THE UNBOUND PROMETHEUS

Technological change and industrial development in Western Europe from 1750 to the present

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CHAPTER I

Introduction

When dealing with ambiguous terms, the first duty of a writer is definition. The words 'industrial revolution'—in small letters—usually refer to that complex of technological innovations which, by substituting machines for human skill and inanimate power for human and animal force, brings about a shift from handicraft to manufacture and, so doing, gives birth to a modern economy. In this sense, the industrial revolution has already transformed a number of countries, though in unequal degree; other societies are in the throes of change; the turn of still others is yet to come.

The words sometimes have another meaning. They are used to denote any rapid significant technological change, and historians have spoken of an 'industrial revolution of the thirteenth century', an 'early industrial revolution', the 'second industrial revolution', an 'industrial revolution in the cotton south'. In this sense, we shall eventually have as many 'revolutions' as there are historically demarcated sequences of industrial innovation, plus all such sequences as will occur in the future; there are those who say, for example, that we are already in the midst of the third industrial revolution, that of automation, air transport, and atomic power.

Finally, the words, when capitalized, have still another meaning. They denote the first historical instance of the breakthrough from an agrarian, handicraft economy to one dominated by industry and machine manufacture. The Industrial Revolution began in England in the eighteenth century, spread therefrom in unequal fashion to the countries of Continental Europe and a few areas overseas, and transformed in the span of scarce two lifetimes the life of Western man, the nature of his society, and his relationship to the other peoples of the world. The Industrial Revolution, as it took place in western Europe, is the subject of this book.

The heart of the Industrial Revolution was an interrelated succession of technological changes. The material advances took place in three areas: (1) there was a substitution of mechanical devices for human skills; (2) inanimate power—in particular, steam—took the place of human and animal strength; (3) there was a marked improvement in the getting and working of raw materials, especially in what are now known as the metallurgical and chemical industries.

Concomitant with these changes in equipment and process went new forms of industrial organization. The size of the productive unit grew: machines and power both required and made possible the concentration of manufacture, and shop and home workroom gave way to mill and factory. At the same time, the factory was more than just a larger work unit. It was a system of production, resting on a characteristic definition of the functions and responsibilities of the different participants in the productive process. On the one side was the employer, who not only hired the labour and marketed the finished product, but supplied the capital equipment and oversaw its use. On the other side there stood the worker, no longer capable of owning and furnishing the means of production and reduced to the status of a hand (the word is significant and symbolizes well this transformation from producer to pure labourer). Binding them were the economic relationship—the 'wage nexus'—and the functional one of supervision and discipline.

Discipline, of course, was not entirely new. Certain kinds of work—large construction projects, for example—had always required the direction and co-ordination of the efforts of many people; and well before the Industrial Revolution there were a number of large workshops or 'manufactories' in which traditional unmechanized labour operated under supervision. Yet discipline under such circumstances was comparatively loose (there is no overseer so demanding as the steady click-clack of the machine); and such as it was, it affected only a small portion of the industrial population.

Factory discipline was another matter. It required and eventually created a new breed of worker, broken to the inexorable demands of the clock. It also held within itself the seeds of further technological advance, for control of labour implies the possibility of the rationalization of labour. From the start, the specialization of productive functions was pushed farther in the factory than it had been in shops and cottages; at the same time, the difficulties of manipulating men and materials within a limited area gave rise to improvements in layout and organization. There is a direct chain of innovation from the efforts to arrange the manufacturing process so that the raw material would move downwards in the plant as it was treated, to the assembly line and transmission belts of today.

In all of this diversity of technological improvement, the unity of the movement is apparent: change begat change. For one thing, many technical improvements were feasible only after advances in associated fields. The steam engine is a classic example of this technological interrelatedness: it was impossible to produce an effective condensing engine until better methods of metal working could turn out accurate cylinders. For another, the gains in productivity and output of a given

innovation inevitably exerted pressure on related industrial operations. The demand for coal pushed mines deeper until water seepage became a serious hazard; the answer was the creation of a more efficient pump, the atmospheric steam engine. A cheap supply of coal proved a godsend to the iron industry, which was stifling for lack of fuel. In the meantime, the invention and diffusion of machinery in the textile manufacture and other industries created a new demand for energy, hence for coal and steam engines; and these engines, and the machines themselves, had a voracious appetite for iron, which called for further coal and power. Steam also made possible the factory city, which used unheard-of quantities of iron (hence coal) in its many-storied mills and its water and sewage systems. At the same time, the processing of the flow of manufactured commodities required great amounts of chemical substances: alkalis, acids, and dyes, many of them consuming mountains of fuel in the making. And all of these products—iron, textiles, chemicals—depended on large-scale movements of goods on land and on sea, from the sources of the raw materials into the factories and out again to near and distant markets. The opportunity thus created and the possibilities of the new technology combined to produce the railroad and steamship, which of course added to the demand for iron and fuel while expanding the market for factory products. And so on, in ever-widening circles.

In this sense, the Industrial Revolution marked a major turning point in man's history. To that point, the advances of commerce and industry, however gratifying and impressive, had been essentially superficial: more wealth, more goods, prosperous cities, merchant nabobs. The world had seen other periods of industrial prosperity—in medieval Italy and Flanders, for example—and had seen the line of economic advance recede in each case; in the absence of qualitative changes, of improvements in productivity, there could be no guarantee that mere quantitative gains would be consolidated. It was the Industrial Revolution that initiated a cumulative, self-sustaining advance in technology whose repercussions would be felt in all aspects of economic life.

