Smith. This founder of "economics" had actually introduced the notion according to which this equilibrium was imposed by an "invisible hand", i. e. it was the consequence of a kind of natural phenomenon. More recently much has been written about the "invisible hand" as if it were the banner of the free market. Free perhaps, but under the aegis of a "scientifically objective" phenomenon. Karl Marx only had to follow a large part of Adam Smith's concepts

to then simply add the idea that in the real market the price depended on the relationships between the forces, also considered a social "scientific reality", and at the end introduce the notion of class struggle.

Today it is beginning to be increasingly understood: "science" ideology (essentially determinist) dominated the whole variety of political ideas from the 18th till the 19th century. The worm stayed inside the fruit, in every fruit for a long time.

Here then is a first point to study: to what extent is economic "science" as it exists today, strictly linked to the experience of an age during which the Industrial Revolution, in the strict sense, was the most important and dominant phenomenon in economic development conducive to the wealth of nations? What consequences must be drawn if the contemporary economy is a Service Economy?

7. THE SERVICE ECONOMY

In every introductory economics text and in current practice, economic activity is sub-divided into three sectors: the primary or agricultural, the secondary or manufacturing (industrial), the tertiary or service (a kind of dump where everything is put that cannot be put into the other two). The three sectors are also quoted in WTO (World Trade Organisation, ex GATT) negotiations and in national and international economic statistics.

In short it is a generalised and universally accepted convention that no longer corresponds to reality. Worse still it is increasingly false. It is once again the story of the sun that "rises".

Actually in the golden period of the Industrial Revolution that lasted till almost 40 years ago this sub-division was justified by the fact that the absolute priority was industrialisation. On the one hand, agriculture's relative economic weight has fallen steeply and in the most advanced countries represents much less than 10%, or even 5% of the total production of wealth. In particular, even where agriculture claims to be organic its management is pretty industrialised.

On the other hand, the service sector is the one that has long been considered "secondary". And even unnecessary. In the same spirit with which in his time Adam Smith was taken to task for not understanding that agriculture was the basis of everything they will now tell you that it is essentially all about producing a car. Today, in fact it is thought that industry is the foundation for everything.

Now, in 2010, especially, but not only, in the developed countries, 80% of people work in services, and that probably includes you who are reading these lines. Ask Jack Welsh, that Napoleon of American industry, who set up the most capitalised, richest industry in the world,

General Electric: He knows well, as do all today's great "industrial" managers, that quantitatively and qualitatively every modern business depends first of all on its service activity.

Services no longer simply represent a sector (even it moreover is in small part industrialised) but a FUNCTION that crosses all economic activities.

It is often said that services are nothing other than immaterial products.

Nonsense the English say: The material product that to be conceived and used doesn't necessitate several services does not exist. Nor does an activity belonging to the service area that does not use material tools., Whatever the "production" of which one speaks, in any sector, the material part represents, on average, at most 20–30%, while the rest are services.

The great start to this far reaching change began around the 1930 s, when research had begun to become a specific professional activity, for which increasingly important laboratories and allocations were needed. Research management introduced new elements into the production system. When one is about to take up a research project one must take account of the fact that every study has a limited probability of success that can range on average from 10% in certain branches of the chemical industry to less than one percent in some sectors in the pharmaceutical industry. It is a first element of uncertainty. The second derives from the fact that even important and innovative research destined to succeed, will require a long period, often a decade and more, to pass from the initial idea to its exploitation on the market.

So it is then that a service function such as research (that requires a lot of equipment) resembles, like the reflection in the mirror, the insurance business, which is founded on the probability of something happening (in this case something negative, such as an accident or an illness) to give life to its business; insurance which is also a "traditional" service sector to which we devote the next chapter.

In the majority of cases service functions are predominant even within the chain of production, and deal mainly with maintenance (production checking and repairs) safety, logistics (arranging for the products necessary for the production line to arrive in time). Then there are all the distribution and sales services. At the end of the utilisation cycle there is recycling or waste treatment. "To produce" means allowing 80% for managing all the service functions and it is essential that everything is well organised or contracted.

In classical economics texts there are long discussions on the notion of use. The "old" economists claimed that it was limited and reductive to base value on sale and purchase price only. This debate, howeer, that has nothing to do with the notion of utilisation related to services ended up being abandoned.

