CHAPTER VII

THE GROWTH OF LARGE-SCALE INDUSTRY TO 1947*

Industrial development in India has been part of the very broad movement which had its origins in Western Europe. Before the more productive technology of the industrializing West could become something other than a casual and accidental feature of the Indian landscape, a larger scale of market demand had to emerge and new ways of organizing economic activity had to be created. Entrepreneurs had to concern themselves with a larger range of calculations, novel forms of enterprise had to be created and labour had to be mobilized to a different discipline. This chapter will describe the growth of India’s modern industries, the forms within which they developed and the character of the labour force that emerged.

The new steam-powered technology was introduced fairly early into south Asia and the pace of its extension within specific sectors was reasonably brisk. Between the 1850s, when the first major industries started, and 1914, India had created the world’s largest jute manufacturing industry, the fourth- or fifth-largest cotton textile industry (depending on what is being measured), and the third-largest railway network. Karl Marx, writing at the beginning of this process, expected that the introduction of railways and modern factories into India would rapidly transform the sub-continent. He was excessively optimistic. Modern industrial processes did not spread easily from sector to sector and the total effect was not cumulative. At the time of Independence, India was still largely non-industrial and one of the world’s poorest areas.1

Most interpretations have attributed the unsatisfactory performance of the Indian economy and the limited scale of modern industrial

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1 Per capita income estimates comparing various countries can be found in Angus Maddison, Economic Progress and Policy in Developing Countries (1970), Table A-11.
development either to British policy which inhibited local initiative or to the Indian value system and social structure which diminished entrepreneurial drives. While these elements may have set parameters within which business behaviour occurred, they do not explain the specific and diverse characteristics of actual entrepreneurial choices. A main theme of this essay is that the Indian economy in the nineteenth and twentieth centuries was a private-enterprise economy and the vast bulk of decisions about the allocation of resources was made by private businessmen. In no decade between 1872 and 1947 did the state's annual share of GNP average more than 10 per cent; usually it was less than that.

Inasmuch as private decision-making was so important, we must understand the factors that businessmen, native and foreign, had to consider – the nature of demand for products and the supply of productive resources, the prices at which output could be sold and the costs of producing it. Even though investment decisions were made within the framework of official policy as well as local values and social structure, it was the range of alternative profit-making opportunities that explains the rate at which businessmen invested, the directions in which they allocated their investments, and the timing of their decisions. If the rate of investment was low and the scope of industrial development restricted, the explanation is to be found in the character of opportunity and costs.

One major influence on entrepreneurial decisions was the nature of demand. At the beginning of the nineteenth century, India's population was about 200 million; by 1947 it had grown to 417 million. But the enormous absolute size of the population and its growth did not necessarily create a demand that encouraged machine production. In fact, it probably worked against the introduction of modern technology. Average per capita income in India was very low. Moreover much of this income was produced in non-monetized activities. Even as late as the early 1950s, some 40 per cent of all consumption in the Republic of India did not enter into the monetary sector and was not directly influenced by or responsive to market supply and demand forces. We are therefore certainly safe in assuming that the market affected very much less than half India's economic activity in earlier decades.¹

Unequal distribution of income contributed to creating more market demand than the low average per capita income might suggest. Higher incomes were concentrated in the hands of traditional luxury-loving

¹ One can get some idea of the general level of demand in India by comparing it with England at the beginning of the Industrial Revolution. Phyllis Deane, The First Industrial Revolution (1965), 6–7, estimated that per capita income of England and Wales in the 1750s was about three times that of the average Indian in the early 1950s. Moreover, the non-market sector was already insignificant in eighteenth-century Britain.
social groups and in the major urban areas. But there were features which probably muted much direct stimulus to industrial development from either of these sources. Demand from the traditionally well-off tended to be for specialty items which could not be mass-produced but required skilled craft techniques of the older sort. The large absolute size of towns provided blocks of effective demand. However, the richest and most rapidly growing centres of urban demand in the nineteenth and twentieth centuries were the great trading ports – Bombay, Calcutta, Madras, Karachi – and some up-country market towns at important railway junctions. Centres which could offer the greatest incentives to local entrepreneurs were also most exposed to foreign competition. Moreover, domestic demand was heavily dependent on agricultural performance. This, responsive as it was to the monsoons, tended to be quite unstable and certainly had adverse effects on entrepreneurial behaviour.

There were also very serious inhibitions on the supply side. In India’s underdeveloped state, most factors of production were costly. All machinery had to be imported. Human capital in the form of skilled labour and technical administration was scarce and, because it initially had to be imported from abroad, it was very expensive. Fuel was costly and so was domestic transport. Only raw labour was cheap and on occasion – as in the jute and cotton industries – it provided an industrial advantage. But cheap labour typically worked against mechanization. The expansion of demand for a product did not necessarily put pressure on labour supply or on labour costs relative to other costs. Thus, there was less incentive for innovation and mechanization. To the contrary, the businessman was encouraged to expand existing organization rather than shift to techniques where capital requirements were relatively greater. And even where mechanized industries grew up, they invariably used more cheap labour per unit of capital than was true in the West. All this was a rational response to relative factor price relationships but it slowed the expansion of factory organization.

While a vigorous protective tariff policy might have reduced foreign competition, scholars are beginning to agree that its effect would have been miniscule unless a programme of development that was designed to make the Indian economy more productive at every point was simultaneously introduced. The two most successful industries in pre-1914 India, the jute and cotton textile industries not only grew swiftly without tariff protection but many of their most important markets were overseas where tariffs could not have helped.

In addition to the objective elements that a businessman had to keep in mind – size of market, price at which he could sell, and his costs of production and distribution – there was always a substantial element of
uncertainty in his projections. An industrialized economy, in the course of its development, will have built up a formal structure of public and private facilities that minimizes uncertainty. Middlemen perform specialist activities through futures markets and other insurance devices. Fluctuations are reduced and knowledge of all elements is improved by flows of statistical and other information that the businessman needs and on which he can depend. Demand, supply and cost relationships begin to take on a more predictable character. But this is precisely what did not exist in India. The complex system of signals, incentives, alternatives and mobilities that makes the market work with a high degree of efficiency is not the cause but the consequence of the process of increasing specialization and modern economic growth. The enormous investments required to ease instability and provide a satisfactory system of information flows had not yet been made. The entrepreneur in India had to accept not merely a higher level of risk but also a much greater range of uncertainty in all his calculations. The consequence was a much higher level of real costs that needed the promise of much higher rates of return if the risk and uncertainty was to be borne.

It was not only the incalculability of demand but also the uncertainties of the cost of production that intimidated the potential entrepreneur. He had to decide the size and type of plant most suitable for the conditions he expected to encounter. This was not merely a matter of selecting the specific technology from an array that existed. The equipment he bought from England or other western economies was designed to economize on labour relative to capital. The Indian businessman often had to redesign or reorganize the equipment balance to allow for his very much more expensive capital and cheaper crude labour supply. The information and technical skills he needed to cope with these problems were invariably scarce and costly, if available at all. This shortage was one of the burdens of capital scarcity and poverty. Yet technical adaptation to relative resource scarcities did occur on some yet undetermined scale. There is evidence of this in both the cotton textile and iron and steel industries.

The pioneering entrepreneur in India also had to provide his own repair shops and power sources. He had to maintain larger inventories of materials and replacement parts. In effect, he had to allow for much greater amounts of both fixed and working capital while he faced an underdeveloped system of credit which tended to dry up on him when he needed it most. Capital tended to be immobile, both because of uncertainty and because of the lack of appropriate capital-mobilizing institutions that operated on a wide scale. Investors often avoided new industries and concentrated on established ones where experience reduced risk and uncertainty. This explains why scholars have found widely diverse evidence about the cost of industrial capital. New
enterprises often had difficulty obtaining capital even at very high interest rates while old firms and activities might have a surfeit at fairly low rates of return.

These were not the only uncertainties. The quality if not the quantity of labour was always a problem. Costs of training were hard to predict. The rate of labour turnover, caused not only by the rural link but by the growth of competitors who raided trained workers, was extremely difficult to predict. In effect, the entrepreneur faced great overall uncertainty about the levels of productivity that could be attained. Thus, a new enterprise had to promise a very high rate of return not only to meet the cost of scarce capital but also to allow for the greater risks. The higher the rate of return required to offset the general uncertainties of novel enterprises, the fewer were the opportunities that promoters and investors found promising. All these factors were very substantial obstacles to the rapid expansion of mechanized industry.

These features influenced the judgements of all entrepreneurs. But there were different responses by various Indian groups and of natives in contrast to foreigners. Here again, the important elements were the calculations that entered into investment decisions. If knowledge of the local and world economies was not perfect and if different groups had different kinds and amounts of knowledge, each would sum the elements of an apparently identical opportunity — costs, prices, demand and expectations of probable rewards — quite differently and behave accordingly. This is why the British tended to invest mainly in activities oriented to foreign markets while Indians generally developed enterprises that catered primarily to domestic demand.

Success in foreign markets depended on access to knowledge about the changing pattern of opportunities around the world. It required an elaborate international network through which a continuous flow of relevant information and skill could be mobilized. Development of foreign markets had to be initiated and sustained in the first instance by the European Managing Agency Houses with their extensive international contacts. A native entrepreneur without these was at a serious disadvantage in the foreign trade aspect of any activity and in any venture that depended on international demand. Indians could move into international markets directly only as they were able to reduce the costs of those formidable information barriers. Either they had to develop a large local demand on the basis of which they could support the high cost and initial risks of invading foreign markets or they had to find other advantages that gave them a specific competitive edge there.

The fact that it was costly to develop the structure of commercial information and institutions to reduce business risks to reasonable levels also explains why foreigners tended to steer clear of investments in industries whose markets depended primarily on domestic demand.
More than three centuries of successful international trade had enabled Englishmen to build institutions through which they could estimate and take advantage of such opportunities with a fair probability of success. Conversely, the British were never able to create their own commercial networks within India. Throughout the British period it was Indian merchants on their own or as agents who operated almost every aspect of trade beyond the great seaports, ‘up country’ in the desh. And as opportunities appeared that encouraged attempts to satisfy such internal demand with modern industrial organization and technology, Indians and not foreigners were the ones best able to take advantage of them. As will become clear in the sections that follow, even apparent exceptions seem to fit this formulation. So do the varied responses of different groups of Indian entrepreneurs.

To the extent that the expansion of modern industry depended on decisions made by private entrepreneurs, it becomes clear that no single social or economic characteristic can explain the slowness of the industrialization process. No single act of policy or single change of behaviour could have made for much more rapid progress than did occur. It is not that India was caught in a low-level equilibrium trap from which, once liberated, development would be cumulative. When the great array of evidence is put together, the image that emerges is rather of a web of relationships which dampened the absolute level of performance and inhibited the rate of change. Expansion in a single sector, however successful, proceeded only in a limited way and could not generate on its own an ever-widening chain reaction throughout the system. Rapid and sustained industrial expansion on a broad front required not only an extensive array of basic social, political and economic preconditions but also the development of an institutionalized capacity to solve new problems that continually emerged in the process of change.

Whatever its other virtues, the Indian system did not possess these features at the beginning of the nineteenth century. During the following 150 years various necessary but not sufficient elements of economic expansion were introduced. But India was not a tabula rasa. It was a complex society with its own internal dynamics. The economic changes were not only limited in scale and scope but they also inevitably generated contradictory features. All this must be kept in mind as we examine the career of the industrial sector.

**THE BASELINE**

Economic novelties can always be introduced to a system from the outside, but functional restructuring of a great society like India only
occurs to the extent that appropriate institutional arrangements already exist or can be brought into being so as to internalize a continuing process of adaptation and transformation. An analysis of what the state of Indian technology and relevant socio-economic organization was like in the pre-British period can tell us important things about its readiness for this kind of change. Only enough is presented here as will make post-1800 industrial responses understandable.¹

The available literature gives a relatively consistent picture of Indian technology in the seventeenth and eighteenth centuries. It was everywhere quite simple. Productive processes depended largely on human skill and effort and very few mechanical devices were used to multiply these capacities. This was true in agricultural processing, quarrying, mining and in the production of manufactured commodities. Those who wrote on the subject were often impressed by the achievements they encountered and they were unanimous in stressing the labour-intensive methods by which they were executed. In a quite typical reaction to what he everywhere encountered, Buchanan described a widely used method of commercial oilseed crushing and extracting: 'It is', he wrote, 'evident that such a process could not be used in any country where manual labour possessed value.'

The particular climatic and geographical features of the landscape made it difficult and usually impossible to employ waterwheels and windmills, power sources which had spread widely in Europe from the late medieval period. Virtually all mining was open-pit, not because the technique was particularly productive but because the problems of underground working – drainage, pit support and movement of materials – could not be handled. Surface transport was also difficult. Mines were usually located in hilly regions from which ore had to be moved by animals or on the backs of people. There was clearly a link between the smallness of most mining operations, the absence of more efficient modes of transport and the very limited production and use of metals. This can be seen in iron manufacturing, the most extensive metallurgical activity in the sub-continent. What stands out everywhere as the distinctive feature of these widely scattered enterprises was the very tiny scale of the individual units of production, the insignificant amounts of fixed capital employed, the very limited specialization of function and the extremely low productivity of labour.

Ironmakers worked in small groups that rarely exceeded two dozen men. Typically, each group gathered its own ore and manufactured its own charcoal during one part of the year and smelted and refined the

¹ The quotations in this section are all from Francis Buchanan, A Journey from Madras through the countries of Mysore, Canara, and Malabar, 3 vols. (1807). They are consistent with all other available evidence.
metal during the remaining months. The labourers always depended on some agricultural employment as well. They might have their own small plots, they might obtain part-time work for others or they would peddle fuel in nearby towns. The ore was smelted in small clay furnaces which involved almost no fixed capital. 'The buildings are so mean that they go for nothing, and at the beginning of the season are put up by the workmen in the course of a day.' The size of the furnace was technically limited by the inability to generate great air blasts with existing bellows. Not only was the rate of metal extraction from the ore very low, it was not possible to liquefy the metal. Cast-iron was nowhere produced on the sub-continent with indigenous techniques and a great amount of labour had to be applied to forging and shaping iron which would not have been required for products had they been cast. For example, cannon were made in Indian arsenals by forging strips of wrought iron together, a method that was not only very labour intensive but also technically inferior. Using the data that Francis Buchanan gathered, we can estimate that a single furnace probably could produce each year no more than 5 or 6 tons of wrought iron, the kind typically sold around the countryside to village blacksmiths and to craftsmen in the towns.

It is useful to compare the output of this technology with that used in western and central Europe before it was transformed by the great innovations of the later eighteenth century. In the west in the seventeenth and early eighteenth centuries, iron-furnaces worked with very large air blasts, typically powered by water-driven bellows, and therefore could be very much larger than Indian furnaces. Conservatively estimated, average output of charcoal-fuelled furnaces probably was 200 tons per year. Moreover, European ironmakers had been able to cast iron since the fourteenth century. Not only was per man output very much higher than in India but these pre-industrial furnaces were very much more efficient in the use of fuel and raw material.

Total production in England and Wales in the first half of the eighteenth century was probably 25 to 35,000 tons a year. The same amount in India, produced with the technology of the eighteenth century, would have required the output of 2,500 to 3,400 fully employed furnaces. While no one has attempted to estimate their numbers, the sources do not suggest anything like this many furnaces operating at any one time. Even if we assume that India did have this many furnaces working in the eighteenth century, the resultant per capita differences between India and Britain are significant. Britain's population in the first half of the eighteenth century was not more than 6 million people so its per capita output of iron (not counting imports which significantly added to the supply available) amounted to about 10 lbs. of iron per head. If we
assume that India’s population was 100 million in 1800 (certainly a very low estimate), the output of these furnaces would provide less than four-fifths of a pound of iron per head per year. No matter how one manipulates the data, so long as we stay within the bounds of the available evidence we must conclude that the production of iron in India was very small. The civilization, of course, generally adjusted to the limited supply of iron by using it very sparingly.

Ironmaking was certainly scattered about the country very much more widely than it is today and technology and organization satisfied demand within very small territories. But there were great parts of India without iron ore. The traditional concentrations of population were located on alluvial plains where no deposits existed. A long-distance trade in refined iron was required but this traffic did not require complex trading organization or very much capital. Individual merchants were sufficient to finance it. Nor did increasing demand – the seventeenth and eighteenth centuries were periods of continual warfare – seem to produce any identifiable innovations or changes in the structure of the industry as warfare most certainly did in Europe.