To be sure, opportunity is not necessarily achievement. Economic progress has been uneven, marked by spurts and recessions, and there is no reason to be complacent about the prospect of an indefinite climb. For one thing, technological advance is not a smooth, balanced process. Each innovation seems to have a life span of its own, comprising periods of tentative youth, vigorous maturity, and declining old age. As its technological possibilities are realized, its marginal yield diminishes and it gives way to newer, more advantageous techniques. By the same token, the divers branches of production that embody these techniques follow their own logistic curve of growth toward a kind of asymptote.

Thus the climb of those industries that were at the heart of the Industrial Revolution—textiles, iron and steel, heavy chemicals, steam engineering, railway transport—began to slow toward the end of the nineteenth century in the most advanced west European countries, so much so that some observers feared that the whole system was running down. (At this point, the Industrial Revolution in these countries was substantially complete.) Similar dire prognoses accompanied the world depression of the 1930's, particularly by those Marxist critics who saw the capitalist economy as incapable of sustained creativity. In fact, however, the advanced industrial economies have given proof of considerable technological vitality. The declining momentum of the early-modernizing branches in the late nineteenth century was more than compensated by the rise of new industries based on spectacular advances in chemical and electrical science and on a new, mobile source of power—the internal combusion engine. This is the cluster of innovations that is often designated as the second industrial revolution. Similarly, the contraction of the 1930's has been followed by decades of unusual creativity, consisting once again primarily in innovations in the application of chemical and electrical science, plus advances in the generation and delivery of power —the abovementioned third industrial revolution.

A more serious cause of concern lies outside the productive system proper—in the area of political economy and politics *tout court*. Even assuming that the ingenuity of scientists and engineers will always generate new ideas to relay the old and that they will find ways to overcome such shortages as may develop (whether of food, water, or industrial raw materials), there is no assurance that those men charged with utilizing these ideas will do so intelligently—intelligently, that is, not only in the sense of effective exploitation of their productive possibilities but in the larger sense of effective adaptation to the material and human environment so as to minimize waste, pollution, social friction, and other 'external' costs. Similarly, there is no assurance that noneconomic exogenous factors—above all, man's incompetence in dealing with his fellow-man—will not reduce the whole magnificent structure to dust.

In the meantime, however, the climb has been spectacular. Improvements in productivity of the order of several thousand to one have been achieved in certain sectors—prime movers and spinning for example. In other areas, gains have been less impressive only by comparison: of the order of hundreds to one in weaving, or iron smelting, or shoemaking. Some areas, to be sure, have seen relatively little change: it still takes about as much time to shave a man as it did in the eighteenth century.

Quantitative gains in productivity are, of course, only part of the

picture. Modern technology produces not only more, faster; it turns out objects that could not have been produced under any circumstances by the craft methods of yesterday. The best Indian hand spinner could not turn out yarn so fine and regular as that of the mule; all the forges in eighteenth-century Christendom could not have produced steel sheets so large, smooth, and homogeneous as those of a modern strip mill. Most important, modern technology has created things that could scarcely have been conceived in the pre-industrial era: the camera, the motor car, the aeroplane, the whole array of electronic devices from the radio to the high-speed computer, the nuclear power plant, and so on almost *ad infinitum*. Indeed, one of the primary stimuli of modern technology is free-ranging imagination; the increasing autonomy of pure science and the accumulation of a pool of untapped knowledge, in combination with the ramifying stock of established technique, have given ever wider scope to the inventive vision. Finally, to this array of new and better products—introduced, to be sure, at the expense of some of the more artistic results of hand craftsmanship—should be added that great range of exotic commodities, once rarities or luxuries, that are now available at reasonable prices thanks to improved transportation. It took the Industrial Revolution to make tea and coffee, the banana of Central America and the pineapple of Hawaii everyday foods. The result has been an enormous increase in the output and variety of goods and services, and this alone has changed man's way of life more than anything since the discovery of fire: the Englishman of 1750 was closer in material things to Caesar's legionnaires than to his own great-grandchildren.

These material advances in turn have provoked and promoted a large complex of economic, social, political, and cultural changes, which have reciprocally influenced the rate and course of technological development. There is, first, the transformation that we know as *industrialization*. This is the industrial revolution, in the specifically technological sense, plus its economic consequences, in particular the movement of labour and resources from agriculture to industry. The shift reflects the interaction of enduring characteristics of demand with the changing conditions of supply engendered by the industrial revolution. On the demand side, the nature of human wants is such that rises in income increase the appetite for food less than for manufactures. This is not true of people who have been living on the borderline of subsistence; they may use any extra money to eat better. But most Europeans were living above this level on the eve of industrialization; and although they did spend more for food as income went up, their expenditures on manufactures increased even faster. On the supply side, this shift in demand was reinforced by the relatively larger gains in industrial as against

agricultural productivity, with a consequent fall in the price of manufactures relative to that of primary products.