In a way the economist John Stuart Mill ended the discussion on value of use when he asserted that every material produced contains within itself the use that is made of it. Use, therefore, is included in the product as such and in its price. This principle can be accepted so long as we live a simple industrial experience, with simple products, The problem of the service economy began to be felt when it was no longer possible to hold that the utilisation of products formed part of or was included in the product. This holds good for a hammer but not for a computer. It is precisely technological evolution that requires increasingly greater investments, not for the tools, whatever they are, but for their utilisation over time.

When one buys a car, a washing machine, a computer today, the price paid (which already pays for a good number of service functions carried out during man-

ufacturing) is only a first payment to be followed by others for the utilisation of the product or car whose "use" is no longer "built in".

Hence, the debate on the difference between material products and service functions is not a question of the sub-division between what belongs to the material and that which forms part of the immaterial. A transport business or service can be considered immaterial or if one refers only to the vehicle that does the transporting it is a material tool. What is essential is to take into consideration the PERFORMANCE of a system or a product over time, for which services have a decisive weight (an economic cost).

What is at stake, therefore, is the very notion of economic value. In a period when the absolute priority was the development of the wealth of nations by manufacturing all kinds of goods, it was possible to concentrate on the notion of value defined by the sale price at any given moment.

In an advanced society however, performance over time demands that account is taken of a whole series of costs, beginning from the research stage (before any production whatsoever), manufacturing, then distribution costs and above all utilisation, and through finally to disposal. Value results from the utilisation of a product or a system during its life cycle. It is about a notion of value founded on a double uncertainty: that of the costs and revenue over time (a good part of which is in the future) and that caused by the duration of the utilization cycle.

We are not dealing here with a new economic "value" for sheer intellectual pleasure, but with showing what happens in reality. An economic and social reality in which, at the end of the day, as the English say, we must confront an uncertain world with increasingly greater risks of every type.

The effort of common sense and management can no longer be geared to promises of certainty, but rather to all those methods that allow us to turn our uncertain reality, full of risks as it is, into a MANAGEABLE reality. To this end we must stress (where they exist) the margins of better actions, available in the majority of uncertain situations.

8. REVERSAL OF PERSPECTIVE

One of the key ideas on which economics is based both in theory and in practice is that we live in a world in which resources are scarce and poverty is still all too visible, even in the most advanced countries.

Free products exist, such as air, at least so far. But to live or to survive we usually have to work, in one way or another.

In paradise, instead, there should be an unlimited abundance, no pollution problem, no work, neither salaries nor unemployment. In fact it's paradise! On earth it's clear that we are in a purgatory and it would be wise to make the best use of it.

The development of the Industrial Revolution can be considered as a heroic development against scarcity. Classical economics concentrated on understanding how to stimulate to its maximum the capacity for producing, what is known as supply. Demand, motivated by necessity could only follow.

But there was a crucial moment! In order to work well the Industrial Revolution increasingly spread the use of money to form the capital needed for the acquisition of machinery and to make exchange easier.

From this it follows that the demand, the need to have products for consumption also had to be expressed in monetary terms. Consumers have to be able to pay for their purchases, so that their demand may be met.

All this might seem banal and obvious but this was not the case during the first 150 years of the Industrial Revolution. Actually, apart from the periods of war, naturally inflationary (when prices increase), and a brief period in the 1870s – following a large importation of gold – economic crises until the beginning of the 20th century were deflationary ones. Too many products were produced for too few purchasers as consumers did not have the necessary money. Penury and poverty on the one hand and over production on the other. Not even the great economists had managed to calculate the extent of the Industrial and technological Revolution and the essential role of monetisation of commercial and social relations.

So, after a century and a half in which economic experts had concentrated on "supply" (the production aspect), priorities were reversed thanks to the economists of the first half of the 20th century, above all John Maynard Keynes and – on a more philosophical level – John Hicks.

Keynes was an expert conservative, an intellectual and lover of classical ballet and champagne. Of rather free habits for the age. He revolutionised economics though. If there was an excess of production the demand could be financed – through the State and public authorities – even if this could result in deficits, on condition of course that this did not go so far so as to cause inflation.

A balance between supply and demand had to be maintained so that the maximum use might be made of all the factors contributing to supply and demand.

In this way Keynes brought about profound changes in the culture of that age: he rendered debt not only morally acceptable but even desirable; moreover he opened the way to the intervention of the State as an economic entrepreneur.

Since then, whether one was right or left wing, it has been thought possible to regulate the economy mainly according to demand. In recent years newspapers have carried out detailed inquiries to discover whether car sales or the sales of other products were increasing sufficiently, little, or not at all. Buy, buy to keep the economy afloat! And if you are business people then obviously you prefer to have a greater number of clients rather than the opposite.