I have already suggested how cheap labour served to make Indian technology unresponsive to growing demand requirements. Social structure may also have played a role. Mining and metal-processing were activities carried on by illiterate groups very low on the social scale and, in the case of tribal groups, often outside the mainstream of the greater society. Illiteracy and isolation from novel intellectual currents made these groups improbable sources of major innovation. The long-distance traders who were literate and for whom growing demand might have served as an incentive were only superficially linked to the processes of production and to the groups carrying them on. Merchants were not likely to play a particularly creative role as long as expanding demand could be satisfied by drawing on easily available labour and multiplying the number of units producing iron with existing technology.

All the same things can be said about cotton textile production, India’s most important manufacturing activity and the only one that was truly important in foreign trade after 1600. Equipment was very simple, labour input was relatively high and output per worker was very low. The printing, painting and dyeing of cloth produced results unknown anywhere else in the world but the processes were tedious and frequently had been frozen into rigidity by the magic and ritual which accompanied them. The processes depended on the conjuncture of specific kinds of water, materials and techniques. Because a scientific approach to technology was virtually non-existent, it was almost impossible for the
results to be reproduced anywhere but at the traditional centres of production. This meant that the output of such specialties was extremely small.

The expanding foreign demand for Indian cottons in the seventeenth and eighteenth centuries did not apparently lead to any technical innovations. It was satisfied by expanding the size of the labour force. If there was any distinctive feature of Indian society then as now, it seems to have been the existence of substantial amounts of underemployment. There were no apparent difficulties in increasing the numbers of part-time and full-time producers in the long run, particularly of the coarser and plainer stuffs. This kept down wages and probably discouraged any search for innovation that would have increased labour productivity. For example, there is no evidence that native entrepreneurs or weavers made any effort to adopt the flying shuttle even though it was widely used in Britain by the mid-eighteenth century and was probably not unknown in India by the late eighteenth century.

There seem to have been no obvious changes in the organization of the industry. When the Europeans came to India, the typical weaver who produced for a non-local market was given an advance by the trader with which the craftsman would buy cotton or yarn and sustain himself and his family during the period of production. Despite the growth in demand, nothing like the complex merchant capitalist putting-out systems of western and central Europe developed even in commercially sophisticated Gujarat. The merchants could not or did not find it necessary to penetrate and transform the traditional organization of production. The system of advances remained adequate for all requirements.

Nor were there, apparently, any changes in commercial organization among Indians. The extended family was the business unit in the eighteenth century as it had been in the sixteenth. The partnership was early known but it only rarely linked people beyond the extended family and then in very limited ways. The expansion of output at more or less constant real costs could be achieved by the simple proliferation of existing technical and organizational arrangements. Because this subtle Indian system was able to meet the demand for manufactures—not only cotton textiles but all other types—before 1800, there were no incentives to develop the institutional forms, skills or social overheads with which it could launch out on any bold new lines. When foreign competition appeared on the scene after 1800, based on a quite novel technology and on large-scale organization that had taken three centuries to establish, the Indian system was not able to respond effectively.

Other features of Indian society reinforced the limited responsiveness and capacities of the economy at its pre-British peak. The culture seems
not to have been preoccupied in any systematic way with the increase of man's control over his material environment. Of course, some individual scholars and a few rulers in the seventeenth and eighteenth centuries had scientific interests but there was no identifiable social manifestation of these. For instance, we do not find associations of scholars or societies for the propagation and dissemination of scientific knowledge. Further, there was no systematic means to transmit what knowledge did become available. There were almost unbridgeable institutional gaps between science and technology; there were formidable social barriers between theorists and craftsmen. To these must be added the practical limit to the wide dissemination of knowledge of all sorts, the failure of an indigenous printing industry to appear.

THE PRELUDE: 1800 – 50

During the first half of the nineteenth century the industrialization process was taking deep hold in Britain and in other parts of the North Atlantic region but in India the new technology and novel processes had only a trifling impact. Most of what was introduced came as a product of official concern, civilian and military. As early as 1788 the East India Company introduced more powerful ‘baling presses’ in order to reduce the bulk of the freight that was being shipped to Europe. In 1794 it began the first of its persistent efforts to introduce modern cotton gins into the countryside. More efficient bellows were applied to improve the traditional methods of iron-refining. Wind-powered sawmills were set up to cut timber. There is some vague evidence that the Company tried to introduce the fly-shuttle late in the eighteenth century.

It is not clear when the first steam engines were shipped to India but it was soon after the end of the Napoleonic Wars. They were apparently intended for use in the Company’s arsenals and at the Calcutta mint. Robert Fulton, the American inventor of the steamboat, wrote in 1813 of the possibility of using them on the Ganges. In the early 1820s a Lieutenant Forbes was sent from India to be trained at the Boulton and Watt workshops in England. He was directed to learn not only how to install and operate five steam engines and other equipment ordered for the Calcutta mint but also to study the application of steam power to river navigation. By the early 1830s a fair number of steam tugs were working in Calcutta harbour and by the late 1830s the Company’s steam flotilla was operating on the Ganges. The first steamship was assembled on the west coast in 1829 and others were constructed subsequently at the Company’s shipyard in Bombay. By the late 1840s a number of steam vessels were plying scheduled runs along the west coast between Columbo and Karachi.
Private entrepreneurs played a modest role in the introduction of the new equipment. The harbour tugs and coastal steam vessels were typically privately owned. Private printing presses multiplied, if only to serve the needs of missionaries. Modern papermaking machinery was brought into India soon after it was introduced into Britain from France. Most of the engines were fuelled by wood but the demand for coal began to stimulate some mining activity. Yet as late as mid-century all of this was a very casual and insignificant feature on a still almost entirely traditional economic landscape. Why?

As we said earlier, before 1800 the scale of markets was far too limited and factor price relationships were much too favourable to the use of labour to encourage the introduction of more productive labour-saving technology. The situation in the first decades after 1800 may have become in some ways even less favourable. As British power spread, certain traditional markets – courts and native armies – dwindled in importance or disappeared altogether. With the growth of imports from abroad – cotton yarn and cloth being the most obvious examples – certain local handicrafts confronted restricted markets.

But the same forces were also generating new types of demand. Foreign trade was expanding. Urban developments of the modern type began to take place not only in the relatively new ports of Calcutta, Bombay and Madras but also in new or invigorated inland centres which were responding to shifts in types and directions of commercial activity. But the growth in demand during the first five decades was not sufficient to trigger any bursts of indigenous innovation or any systematic pressure for the introduction of more productive techniques from abroad either by natives or foreigners.

Moreover, there were major problems in using the new technology, one being the absence of adequate technical skill. There were few people who knew anything about it. For example, when the Company sent some American cotton gins to Bombay in the 1820s, there was no one capable of getting them to work. It took some years before the machines were finally put together. There were also special difficulties in adapting the equipment to local conditions. The introduction of steamships on Indian rivers posed special technical problems – hull dimensions, appropriate draft, size of engines required. The engineering and mathematical knowledge needed to solve them was very scarce in Bengal. Even people with engineering training, like Lieutenant Forbes, were not equipped to cope with novel machines and had to be returned to England for special training.

Nevertheless, official requirements and the accelerated pace of commercial growth, particularly after 1835, began to be more favourable to the new industrial possibilities. And in a few places Indians were
being exposed to the intellectual manifestations of the Industrial Revolution. The major justification of the educational reforms proposed by Macaulay and his supporters in the 1830s was that English-style education would give Indians access to the superior scientific and technical knowledge of the west. While that education did produce clerks and lawyers, it also exposed Indian students to as much scientific and technical knowledge as the typical student in Britain got in school.

There were no barriers to the movement of skilled artisans or machines from Britain to India. Moreover, the Company spent considerable sums to develop geographical and geological knowledge which was intended for the use of potential entrepreneurs. And there were, in Calcutta and Bombay at least, small societies with Indian members which were devoted to the spread of scientific and technical information of all sorts. But efforts to print in the vernacular were almost totally unsuccessful for a long while and this new information and these novel ideas did not spread easily or penetrate deeply.

New institutions that confined uncertainty and reduced risk and cost began to develop before 1850, thus offering the possibility of wider markets. There were improvements in domestic and foreign transport and communications facilities that pre-date the railways – the development of somewhat better roads, the shift from pack animals to bullock carts, improved port and shipping facilities, the speeded postal service. Standardization of currency and the gradual repeal of internal duties, however much these hurt some local groups, had favourable effects on commerce. Banking and insurance facilities began to multiply, particularly in the major ports.

Although a code on the subject of contract did not become law until 1872, case law based on British common law began to emerge. The development of a system of relatively explicit legal expectations favoured the expansion of wider economic activity. The system was certainly not as encouraging as is sometimes suggested. There were large areas of ambiguity and uncertainty. As late as 1866 the Indian Law Commission remarked that contract law afforded the most frequent occasion for litigation. Yet British businessmen could operate with a system of commercial arrangements that was largely their own. It enabled them to work the principle of agency into what ultimately became the Managing Agency system. Some Indians also began to learn how to operate within the essentially novel framework of western commercial principles. We do not yet know how and to what extent the process occurred but it is obvious that they knew about contract, partnership and company law, about shares and the responsibilities of agency. The possibilities of the Managing Agency device, for example, were quickly understood and used in certain spheres. All these developments somewhat increased the
ease with which capital could be mobilized and moved about even though very substantial barriers continued to exist.

The concentrated focus of this expanding modern commerce was in the great presidency towns, notably Bombay and Calcutta. They were not only centres through which flowed an expanding import and export trade, but their growing populations had to be provided with food, raw materials and finished products. The towns were the hubs of merchant networks by which south Asia's most advanced business institutions were linked to up-country sources of supply and centres of demand. These two great towns provided an environment – both the institutions and the demand and supply conditions – which stimulated the first substantial manifestations of modern industrialism.

THE FIRST BURST: 1850–1914

The history of large-scale private factory enterprise between 1850 and the First World War is associated almost entirely with developments in three industries – jute, cotton, and iron and steel. It is only towards the end of this period and during the inter-war years that the Indian industrial structure began to diversify. The development of the three industries reveals a great deal about the complexity of economic response on the sub-continent and it is this diversity that will be emphasized.

The jute industry

Demand for hemp, traditionally used in the west for rope, sail canvas and sacking, greatly increased with the growth of international commerce. The British in the eighteenth century were much concerned to reduce their dependence on Baltic and Russian sources. Efforts to develop supplies from the North American mainland colonies were not very successful and the East India Company went to considerable effort to find south Asian substitutes for Russian hemp. About 1820 some samples of jute were shipped to Dundee, already a major British centre of flax and hemp cloth and sacking manufacture, but the machinery was not suited to the cheap import. At the behest of the British government which was concerned about the high prices of linen and hemp for naval purposes, the Company continued its small shipments. It was not until 1832 that a Dundee firm was able to produce a reasonably satisfactory

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1 Railway workshops were important centres of large-scale production but unfortunately this is an activity about which it is not yet possible to say much. Coal production required expanding amounts of capital and large amounts of labour but very few technical features of the factory system and therefore will not be considered.
material. As costs of manufacturing gradually fell, jute began to take
over as a substitute for sacking and other rough goods. Mechanical
improvements in the 1840s made it possible to apply factory methods to
their production. From then until about 1870 Dundee had an almost
complete monopoly of the world's factory-made jute cloth trade, based
on the cheap Indian raw material.

The expanding foreign demand for raw jute from Bengal was
matched by the growth of an export trade in handloom cloth. The
handicraft sector expanded rather substantially between the late 1830s
and about 1880, not only because of the growth of foreign markets but
also to provide bagging for the increased domestic and foreign
commerce in Indian agricultural products. These developing markets
attracted the attention of George Acland, an English entrepreneur with
considerable experience in south Asia, first in the Company's Marine
Service and then as a coffee planter in Ceylon. He had some sense of
foreign markets and how to organize Indian labour. He also knew his
way around Calcutta and was able to mobilize enough capital to import
spinning equipment and mechanics from Dundee. His small factory, the
first modern jute-spinning firm in India, went into operation in mid-
1855. During the first two years it only spun yarn, about 8 tons a day,
which seems to have been sold to local handloom weavers.

Acland's firm was never very successful but it apparently showed
enough promise to induce the Borneo Company, a trading enterprise in
Calcutta with some idle capital, to start an integrated power spinning
and weaving mill in 1859. This venture, which used handlooms as well
as powerlooms quite successfully, doubled the size of its plant within
five years. In 1862 two other mills were started and in 1866 the Calcutta
partners of a British trading company opened a fifth mill. Between then
and 1873 all except Acland's firm are supposed to have been very
profitable yet there were no further entries. What expansion of capacity
occurred was carried out by the existing mills. The plants were
experimenting with local markets which served as their learning
ground. Economic conditions were generally unstable between the end of
the American Civil War and the early 1870s and potential entrants
apparently found conditions more risky than the established firms.

Jute manufacturing was not a complicated process. Cheap labour was
a very great advantage, one that was not offset as it was in cotton textiles
by cheaper raw materials in other countries. With labour and raw
material costs favouring them, Calcutta trading houses with interna-
tional connections were able in the early 1870s to begin a quick
penetration of foreign markets, first in Australia, New Zealand and
South Africa and then in the US and Egypt. After 1880, Indian flour and
salt bags began to be sold in Britain. Between 1875–6 and 1913–14, the
weight of raw jute exported from India rose by 195 per cent, but the export of manufactured products rose much more dramatically—gunny bag exports rose nineteen-fold and jute cloth exports increased 272 times. With their cheap labour costs, Indian jute mills quickly became the world’s major exporters. One indication of their competitive success is indicated by the way in which they took the US market from the British. Between 1897 and 1913, the value of US imports of jute manufactures from Great Britain declined by 7 per cent while imports from India increased nine-fold. In 1913, Indian mills exported £7.2 million of jute products to the US while British mills exported a mere £1.5 million.

Responding to the expanding export opportunities after 1870, greater capacity was added to existing enterprises and new mills were opened. By the outbreak of the First World War, jute manufacturing was easily one of India’s two important factory industries whether measured by capital invested or employment generated.

Having so briefly described the industry’s expansion to 1914, what can be said about the specific characteristics of that growth? The first point to be made is that the industry was initiated, managed and until the First World War entirely controlled by Europeans. Every mill but one started by an American group in 1914 was promoted by Englishmen or Scotsmen. The mills were typically initiated as rupee firms although a few—only nine of the sixty-four existing in 1914—started as sterling ventures. Of the forty-one companies for which data were available in 1914, paid-up capital plus debentures averaged about Rs. 4 million per firm. Rupee companies tended to be financed mainly by investors in India. Sterling companies probably obtained much of their initial capital in the UK but they offered blocks of shares for sale in India. In all cases the vast bulk of local capital came from British investors—civil servants, other officials and merchants.

Some companies started as private partnerships which ultimately went public; others began as public companies sponsored by Managing Agencies. There were no obvious barriers preventing Indians from starting their own firms or from investing in already established companies. Not only did they not float their own enterprises, they tended to be very cautious about their investments in going mills. It has been suggested that when they did invest, they tended to select companies that already had shown their staying power and put their money in the more secure preference shares.

The only figures we have on Indian participation were presented to

1 We do not know how important domestic demand was or how its share varied. *Investors India Yearbook 1916*, 82, suggests that south Asian consumption of gunny bags plus shipments to Burma between 1906–14 were 22–39 per cent of the amount exported. Most other estimates assume that domestic consumption was about 10 per cent of exports.
Table 7.1

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of mills</th>
<th>No. of looms</th>
<th>Average daily employment</th>
<th>Average no. of looms per mill</th>
<th>Average employment per mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1854-5</td>
<td>1</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>1868-9</td>
<td>5</td>
<td>950</td>
<td>N.A.</td>
<td>190</td>
<td>N.A.</td>
</tr>
<tr>
<td>1883-4</td>
<td>28</td>
<td>9,580</td>
<td>69,179</td>
<td>342.1</td>
<td>2,470.7</td>
</tr>
<tr>
<td>1903-4</td>
<td>38</td>
<td>18,400</td>
<td>123,869</td>
<td>484.2</td>
<td>3,259.7</td>
</tr>
<tr>
<td>1913-14</td>
<td>64</td>
<td>36,050</td>
<td>216,288</td>
<td>563.3</td>
<td>3,379.5</td>
</tr>
</tbody>
</table>

the Indian Industrial Commission by Mr Ironside, a partner in Bird and Co., the Managing Agency that controlled more jute mills than any other firm. He claimed that of 2,894 shareholders in their eight mills, only 423 (14.6 per cent) were Indians at the beginning of the First World War. He estimated that they held a similar proportion of the total capital invested in these firms. This proportion, Ironside thought, was typical throughout the industry but he then went on to suggest that the figures understated Indian holdings.