Whether this disparity is inherent in the character of the industrial process, in other words, whether manufacture is intrinsically more susceptible of technological improvement than cultivation and husbandry, is an interesting but moot question. The fact remains that in the period of the Industrial Revolution and subsequently, industry moved ahead faster, increased its share of national wealth and product, and drained away the labour of the countryside. The shift varied from one country to another, depending on comparative advantage and institutional resistance. It was most extreme in Britain, where free trade stripped the farmer of protection against overseas competition; by 1912, only 12 per cent of Britain's labour force was employed in agriculture; by 1951, the proportion had fallen to an almost irreducible 5 per cent. And it was slowest in France, a country of small landholders, where a more gradual introduction of the new industrial technology combined with high tariffs on food imports to retard the contraction of the primary sector. Over half the French labour force was in agriculture in 1789 (perhaps 55 per cent or more), and this was still true in 1866, after three quarters of a century of technological change; as recently as 1950, the proportion was still a third.[1]

Industrialization in turn is at the heart of a larger, more complex process often designated as *modernization.* This is that combination of changes—in the mode of production and government, in the social and institutional order, in the corpus of knowledge and in attitudes and values—that makes it possible for a society to hold its own in the twentieth century; that is, to compete on even terms in the generation of material and cultural wealth, to sustain its independence, and to promote and accommodate to further change. Modernization comprises such developments as urbanization (the concentration of the population in cities that serve as nodes of industrial production, administration, and intellectual and artistic activity); a sharp reduction in both death rates and birth rates from traditional levels (the so-called demographic transition); the establishment of an effective, fairly centralized bureaucratic government; the creation of an educational system capable of training and socializing the children of the society to a level compatible with their capacities and best contemporary knowledge; and of course, the acquisition of the ability and means to use an up-to-date technology.

All of these elements are interdependent, as will become apparent in

[1] Simon Kuznets, *Six Lectures on Economic Growth* (Glencoe, Ill. 1959), pp. 50–1; J. C. Toutain, *La population de la France de 1700 à 1959* [J. Marczewski, ed., *Histoire quantitative de l'économie française*, vol. III], in *Cahiers de l'Institut de Sciences Economiques Appliquées*, Series AF, no. 3, Suppl. no. 133 (January, 1963), p. 127.

the discussion that follows, but each is to some degree autonomous, and it is quite possible to move ahead in some areas while lagging in others—witness some of the so-called developing or emerging nations of today. The one ingredient of modernization that is just about indispensable is technological maturity and the industrialization that goes with it; otherwise one has the trappings without the substance, the pretence without the reality.

It was Europe's good fortune that technological change and industrialization preceded or accompanied *pari passu* the other components of modernization, so that on the whole she was spared the material and psychic penalties of unbalanced maturation. The instances of marked discrepancy that come to mind—the effort of Peter to force the westernization of a servile society in Russia, the explosion of population in Ireland in a primitive and poor agricultural environment, the urbanization of Mediterranean Europe in the context of a pre-industrial economy—yielded a harvest of death, misery, and enduring resentment.

Even so, industrial Europe had its own growing pains, which were moderate only by comparison with extreme cases of accelerated modernization or with the deep poverty and suffering of that outer world (the so-called Third World) of technologically backward, non-industrializing societies in Asia, Africa, and Latin America. For one thing, if mechanization opened new vistas of comfort and prosperity for all men, it also destroyed the livelihood of some and left others to vegetate in the backwaters of the stream of progress. Change is demonic; it creates, but it also destroys, and the victims of the Industrial Revolution were numbered in the hundreds of thousands or even millions. (On the other hand, many of these would have been even worse off without industrialization.) By the same token, the Industrial Revolution tended, especially in its earlier stages, to widen the gap between rich and poor and sharpen the cleavage between employer and employed, thereby opening the door to class conflicts of unprecedented bitterness. It did not create the first true industrial proletariat: the blue-nails of medieval Flanders and the Ciompi of the Florence of the *quattrocento* are earlier examples of landless workers with nothing to sell but their labour. Indeed, as we shall see, the putting-out system was in its day as productive of class hostility as the factory. But the eighteenth and nineteenth centuries did see the growth of a working class more numerous and concentrated than ever before. And with size and concentration came slums and class consciousness, workers' parties and radical panaceas.

In similar fashion, the Industrial Revolution generated painful changes in the structure of power. It did not create the first capitalists, but it did produce a business class of unprecedented numbers and strength. The hegemony of landed wealth, long threatened by the mobile fortunes of

commerce but never overturned, yielded to the assaults of the new chimney aristocrats. Largely as the result of a series of revolutions, domestic government policy came to be determined in most of western Europe by the manufacturing interest and its allies in trade and finance, with or without the co-operation of the older landed establishment. In central Europe—Germany and Austria-Hungary—the picture was different: the attempt at revolution failed, and the aristocracy continued to hold the reins of government; business ambitions were subordinated to, rather than identified with, the goals of unity and power. Even there, however, the growing wealth and influence of the industrial and commercial bourgeoisie was apparent in the course of legislation and in the penetration by parvenus of the social and occupational strongholds of the old elites. In the course of the nineteenth century, much of the privileged knights' land (*Rittergüter*) of east-Elbian Prussia came into the hands of commoners; while from 1870 to 1913, the proportion of aristocrats in the officer corps of the Prussian army fell from 70 to 30 per cent.[1]

To be sure, this kind of victory often spelled a kind of defeat: the rising bourgeois could be more snobbish than the blooded nobleman, stiffer and more arrogant than a Junker guardsman. Whereas in Britain and France, the new business elite competed for power, in Germany they acquiesced in the status quo and sold their liberal birthright for a mess of chauvinistic pottage seasoned by commercial legislation and administration favourable to business enterprise. The fact remains that they did have to be bought off; and indeed everywhere the balance of status and power shifted, in greater or lesser degree, from the older landed elite toward the new rich of industry and trade.