But since 1973, above all in the industrialised countries there was a tendential revival of inflation, sometimes reaching a rate of over 10%. Since then the average rate of growth has significantly diminished. What had happened? Why was it not possible to reraise the economy everywhere to the rate of 6% annually, something that would have helped more than a little to resolve several problems, such as that of the financing of welfare?

In my opinion, not enough attention was paid to the fact that on the supply side – the production side – there had been a move from a prevalently manufacturing economy to one based on services. That the very notion of economic value,

and hence of growth, was tending to change. That the rythm of technological innovation, increasingly dependent on basic research, could not do other than advance in an uneven manner, when some basic discoveries were available and utilisable. It was not enough to invest in massive programmes of technological research to be certain of quick results.

Forced by necessity to curb inflation and having become become increasingly independent, the central banks were committed to carrying out policies based on the control of the economy through monetary tools.

From the point of view of economic theory on the balance between supply and demand, I think it is useful to suggest another way of viewing this relationship. Classical economics had favoured the supply aspect (production), the neo-classical economics (of the last sixty years) concentrated on demand. Both suppose that the point of reference remains the notion of equilibrium between supply and demand.

It could be thought that in the service economy we are dealing simply with a return to the economy of supply, given the suggestion for a more detailed analysis of the ways of producing the wealth of nations today.

But this point of view is insufficient, if one also considers the definition of the value of utilisation given earlier. In reality, in real economics, as in life and as in nature, productive activity always exceeds, often by a lot, consumption or demand possibilities. Every businessman knows that he will never sell everything he offers but that every product (above all new ones) undergo a difficult trial period at different levels including those relating to consumers. The totality of the production process therefore must cover the costs of all the surplusses, as in the case of research strategies that take into account the fact that most projects will not result in success.

As far as "demand" is concerned its primary function is that of choice. This function is indispensable and demand will pay a price, not only for the purchase of a product or a system but will be responsible, directly or indirectly, for all the expenses relating to its utilisations over time. Certain classical economists say that, in a notion of equilibrium, so long as one half of the equation is understood (supply = demand) the other is also automatically understood.

It may be rational but it does not make much sense. In the service economy, supply and demand, production and utilisation, must both be studied and understood well within their own logic and manner of working. Demand costs, in the utilisation period remain uncertain for a long time (and even after the utilisation stage).

Finally, one must also consider that, increasingly, the user very often plays a part in producing results. Alvin Toffler has spoken about the "prosumer", i. e. the producer-consumer, in whom the two functions are increasingly less distinct. The paths of contemporary economics offer enormous possibilities and challenges.

9. NON MONETARISED ACTIVITIES

The Industrial Revolution was able to be born and develop thanks to a decisive number of social, cultural and technological factors. Some books have highlight-

ed how at the end of the Roman empire or later during the Middle Ages, there had been notable progress and innovations too.

The rest was missing however, above all the great spread of money, stimulated by the explosion in local and international trade. No money, no monetary savings and without savings no capital for investing in new machines and technologies, even though at the beginning this investment was limited to about 5% of the turnover of the new entrepreneurs. They too had to make a cultural leap, from tradesman to industrialist.

Money is often despised (especially as some cynics say, by those who do not have enough of it), but without it there would be less freedom and less wellbeing in the world today. Certainly, it is a means of power and human nature knows how to become diabolical. Nevertheless, the whole structure and working of the Industrial Revolution revolves around money as the most efficacious means for fighting poverty. The goal is still a long way off, but without money it would be even further off.

Let us now take a small step forward: In Samuelson's book, from which millions of student have learnt the basics of economics, he states right from the first page that economics deals with business and transactions (exchanges) that can be based on money or not. Be careful not to misunderstand this. I have thought long on it. Actually it is necessary to understand that value (almost always monetary) depends on an exchange. Now, in certain exchanges money is not used: we are speaking here of barter.

In this case too there is an implicit value that can be reduced to money, even though it may not be explicitly used. Three books can be exchanged for a kilo of chocolate. A transaction has taken place just the same and the value of the books can be deduced indirectly.

Why this discussion? Because in the service economy, the production and utilisation part carried out without recourse to money is increasingly important.

Value is not only that deriving from the exchange. When one pays attention to the notion of utilisation (of a product or of a system), one understands that this depends in large measure on the activities and the efforts related to self-production and self-consumption. And in this case there is no exchange.