Gilbert Slater later estimated that about 55 per cent of jute mill shares had come into Indian hands by 1914 but he did not say how he came to that conclusion. D.R. Wallace mentioned two mills founded in the mid-1870s and initially operated by Europeans which had been taken over and worked for varying periods by Indians. And at least one other mill, being built just before the First World War, had an Indian on its board of directors. It is obvious that the industry was not completely financed by Europeans during this first period. But whatever the sources of finance, initiative and control rested in British hands.

The passivity of the Indian capital that did flow into the jute industry before 1914 suggests that the funds came from small investors and rentiers and were not the accumulations of aggressive entrepreneurs. It implies that much smaller quantities of native capital in Bengal were available for industrial ventures than was the case in Bombay. This may have something to do with the fact that the scale of Indian commercial enterprise in eastern India before 1914 also was relatively small. Industrial requirements were typically generated out of commercial accumulations. Apparently merchant capital began to spill over into


industry mainly during and after the First World War. Even though it then began to turn aggressive, it still remained, for reasons that are not entirely clear, more dependent on Europeans than it ever was in the cotton textile industry.

What was the cost of starting a jute mill? Rungta indicates that paid-up capital for registered mills averaged Rs. 933,000 in 1881–2 and no more than Rs. 1.5 million as late as 1900–1. These figures suggest that it cost no more and probably somewhat less to set up a jute mill than to open a cotton mill in Bombay at the same time. If cost of entry into jute manufacturing was not exceptionally great, why was native capital so timid? The usual explanation is that local businessmen suffered from lack of access to credit and marketing facilities. While commercial facilities were certainly imperfect in the second half of the nineteenth century, this was a defect everywhere in India. If that difficulty did not prevent Bombay entrepreneurs from entering manufacturing, they should not have been sufficient cause to bar Bengali or other native entrepreneurs.

Another suggestion is that potential Bengali capitalists suffered from generalized discrimination by European jute manufacturers who worked as a group to make both entry and survival impossible for Indian entrepreneurs. This brings us to the most distinctive feature of the jute industry, certainly when compared with the rampant individualism of the cotton mills—the high degree of cooperation attempted by the companies. But as will become clear, collusion did not keep out new entrants. A more probable explanation of the insignificant role of Indian capital is that rates of return were not high enough to be attractive.

The Indian Jute Mills Association (IJMA) was organized in 1884 to cope with problems of overproduction and excess capacity. The Bombay Millowners Association, founded a decade earlier, never seriously attempted the degree of cooperation undertaken by the IJMA. Between 1886 and 1890 the jute mills worked out the basic techniques—restrictions on time and proportion of looms at work—with which they henceforth attempted to control production.

It is sometimes said that monopolistic agreements worked in the jute industry because Englishmen found it easy to collaborate, and attempts failed in the cotton textile industry because Indians were unable to cooperate. In fact, the different geographical distribution of the two industries explains much of this difference in behaviour. The cotton mills were located all over the country while the economics of the jute industry dictated that it be concentrated in the Calcutta area. It was certainly easier to seek the cooperation of a relatively small number of mills in a concentrated area than of four times as many companies scattered across the sub-continent. But the crucial question is not

whether cooperation was attempted but whether it worked.

These monopolistic arrangements really were not very effective in restricting output. Producing and marketing conditions made it impossible to control the supply of jute products on world markets. Thus they could not keep profits 'fabulously high'. For example, unless foreign mills could be kept from filling the gap left by the restriction of Indian output, world prices could not be kept up. The only way to do this was to deny them access to raw jute which, obviously, the Calcutta firms were in no position to do.

Fragmentary evidence suggests that in the short-run these agreements may have kept Indian prices somewhat higher than they otherwise would have been. Their very low labour costs made it possible for the local industry to engage in some rigging before their prices rose enough to encourage foreign producers to respond to them. But the net effect within India was to encourage more firms to enter the industry and existing mills to cheat by surreptitiously adding more equipment. In effect, these agreements added more capacity and greater potential instability to the industry than otherwise would have been the case.

Certainly, the near tripling of new mills, the 488 per cent increase in looms and 352 per cent increase in employment between 1883–4 and 1913–14, does not suggest that the restrictive policy was particularly successful. (By way of comparison, the very individualistic Bombay cotton mills only increased their loom capacity by 332 per cent and employment by 211 per cent during the same period.) Not only was it impossible to prevent entry of new mills, but the steady increase in average number of looms and workers per mill suggests that existing jute firms were also adding to capacity despite the agreements. An official study, looking back on the situation as it had developed by 1912–14 remarked that 'the mills were working for about half the possible working hours, and the machinery then in existence was capable of meeting a substantially higher demand than India had known before or has known since'.

The biggest Managing Agency Houses were not able to repress these tendencies if for no other reason than that by 1911 the ten most important controlled less than two-thirds of total loom capacity. And the great banks which provided credit to the industry do not seem to have tried, or were unable, to stem the tide. The net result of all these efforts was a lower level of efficiency and a not particularly high rate of profits.

The final test, of course, is the profit rate. W.V. Delden compiled

2 These agreements were so inadequate that in 1911, when business was very bad, a committee of the IJMA was driven to seek out an expert on trust organization from the US where they knew how to organize these matters. Even that desperate move proved abortive.
average dividend rates for a varying but increasing number of jute mills. While these are not the same as net profits, evidence suggests that they come very close to them. In the peak year, 1898, dividends paid out averaged 17.5 per cent. In general, these returns were not higher than in the cotton mills of Bombay city. For example, during the ten years 1905–14, when jute mill dividends ranged between 2.7 and 15.1 per cent and averaged 9.1 per cent, net profits in the Bombay cotton mills averaged 10.3 per cent.

Estimating rates of return in Indian industry is one of the more hazardous occupations, but this comparative evidence suggests that oligopolistic manipulation did not yield very high profits. The IJMA restrictive agreements may look impressive on paper but in the period between their introduction and the onset of the First World War the jute industry seems to have performed no better than did the more competitive cotton mills industry of Bombay city.

One additional characteristic about the industry ought to be noted. While the cotton textile industry quickly developed an indigenous managerial and technical cadre, the jute industry continued to use British supervisors. The technology was as easy to master as in the cotton mills and Indian technicians would have been cheaper. Why did shareholders not press for the employment of Indian technicians and managers as a way of lowering costs and increasing profits? The lack of pressure suggests that the dominating European shareholders, managing agents and others, were willing to take a somewhat lower rate of return than might otherwise have been earned. It raises the possibility that there may have been in India not one effective profit rate but two. The fact that Europeans tended to invest mainly in export-oriented sectors while Indians concentrated on enterprises that depended mainly on domestic markets has already been mentioned. It seems quite likely that Europeans were typically satisfied with rates of return comparable with rates earned in Britain while Indians sought higher rates akin to those available elsewhere within India. This hypothesis implies that the typical European investors felt more secure if European technicians were employed, yet still were able to obtain dividends somewhat better than might be earned in Britain.

The cotton textile industry

The foundations of the modern cotton textile industry were laid in western India at the same time as the jute industry was established in Bengal. But whereas the jute industry was dominated by the foreigner, the cotton industry was essentially Indian in origin, largely controlled by Indian investors, and increasingly administered by native managers and
technicians. Given the widespread impression that industrial development was impossible because of implacable British hostility to Indian competition, the career of the cotton mill industry seems particularly paradoxical. It flourished despite the fact that it confronted the most important, the most internationally aggressive and politically most powerful industry in Britain. Its rapid expansion began only after 1870, yet in four decades the Indian industry had become one of the world’s largest. Unlike the jute industry, its expansion, although certainly assisted by substantial opportunities in foreign trade, ultimately depended on its domestic markets.

It was not foreordained that the modern cotton industry should have been successfully developed by natives. The earliest experiments with machine production of textiles in India go back well before mid-century and all were initiated by foreigners. The first steam-powered mill was erected a few miles outside Calcutta by Englishmen in 1817 or 1818. Two Frenchmen in Pondicherry set up a spinning mill in 1830. Another spinning mill was organized in Broach in 1853 by James Landon, an Englishman long resident in America and then connected with the Bombay government’s Cotton Experiment Centre. None of these enterprises amounted to very much in themselves nor did they trigger progress. Cumulative developments began in Bombay.

The two decades after the end of the Company’s trade monopoly with China were years of commercial expansion. Between 1834–5 and 1855–6 India’s recorded foreign trade tripled in value from £12.3 to £36.5 millions. Bombay and Calcutta were the two entrepôts through which the bulk of this traffic moved. But the economic structure of the two centres was not the same. Foreign trade in Calcutta was effectively dominated by Europeans. The Indian businessmen who made their fortunes in modern-type activities in the first half of the nineteenth century were very few in number and after 1850 this group largely withered away. It was not until much later in the century that new native groups began to enter modern enterprise in Calcutta on a significant scale.

The situation in Bombay was more complex. Commerce with Europe was controlled by British merchants. But the sea-trade of east and west Asia was jointly shared by natives and foreigners. West coast merchants had been active in this trade during the Mughal period and this experience enabled them to take advantage of the expanding commercial opportunities in Asia during the first half of the nineteenth century. With this trade came the multiplication of facilities and institutions necessary to sustain it and Indians participated in their development. As early as 1836 a group of ten Indian and fifteen European merchants organized the Bombay Chamber of Commerce. By the early 1850s, some
Indians were already involved in modern banks, steam shipping along the west coast, and in steam ginning and hydraulic pressing enterprises. A great deal of the export trade in raw cotton and opium, primarily to China, and the re-export trade of British products throughout Asia was handled by Indian merchants in Bombay either on their own or in partnership with, or as agents for, British firms. Indian merchants were also the brokers or agents responsible for the distribution of British products throughout western India. Knowledgeable about the supply of cotton from the desh that entered into international trade and largely involved in the marketing of Lancashire’s yarn and cloth, it did not take these aggressive and successful merchants long to recognize the commercial possibilities of local factory production of cotton yarn and cloth. The advantages were obvious. Raw materials were assured; unskilled labour was easily available; Indian markets for textile products were large and growing; and distance from Britain offered the protection of transport costs. The difficulties were also formidable. The cost of capital was high and experimentation would certainly be expensive. Equipment and inventories had to come entirely from abroad, as did the plans for the enterprise. Labour had to be trained to every part of the work. Coal was extremely expensive so wood, also not cheap, had to be used for fuel.

But in the expansive commercial environment after 1840 there were a number of people willing to consider the possibilities. We know of a number of attempts to finance projects but all had difficulty mobilizing capital. The first successful entrepreneur was C.N. Davar, a Bombay merchant who was active in a large number of enterprises. He was broker to two English commercial firms, his own company traded to the Far East, he participated in promoting four Bombay banks between 1846 and 1863, was active in the formation of the Bombay Steam Navigation Company, organized a company that imported machinery and in early 1854 opened the first steam-powered cotton press in Bombay.

Davar tried to establish a cotton mill as early as 1851 but was unable to muster financial support. Finally, in July 1854 he floated a spinning company with a capital of Rs. 500,000 which was contributed by fifty of the city’s leading traders. Although Davar and a majority of the shareholders were Parsis, the investors reflected the cosmopolitan character of Bombay’s economic life. At least two of the participants, with 13 per cent of the shares, were Englishmen. The company started production in February 1856.

The opportunities must have seemed very obvious. At least two other mills were promoted in 1854 and by the end of 1860 at least ten mill companies had been organized in the city although not all of them were
yet constructed. There were even mills being established up-country, where raw cotton was cheaper and close to the handloom markets. By 1861 one mill was spinning yarn in Ahmedabad and companies financed by Bombay merchants had been formed to put up mills in Surat and Kanpur. Despite the obvious rationale of such enterprises, up-country capital tended to be extremely timid. Bombay merchants generally found it easier to start mills in Bombay.

The early mills were not exceptionally costly ventures by local standards. A company could get into operation in Bombay for an investment of Rs. 500,000 to Rs. 1 million or about £50,000 to £100,000 at prevailing exchange rates. This covered cost of land, buildings, equipment and inventory. Many other types of enterprise projected in the same period involved sums as great or greater. Shares were issued in units of Rs. 2,500 or, more typically, Rs. 5,000. These were not amounts intended to attract the small investor. Yet the number of people in Bombay with sums to risk in promising enterprises was sufficiently great so that when the Oriental mill was floated in 1854 with a paid-up capital of Rs. 1,250,000 divided into 500 shares of Rs. 2,500, no one was permitted to subscribe for more than four shares.

Despite the initial rush of company formations, in 1865 there were only ten mills working in Bombay and a few others scattered elsewhere in India. The American Civil War boom and the subsequent economic collapse stemmed the first burst of growth. The industry’s great expansion began in the early 1870s. We do not know very much about the expansion in other parts of the country but it is clear that the Bombay city group of mills remained the industry’s pacesetter before 1914. Tables 7.2 and 7.3 do not show the great rush with which the Bombay city mills multiplied. None were established between 1865–71. But between 1872–8 thirty-two new mills were erected. Twelve opened in one year, 1874–5. By 1914 there were eighty-five in operation. And in Ahmedabad, which emerged as the second-largest cotton mill centre in India, forty-nine mills were working in 1914.

British mills tended to specialize in spinning yarn or weaving cloth but did not do both. Indian mills, to the contrary, may often have started as spinning mills but they tended generally to become composite enterprises as they did in the US. Initially, their cloth was sold locally. The Manchester Chamber of Commerce—certainly prone to exaggerate its competition—reported in 1867 that 75 per cent of all mill-made cloth sold in Bombay bazaars was locally manufactured. Making use of their overseas connections, these mills quickly found foreign outlets in their traditional Middle East and east Asian markets. As early as 1872–3 government officials reported that they were successfully competing with Manchester in Aden. However, throughout the entire period even
composite mills generally concentrated on producing yarn for handloom weavers. S.D. Mehta estimated that in 1869 nearly 50 per cent (by weight) of all yarn produced by Bombay mills was so sold. As late as 1896–7 to 1900–1, the average mill in India sold over 80 per cent of the yarn it produced to handloom weavers at home and abroad.

The rapid expansion of yarn sales had profound effects on the British industry. In 1888 yarn exports to India reached a peak never again achieved. There was also a shift in the kind of product shipped out. As local mills developed a competitive edge in the coarser products, British

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1 Except where otherwise noted, data on the cotton textile industry come from the annual reports of the Bombay Millowners Association (henceforth cited as BMOA).
producers had to specialize in finer-count yarns. Moreover, they also faced difficulties elsewhere in Asia. British producers had a virtual monopoly of yarn sales in the Far East until the early 1870s. But about 1873 Bombay mills began to invade the China market with great vigour and after the mid-1880s started to drive British yarn out of the field. It was, in fact, the very rapid growth of the China market that made India, particularly Bombay city, so important an exporter. By 1913 India had become, next to Britain, the world's greatest exporter of yarn.

The expanding Far East yarn market particularly influenced the development of the Bombay city mills, encouraging a large number to produce only yarn. While a larger proportion of units elsewhere in India had some looms, the up-country mills averaged more spindles per loom. As a group they apparently were selling a greater proportion of their yarn than were the Bombay city mills as a group. That yarn was being sold almost entirely inside India. Since there were almost no mills specializing entirely in cloth manufacture, it obviously was being sold to handloom weavers whose consumption of this domestic output plus imported British yarn is evidence that the handloom sector certainly had not died. As late as 1913–14 handlooms produced at least 20 per cent of all cloth available for sale in India.