Two of the factors conducing in this direction were the separation of the aristocracy from the mass of the country population and the general decline of rural forces in national life. Partly (though only partly) owing to industrialization, the traditional system of land tenure, with its vestiges of feudal privileges and its tenacious communal rights, was replaced by one of unlimited ownership of enclosed parcels. A certain amount of the traditional paternalistic authority of the 'lord of the manor' was lost in the process, especially in those regions where the changed was forced. Even more important, however, was a progressive anaemia of rural life: on the one hand, a massive exodus to the cities at the expense of marginal lands; on the other, an invasion of agricultural areas by industry—how green was my valley!

The growth of a factory proletariat, the rise of the industrial bour-

[1] Hans Rosenberg, 'Die Pseudodemokratisierung der Rittergutsbesitzerklasse', in H. U. Wehler, ed., *Moderne deutsche Sozialgeschichte* (Cologne and Berlin, 1966), pp. 287–308; Karl Demeter, *Das deutsche Offizierkorps in Gesellschaft und Staat 1650–1945* (Frankfurt-am-Main, 1962), p. 26.

geoisie and its progressive merger with the old elite, the ebbing resistance of the peasantry to the lure of the city and to the competition of new ways and a new scale of cultivation—all of these trends encouraged some observers to predict a polarization of society between a large mass of exploited wage earners and a small group of exploiting owners of the means of production. The trend to size and concentration seemed inexorable and pervasive. Every advance in technology seemed to hurt the ability of the small, independent operator to survive in the impersonally competitive market place.

Yet this was a serious misreading of the course of change. Mass production and urbanization stimulated, indeed required, wider facilities for distribution, a larger credit structure, an expansion of the educational system, the assumption of new functions by government. At the same time, the increase in the standard of living due to higher productivity created new wants and made possible new satisfactions, which led to a spectacular flowering of those businesses that cater to human pleasure and leisure: entertainment, travel, hotels, restaurants, and so on. Thus the growth of a factory labour force was matched by a proliferation of service and professional people, white-collar workers, functionaries, engineers, and similar servants of the industrial system and society. Indeed, as productivity rose and the standard of living with it, this administrative and service sector of the economy—what some economists have called the tertiary sector—grew more rapidly than industry itself.

In sum, the Industrial Revolution created a society of greater richness and complexity. Instead of polarizing it into bourgeois minority and an almost all-embracing proletariat, it produced a heterogeneous bourgeoisie whose multitudinous shadings of income, origin, education, and way of life are overridden by a common resistance to inclusion in, or confusion with, the working classes, and by an unquenchable social ambition.

For the essence of the bourgeois is that he is what the sociologists call upwardly mobile; and nothing has ever furnished so many opportunities to rise in the social scale as the Industrial Revolution. Not everyone seized these opportunities. For many, the shift from country to city, from farm to industry or trade, marked simply the exchange of one labouring status for another. The factory worker could be, and usually was, as tradition-bound in his expectations for himself and his children as the peasant. But for thousands, the move to town, or often to another region or country, marked a decisive break with the past; the migrant found himself afloat in a fluid society. Some rose and founded unexampled fortunes in their own lifetimes; others climbed slowly, generation by generation. For many, education was the open-sesame to

higher status, and this channel was in itself evidence of the more explicit functional requirements of a technologically advanced society. More and more, it became important to choose someone for a job or place on universalistic rather than particularistic grounds, on the basis of what he could do rather than who he was or whom he knew.

But universalism cuts both ways. While some rise on merit, others must fall; some succeed, but others fail. It has been said of political revolutions that they devour their children. So do economic revolutions. Thus the small machines of the early Industrial Revolution were succeeded by big ones; the little mills became giant factories; the modest partnerships were converted to large public companies; the victims and laggards of the early decades were succeeded by new victims and laggards. The resulting concentration of enterprise in certain sectors of the economy did not displace the small firm or make it obsolete. The very forces that promoted industrial and commercial giantism opened new possibilities for small ventures: service enterprises, distribution agencies, subcontractors, and so on. The fact remains, however, that smaller firms in traditional lines were pressed hard by bigger and more efficient competitors; many collapsed in spite of all the resistance, ingenuity, and sacrifice that old-style family enterprises are capable of. Both casualties and survivors proved easy converts for the preachers of discontent and reaction: in some countries they turned the government into the instrument of vested interests; in others, they became the troops of right-wing revolution.

For if the first effect of the Industrial Revolution was to shift drastically the balance of political power in favour of the commercial and industrial classes, subsequent economic development raised up new enemies of the liberal, parliamentary system that was the symbol and instrument of bourgeois government. On the one hand, there was concentrated, class-conscious industrial labour; on the other, the bourgeois victims of economic and social change: the marginal entrepreneurs, the discontented, the *déclassés*. Between the two extremes the gulf widened, as each reacted to the other. The World War brought the latent conflict to a head by stimulating the demands of labour while ravaging the savings of the bourgeoisie. In all countries, the postwar years saw a flow of political power outward from the centre to the extremes. In a nation like England, the result was a new party alignment and gradual movement to a new position of compromise. In countries like Germany and Italy, the resolution was more radical. In France, the centrifugal trend was countered by the distraction of logrolling; the heterogeneous special interests of the bourgeoisie found a *modus vivendi* in the manipulation of government on behalf of the status quo and at the expense of a divided labour movement.

In each case, of course, the nature of the political adaptation to the economic changes wrought by the Industrial Revolution was a function of the existing political structure and traditions, social attitudes, the particular effects of the war, and the differential character of economic development. For the Industrial Revolution, as we shall see, was not a uniform wave of change; nor did it roll up on like shores. On the contrary, it came to a great variety of places, with differing resources, economic traditions, social values, entrepreneurial aptitudes, and technological skills.