Let us think of all the self-service or do-it-yourself activities. It can be about a restaurant where we go to get our dishes, or a table or a wardrobe that we ourselves build at home. The total value is given by the final result and it is not possible in most cases to quantify the work done by ourselves in money terms. A senior manager who earns 100 euros an hour, and even more, and goes to get himself a glass of water cannot quantify the value of this act: three minutes computed on the basis of his salary (the time taken to look for the glass and fill it) cannot be compared to the value of a glass of water on the market. Let us think of all the time necessary to learn by ourselves how to do all kinds of things, to cook, to use a computer, carry out small and medium repairs, change a baby's nappies. If there is no exchange, there is no benchmark, not even an indirect one, that offers any indication as to a price on the market.

An important corollary in a service economy, therefore, is that which states that there are not only directly or indirectly monetarised activities (i. e. monetised or non-monetised, making use of money or not for a transaction). There are also non-monetarised (and non-monetisable) activities that are not linked to an exchange but that are decisive in ensuring that utilisation of goods over time give the best results. Results that are not flows but a stock, as we have already underlined.

The measurement of results (by means of indicators), will also take into account the quality of every performance. If something is made well the costs will be less and the product will be better. It is necessary, however to measure the results during utilisation. A well maintained car will require minor repairs. Perhaps the global repairs industry's turnover will decrease, but its productivity in terms of individual profit will be greater.

In the service economy, there is therefore a whole research sector waiting to be set up to explore the effects of activities that contribute to increasing the wealth of nations and that are not "monetised".

The other fundamental aspect of this question consists in defining the passage between what is "monetised" and what is not. Let us imagine that a new technology, for example in the communications sector, reduces all its costs to zero. At that point, every communication could become free: a great step forward for our material wellbeing. On the other hand, let us suppose, as often already happens in the case of water, that in the centre of some cities we increasingly have to acquire air in a bottle, in order to breathe normally. In both cases, the disappearance of the monetised turnover or its increase indicate only the variation in the monetisation of an activity that has nothing to do with with the real increase in wellbeing. For this other measurements are needed (of result, of utilisation).

Monetisation, in the service economy too, remains an important foundation, often even decisive, of economic activity. However we will increasingly be forced to take account of adjacent areas where non-monetised activities, caused or not caused by technological evolution, become an increasingly important, or better, very important, strategic aspect of economic development *tout court*.

From this viewpoint it will be possible to assign value, even as economic and social activity, to all the work undertaken in our society by the various voluntary organisations. Let us measure the true benefit, i. e. the result of monetised and non-monetised activities, and we will reduce some irrational aspects of our economics. Allocations are very important in the modern world but they are not enough to guarantee a good economic result, whatever it may be.

I was convinced of this one day when, in my Geneva office, the young Xerox technicians who came to check or repair the photocopier suggested that I should organise a drink after work. The machine in question was the first in its category to have reached a million copies in the Genevan canton. There were five technicians. They had also invited their boss and brought some bottles of champagne. The crowning moment of the evening was when they amused themselves by comparing the booklet that recorded the number of service visits with that of the copies that had been made before another visit had been necessary. "See," said one of

them, "after my visit that day the machine made almost 50,00 copies, while after your visit it made only 40,000". And they made fun of each other comparing the figures… A beautiful example (still exemplary) of the Swiss taste for quality of work. But what is there to be said about its economic value?

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After the second world war GATT (General Agreement on Tariffs and Trade) contributed widely to economic development, avoiding the disastrous protectionist experiences that had characterised the period following the first world war.

Above all it was a matter of a negotiating mechanism between the different States to limit, sometimes abolish, the obstacles to international trade, (customs tariffs, the imposition of quotas at different levels for imports, and a whole series of other bureaucratic obstacles). Trade of course concerned the import-export of products, in the purest and most orthodox Industrial Revolution style.

Services made their appearance on the quiet in the GATT negotiations. During the Tokyo round obstacles of a non international trade tariff type began to be spoken of. In effect, these concerned a certain number of service functions (for example quality control). During the following round successively named the Uruguay round, negotiations began to take place specifically dealing with services, in a separate area or hall. They were not yet dignified with the term "products". The experts in the subject tried for a long time to explain that services were nothing other than "immaterial" products. The reader knows what I think of this definition.

Whatever the case, at the conclusion of the Urugay round some principles were agreed for the liberalisation of world trade services, that underlined the need to avoid discrimination in one country against the commercial activities of another country that had established itself there. Seen more clearly there were means that in the end opened up the way to investment. Economic reality had begun to prevail.