Beginning in the early 1890s, the Bombay industry encountered considerable difficulty. Foreign demand for both yarn and cloth dropped precipitously in 1893. There was also a silver crisis in the same year. Between 1894 and 1896 tariff agitation generated considerable uncertainty. The year 1896 brought bubonic plague and the great flight of people from the city. The unstabilizing effects of this on the labour force were not worked out until mid-1898. And between 1896–1902 there was a series of crop failures in western India which adversely affected domestic markets.

Although their problems seemed to be caused by specific incidents, the Bombay mills were really being subjected to longer-run pressures. The very important yarn markets in the Far East were beginning to be threatened by Japanese and Chinese cotton mills. Indian imports were being displaced for many of the same reasons which explain the rise of an indigenous industry in south Asia despite Manchester's competition. Simultaneously, Bombay city was beginning to encounter more serious competition from mills elsewhere in India. Table 7.3 shows the quite sharp decline in the city's share of textile mill capacity between 1876 and 1914.

Faced by increased competition in both the foreign and domestic yarn markets, Bombay city mills began to use more of the yarn they produced to manufacture cloth. Actually, the shift of mills towards the use of greater proportions of their yarn output for cloth production was a
general tendency throughout the country. During the last four years of the nineteenth century, Indian mills consumed in cloth manufacturing only 17 to 18 per cent of the yarn they produced. By the outbreak of the First World War they were converting 36 to 37 per cent of their own yarn.

The market for Indian cloth was almost entirely domestic. The best estimate is that between 1896—7 and 1913—14 no more than 10 per cent of all indigenous cloth production was sold abroad. Indian mills concentrated on cloth made of coarse yarns. As late as 1913—14 nearly 80 per cent of the yarn produced by Indian mills was of 20s count or below and it is probable that the proportion of cloth made of these yarns was at least as great. This emphasis reflects the relative factor costs, the comparative advantage of using cheap labour and local short staple cotton in a situation where there was very little investment in the bleaching, dyeing and finishing facilities needed to produce finer cloth.

The expansion of Indian mill cloth output inevitably had similar effects on foreign (almost entirely British) imports into India as expanded Indian yarn output did. From the early 1890s, when data become more easily available, the tendencies were obvious. Total yardage imported from England continued to increase, albeit more slowly than before. Product composition changed rather dramatically. Demand for grey goods, typically the coarser varieties, stagnated while expansion was concentrated in the finer bleached and coloured fabrics. British producers were selling more cloth than ever but they were not doing as well as absolute figures might suggest. Indian mills were slowly eroding the British share of the market. Indian mills were doing the same thing to local handloom weavers whose output continued to rise but whose share of the market was declining. This can be seen in table 7.4.

It has already been suggested that the total cost of setting up a cotton

1 Calculated from data in R.D. Bell, Notes on the Indian Textile Industry with Special Reference to Hand Weaving, Department of Industries, Bombay Presidency, Bulletin No. 6, p. 6. All figures are, of course, net of exports. I have assumed that exports of domestic mill and handloom cloth were proportionate to the share each had of total output.
The growth of large-scale industry

Mill in Bombay in the earliest period was no more than Rs. 1 million. As average mill size increased, the costs of entering the industry probably rose but it is likely that at the same time the cost of establishing a mill in India relative to the cost of setting up a similar enterprise in Lancashire actually fell. Declining freight rates, better knowledge about design and construction and the general diminution of risk associated with the growth of the industry certainly must have cheapened the real cost of entry.1

It is difficult to say how much capital was invested in the industry. There was no necessary relationship between authorized and paid-up capital. Moreover, financing methods make those figures understatement of the actual resources committed to an enterprise. A great deal of fixed and working capital was provided in the form of loans of one sort or another. Just before the First World War a knowledgeable industry figure estimated these to average at least 50 per cent of actual capital paid up. Ingenious alternatives were developed to fill the gaps which an imperfect capital market and inadequate bank finance left. Contractors and machinery and stores suppliers were often persuaded to provide services either on long credit or in return for shares which they were able to sell after the mill had become a success. Companies also took deposits from the general public for fixed terms and at set rates of interest. This technique, usually associated only with Ahmedabad mill finance, seems to have been commonly employed in Bombay as well. (It was a device also known in Lancashire.) And finally, the Managing Agency system played a major role, particularly in Bombay. The agent could move resources from one enterprise to another and usually found it easier to get credit from banks than an individual could.

The burdens of the general shortage of capital and credit seem to have weighed as heavily on European as on native businessmen. For example, Greaves, Cotton & Co., controlled seven spinning mills in Bombay city. Altogether, this agency was the largest private industrial employer in India before 1914. Despite its reputation, the firm was not able to mobilize sufficient capital to transform its operations by shifting into weaving when the China market dwindled in the years before the First World War and it finally had to dispose of its mills in 1915.

What is distinctive about the cotton textile industry, certainly by contrast with the jute industry and many other pre-1914 developments,

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1 It was estimated in 1877 that the cost of erecting a spinning mill in Bombay, including spindles and fitting up, was about three times the cost in Lancashire. A mill of 50,000 spindles would have been set up for about £1 per spindle in Lancashire and cost about £150,000 in Bombay. In England, interest on the capital would have been about 5 per cent while in Bombay it would have been about 9 per cent on the larger capital cost. W.W. Hunter, The Indian Empire (1892), 715. There are no similar comparisons available for any later period.
is that it was financed and administered very largely by Indians. The number of sterling companies was very small. Europeans resident in India played a more active but still modest role via their participation in rupee enterprises. All estimates are very casual but they agree that at no time did European capital, combining rupee and sterling investments, ever amount to more than 10 to 20 per cent of total capital invested in the industry. Even in Bombay Europeans played an essentially dependent role. They contributed capital to early Indian enterprises but it was not until 1874, after seventeen Indian-promoted mills had gone into operation, that the first English project started working. Of ninety-five mills started before the First World War, only fifteen were promoted and controlled by Europeans and twelve of these were controlled by two Managing Agency Houses. James Greaves and George Cotton, the partners in one of these Agency Houses, had spent a considerable time in India as cotton exporters before they became manufacturers. Bradbury and Brady, who controlled the other great cluster of European mills, had both come out as mill technicians. The limited involvement of Europeans and the backgrounds of those who did get actively involved in the industry supports a point made earlier. Europeans tended to get largely involved in sectors of the economy which were mainly oriented to external markets or were closely supported by the state. Europeans who did get involved in producing for south Asian domestic markets or for the 'country trade' tended to be resident Europeans with a fairly extensive and specific familiarity with local conditions.

The rather spectacular difference in the character of industrial entrepreneurs in Bombay and Calcutta has long intrigued observers. The vitality of Bombay's native businessmen was attributed to the role of the Parsees. It was argued that Parsees were ideologically and culturally outside the mainstreams of Indian life and therefore were free to respond to new economic opportunities. Parsees, of course, did play an important role in the economic life of western India, particularly in the cotton textile industry. Of the ninety-five mills established in Bombay city before 1914, Parsees were credited with having promoted at least thirty-four, while Hindus promoted twenty-seven, Europeans fifteen, Muslims ten, Jews five (with the classification of four mills being uncertain). But D.P. Pandit and others have now pointed out that Parsees were only one of many economically aggressive groups in western India.1 To the extent that they played an important role in Bombay's industrial development, it seems to have been for reasons that were initially somewhat accidental. They were often merchants in the seventeenth

century and one group became the East India Company's shipbuilders, first in Surat and then later in Bombay, thus developing contacts and knowledge that were specifically useful when the new opportunities appeared. By the beginning of the nineteenth century, when about 10,000 Parsis lived in Bombay, they were already identified as the richest native community on the island. Their foreign trade activities provided the cutting edge of success. By 1835-40, Parsis owned the largest block of shipping tonnage in India, apart from the East India Company. With this kind of head start, the entry of a few Parsi families into cotton textile manufacturing seems inevitable.

Moreover, the emphasis on the promoter's community of origin tends to blur one striking feature of Bombay industrial development, the high degree of inter-communal cooperation involved. For example, the Oriental Mill, the second established in Bombay, is listed as promoted by Parsis. But among those intimately involved in its promotion were two Englishmen, E.D. Sassoon, a successful Baghdadi Jew whose commercial activities already extended from the Persian Gulf to the Far East, and Veerjeewandas Madhowdas, a wealthy Hindu Kapole Bania merchant banker. Such combinations were common. At the same time, many millowners were connected by intermarriage within their own communities.

While collusion among the Calcutta jute mills has been emphasized by observers, cotton-mill owners made similar attempts. The Bombay Millowners Association (BMOA) was founded in 1875, nearly a decade before the Indian Jute Mills Association (IJMA). The industry was too scattered around the country for the association to carry out its original intention of coordinating the activities of all Indian mills. However, the Bombay mills certainly tried to control output through the BMOA during periods of falling prices. They made abortive efforts in the mid-1880s and the early 1890s to limit days of work. And there was at least one serious effort in the early 1890s to standardize wages. All these failed and even Bombay mills gave up collective efforts to rig the market. The widespread nature of domestic production and the ever-present foreign competition made this impossible.

As was to be expected in a situation where the novel technology had to be imported, cotton mills also had to import their first managers and technicians. The contracts of service which these foreigners signed obligated them to take on and train native apprentices. The speed with which Indians moved into higher technical and administrative posts suggests that 'Indianization' was always kept in mind, if for no other reason than the lower cost of native talent. The system was surprisingly effective. As early as the mid-1870s some Bombay mills were entirely staffed by Indians. The only figures we have, again for Bombay, indicate
that in 1895 at least 57 per cent of all technical and administrative posts were held by Indians. Given the fact that the industry was expanding very rapidly, this was an impressive achievement. We cannot say anything about the rate of Indianization elsewhere in the country.

It is frequently asserted that the industry was technologically backward and had no independent adaptive capacities because the entrepreneurs, being merchants rather than technicians, tended to have a 'speculative' rather than a long-run view of the system. The speed of expansion and the rate of Indianization before 1914 should suggest the meaninglessness of such a proposition. Moreover, the successful operation of a firm does not depend on technical knowledge but on economic calculations, on the ability correctly to estimate present and future costs and demands. Technical possibilities are varied and have to be adapted to relative factor costs. The technician can offer the alternatives but he cannot necessarily make the efficient economic choices. There is no basis for saying that the mercantile origins of entrepreneurs in the textile industry affected either the general rate of growth or the industry's adaptability.

Nor was the industry organizationally supine. It exhibited a considerable capacity to move away from the original Lancashire model, as in the shift from mule to ring spinning, the move towards composite spinning and weaving mills, the dramatically different manning schedules, and the use of the limited liability and Managing Agency forms. All these were rational responses to specific needs. The fact of relatively cheap labour and expensive fixed capital and administration encouraged the firms to undertake those adaptations that would permit them to use as much labour as possible. The frequent pre-1914 criticisms that the mills were inefficient because they employed many more workers per machine than did Manchester mills were irrelevant because they ignored the fact that this permitted the Indian factories to work their equipment much harder.1

As up-country mills with even cheaper labour costs came into the industry, Bombay mills had to adapt by changing their pattern of labour deployment and the composition of their output. (It is likely that Ahmedabad mills - the second-largest concentration in the country - also had to make adjustments. Unfortunately, we still know very little about their behaviour.) Complaints about the difficulties of

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1 The failure of an indigenous machine-building industry to appear cannot be attributed to the specific entrepreneurial weaknesses of the textile industry. Rather, it exhibits the frailness of the links between one industrial sector and another. Despite the apparent opportunities, the costs and risks were unfavourable over too great a range to encourage serious large-scale private investments along this line. The availability of cheap machines from Britain and elsewhere was only one unfavourable factor. Both the jute and cotton textile industries opposed any tariffs on machine imports.
such adjustments often lead observers to conclude that the textile industry lacked adequately trained technicians. The Victoria Jubilee Technical Institute was not established in Bombay until 1888 and there were no other institutions of that sort where textile technicians could be trained in the country. But it is not clear how significant such graduate technicians were to the industry. Certainly, the mills were not always eager to employ them. They thought it better that technicians got their training as in Lancashire, via apprenticeships at the workplace. Nor is it obvious that the mills were necessarily wrong. The great problem was not so much the way technical training was provided for this industry but the fact that the whole society suffered from an insufficient investment in human capital, a scarcity that produced adverse effects on the cotton textile industry among others.

In the UK, as elsewhere in the West before 1914, technicians and administrators typically started at the workbench and moved up through the ranks. Widespread literacy made this possible. In India, literacy even in the vernacular tended to be the monopoly of small groups and it was from these that managers and technicians had to be drawn. Industrial development in the West is usually seen as an instrument for increasing social mobility, but in India there were almost no cases where ordinary workers were able to rise into these ranks. The traditional social gap was transformed into a major occupational barrier that could nowhere be mitigated by significant upward mobility. It is possible that this great divide helped inhibit technological innovation, particularly in an era when research and development was still not institutionalized.

The iron and steel industry

Indigenous levels of income, demand and costs of production during the pre-British period were insufficient to stimulate local innovations in iron and steelmaking. The first serious attempts at modern iron production came from Europeans responding to the needs of Europeans. Throughout the late eighteenth and nineteenth centuries, the East India Company and then the Government of India sought to stimulate developments by their demands, surveys, subsidies and direct subventions. Whatever may be said of the scale of this official support, the people who undertook the ventures were stimulated to act primarily by such encouragement. Each of the few undertakings that were seriously attempted indicates in specific ways the overwhelming supply and demand problems faced by all modern ventures in nineteenth-century India.

All early efforts attempted to increase productivity by changing one
or another feature of local ironmaking without actually modernizing the entire process. As early as the 1770s attempts were made to substitute coal for charcoal. Other attempts introduced improved blasts. The most substantial effort was the abortive Porto Novo enterprise in South Arcot. This was promoted by a former Company servant named Heath in the late 1820s and obtained substantial support from the East India Company and the Government of Madras. This firm undertook production at Porto Novo, a small seaport south of Madras, at Palampetti near Salem, and at Beypore on the Malabar Coast. Charcoal was used as fuel and bullocks were employed to power what machinery was used. It is obvious that the technology was not the most advanced but we do not yet know how this enterprise differed from indigenous units. Despite continued infusions of funds, the company never got off the ground. By 1846 its indebtedness to the government totalled more than Rs. 822,000.

Despite two decades of failure, the East India Company remained determined to make a success of the enterprise. The Court of Directors argued that if British capital was ever to flow into India in great quantities — this was seen as the trigger for economic development in India and accounts for official concern — it was necessary to persist. In 1847 protracted negotiations began with the intent of forming a company to operate the defunct enterprise. Sufficient inducements were ultimately provided and in 1853 a group of Madras businessmen took over and started with a capital of £40,000. This effort also was inadequate. Production ended in the early 1860s and the company, by then almost worthless, was dissolved in 1874. Thus ended what George Watt in 1906 called 'the earliest and perhaps most persistently worked concern in India'. Why did these determined efforts fail? We cannot be certain but it is possible to identify characteristics which adversely affected survival.

The enterprise was designed to produce charcoal iron mainly to serve foreign markets. The plan to use charcoal was not in itself unrealistic. Not only was there no coal in south India where the known iron deposits were, but charcoal iron was still the major product of every North Atlantic producer except Britain. Wrought-iron rather than cast-iron or steel everywhere predominated throughout the first half-century. But the firm was unable to operate economically in any market with the technology it chose. Its costs of production, including fuel, were too high to compete in foreign markets. And it could not compete in domestic markets. It had no particular advantage in the villages. Traditional methods of ironmaking produced a material that the village blacksmith could work easily and which was suitable for crude agricultural tools and firearms. Nor was the enterprise able to produce
the material needed for the variety of new needs on the sub-continent – bridges, buildings, factories, machinery and railways. The effort to compete by upgrading indigenous technology with modest improvements in bellows and forging equipment – this is what seems to have been involved – was destined to fail.