This unevenness of timing and distribution in turn has had the most serious consequences. Politically it has meant a complete revision of the balance of power. The basis of military strength has shifted from sheer numbers—and tactical inspiration—to industrial capacity, particularly the ability to turn out guns and munitions and move them to combat. Money was once the sinews of war because it could buy men; now it must produce fire power as well. As a result, the nineteenth century saw a unified Germany rise to Continental hegemony on the strength of the Ruhr and Silesia; while France, slower to industrialize, was never again to enjoy the pre-eminence to which the *levée en masse* and the genius of Napoleon had raised her on the eve of economic revolution. With the spread of the new techniques, moreover, new powers arose: the twentieth century saw the millennial predominance of Europe dwindle before the unprecedented might of the United States and Soviet Russia.

At the same time, the technological gap has made possible and economic interest has called forth a spectacular expansion of Western power in the preindustrial areas of the world; in this respect, the Industrial Revolution consummated the process begun by the voyages and overseas conquests of the fifteenth and sixteenth centuries. And while in recent decades the tide of imperial dominion has receded, it has left its indelible imprint wherever its waters have rolled: all of the undeveloped countries of the globe are converted to the religions of industry and wealth with a faith that surpasses that of their teachers. Never in the thousands of years of contact between civilizations has one of them enjoyed such universal success.

Yet up to now, at least, faith has not been enough. The nations of the Third World have yet to effect their industrial revolution, and the gulf in wealth and standard of living between them and the economically advanced countries has increased to the point of scandal and danger. The disparity has been aggravated by the partial character of their modernization. The West has brought them lower death rates, but not lower birth rates; so that population growth has eaten up, and in some instances outstripped, their gains in income. The West has provided

them with some education—enough to know their dependence and to dream of freedom, but not enough to create and operate a modern economy. It has given them a distorted underview, the view from the kitchen, the mine, and the labour camp, of the potentialities and rewards of an industrial technology—a tantalizing taste of what seems to be a material paradise; but it has not given them the means to satisfy the appetite thus engendered. It has also left them a memory of brutality and humiliation, a stain that some have argued can be erased only in blood.[1]

This is not to imply that the conduct of colonial powers has always been reprehensible or the consequences of their rule invariably bad. On the contrary, one could argue that many of the colonial peoples were better off under European rule than they have been since independence. But as we all know, the evil that men do lives after them; besides, most of the peoples in the world (with the possible exception of Puerto Rico) have opted for freedom even in mediocrity as against prosperity in subordination.

The explosive implications of this legacy of jealousy, frustration, hatred and alienation need not be laboured here.

In sum, the Industrial Revolution has been like in effect to Eve's tasting of the fruit of the tree of knowledge: the world has never been the same. (There is no point in arguing here whether the change is for the better or the worse. The question is one of ends more than means and has its place in moral philosophy, not economic history.)

* * * *

So much for the wider historical implications of the Industrial Revolution. For the economic historian *qua* economist, the problem has another side. His concern is with the processes of industrial change as such: how did they occur? why did they move faster in some places than others? why did they take different forms in different economies? In short, he is interested in the causes and process of growth.

From this point of view, the Industrial Revolution poses two problems: (1) why did this first breakthrough to a modern industrial system take place in western Europe? and (2) why, within this European experience, did change occur when and where it did?

The essay that follows is concerned with the second of these questions; but it will not be amiss to consider the first by way of introduction.

The first point that needs to be made is that Europe on the eve of the Industrial Revolution was a society that had already advanced a long

[1] The most powerful and popular expression of this thesis is the late Frantz Fanon's *Les damnés de la terre* (English translation: *The Wretched of the Earth* [London, 1965]).

way economically beyond the level of minimal subsistence. The significance of this advance is apparent from a comparison of such estimates as we can make of income per head in eighteenth-century England, say, and pre-industrial economies of the twentieth century. Phyllis Deane, who bases her calculations on the estimates of contemporary observers, tells us that the average for England and Wales at the end of the seventeenth century was about £9 per year;[1] in the 1750's, between £12 and £13. Given the revolution in consumption that has taken place since then, it is hazardous to convert these sums into their twentieth-century equivalents; but on the reasonable assumption that money was worth at least eight times as much 200 and 250 years ago (Miss Deane's multiplier of six is far too low), we are talking of incomes of about £70 in 1700, £100 a half-century later. Comparable figures for the France of the eighteenth century have to be inferred from even more precarious 'guesstimates'; but it seems reasonable to suppose that income per head was moderately lower than in Britain at the beginning and that it kept pace fairly well until the last quarter of the century.[2] By comparison, average annual income in Nigeria, one of the richer African countries, was about £30 per head in the early 1960's, while that of India was even lower—about £25. To find something comparable to the western European level of two centuries ago, one has to look at the already semi-industrialized countries of Latin America: Brazilian income *per capita* was some £95 per annum in 1961; Mexican income, about £105.[3]

Western Europe, in other words, was already rich before the Industrial Revolution—rich by comparison with other parts of the world of that day and with the pre-industrial world of today. This wealth was the product of centuries of slow accumulation, based in turn on investment, the appropriation of extra-European resources and labour, and

[1] Deane, *The First Industrial Revolution* (Cambridge, 1965), p. 6; cf. her earlier article, 'The Implications of Early National Income Estimates for the Measurement of Long-Term Economic Growth in the United Kingdom', *Econ. Devel. and Cult. Change*, IV, no. 1 (1955).