Actually in a modern economics based on service functions every product or item exported to another country needs a whole infrastructure in place for distribution, financing, maintenance and finally for waste disposal. This is without counting activities such as assembly and training. All this requires investment. Consequently in our new service economy trade and investment are no longer alternatives. They are complementary and each needs the other. In a prevalently manufacturing economy, it could be said that it was possible to choose between exporting cars to a third country or investing in creating a car factory. This is always possible, but the increasingly most important part, even in the most traditional exportation, is that relating to investment. An investment that constitutes an ever more decisive condition for making exporting possible.

One also has to understand the political and social advantage of this transformation. In the case of the industrial or traditional manufacturing economy, it could be stated that investment sometimes became foreign tampering in a country. In the service economy, investment is more and more linked to on site utilisation of products and goods, above all for the local population. We are dealing with a great op-

portunity for development that can be realised above all at local level, with the specific contributions of the place.

Studying and understanding the significance of the service economy, therefore, could offer very favourable opportunities, not only for WTO (World Trade Organisation) negotiations but for the spread of a positive and realistic perspective on the globalisation process.

Economists have a great responsibility in the process of understanding and identifying the necessary means for the development of civilisation based on world interdependence.

About 20 years ago, in order to stimulate some thought on this matter, Jaques Nussbaumer (now deceased), Raymond Krommenacker and I founded the World Science Forum in Geneva. It organised a series of conferences and distributed some books. The Forum then moved to Paris and to Dublin. According to me it wasted a little time in discussing the idea that services were "immaterial" products that, as was said "if they fall on your feet, you don't feel anything". Not even on your head…

Obviously we hesitated a long time over launching the debate on a crucial point, the adapting of economic analysis to what are really the functions of service. Some initiatives parallel to the Forum are now very active, such as The ASEC (Applied Services Economic Centre programme – a network of experts in various types of services) programme which relies on the Geneva Association[8]. For some years now it may be observed that there is a flood of conferences, congresses, publications, that begin to spread a little everywhere, from Hong Kong to Paris. The train is on the move and is getting up speed.

10. BROADENING THE HORIZONS OF POLITICAL ECONOMICS

In the next chapter I will return to a number of very important concepts that characterise the service economy, such as pure risk and entrepreneurial risk, vulnerability, moral risk (moral hazard), insurability (the new complementarity between public and private bodies), the effects of the so-called asymetric information, diversity and complementarity of financial services, the new functions of capital in the service economy, etc.

Here it is necessary to add another word on the problem of ecology and the environment. The questions that for three decades have stimulated this movement – beginning with the Club of Rome – are very like those that have given birth to many studies on political economics, though neither the economists nor the ecologists have taken the care to sufficiently compare the texts.

The great economists of the past had an essential preoccupation – for some it was even a matter of a moral commitment – the improvement of the human material condition.

This meant making the best use of the earth's resources.

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[8] See also www.newwelfare.org and the "Wealth of Nations revisited" project, promoted by members of the World Academy of Art and Science – SEED, South East Europe Division.

The ecologists talk about resources in the broad sense, the economists struggle to push themselve beyond what is defined by a price. From this derives the importance in the service economy of analysing and studying the passage between monetised goods and the non-monetised ones. To bring a product under economic scrutiny only when it has become scarce following a process of pollution and ignore the original cause of the scarcity long before it has become visible (i. e. marked by a price) is not satisfactory.

The horizons of political economics in any analyses and theories have to be extended to include the passages from non-monetarised and non-monetised toward the monetised and vice versa.

It is an accepted fact that economics tends to be active and efficacious in the short term. It is not always true: insurance for example covers risks that can appear after tens of years.

The ecologists are right when they suggest that everything possible should be done to preserve the earth and its resources for the long term. On this point they have achieved a great political victory after the word "sustainable" became an accepted word applied to the notion of growth and development.

The great problem that contemporaneously concerns economists and ecologists, however, is the long term forecast. The more time passes the greater the unceratinty that can distract from an objective, in both the positive and the negative sense. Once again we must not be deceived about the significance of science. There are no absolute good results, but there are better results. To believe in the possibility of one hundred percent scientifically certain forecasts means running the risk of falling into the same trap into which so called scientific Marxism fell. Let us not make the same mistakes: That would be a new and very serious form of social and political pollution.

If the "precautionary" principle that is often spoken of means anything it is of the reduction, the control of risks and vulnerability, of repairs to and indemnification for damages. It is often said that zero risk does not exist: to want to believe this is the greatest risk. Why then we should never go to bed, the item of furniture on which the great majority of men die. We must, we want – I hope – to live: to understand, to reduce, to manage, to utilise risks. And to sleep…