Good-quality iron could be made with charcoal but competitive success could not be built upon indigenous experience. Even successful charcoal iron operation required a shift to much larger-scale techniques than were ever contemplated. Most important in the long run was the fact that charcoal iron in the second half of the century was giving way before the innovations which used coke as fuel and dramatically reduced the cost of producing iron and steel in very large-scale units.1

The early projects, particularly the Porto Novo Company, were designed to produce iron mainly for sale abroad. With the development of railways and other public works and the rise of modern industry after mid-century, India became a large importer of iron and steel. Plans began to focus around the possibilities of import substitution. The Bengal Iron Works Company, the first plant designed along modern lines, was formed in 1874 to take advantage of this growing demand and the high prices of imports. It began with a capital of Rs. 1 million, an amount which promptly proved to be a serious underestimate of what was needed. The plans were very casually drawn and imprecisely calculated. By the time the company's first blast furnace and foundry came into operation in 1877, it had been forced to borrow an additional Rs. 400,000 at 10 per cent. Not only were costs of production very much higher than had been estimated, but world iron prices were falling rapidly. It was discovered that the plant had been designed on too small a scale and along outmoded lines. In 1878 the Government of Bengal estimated that it would take an added investment of Rs. 3.2 million to put the operation firmly on its feet. The company claimed that such a sum could not be privately mobilized without a government guarantee of a 5 per cent rate of return. This was refused. Unable to survive without this additional subvention – the Railway Branch had supported the original plan by contracting to buy one-third of planned capacity for a period of three years at a price which by the time of delivery was 25 per cent above the market price – the company shut down in 1879. But because the Government of India felt strongly about the need to develop

1 Technicians continued to devote attention to the possibilities of producing charcoal iron in south India in the 1890s. As late as 1908, George Watt still felt that 'the whole subject needs to be even still further investigated before it can be regarded as satisfactorily disposed of one way or the other'. And at the end of the nineteenth century the Tatas thought their project might produce charcoal iron. It was only when they did not find forests sufficient to warrant the establishment of a charcoal furnace in the Central Provinces where they had mineral concessions that they turned their attention to working with coal.
a modern iron industry, it bought up the defunct firm in 1881 at something less than half the value of the original investment and operated it as a public enterprise until 1889.

During this period the firm produced a variety of products for railway, public works and agricultural uses. The plant was not expanded but it was reorganized and, it is claimed, made more efficient. It is impossible to be clear about this until the financial accounts have been examined. Apart from the fact that the state took over the enterprise at bankrupt prices, we do not know the extent to which its prices 1882–9 reflected full costs. Home government doubts and pressures from private entrepreneurs forced the Indian government to dispose of the firm but not until it had found a group with capital sufficient to promise a fair chance of success.

In 1889 the Bengal Iron and Steel Company (BISCO) was incorporated in England with a capital of £150,000. It paid the insignificant sum of £31,000 for a property that included 1,500 acres of land bearing large coal and iron deposits, two blast furnaces with an annual capacity of 7,000 tons and a foundry. The company was obligated for a nominal rent on a 999-year lease and a royalty of As. 5.5 per ton on all coal sold. It proposed to expand capacity to 20,000 tons of pig-iron.

By 1894 BISCO had expended its initial capital and desperately needed more. As was the case with all earlier ventures, the scheme was grossly undercapitalized to begin with and had no easy access to cheap additional finance. Despite the great experience of the company’s directors and advantages with which they began, they were brought near to defeat by the wide areas of uncertainty on the cost side. The government was approached for two subsidized loans. Neither was granted but the state did reduce the royalty charge on coal by two-thirds and it also agreed in 1897 to buy 10,000 tons of iron annually for ten years at rates 5 per cent below the prices at which English manufacturers could land it in India. In effect, the state guaranteed to take well over half the output of the enterprise for a decade at prices at least 50 per cent above the cost of production in the UK, this difference being roughly the freight and landing charges from Britain to India. This offer encouraged the firm to carry out its expansion. By 1901 it produced annually about 25,000 tons of pig- and cast-iron products, mostly being sold to government

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1 The directors were all Europeans. They included a member of a Glasgow iron manufacturing firm, a former high official in the Indian Public Works Department, a partner in a large firm of contractors and the managing director of the Bengal-Nagpur Railway. The general manager was a distinguished metallurgist who had operated the plant when it was a state enterprise.
departments. The firm was unable to expand sales to the private sector very much.

In 1907 the government refused to renew its 1897 agreement to buy 10,000 tons of iron products a year. It is not clear why. There is some evidence that BISCO was a very high-cost producer. It was badly located and the quality of both its ore and coal were unsatisfactory. During the next few years it underwent considerable reorganization, getting access to better ore and coal supplies and improving its efficiency. In 1913 it produced over 59,000 tons and in 1914 more than 72,000 tons of iron products.

As late as 1900 only pig-iron was being produced in India by modern methods for commercial purposes but it was increasingly recognized in official circles that it was also desirable to develop a modern domestic steel industry. In 1897 the Director-General of Statistics pointed out that the market for pig-iron was limited and that the great expansion in Indian demand was for steel. As an aspect of its wider efforts to stimulate private enterprise, Curzon’s government eased the rules for the issuance of prospecting licences and mining leases in 1899. Responding to these more favourable signs, BISCO offered to undertake steel production if it could be assured that the government would not start its own enterprise in competition and would agree to buy 15,000 tons of steel rails a year for five years. The government refused to guarantee steel purchases but it did agree in 1903 to subsidize a rate of return — 3 per cent on a capital of £50,000 — for ten years. The project was a total failure. The plant went into production in November 1904 and closed down permanently in 1906.

The details are not clear but it seems that the plant was far too small to be efficient and was grossly undercapitalized, even allowing that the ironmaking part already existed. The original works had not been designed for expansion into steelmaking and location and quality of both coal and iron were inferior. The speed with which the project was planned and got under way and the equal speed with which it was shut down suggests that both technical and economic planning by the European entrepreneurs was grossly defective. And this is the impression one gets of all British iron and steel projects projected in the century before the First World War.

Of course, official policy did not strongly support the development of an iron and steel industry before 1900. There were no protective tariffs and a most ineffective stores purchase policy. But these are not sufficient to explain the entrepreneurial behaviour one encounters throughout the

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1 Too little attention has been paid to the generally high phosphorous content of Indian iron ore which imposed very severe production constraints. In fact, the manufacture of steel by modern methods would not have been easy until after the development of the basic steel process in 1876.
nineteenth century. Considerable government resources were committed to geological surveys, cost estimates, infrastructure development, and to subsidies and purchase guarantees of various sorts. There was also a very substantial transport cost advantage. Yet we are left with a sense of the ramshackle character of the technical and financial proposals and the impression that plans were formulated and operations conducted in impulsive, speculative and unsystematic ways. This may be an unfair impression. It may be that even as late as the end of the nineteenth century information about markets and costs was still too imperfect to permit any more than this kind of risk-taking. We will not know until the record has been carefully studied. But we do know that the first great Indian venture was planned and calculated in a much different way.

J.N. Tata was probably the most creative of the first generation of Indian industrial entrepreneurs. A member of a family of successful Bombay merchants, his first industrial successes were cotton textile mills in Bombay and Nagpur. His interest in iron and steel was apparently triggered in 1882 when he came across an official report on the Chanda district which identified large deposits of high-quality iron but also noted a lack of suitable coal in the region. He briefly negotiated with the government about the use of coal from a state-owned mine but the conditions he set were not acceptable and the proposal was quickly dropped. His interest in a swadeshi iron and steel enterprise persisted and the more favourable state attitude at the turn of the century encouraged him to become more active. But favourable official policy was not enough, as the abortive BISCO expansion proved. Ultimately the issue was whether the amounts, quality and location of coal, iron ore, limestone and water supply in relation to one another and to potential markets were such as to make possible large-scale economic operations. It was against these difficulties that all previous efforts foundered and it was to the solution of these problems that the Tata organization addressed itself. The record of these efforts suggests why so few such ventures were even attempted at any earlier stage.

Tata got concessions in 1901 to prospect in the iron-rich Chanda district. His agents set to work to identify suitable coal and iron deposits as well as potential copper and manganese beds. India had no laboratories so samples of coal had to be sent to England, Germany and the US to determine their coking potential. In 1902 Tata spent nearly two months in the US seeking advice from the elite of American large-scale industry. He was put in touch with four distinguished engineers with world-wide experience who became active consultants to the project.

One of these men spent four years making detailed field surveys. The object was to find an economic juxtaposition of coal, iron, limestone and
water supply that would keep down transport costs in manufacturing and marketing. The only suitable coal was found in the Jheria field of Bengal. Fortunately, very rich iron deposits were found in Mayurbhanj, a well-located thinly populated tributary state of Orissa. The ore could be mined by stripping techniques that required very little capital and could use absolutely unskilled labour. The ore could be delivered at less than one-half the cost of production of any other major ore-producing district in the world. The site of the plant at what is now Jamshedpur was only 152 miles from Calcutta, India's largest domestic market for iron products and also the major outlet to foreign markets.

During the planning and construction phases, the Tatas received extensive official assistance—geological surveys, reduced transport costs, eased access to land and water rights, simplified import arrangements for construction materials, and an agreement that the state would buy 20,000 tons of steel rails annually for ten years at import prices. To assure the necessary quality, the government provided a laboratory at the new plant and an English metallurgist to operate it.

The Tata firm spent about £35,000 in its initial explorations. What sort of market warranted such a large initial private risk? Their estimates were based entirely on replacing imports, making no allowance for local consumption that was still satisfied by iron produced by traditional methods. They planned initially to specialize in three classes of product—foundry iron for castings, steel rails, and bars—which were simplest to produce, demand for which was growing rapidly, and in which they expected to be able to beat all competition. The Tatas planned to expand into the production of more complex products only as the company developed its technical skills and competitive abilities. In all this, the Tatas had a major marketing advantage. The family firm, Tata Sons and Company, was one of the largest iron and steel importers and dealers in India. It knew the local market intimately. It also had offices in China and Japan where it expected to find an important demand for both steel and foundry iron.

The plant was conceived along very conservative American standards. Few concessions were made to the quite different factor price relations in India but a few adjustments to local circumstances had to be made. For example, in the US, furnaces of identical design were capable of producing about twice as much as in Jamshedpur but only at the cost of burning out refractory linings more rapidly. By working the furnaces at a slower pace, the life of the linings, which were very expensive and difficult to replace in India, was prolonged. The plan to reduce costs by recovering coal tar and sulphate of ammonia from the coking process was dropped when it was discovered that there was no market for them in south Asia. It was planned to work on three eight-hour shifts rather
than two twelve-hour shifts as was standard in the West, not to take advantage of available labour but as a concession to the climate.

The Tatas initially planned to obtain all or most of the capital in London. Despite favourable reports about the quality and quantity of raw materials and the careful planning of the enterprise, negotiations in 1906 and early 1907 proved fruitless. The Tatas were unable to get solid financial support for their project. A major factor seems to have been their unwillingness to yield control. London investors were not prepared to risk their capital in ventures controlled by Indian entrepreneurs even with the reputation of the Tatas. Only then did the Tatas turn to India. The Tata Iron and Steel Company (TISCO) was registered in August 1907 with a nominal capital of Rs. 23,175,000 (approximately £1,630,000) and the entire amount was subscribed to the Bombay firm by some 8,000 people in three weeks. There were a number of reasons for this rather surprising success. Not only was Bombay a major commercial centre where people were prepared to take some investment risks in modern enterprises, but since 1904 the city had been in the midst of a great boom. At the same time, India generally was engulfed by an enthusiastic swadeshi agitation to which the Tatas appealed in their prospectus. The Tatas, known for a record of financial competence, caution and golden successes, were an ideal group to take advantage of this fortunate conjuncture of conditions.

In 1911, the first year for which there is a surviving list of stockholders, there were over 11,000 recorded.¹ Most of them were small investors. Over 10,000 each held shares valued at less than Rs. 1,500. The value of holdings was very concentrated. Four members

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<tr>
<th>Community</th>
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<th>Excluding Tata family holdings</th>
<th>Community population as proportion of total Bombay city population</th>
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1 I am indebted to Dr William Johnson for generously giving me his original research materials from which this and other data are derived.

of the Tata family held 13 per cent of the value of all shares and fifty-nine other people held 30 per cent more. The 378 largest shareholders, less than 4 per cent of the total number, were responsible for 64 per cent of the entire investment. Practically, the small shareholders had access only to the more secure preference shares. Equity capital in the form of ordinary and deferred shares was allocated in advance to the quite small group of very wealthy participants.

The financing of TISCO once again exhibited the truly cosmopolitan nature of industrial finance in Bombay. Parsis invested more than any other community but this was partly at least a consequence of the fact that they had a high per capita income relative to other groups in Bombay. The very largest shareholders came from every major community. Many of the great millowners were involved. And fifteen rulers of princely states held among them 13 per cent of the share capital.¹

Labour had to be recruited from all over India into a district thinly populated mainly by tribal people. Skilled technicians, of course, had to be imported. Plans called for a general manager, eight departmental superintendents and assistants, 100 foremen and 200 skilled workers – about 325 foreigners for an initial plant workforce of about 4,000. The plant was able to operate with fewer. Peak employment of foreigners was 229 in September 1924, after which their number declined. There were no special difficulties organizing and training the Indian labour force, a process which merely took time. The main deviation from original plans was that it remained larger than projected. TISCO Manning levels never came close to those in the West. This was a matter that was regularly raised at Tariff Board enquiries. There is some evidence that relative factor price differences encouraged a greater use of labour wherever possible.

The entire plant had to be imported. Greater inventories and much more elaborate facilities for repair and fabrication were needed than in a more developed economy. The company had to provide housing and general urban facilities for a very large part of its workforce on its own properties. These requirements make it difficult to compare TISCO and steel operations in western countries at the same time.

Groundbreaking occurred in February 1908. The first iron was made in December 1911 and steel was poured early the next year. In 1913–14 the company produced 155,000 tons of pig-iron and 78,000 tons of steel ingots. In 1917–18 the plant produced 188,000 tons of iron and 181,000 tons of raw steel. There were no exceptional technical or organizational problems. Planning and design had been done so well

¹ The Maharaja Scindia of Gwalior also subsequently provided a large part of the working capital. Princely investments were obviously of considerable importance in the expansion of modern industry but their precise role is not yet clear.
that by the time the First World War broke out the enterprise had gone beyond its initial teething difficulties. But it had taken the Tata organization many years and millions of rupees to go from initial conception to the beginning of production.

**Other industries**

The great famines of the mid-1870s and the late 1890s forced the Raj to recognize the need for economic diversification. One gets the sense that policymakers were somewhat smug about the progress achieved, particularly between 1890 and 1914. The rapid growth of the jute and cotton mill industries, coalmining and railway activity, the beginnings of modern iron and steel production and large-scale hydro-electric schemes all seemed promising. Nor was this entirely unwarranted. It has been estimated that between 1880 and 1914 large-scale industrial production expanded at an annual average rate of between 4 and 5 per cent, a rate of growth that compares favourably with other parts of the world. Nevertheless, this entire sector still represented an insignificant proportion of total economic activity in India. Manufacturing industries produced only 3.8 per cent of the national income in 1913–14 and total factory employment of 1,023,000 (including at least 200,000 workers in seasonal factories) still represented less than eight-tenths of 1 per cent of the total workforce.

Cotton and jute were not only still the largest but also the most rapidly growing manufacturing industries. Woollen mills, breweries, and papermaking factories were recorded as large-scale industries not because they were of great economic significance but only because the size of individual units brought them within the purview of the government’s statistical net. Together, those three industries employed barely 10,000 workers in 1914. Their experience and that of one or two other industries is useful in illustrating how limited domestic demand and high costs of production in India worked against their rapid development.

In the case of wool, India was not a particularly efficient producer so there was no resource incentive for an industry to develop to satisfy foreign demand. Climate limited internal demand and much of that could be satisfied by handlooms. Modern woollen mills were organized to satisfy military, police and railway requirements for uniforms and blankets. In 1881 the Government of India directed that where possible Indian manufactured cloth should be bought instead of European

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products. Official, railway and private demand combined was not large enough to support more than seven factories which in 1913–14 together employed fewer than 5,000 workers. The two largest at that time were one in Cawnpore with 2,000 employees and another in the Punjab with somewhat more than 1,000. These and another in Bangalore, all set up in the late 1870s, were located in important hand-weaving areas where raw material was available and where outlets for machine-made yarn could offset instabilities in the demand for machine-made cloth. The two North Indian firms used handlooms as part of their equipment for many years, thus minimizing the fixed capital risked. These larger mills were European financed and managed but a couple of smaller enterprises in Bombay Presidency were established by Indians. An important Bombay city mill was founded by an Indian with considerable experience in the cotton industry.