[2] In 1688, Gregory King estimated that income per head in Britain was higher than anywhere else in Europe except Holland; and that it was 20 per cent above that of France. On the course of French and British economic growth in the eighteenth century, see François Crouzet, 'Angleterre et France au XVIII[e] siècle: essai d'analyse comparée de deux croissances économiques', *Annales; économies, sociétés, civilisations*, XXI (1966), 270. J. Marczewski, 'Le produit physique de l'économie française de 1789 à 1913', *Histoire quantitative de l'économie française* (*Cahiers de l'I.S.E.A.*, AF, 4, no. 163 [July 1965]), p. lxxix, Table 30, shows English and French physical products per head as approximately equal at the start of the nineteenth century. From what is known of comparative productivities in the two economies and the effect of the Revolution on French industry, this comparison would seem to be too favourable to France.

[3] Deane, *The First Industrial Revolution*, p. 7.

substantial technological progress, not only in the production of material goods, but in the organization and financing of their exchange and distribution.

Economic growth in this period of preparation, as it were, was by no means continuous: there was a major setback in the late fourteenth and fifteenth centuries, in the aftermath of the Black Death; and certain parts of Europe suffered grievously and long in the following period from the effects of war and pestilence. Nor was the rate of growth at best anything like so rapid as it was to become during and after the Industrial Revolution. (We have no true statistical estimates of pre-modern growth; but one has only to extrapolate the levels of income prevalent on the eve of industrialization backward at the rates of growth prevailing after 1700, and one arrives very quickly at levels of income too low for human survival.) Indeed, there is good reason to believe that much of such economic growth as did take place was translated into population growth: increased income meant lower death rates, in some instances higher birth rates; and larger numbers either ate up the gain or, outstripping it, set the stage for Malthusian disaster. Even so, it seems clear that over the near-millennium from the year 1000 to the eighteenth century, income per head rose appreciably—perhaps tripled—and that this rise accelerated sharply in the eighteenth century, even before the introduction of the new industrial technology.

In a sense, this preparation alone is sufficient explanation of the European achievement: Europe industrialized because she was ready to; and she was the first to industrialize because she alone was ready to. But this kind of statement is merely an evasion of the issue; the question still remains, why Europe alone effected this advance.

A definitive answer is impossible. We are dealing here with the most complex kind of problem, one that involves numerous factors of variable weights working in changing combinations. This sort of thing is hard to deal with even if one has precise data that lend themselves to refined techniques of analysis. But we have almost no evidence of this kind for the pre-modern period (say, before the eighteenth century), so that any judgment must be based on an impressionistic examination of the record. Such a judgment is necessarily personal: it would be hard, I think, to find two historians who would agree across the board on the 'causes' of the European economic advance. Still, one man's interpretation can serve to guide or sharpen the appreciation of others, if only on an adversary basis. The analysis that follows, therefore, is my own—though it rests heavily on the work of those specialists whose arguments on particular points I have found persuasive. The method of inquiry is to seek out these factors of European development that seem to be both significant and different; that set Europe apart, in other

words, from the rest of the world. By holding Europe up against the mirror of the most advanced non-European societies, we should be able to discern some—surely not all—of the critical elements in her economic and technological precedence.

From this point of view two particularities seem to me to be salient: the scope and effectiveness of private enterprise; and the high value placed on the rational manipulation of the human and material environment.

The role of private economic enterprise in the West is perhaps unique: more than any other factor, it made the modern world. It was primarily the rise of trade that dissolved the subsistence economy of the medieval manor and generated the cities and towns that became the political and cultural, as well as economic, nodes of the new society. And it was the new men of commerce, banking, and industry who provided the increment of resources that financed the ambitions of the rulers and statesmen who invented the polity of the nation-state. Business, in other words, made kings—figuratively; and literally in the case of the Medici, who ruled Florence and whose children sat on the throne of France.

To be sure, kings could, and did, make or break the men of business; but the power of the sovereign was constrained by the requirements of state (money was the sinews of war) and international competition. Capitalists could take their wealth and enterprise elsewhere; and even if they could not leave, the capitalists of other realms would not be slow to profit from their discomfiture.

Because of this crucial role as midwife and instrument of power *in a context of multiple, competing polities* (the contrast is with the all-encompassing empires of the Orient or of the Ancient World), private enterprise in the West possessed a social and political vitality without precedent or counterpart. This varied, needless to say, from one part of Europe to another, depending on comparative economic advantage, historical experience, and the circumstances of the moment. Some countries were better endowed by nature for industry and trade than others. Some—especially those on the turbulent frontier of European civilization—came to accord inordinate place and prestige to the military and its values. And sometimes, adventitious events like war or a change of sovereign produced a major alteration in the circumstances of the business classes. On balance, however, the place of private enterprise was secure and improving with time; and this is apparent in the institutional arrangements that governed the getting and spending of wealth.

Take the idea and nature of property. This was often hedged around in the pre-industrial period by restrictions on use and disposition and by complications of title. Land especially was caught up in a thicket of con-

flicting rights of alienation and usufruct, formal and customary, which were a powerful obstacle to productive exploitation. Over time, however, the nations of western Europe saw an increasing proportion of the national wealth take the form of full property—full in the sense that the various components of ownership were united in the person or persons of the possessor, who could use the object of ownership and dispose of it as he saw fit.

Concomitant with this development and, indeed, implicit in it was the growing assurance of security in one's property—an indispensable condition of productive investment and the accumulation of wealth. This security had two dimensions: the relationship of the individual owner of property to the ruler; and the relationship of the members of the society to one another.

With respect to the first, the ruler abandoned, voluntarily or involuntarily, the right or practice of arbitary or indefinite disposition of the wealth of his subjects. The issue was joined very early, and its outcome was clearly linked to the larger question of the political as well as economic status of the business classes. Lambert of Hersfeld, an ecclesiastical chronicler of the eleventh century, tells the story of a confrontation on this score between the Archbishop of Cologne and the merchant community. The Archbishop wanted a boat for his friend and guest, the Bishop of Münster, and sent his men to commandeer a suitable vessel. The Archbishop may have been acting within his traditional rights; that is, the residents of Cologne may well have been obliged to furnish such facilities as a *corvée*. But in this instance, the son of the owner of the boat refused to submit and, calling some friends together, drove off the Archbishop's men-at-arms. The conflict quickly burgeoned into a riot, which the Archbishop finally succeeded in repressing by a show of force and threats of reprisal. Yet this was not the end of the matter:[1]

> ...the young man, who was filled with anger and drunk with his initial success, did not stop making all the trouble he could. He went about the town making speeches to the people about the bad government of the Archbishop, accusing him of imposing unjust charges on the people, of depriving innocent men of their property, and of insulting honorable citizens...It was not hard for him to arouse the populace...

This was surely not the last such incident at Cologne or elsewhere; but eventually the ruler learned that it was easier and in the long run more profitable to expropriate with indemnification rather than con-

[1] From the French of Jacques Le Goff, *La civilisation de l'Occident médiéval* (Paris, 1965), p. 368. I am indebted to my colleague Giles Constable for advice on the significance and credibility of this account.

fiscate, to take by law or judicial proceedings rather than by seizure. Above all, he came to rely on regular taxes at stipulated rates rather than on emergency exactions of indefinite amount. The revenue raised by the older method was almost surely less than that yielded by the new; over time, therefore, it constituted a smaller burden on the subject. But the effect of this uncertainty was to encourage concealment of wealth (hence discourage spending and promote hoarding) and to divert investment into those activities that lent themselves to this concealment. This seems to have been a particularly serious handicap to the economies of the great Asian empires and the Muslim states of the Middle East, where fines and extortions were not only a source of quick revenue but a means of social control—a device for curbing the pretensions of *nouveaux riches* and foreigners and blunting their challenge to the established power structure; and it was the experience of European traders in those countries that gave us from the Arabic the word 'avania' (French *avanie;* Italian *avania*), meaning both insult and exaction.[1]

At the same time—this is the second of our two dimensions—Europeans learned to deal with one another in matters of property on the basis of agreement rather than of force; and of contract between nominal equals rather than of personal bonds between superior and inferior. Jerome Blum, in his valuable study of Russian agrarian society, tells of one among many instances of violent seizure of land by a local lord from a nominally free peasant: the people in the area called the piece in question the 'cudgel field', because the servants of the rich man had beaten the poor farmer in public to exact his consent to the transfer.[2] (In most cases, of course, no beating would have been required; little men knew their place.) Predatory behaviour of this kind was easiest and most persistent in societies divided by wide barriers of power and status. Anywhere east of the Elbe, for example—in Prussia, Poland, Russia—the local lord enjoyed so much authority over the population that abusive treatment even of those residents who were nominally free,

[1] In these 'Oriental despotisms' one response to the threat of arbitrary levies was the investment of business profits in land, which had two major virtues in this respect: it was a fixed form of wealth, hence less tempting to covetous officials than liquid assets; and it sometimes conferred on its possessor political power, that is, a certain immunity from despoilment. Thus we find the richest business community of Safavid Persia, the Armenian silk merchants of Julfa, ready to risk their money in trading ventures as far afield as Poland and the Baltic, but hoarding it at home or using it to buy country estates. Amin Banani, 'The Social and Economic Structure of the Persian Empire in Its Heyday' (paper presented to the Colloquium in Middle Eastern Studies, Harvard University, 5 January 1968).

[2] Jerome Blum, *Lord and Peasant in Russia from the Ninth to the Nineteenth Century* (Princeton, 1961), p. 535.

let alone the unfree serfs, was widespread and unrestrainable. In these areas of seigneurial autonomy, moreover, conditions actually grew worse from the sixteenth to the eighteenth centuries, as the spread of commercial agriculture enhanced the incentive to exploit the weak.

In western Europe, however, the abuse of private power and recourse to violence were rarer and tended to diminish over time. (La Fontaine's *raison du plus fort* was reserved increasingly to international relations.) Here, too, the trend went back to the Middle Ages, when the ambitious rulers of inchoate nation-states succeeded in substituting their writ for that of their vassals; and in developing, as an instrument of royal power, a judicial apparatus operating in a context of established rules. They were helped in this effort by the bourgeoisie (in the strict sense of the citizens of the towns), who needed the protection of the law to flourish and, flourishing, provided the crown with a counterweight to the common feudal enemy.

The shift from diffuse obligations to explicit contract was part of the same development. Medieval society had been held together by loosely defined, open-ended personal bonds between lord and vassal, seigneur and serf; but business could not operate in this realm of indeterminacy and needed a measure for all things. The new law provided the measure, and the new nation-state enforced it.