The breweries constituted no more substantial development. At the peak in 1902 there were twenty-seven breweries, nearly all European enterprises, employing about 6,500 people to meet a demand largely from the military and resident European civilians. Sustained until 1907 by government contracts, changing tastes and increasing foreign competition led to a slow decline. At the outbreak of the war there were only twenty-one breweries with about 1,300 workers.

Unlike the woollen industry which possessed no particular resource or demand advantage and the breweries, which catered almost entirely to foreigners resident in the area, the paper industry would seem to have had both factor supply and expanding demand advantages. The country had a variety of pulping materials. Transport costs were an important consideration. Moreover, the development of modern administration, the growth of literacy and the expansion of commerce all stimulated the consumption of paper products.

There are no good figures on the demand for paper products in the nineteenth century. We know that between the beginning of the century and the First World War the combined value of Indian production and imports rose rapidly. In the last year before the war, Indian mills satisfied about 41 per cent of a total demand of Rs. 20 million. The government was a major consumer, buying well over 80 per cent of its requirements from Indian mills in the years immediately before the war. How, then, do we explain the industry’s small scale and concentrated character?

Modern papermaking methods were introduced into India in the second quarter of the nineteenth century but it was not until the government changed its policy in the 1870s and encouraged local purchase of paper that a modest factory industry began to develop. It was never terribly successful. Even though private demand expanded and central government purchases between 1901 and 1913 took an
average of 47 per cent of the value of total output, this was not sufficient to sustain profitable operation for all the mills. Two large mills in Bengal failed, one in 1902 and the other in 1905, and both were taken over by the Titaghur Mills at very low prices. Despite this advantage and the scale at which the Titaghur Company was thus able to operate—it had a capacity of 18,000 tons, about 60 per cent of the all-India total, and sold about 6,000 tons a year to the government—it was not very efficient. At the beginning of the war, local products cost on the average about 15 per cent more than the landed price of equivalent imports. Mills elsewhere in India were small. The only reasonably profitable one was an Indian firm in Lucknow which had an annual capacity of 4,000 tons. Located near a fairly adequate supply of pulping materials and sheltered by distance from foreign and Bengal competition, the firm was sustained by official contracts but made no effort to improve or expand its output.

One manifestation of the industry's difficulties was the problem of mobilizing adequate capital. While this was a complaint of the Indian mills, it was not their problem only. Sponsorship by a major European Managing Agency House did not guarantee adequate capital. For example, there was an abortive effort by F.W. Heilgers and Company, the managers of the Titaghur Mill, to establish a company to manufacture strawboard. Promoted in 1906, it quickly proved a failure and was liquidated in 1910. In fact, the Titaghur Mill itself had been started by another European firm which was unable to find adequate capital to keep the enterprise going and had been forced to transfer its agency rights to Heilgers.

But the problems in the industry were not merely financial. They were associated with the technological demands of modern papermaking. Two major factors were involved. One was the continually expanding scale needed for efficient production. The economies of scale not only favoured very large foreign producers but also required domestic companies to expand in order to lower costs of production. This generated persistent problems of excess capacity from the 1880s. Even with large guaranteed sales to official agencies, the growth of private and government demand was inadequate to sustain efficient producers. In fact, one distinctive feature of this tiny industry, if bureaucratic complaints are to be believed, was the constant efforts of the firms to collude and keep up prices to its official customers.

The other problem was the changing raw material base. Indian mills generally used jute mill rejects and sabai grass as their raw inputs. As long as foreign producers depended on similar pulping materials—rags, straw, waste paper—Indian producers were not at a great disadvantage. But the introduction in Europe of exceptionally cheap mechanically and chemically produced wood pulp radically transformed the situation.
After 1890, cheap Scandinavian and German paper not only sharply undercut British producers but also created some fundamental Indian problems. There were stands of timber and potential alternatives such as bamboo in India but these were not conveniently located. Indian mills thus laboured under the need to haul cheap raw materials very long distances, a handicap that could not be overcome by marginal adjustments in railway freight rates. The lack of complementary chemical industries and the high cost of power added to the burden. In other words, the industry suffered from an array of high input costs across the board. Even the growing use of imported wood pulp could not lower costs sufficiently, particularly when the domestic markets were too small for the scale which modern equipment required.

So much for industries which, however small, were officially recorded as part of the large-scale factory sector. For purposes of comparison, let us briefly examine the tanning, vegetable oil pressing and glassmaking sectors, where conditions for factory production also seemed favourable but which retained their small-scale character.

India was one of the world’s greatest sources of skins and hides and government stores policy actively favoured the industry. Yet while every stage of tanning and manufacturing in the West was being organized into extensively mechanized large-scale enterprises using sophisticated chemical processes, the sub-continent remained almost entirely a handicraft producer of leather goods and an exporter of raw or only half-tanned products. What little factory-scale leather goods manufacturing existed in 1914 was designed mainly to supply local military demand.

A government factory was established in Cawnpore in 1860. Subsequent large enterprises were private, typically European, responses to the stimulus of official demand. Cawnpore became the major centre of production and Europeans were the prime entrepreneurs but at least one important firm using machinery was established in Bombay by a Khoja merchant. Yet as late as 1913 the large-scale sector for producing leather goods employed a mere 7,800 people. Civilian needs, except for the import of 2 million pairs of shoes and boots and some industrial products, were almost entirely produced by very small enterprises using handicraft methods and selling their output locally.

The tanning of skins and hides throughout the nineteenth century was also carried out by small-scale traditional methods. The bulk of exports were shipped in raw or pickled form although in the second half of the nineteenth century an increasing proportion of south Indian skins and hides were shipped in a tanned or semi-tanned state. Late in the century the much cheaper and better chrome tanning method was developed in the US and spread to Western Europe and Britain. A
peculiarity of the method—apart from requiring chemical sophistication and extensive use of mechanical equipment—was that the material had to be finished immediately after it was tanned. This meant that leather producers in importing countries reduced their imports of tanned and semi-tanned products from India and increased their imports of raw or pickled skins and hides.

Scholars have given much attention to the efforts of the Madras government to develop chrome tanning techniques in an experimental factory beginning in 1903 and to the sale of that enterprise in 1910 because of complaints that it was competing with private enterprise. The Indian Industrial Commission wrote in 1918 that the factory had been ‘prematurely closed’ and that ‘the progress of chrome tanning in India had been much slower than . . . would have been the case had Government assistance in pioneering the industry been given for a longer period’. The Commission was concerned with the technical experiments but not with the question of economic viability. Earlier private efforts to chrome tan for the export market had failed. The Madras experiments were not designed to produce a product that would compete abroad but rather to supplant the inferior country-tanned leather used for local purposes, particularly for water bags. It was hoped that by selling longer-wearing chrome leather bags to peasants, more raw skins and hides would become available for export.

Whatever the technical possibilities, the Industrial Commission admitted that the economic outlook was not promising. The domestic market for chrome leather proved very disappointing. Galvanized-iron buckets were much cheaper and peasants preferred them. There was little hope for the rapid expansion of other domestic demand. The Industrial Commission concluded that the ‘Indian tanning trade must, therefore, look to foreign markets . . .’. If the market was abroad, why was there so little effort to shift to the production of chrome leather for export?

Much has been made of tariff discrimination by importing countries against manufactured leather. But there were no tariffs in Britain and that market for fully tanned leathers was wide open to producers in India. In fact, before the First World War the British were importing from Germany alone nearly £2 million-worth of these tanned leathers, most of the raw materials for which probably came from India.

It has been suggested that Indians stayed out of the industry because of religious scruples, but much of the capital in the eight small tanneries capable of producing chrome leather during the First World War was probably Indian. Another possibility is that Indians were reluctant to venture in an activity that depended so thoroughly on foreign markets for its success. Whatever the inhibitions on native businessmen, why didn’t Europeans enter the field? It appears from the various experi-
ments that the cost disadvantages were very formidable and were not to be overcome by modest research and development expenditures by the state. The chrome tanning process required a sustained flow of superior raw skins and hides and these could not be obtained without a major upgrading of the raw material market. Chrome tanning had to be conducted on a large scale calling for more capital than most businessmen, Indian or European, were willing to risk. And finally, the skills which were required did not exist in the economy. Traditional tanning could be handled by untutored mistris but chrome tanning depended on highly skilled technicians who could cope with the chemistry involved. These problems individually and collectively were more fundamental than could be handled by the Madras government.

India was one of the world’s greatest oilseed producers but did not develop much of a modern oil-pressing industry. Domestic oil demand was satisfied by the traditional ghani worked by hand or bullock which remained reasonably competitive although in some parts of the country small ‘chucker mills’ powered by oil engines began to spread after 1900. International demand for vegetable oils rose rapidly after 1870 but was largely met by the shipment of oilseed. For example, in 1913—14 India’s oilseed exports totalled about £16 million while export of oil amounted to less than £400,000. This has been attributed to the tariffs importing countries imposed to protect their manufacturers. But there were no tariffs in Britain and yet businessmen in India did not respond to this enormous market. As in the case of leather, the answer probably has to be found in the demand and cost factors that were at work in India.

One basic difficulty seems to have been the lack of an adequate domestic demand for the oilcake residue as a cattle feed. Lacking a significant market for the cake, costs could not be allocated between the two products but had to be borne entirely by the oil sold abroad. At the same time, the cost of shipping oilseed was significantly less than the cost of shipping the manufactured product. In other words, the combination of inadequate domestic demand and the specific structure of production and transport costs combined to work against significant industrialization of this activity. (The absence of large Indian markets for wheatbran similarly inhibited the growth of large mechanized mills to produce wheat flour for foreign markets.)

Handicraft glassmaking was a widely spread activity in India, producing crude beads, bangles and other minor items for local sale. From the early 1870s there were a number of efforts to introduce modern glassmaking methods into the country - one estimate suggested that as much as Rs. 5 million was ventured by 1914 - and all were commercial failures. In 1914 only two or three firms survived and they were able to produce only soft bangle and lantern glass.

Modern glassmaking required a high degree of skill and scientific
knowledge, little of which existed within India. Expensive technicians and managers had to be imported. These people had difficulty adapting what they knew to Indian conditions. There were problems of finding satisfactory raw materials, particularly sand suitable for fusing, and training local glassblowers. Enterprises were invariably undercapitalized. They often suffered from too little fixed capital and they always lacked enough working capital to carry them through the long initial period of technical and organizational experimentation. The Indian Industrial Commission stressed the haphazard way in which the various firms were conceived and how little attention was given to proper location in relation to raw materials and markets. These defects in planning and execution were typical of European-financed projects—some with official patronage and sponsored by European managing agencies—as they were of Indian enterprises. Alfred Chatterton further commented: ‘The experience available from the failures that have already occurred does not seem to have been made much use of . . . ’ by those who followed.

We have identified three industries—leather, vegetable oil and glass—where conditions, superficially observed, seemed to favour industrial development which did not take place. Looked at overall, no single factor can be blamed for the difficulties which limited private economic investment. There is little evidence that caste or social values inhibited Indian enterprise in any explicit manner. European entrepreneurs did not turn their backs on any obvious business opportunity. Government policy was not vigorous but it was not as hostile to local development as has often been suggested. The problems which faced all businessmen were more explicitly economic. Complex problems of high cost inputs and great areas of uncertainty existed. New technical knowledge and labour skills were expensive to obtain and expensive to pass on. Natural resources were not always easily available. The siting of an enterprise often raised complex and ambiguous calculations of appropriate location. Much more capital was required by these pioneers than was usually allowed for. But this was because capital was costly. Even if the initial capital was found, the market was often unwilling or unable to provide added support at anything resembling the rate on which profitable operation of the enterprise had initially been calculated. In this general way one might argue that it was a shortage of capital that restricted the rate of industrial growth. But this is merely a shorthand way of saying that the system was impoverished in all its dimensions. Simultaneously, the structure of demand was rarely entirely favourable. General poverty dampened the vitality of the domestic market. And the absence of a rapidly growing indigenous market meant that businessmen could not enter international competition with the
advantages derived from domestically generated economies of scale. India in other words faced that distressing paradox, the high cost of being poor.

All this explains why modern manufacturing industry in India was only weakly developed before 1914. Nevertheless, we should not ignore certain features which did offer some promise for change in the future. There were, for example, ninety-one railway workshops with 113,000 workers and thirteen arms and ammunitions factories which employed another 13,000. These units were organized on a large scale and often used power machines although neither organization nor equipment was particularly up-to-date. There were a few big private engineering firms in the larger cities but the public enterprises were the most important centres of mechanical engineering.

One, of course, also gets a strong sense of the limits of these activities. The arsenals and ordnance factories produced a very restricted range of military requirements; the armed forces depended on British sources for heavy equipment. The railway workshops could repair and maintain rolling stock and rights-of-way and assemble carriages but were not allowed to construct locomotives or build any but the smallest and most crude prime movers. The shops and arsenals could train local labour to fairly high skills but did not provide Indians with opportunities to develop sophisticated technical and supervisory capacities.

The introduction of electricity ought also to be mentioned. Electric power was used in the 1880s by firms who worked their own generating sets. Over time, more dynamos and electric motors were installed. We do not know how much energy was generated for these private uses. The first general hydroelectric scheme was set up in 1896 to light Darjeeling and another began to furnish power to the Kolar goldfields in 1903. The major electrical development before 1914 was the organization in 1910 of the Tata Hydroelectric Power Supply Company to generate and sell energy to Bombay enterprises. The project required an original investment of Rs. 17.5 million. For a long period it looked as if the funding would have to come from either British or American sources. Only when the Governor of Bombay threw his official weight behind the scheme did local financiers and the ruling princes of some of the major native states support it.

The project was a large financial venture by Indian standards but it was technically modest. By the beginning of the First World War there were individual units in the West that were capable of generating as much energy – 30,000 h.p. – as the entire Tata scheme. The cost of the energy generated – relatively cheap in Bombay where all other fuels were expensive – was not absolutely cheap. It was distributed at Rs. 0.55 per unit, between 5.5 and 11 times the price at which power was sold in
some parts of North America and Scandinavia. The high cost was partly a function of the small scale of the scheme but it was also attributable to technical requirements. The monsoon pattern required the construction of larger water-storage facilities than were required in those parts of the world where rainfall was more equitably distributed throughout the year. Whatever the causes, we must keep in mind that high fuel costs were another burden that adversely affected the rate at which industrial growth could occur.

The internal combustion engine was another source of power. In the years before the First World War small engines began to be employed not only in major urban areas but also in the countryside. They were used as mechanical pumps to lift water and as prime movers to grind flour, clean and polish rice, press oilseed, cut timber, and gin and press cotton. This suggests a degree of rural non-agricultural development about which we know nothing. The extension of electric power and the internal combustion engine was certainly very modest before 1914 but their true significance cannot be fairly estimated until the subject has been investigated.

THE FIRST WORLD WAR

Scholars have devoted considerable attention to the significance of the two great wars of this century on political developments in India. No such attention has been paid to the economic consequences. Yet it is hard to believe that these wrenching events can have been so unimportant to the capacity and functioning of the economic system. But whatever future research will reveal, current knowledge leaves us with a rather simple story. The outbreak of the war had some initially disruptive effects on manufacturing industry but its general impact was favourable if limited. India became the supply centre for all Allied operations east of Suez and Indian troops served in Europe. These activities sharply increased aggregate demand in India. At the same time, foreign competition declined sharply. Germany and its allies vanished as suppliers of that average 9 per cent of Indian imports they had provided in the five years before the war. The Central Powers also ceased taking about 14 per cent of India's exports. Exports were almost entirely agricultural raw materials; imports were largely manufactured products. The Indian industrial sector benefited by the curtailment of the foreign competition and by the reduction of foreign demand for many factory inputs.

A large proportion of Britain's resources went into war activities which reduced the supply of those consumer products and capital goods which previously flowed to India so lavishly. Military demands for
shipping further limited British exports to India. In the years before the war, Britain provided about two-thirds of India's total imports, but after 1914 she was unable to maintain either her share or the absolute value (despite increased prices). Although both the US and Japan took some advantage of Britain's predicament—imports of American goods into India rose 147 per cent and Japanese goods 801 per cent between 1913–14 and 1918–19—the money value of all imports into India remained roughly constant and the real value, of course, fell significantly.