These political and legal changes combined with economic and social developments to undermine seigneurial authority and enhance the personal status of the peasantry. Without attempting to examine this process in detail, one may point to a few major influences: the Black Death and subsequent epidemics, which altered sharply the ratio of land to labour and compelled the propertied classes to offer substantial inducements to attract and hold the manpower needed to work their estates; the long inflation of the sixteenth century, which found many peasants holding long-term leases whose burden diminished with the value of the currency; above all, the rise throughout western Europe of prosperous cities and towns, which offered refuge, employment and freedom to the serf who left the land and which thus acted as a constant source of upward pressure on the conditions of rural life. As a result, the opportunities created by a growing market for cash crops conduced not, as in the East, to the aggravation of labour services and a tightening of control, but to the solution of personal bonds and the substitution of free peasant enterprise for managed domains. This in turn laid the basis for what was to prove a crucial element in the rise of industrial capitalism: the spread of commercial manufacture from the towns to the countryside. It was this that enabled European industry to draw on an almost unlimited supply of cheap labour and to produce at a price that opened to it the markets of the world.

The rise of rural manufacture was the most striking and significant expression of freedom of enterprise; but one should not infer from the fact of this rise a state of generalized freedom. On the contrary, the very unevenness of this development—cottage production for market came far earlier in England than elsewhere—is testimony to the fierce and successful opposition it encountered from privileged interests in the towns; and these privileges are only one example of the many fetters on trade and industry. Thus essential commodities like food were subject to formal and customary restrictions designed to insure the nourishment and tranquillity of the population. Land, as noted above, was *sui generis:* because of its tie to social status and power, rights of purchase and alienation were often severely limited. Entrance into numerous occupations was subject to official authorization or to the permission of guilds that had every incentive to minimize competition by excluding newcomers. By the same token, the authorities often tried to confine business activity to fixed channels, to prohibit as unfair a wide range of what we would consider perfectly permissible behaviour, to discourage innovation that might harm vested interests. Much of this reflected the values of the medieval village or town community, which saw wealth as more or less fixed and assumed that the only way one got rich was at the expense of one's neighbour. Yet these constraints made little sense in a context of increasing wealth and rising productivity.

For all that, the scope of private economic activity was far larger in western Europe that in other parts of the world and grew as the economy itself grew and opened new areas of enterprise untrammelled by rule or custom. The trend was self-reinforcing: those economies grew fastest that were freest. This is not to imply that state enterprise or control is intrinsically inferior to private enterprise; simply that, given the state of knowledge in pre-industrial Europe, the private sector was in a better position to judge economic opportunity and allocate resources efficiently. Even more important, perhaps, was the impulse given thereby to innovation: in an age when the nature and direction of technological opportunity were far less obvious than now, the multiplication of points of creativity was a great advantage. The more persons who sought new and better ways of doing things, the greater the likelihood of finding them. Again the process was self-reinforcing: those economies that were freest seem to have been most creative; creativity promoted growth; and growth provided opportunities for further innovation, intended or accidental.

Why the rest of the world failed to develop a business class of comparable vitality and influence is still more a matter for speculation than analysis. The explanations offered by the specialists are not fully per-

suasive; often they take the form of bald assertions of cause-and-effect without specification of the intervening mechanism of change. Thus Prof. Wu Ta-k'un tells us that the establishment in China of a state monopoly of salt and metals (Han dynasty, 206 B.C. to A.D. 220) 'effectively checked the development of a mercantile class separate from the land-owning interest'. Perhaps; though one is more impressed by his reference to the congruency of the administrative and landowning elites and the assimilation of successful merchants into this group. 'For this reason,' he writes, 'the development of merchant capital led, not to the formation of a capitalist class, but to the continuous reinforcement of the landowning ruling class.'[1]

These and similar explanations are the ones usually offered for the abortion of economic development in non-European societies. Sometimes the historian stresses the subordination of trade and traders to an all-powerful central authority; sometimes the social inferiority and disabilities of the merchant class; sometimes the precarious character of private property and the heavy burden of arbitrary exactions; sometimes all of these. None of these was wholly absent in Europe; but the usual argument is that the differences in degree were so great as to be differences in kind. Where, for example, in Europe does one find anything comparable to the Egyptian principle that all wealth is the property of the ruler, lent by him to his subjects and taxable or confiscable at will?

In any event, it was surely one of Europe's great advantages that its first capitalist entrepreneurs worked and flourished in autonomous city-states, hence political units where the influence of landed wealth was necessarily limited; and that even in the larger embryonic nation-states, the special juridical status of the urban commune made it possible for its inhabitants to develop and sustain their own distinct political interest, while it isolated them culturally and socially from the great agrarian world around them. In this way the cities were not only foci of economic activity but schools of political and social association—

[1] Wu Ta-k'un, 'An Interpretation of Chinese Economic History', *Past and Present*, no. 1 (1952), pp. 6, 9. Cf. Frederic Wakeman, Jr., *Strangers at the Gate: Social Disorder in South China, 1839–1861* (Berkeley and Los Angeles, 1966), p. 45: 'But Chinese society was bureaucratic, state-centered. Tax-farming or monopoly capitalism was the only sure road to wealth. Instead of being an independent, vigorous class that challenged a ruling aristocracy, the Cantonese merchants lived in symbiosis with the state and its mandarinate. Status honor being what it was, wealth invariably led to the purchase of office, or conspicuous consumption in the scholar-gentry manner, both of which dissipated capital. Thus the merchants of China were perpetually servile to the honored symbols of that society, the gentry.' For similar tendencies in the Mameluke Empire of Egypt and Syria during the fifteenth century, see Ira M. Lapidus, *Muslim Cities in the Later Middle Ages* (Cambridge, Mass., 1967), p. 126.