While Indian industries were blessed by a great expansion of demand and a decline in foreign competition, they were unable to expand existing capacity much or extend the variety of industrial activities until after the end of the war. In one sense, this was a burden that every nation at war bore. There were only two exceptions. The US was a neutral for the first part of the war and was also so exceptionally productive as to be able to expand its industrial capacity while meeting its direct military commitments. The Japanese, though nominally at war, devoted few resources to direct military purposes. With a per capita income in 1913 more than two and a half times that of India's and with a much more advanced economic structure, they were in a position to take advantage of the world demand gap as Indians were not.1

It quickly became apparent that India's pre-war industrialization had occurred along a very narrow front. Only with the opening of TISCO had India ceased being totally dependent on foreign steel. The capacity of this new enterprise was quite small—about 120,000 tons of rails and smaller sections annually—and it could not produce plate, sheet or other important industrial shapes. While there was a significant engineering capacity for repair and maintenance, no machine-building facilities of any consequence existed. Virtually all plant, equipment, stores and

1 Maddison, Economic Progress and Policy in Developing Countries, 18, is the source of the 1913 comparison of Japanese and Indian per capita incomes. The figures are in US dollars at 1965 prices.

<table>
<thead>
<tr>
<th></th>
<th>1870</th>
<th>1913</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>209</td>
<td>366</td>
</tr>
<tr>
<td>India</td>
<td>103</td>
<td>138</td>
</tr>
<tr>
<td>Pakistan</td>
<td>88</td>
<td>117</td>
</tr>
</tbody>
</table>

If the sub-continent is considered as a whole, Japan's advantage was even greater than mentioned. Moreover, in 1870, at the very beginning of its modern development, Japan's per capita income was already at least twice that in India. This suggests the inappropriateness of considering Japanese development as a model of what would have happened in India had political conditions been different. For some details of Japan's readiness to respond to wartime opportunities, cf. D.J. Tata, 'The Japanese Industrial Invasion', Papers Submitted to the Eleventh Industrial Conference, Bombay, December 1915, 1–22.
prime movers came from abroad. The economy was also desperately short of skilled labour, technicians and supervisory skills. A large proportion of what existed pre-war was European. War demands reduced the number of British managers and technicians. Technical talent from the continent – there was a fair amount of it – was interned. As a consequence of all these handicaps of resources and skills, indigenous enterprise was able to expand only marginally during the war.¹

But if industrial capacity could not expand much before 1918, the profits of existing enterprises rose generously, particularly in the last half of the war and for a few years thereafter. A boom psychology stimulated entrepreneurial expectations and encouraged plans to expand old companies and to form new ones as soon as hostilities ended. This enthusiasm did not end with the Armistice. It continued more or less until this new capacity in India and elsewhere in the world began to flood the market with its output.

The jute mills

The rapid rise of military requirements eliminated the plague of excess capacity which had bedevilled the pre-war industry. To the general need for gunnies and hessians was added a growing demand for sandbags and cornsacks. As supplies of flax from Russia dwindled, jute had to be substituted in canvas production. Official policy also encouraged the export of manufactured products directly to the war zones rather than as raw jute to Dundee. The effect of this can be seen in table 7.6.

The manufacturers were favoured by relatively low prices for raw jute and by easy supplies of labour. Although six mills were floated during

<table>
<thead>
<tr>
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<th>1913–14</th>
<th>1918–19</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(£)</td>
<td>(%)</td>
</tr>
<tr>
<td>Raw jute</td>
<td>20,551</td>
<td>52.7%</td>
</tr>
<tr>
<td>Manufactured jute</td>
<td>18,849</td>
<td>47.3%</td>
</tr>
<tr>
<td>Total</td>
<td>39,400</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

¹ Experiments were made to cope with the shortage of skilled foreign labour. In some engineering and military factories, skilled jobs were divided into clusters of simpler tasks for which unskilled workers could be trained quickly. However, it was difficult to work nightshifts because foreign supervisors were not available and Indians had not been trained for these jobs.

the war period, only one was able to get into operation. Small amounts of equipment were built in Calcutta but most of it had to be bought abroad. It was very hard to get – Bagchi estimates that in 1918–19 the real value of jute machinery imports into Bengal was only 22 per cent of 1913–14 – and the industry was only able to add about 4,000 looms (11 per cent) to its capacity.1 Greater output came mainly from working the mills longer and employing more labour. Under these circumstances, profits rose dramatically. We still do not know what happened to ownership. There are some suggestions that Indians increased their holding of shares in the industry but it is clear that control and management remained in British hands.

The cotton mills

The cotton textile industry reflected all the general wartime features, as can be seen in table 7.7. In effect, mills operated equipment at forced draft by using more workers. Employment data do not include workers on second and third shifts but other evidence indicates that very few mills worked more than one. It is not clear why there was no great effort to work multiple shifts. The BMOA opposed double-shift working, claiming that Bombay could not find housing for the additional workers. But this does not explain why mills elsewhere did not move towards double-shift operations.

Overall, the number of mills and spindles declined slightly and the number of looms increased by 13 per cent, with the great bulk of that expansion occurring in Bombay. In effect, the mills responded to the heavy demand for cloth and the relative shift in prices that favoured cloth against yarn by cutting back on their sales of yarn to handlooms and to foreign markets in order to produce more cloth. Mehta’s figures exaggerate the shift because of the length of time involved but they are

<table>
<thead>
<tr>
<th>Mills</th>
<th>Spindles (thousands)</th>
<th>Looms (thousands)</th>
<th>Average daily Employment (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombay</td>
<td>elsewhere</td>
<td>Bombay</td>
<td>elsewhere</td>
</tr>
<tr>
<td>1913–14</td>
<td>85</td>
<td>186</td>
<td>3,009</td>
</tr>
<tr>
<td>1918–19</td>
<td>85</td>
<td>173</td>
<td>2,934</td>
</tr>
</tbody>
</table>

1 A.K. Bagchi, Private investment in India 1900–1939, Table 8.1 col. 4, p 273.
2 The data come from Bombay Millowners Association, Annual Report.
Table 7.81 Annual average consumption of available yarn by sector 1906-7 to 1908-9 and 1916-17 to 1918-19 (Million lbs.)

<table>
<thead>
<tr>
<th></th>
<th>1906-7-1908-9</th>
<th>1916-17-1918-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total available yarn</td>
<td>689 (100%)</td>
<td>685 (100%)</td>
</tr>
<tr>
<td>Consumed by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton mills</td>
<td>162 (23.5%)</td>
<td>338 (49.4%)</td>
</tr>
<tr>
<td>Handlooms</td>
<td>282 (40.9%)</td>
<td>194 (28.3%)</td>
</tr>
<tr>
<td>Exports</td>
<td>245 (35.6%)</td>
<td>153 (22.3%)</td>
</tr>
</tbody>
</table>

Table 7.92 Sources of cloth supply 1906-7 to 1908-9 and 1916-17 to 1918-19 (Annual averages in million yards)

<table>
<thead>
<tr>
<th></th>
<th>1906-7 to 1908-9</th>
<th>1916-17 to 1918-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total available cloth</td>
<td>3,893 (100)</td>
<td>3,418 (100)</td>
</tr>
<tr>
<td>Produced by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian mills</td>
<td>667 (17.1)</td>
<td>1,301 (38.0)</td>
</tr>
<tr>
<td>Imports</td>
<td>2,154 (55.3)</td>
<td>1,397 (40.9)</td>
</tr>
<tr>
<td>Handlooms</td>
<td>1,072 (27.6)</td>
<td>720 (21.1)</td>
</tr>
<tr>
<td>Per capita availability</td>
<td>12.6 yards</td>
<td>9.8 yards</td>
</tr>
</tbody>
</table>

instructive (table 7.8). The increased consumption of yarn by mills made it possible for them to increase their cloth output very substantially but they were still unable to fill the entire gap left by the 35 per cent decline in imports. As a result, per capita cloth availability fell by about 22 per cent. We do not know how the curtailment of Indian yarn sales affected foreign handlooms, but table 7.9 makes it clear that domestic handloom output suffered substantially, falling by one-third between the two periods. This was a blow from which the handicraft sector never fully recovered.

Indian mills had trouble producing finer-count yarns, mainly because domestic cotton was unsuitable. As late as 1918–19, only 2.6 per cent of their total output was 31s count or above. When English imports fell off, that finer market was partly taken over by Japanese mills using American cotton. Nevertheless, during the war, Indian mills made a rather substantial upward shift within the range in which they were dominant. Between 1913–14 and 1918–19, yarn output in the 20s and

2 ibid., 126.
below group fell from 77.7 per cent to 67.8 per cent while it rose in the 21s–30s range from 21.1 to 29.6 per cent of total output. It is generally accepted that the shift in yarn counts was accompanied by a similar upgrading of average fineness of cloth.

Profit data are notoriously imprecise but it is very clear that wartime profits rose rapidly. One reputable estimate suggests that in 1920–1 Indian mills made more than sixteen times the annual average profits of the period 1909–10 to 1913–14. In Bombay, during the six years 1917–22, gross profits averaged 75.6 per cent on a steadily rising paid-up capital base. And net profits, after depreciation and Managing Agency commissions were deducted, averaged 60.5 per cent. The boom encouraged a great deal of profit-taking which often expressed itself in organizational change. Between 1913 and 1922 at least thirty-eight of the eighty-two mills in Bombay city changed Managing Agencies or became public limited liability companies or both. (By 1922, only three mill companies were privately held.) Mehta states that mills outside Bombay, because they tended to be smaller, less broadly held and because the share market was very imperfectly developed, tended not to undergo the same structural changes.

Iron and steel

As with other industries, iron and steel firms worked in a favourable environment in which foreign competition diminished sharply while demand rose. Steel imports declined from a peak of 1.04 million tons in 1913–14 to 165,000 tons in 1917–18. At the same time there was an increasing demand for military and railway needs. By 1914, the Tata Iron and Steel Company had passed through its initial production problems. The war period proved that it was technically possible for an Indian firm to produce high-quality iron and steel at more or less competitive prices. Steelmaking skills could be transmitted by foreign technicians to native workers. TISCO’s steel output rose from 31,000 tons in 1912–13 to 181,000 in 1917–18, well above original designed capacity. Initially planning to sell a very large proportion of its pig-iron output, the company by adding marginally to its steelmaking equipment was able to convert more pig into steel. The company did well financially but its profits were held down because the vast bulk of its output — between April 1917 and December 1918 an average of 81 per cent of its production — went for official uses at fixed prices. Its general success and the expectation that post-war domestic demand for steel would continue to grow as it had before the war encouraged TISCO to undertake a great expansion programme in 1917 that was to be completed by 1920 or 1921. Despite the official priority it was given, the ‘Greater Extensions’ were not completed until 1924 by which time economic conditions had
drastically altered. The consequences of this expansion are better described at a later point.

TISCO remained the only commercial steel producer in India. But industrial capacity was expanded by the growth of the Bengal Iron and Steel Company. After years of difficulty, BISCO was able to solve many of its technical problems by gaining access to better ore sources in 1910. It slowly increased its capacity and during the war, while the Tata firm concentrated mainly on steel, BISCO manufactured pig-iron. In the five years 1909–13, its iron output averaged about 48,400 tons a year; during 1914–18 that figure rose to about 77,400 tons. BISCO also produced small amounts of sulphuric acid and ammonia as byproducts which were converted into ammonium sulphate. Lacking a market for this fertilizer among Indian farmers, it was exported to sugar plantations in Java and Mauritius. There was some discussion between the managing agents, Martin and Company, and British interests about expanding into steel production but nothing came of the idea.

Other developments

As a consequence of wartime shortages and necessities, a variety of things were manufactured in India that had never been produced before. Many were merely stopgaps; others were projected as hopeful experiments with a more substantial future. The Indian Munitions Board was organized at the beginning of 1917 to coordinate India’s role as a military supplier and to take steps to overcome those industrial frailties which had never before been so obvious. For many, Indians as well as Englishmen, who before the war had seen Indian industrial development as an evolutionary process occurring in the stately fashion for which England’s lengthy development was the model, there occurred a significant ideological shift. This was to be reflected in the growing postwar pressure for an active government commitment to industrial development. But few of the wartime manufacturing novelties carried much weight and can be ignored here.

The only other manufacturing development of note was the emergence of large-scale enterprises producing Portland cement. The technology of modern cement-making with rotary kilns had been employed abroad as early as 1885. But apart from an attempt in Madras in 1904 which lasted only a few years, nothing occurred in India until just before the war when two plants were promoted, one at Katni in the Central Provinces and another at Porbunder in Kathiawar, both of which came into full production in 1915. A pre-war producer of hydraulic lime at Bundi in Rajputana became the third firm in the new industry when it began manufacturing Portland cement in 1916. By 1918 the three plants were able to produce 84,000 tons, about half the amount imported in
1914. Although imports in 1918 were only about 16 per cent of the 1914 total, no other firms entered the industry during the war. But the profitable working of three ventures encouraged a flurry of investment afterwards.

The three firms were each promoted by a different Bombay group. Each reflected the cosmopolitan financial characteristics so typical of large-scale enterprise in Bombay. The major investors were people also active in cotton mills, in the hydroelectric scheme, in banking and commerce. The Managing Agencies of two companies were European but the directors were almost all Indians; the third enterprise also had an Indian managing agent.

We can understand why so little expansion occurred during the war itself. Equipment was hard to import. But why was development in cement production so slow before? Large-scale development was not inhibited by foreign production. Transport costs clearly favoured local production. The answer, it appears, is that the demand for Portland cement was very small. Most construction in India did not require the strength and exact specifications of Portland cement. Even the larger projects of railways, port trusts, municipalities and public works departments could use a locally produced hydraulic cement made from kankar which was generally satisfactory and quite cheap. In other words, the real competition to Portland cement were the limes and natural cements (not to say stone and clay brick) that could be locally produced with cheap labour and without great investment in machinery and other fixed capital. The Katni Company, for example, required a subscribed capital of Rs. 2 million. Apparently, the great Bombay public construction boom during the years before the war did offer the promise of a steady local market for Portland cement that warranted this kind of investment. Only then were entrepreneurs willing to take a new risk.

Now that we have examined the development of specific industries, what can be said about the total output of large-scale manufacturing industries during the First World War? Sivasubramonian’s estimate, the only one available, suggests that the real value of manufactured output rose about 11 per cent between 1913–14 and 1915–16 and then fell back so that in 1918–19 real output was no more than it was in 1913–14. Despite the care with which his calculations were made, the path he describes is inconsistent with all other evidence not least being the substantial increase in industrial employment.
a host of provincial and local investigations as well as a regular output of information from public and private agencies. This is a legacy greater than exists for all but a few other countries and we have only barely begun to mine it. However, the circumstances for which the material was generated creates three fundamental problems of analysis.

These materials were all typically concerned with well-established activities and sectors. They throw strong light on the more firmly entrenched elements of the economy but tend to keep in the shadow any newly emerging features whether rural or urban. This makes it difficult to develop a satisfactory perspective on the period.

Second, the great inquests, particularly the tariff enquiries, were preoccupied with the effects of foreign competition on Indian industrial development. This leads to an exaggeration of the international aspects even though foreign trade was not a very large part of total activity in the economy.

The third difficulty is that the great investigations typically dealt with problems experienced by grievously affected industries. They tend, therefore, to stress the pathology of a situation rather than typical or ordinary functioning. This, too, makes it difficult to achieve a balanced perspective. To date no one, not even D.R. Gadgil in his seminal survey, *The Industrial Evolution of India*, has been able to capture the relationship of individual parts to the whole of the economic system. In fact, one of our difficulties is that we do not know the extent to which the parts truly were integrated into a whole. It was only after 1947 that policymakers became aware of how grossly exaggerated was the impression that the domestic economy had been largely commercialized and simultaneously integrated into the world economy by railways and imperialist policies in the nineteenth and twentieth centuries. We have not yet asked how or in what ways the limited specialization and division of labour within the Indian economy affected the forces of both supply and demand on which large-scale industrial development depended.

These three biases in the material combine to encourage the impression that India suffered as much from the Great Depression as did Western economies. Deeper examination of the evidence suggests that a substantial re-emphasis and reinterpretation of the economic history of the inter-war era may be called for. For example, the few quantitative surveys of manufacturing performance that are available point up certain surprising features about the period. Based on the series published by David Meek, Folke Hilgerdt compared India’s development with the rate of growth of manufacturing output in twenty-eight countries elsewhere in the world. Table 7.10 distinguishes the five major ones with which Indian performance is often compared. The countries in table 7.10 are listed in order of the relative magnitude of their
Table 7.10  
Index of growth of world and selected country manufacturing activity, 1913 to 1936-8 (1913 = 100)

<table>
<thead>
<tr>
<th>Annual average for period</th>
<th>World</th>
<th>USA</th>
<th>Germany</th>
<th>UK</th>
<th>USSR</th>
<th>Japan</th>
<th>India (7)</th>
<th>India (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1920</td>
<td>93.2</td>
<td>122.2</td>
<td>59.0</td>
<td>92.6</td>
<td>12.8</td>
<td>176.0</td>
<td>118.4</td>
<td>114.8</td>
</tr>
<tr>
<td>1921-5</td>
<td>103.2</td>
<td>129.3</td>
<td>77.7</td>
<td>76.4</td>
<td>41.1</td>
<td>203.3</td>
<td>122.1</td>
<td>119.1</td>
</tr>
<tr>
<td>1926-9</td>
<td>138.9</td>
<td>163.6</td>
<td>112.2</td>
<td>92.6</td>
<td>134.9</td>
<td>289.8</td>
<td>146.6</td>
<td>157.0</td>
</tr>
<tr>
<td>1930</td>
<td>136.9</td>
<td>148.0</td>
<td>101.6</td>
<td>91.3</td>
<td>235.5</td>
<td>294.8</td>
<td>144.7</td>
<td>154.2</td>
</tr>
<tr>
<td>1931-5</td>
<td>128.2</td>
<td>117.8</td>
<td>90.6</td>
<td>92.3</td>
<td>393.2</td>
<td>365.8</td>
<td>174.8</td>
<td>178.7</td>
</tr>
<tr>
<td>1936-8</td>
<td>185.0</td>
<td>166.6</td>
<td>138.3</td>
<td>121.5</td>
<td>774.3</td>
<td>528.9</td>
<td>230.4</td>
<td>250.7</td>
</tr>
</tbody>
</table>

Percentage increase of output in the period

| 1913 to 1926-9 | 38.9 | 63.6 | 12.2 | -7.4 | 34.9 | 189.8 | 46.6 | 57.0 |
| 1926-9 to 1936-8 | 33.2 | 1.8 | 23.3 | 31.2 | 474.0 | 82.5 | 57.2 | 59.7 |

Table 7.11  
Average annual rate of increase of Indian manufacturing output  
1913 to 1926-9 and 1926-9 to 1936-8

<table>
<thead>
<tr>
<th></th>
<th>Hilgerdt-Meek series (%)</th>
<th>Sivasubramonian series (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913 to 1926-9 (13 years)</td>
<td>3.6</td>
<td>4.4</td>
</tr>
<tr>
<td>1926-9 to 1936-8 (11 years)</td>
<td>5.2</td>
<td>5.4</td>
</tr>
</tbody>
</table>

manufacturing industry in 1913. The table shows changes in levels of output. The second estimate for India (col. 8) is calculated from S. Sivasubramonian's estimate, which is the most recent comparable series.

Table 7.10 shows that during the inter-war period Indian manufacturing output grew at a rate well above the world average, being exceeded during the whole period by only four of the twenty-eight other countries for which Hilgerdt had data – the USSR, Japan, Finland and the Union of South Africa. India's manufacturing output grew faster than that of the UK, the US and Germany. If one divides the period roughly in half – 1913 through 1926–9 and 1926–9 through 1936–8 – India's growth rate was higher than the world average in each period although by a smaller amount in the 1920s than in the 1930s. In the 1920s there were ten countries where the rate of growth was more rapid than in India. All of these except Japan, the USSR and the Union of the South

1 Hilgerdt, *Industrialisation and Foreign Trade*, 130–1, for cols. (1) through (7). Col. (1) represents the average for twenty-nine countries. Col. (8) is from Sivasubramonian, 'National Income of India', 226, col. (5).
Africa fell well behind India in the second period, which suggests that the harshness of the Great Depression may have been felt more by other countries than by India.

One cannot be certain that the difference in the rate of growth of Indian output in the two periods is significant, but table 7.11 shows that the average annual rate of increase was higher in the 1930s than in the 1920s. The figures suggest that Indian manufacturing activity was not affected by the inter-war depression in the same way as was the rest of the world. Sivasubramonian’s basic data show that between 1918–19 and 1938–9 manufacturing output had occasional setbacks but only once – 1922–3 and 1923–4 – did the index fall for two consecutive years. There were declines in 1930–1 and 1933–4 but none thereafter. Indian manufacturing output did not fall during the 1937–8 recession as it did in the rest of the world. It is possible that India’s ties to the world economy have been exaggerated and that manufacturing performance generally depended more on what occurred within India than outside.

The figures also support the view that tariff protection may have played some role in maintaining the level of manufacturing output. Too much should not be made of the point yet. Sivasubramonian’s ‘all manufacturing’ series includes much activity that was not protected. The performance of individual industries within India does not show any clear correlation between the level of tariff protection and the rate of growth. It is likely that the vitality of domestic markets was more important than tariffs in determining rates of industrial growth.

Railway freight movements, generally a useful measure of economic activity in a market economy, show a slight decline in the early 1930s but

<table>
<thead>
<tr>
<th>Years</th>
<th>Index</th>
<th>Per cent change over previous period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1909–1913/14</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>1919/20–1923/4</td>
<td>127.4</td>
<td>27.4</td>
</tr>
<tr>
<td>1924/5–1928/9</td>
<td>156.6</td>
<td>22.9</td>
</tr>
<tr>
<td>1929/30–1933/4</td>
<td>146.7</td>
<td>(–)6.3</td>
</tr>
<tr>
<td>1934/5–1938/9</td>
<td>166.8</td>
<td>13.7</td>
</tr>
</tbody>
</table>

The growth of large-scale industry

Table 7.13 Value of individual industry output as percentage of all large-scale factory output 1913–14 and 1938–9 (in constant prices)

<table>
<thead>
<tr>
<th></th>
<th>Cotton</th>
<th>Jute</th>
<th>Sugar</th>
<th>Paper</th>
<th>Cement</th>
<th>Woollens</th>
<th>Iron and steel</th>
<th>Matches</th>
<th>Total of listed industries</th>
<th>All other industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913–14</td>
<td>36.2</td>
<td>15.0</td>
<td>1.6</td>
<td>0.4</td>
<td>–</td>
<td>0.3</td>
<td>0.8</td>
<td>–</td>
<td>54.3</td>
<td>45.7</td>
</tr>
<tr>
<td>1938–9</td>
<td>29.0</td>
<td>8.0</td>
<td>3.4</td>
<td>0.5</td>
<td>1.0</td>
<td>0.3</td>
<td>4.4</td>
<td>1.2</td>
<td>47.8</td>
<td>52.2</td>
</tr>
</tbody>
</table>

certainly nothing of catastrophic proportions. The real meaning of these data will not become clear until they are disaggregated and the movement of manufactured products is separately examined.

The significance and pattern of manufacturing changed somewhat during the inter-war period. Sivasubramonian’s data show that manufactured output as a share of national income exactly doubled during the period between 1913–14 and 1938–9, rising from 3.75 to 7.5 per cent. Its composition also changed somewhat, as table 7.13 shows. The most obvious feature was the diminishing significance of the two greatest industries, cotton and jute. The combined value of their activity fell from 51.2 to 37 per cent of total manufactured output. (Employment in the two industries fell marginally less, from 51.8 to 39.7 per cent.) Thus, although their total output rose during the period, they grew less rapidly than other manufacturing activities. The diminished significance of the jute industry—although its continuing importance as a foreign-exchange earner should not be forgotten—is particularly noteworthy.

No new industries grew to replace cotton or jute in significance. In 1938–9, iron and steel output, next in importance, constituted little more than half the value of jute output. Overall, the newer industries—cols. (3) through (8)—increased their share of total output from 3.1 to 10.8 per cent. And ‘All other industries’—many of them relatively new—grew slightly in significance. In effect, India’s large-scale manufacturing structure was expanding and also diversifying during the inter-war period but not at a rapid rate.

Jute Manufacturing

The jute mill industry benefited from wartime demand and suffered only from its inability to expand capacity very much. When the war

---

1 Calculated from Sivasubramonian, ‘National Income of India’.
Table 7.14 Expansion of the Indian jute mill industry 1913-14 to 1938-9

<table>
<thead>
<tr>
<th>Year</th>
<th>Mills</th>
<th>Looms</th>
<th>Average daily Employment</th>
<th>Mill consumption of raw jute (thousand bales)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913-14</td>
<td>64</td>
<td>36,050</td>
<td>216,288</td>
<td>N.A.</td>
</tr>
<tr>
<td>1918-19</td>
<td>76</td>
<td>40,043</td>
<td>275,500</td>
<td>5,139</td>
</tr>
<tr>
<td>1923-4</td>
<td>89</td>
<td>49,088</td>
<td>330,408</td>
<td>5,148</td>
</tr>
<tr>
<td>1928-9</td>
<td>95</td>
<td>52,409</td>
<td>343,868</td>
<td>6,047</td>
</tr>
<tr>
<td>1933-4</td>
<td>99</td>
<td>59,501</td>
<td>257,175*</td>
<td>5,004</td>
</tr>
<tr>
<td>1938-9</td>
<td>107</td>
<td>67,939</td>
<td>295,162*</td>
<td>6,463</td>
</tr>
</tbody>
</table>

* Calendar years 1933 and 1938.

ended and industrial plant could be imported, more capacity was added. This included the opening of the first Indian-financed and controlled mills, Birla (1921) and Hukumchand (1922). Profits dropped from the wartime highs but remained impressive through 1929–30, a year when net profits as a percentage of paid-up capital averaged 27.4 per cent. In the next year profits dropped to 7.2 per cent and with the exception of 1934–5 and 1935–6 remained below 10 per cent throughout the 1930s. In the 1920s jute mills did much better than Bombay cotton mills and probably better than the cotton mill industry in the rest of the country, but during the 1930s they seem to have suffered from lower rates of return than the cotton mills or than the average of all industries.

The prosperity of the jute mill industry was a function of the costs of inputs (mainly raw jute, labour and capital) and the price at which the manufactured products could be sold. Labour and capital costs tended to be reasonably stable and predictable; it was the price of raw jute that was most volatile. Changes in world traffic in agricultural products largely determined the demand for jute mill products. Effectively, the mill operator was gambling on the price of raw jute. Doing well or badly here was decisive for the profitability of individual mills. This explains the industry’s preoccupation with the accuracy of official crop forecasts.

As was true before the First World War, the economic and geographical character of the industry encouraged efforts to reduce instability. Although its products were sold mainly abroad, India’s exceedingly cheap unskilled labour was an effective bar to foreign competition on a large scale. In the late 1930s the Indian jute industry had about 66,000 looms while Germany, the largest single foreign producer, had only 11,000 and Dundee a mere 8,500. The cost

1 Statistical Abstract for British India for various years. Employment data for 1933 and 1938 from Amiya Kumar Bagchi, Private Investment in India 1900–1939 (1972), 277.
advantage gave Indian mills some apparent scope for rigging market price before it paid foreign producers to expand or foreign consumers to seek substitutes.

Domestic factors also favoured attempts at private cooperation. The mills continued to be concentrated in the narrow strip along the Hooghly which ran north and south through Calcutta. As late as the end of the inter-war era, 95 per cent of the looms were still there. And geographical concentration was matched by financial and managerial concentration. In 1927, eighty-four mills were organized into fifty-nine companies which were administered by only twenty-three Managing Agencies. In fact, 50 per cent of the loom capacity was controlled by five agents.

During the inter-war years the Indian Jute Mills Association (IJMA) continued to sponsor restrictive agreements within the industry. These made use of techniques well known before 1914 — limitations on hours and/or days of work per week, limitations on the number of weeks worked per month, the sealing of looms already in place and restrictions on adding new capacity. But apparently the agreements were not successful in restricting the growth of either capacity or output adequately. For example, table 7.15, which divides the inter-war era into the pre-1928–9 period of general prosperity and the post-1928–9 period of general depression, shows how capacity and output grew. During the first period, capacity and output grew mainly via the addition of new mills. During the second period, increased capacity came less from the entry of new units than from the expanded number of looms per mill.

Private efforts to raise the industry's average profit above the competitive rate were bound to fail because entry was not difficult and there were no effective penalties for violating agreements (except expulsion from the IJMA). To the extent that restrictive covenants kept prices and potential profits higher than they might otherwise have been, new producers entered the industry. Moreover, existing mills were tempted to violate the agreements and take advantage of the self-restraint of others. For example, when the IJMA carried out a census in

<table>
<thead>
<tr>
<th>Period</th>
<th>Mills</th>
<th>Looms</th>
<th>Employment</th>
<th>Mill consumption of raw jute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1918–19 to 1928–9</td>
<td>+25.0</td>
<td>+30.9</td>
<td>+24.8</td>
<td>+17.7</td>
</tr>
<tr>
<td>1928–9 to 1938–9</td>
<td>+15.8</td>
<td>+29.6</td>
<td>-14.2</td>
<td>+6.9</td>
</tr>
</tbody>
</table>
1930, it discovered that its members were under-reporting their loom capacity by more than 10 per cent and were also under-reporting their inventories. The main consequence of these restrictive agreements was that the industry suffered from continual excess capacity.

Given the inability to restrict entry or control expansion, each private agreement in turn was doomed to a fairly quick demise, in fact if not in form. There was continual friction between non-member and member mills of the IJMA as well as within the association. The industry therefore made frequent but fruitless attempts to get the state to give statutory force to its restrictive agreements. Throughout most of the industry’s history the Bengal government might apply informal pressures on uncooperative producers, but it was unwilling to do more. As late as 1935 it refused to write an IJMA working-hour agreement into law, charging that such a step would merely encourage even more excess capacity and higher prices to consumers. The government argued that only ruthless competition would solve the industry’s problem. Ultimately, in September 1938, it was forced to intervene, apparently because the industry’s instability had particularly disruptive effects both on the peasants who produced the raw jute and on the industry’s workforce. An emergency ordinance was issued which limited hours of work and controlled the use of machinery. The state threatened to pass formal legislation to deal with the crisis in its own way if the companies did not come forward with a scheme to reorganize and rationalize the industry. Faced by this drastic alternative, the IJMA was able to put together an agreement which seems to have worked until 1947, possibly because the Second World War broke out just after it was negotiated.

There are many puzzling features in the inter-war history of the industry. The fairly steady expansion of capacity was the consequence of the attempts at price maintenance but what is not clear is why the pre-1930 expansion came mainly via an addition to the number of units while the post-1930 expansion came both from new units and an increase in capacity. It is also difficult to explain why there was so much expansion in the 1930s when average profits were so low. Whatever the causes, table 7.16 shows that the number of looms per mill increased, employment fell and labour productivity rose substantially.

Questions also arise about the working of the Managing Agency system. It is usually assumed that each Managing Agency applied common policies to all the companies it managed, that this necessarily led to relatively equal rates of return and that all the units managed by a single agency adopted a common line on restrictive practices. Even casual investigation throws doubt on this view. Lokanathan and M.M. Mehta record wide profit variations among mills managed by the same agent. And policies varied. For example, Begg, Dunlop and
Company managed four jute companies. In 1928 two of them refused to join the IJMA's restrictive scheme until specific concessions were made to them. We do not know why this was so but it is probable that individual mills, built at different times, varied in their equipment, costs of operation and efficiency. Thus, each mill faced different problems. Each company was a separate legal and financial entity and had its own body of shareholders whose interests had to be satisfied. Even if a Managing Agent held important blocks of stock in each of the units it managed, the differences in appropriate market policy had to be compromised. Unfortunately, we do not know how conflicts of interests among units administered by the same agent were resolved.

We do not know what proportion of jute mill shares were held by Indians before 1914. After the war, they became increasingly important shareholders. The quantitative data are not good but it appears that while in 1913 only one Indian was a director, by 1939 a majority of the companies had one or more Indian directors. But only a few firms were truly Indian in that they had both Indian boards of directors and Indian Managing Agents. G.D. Birla and S. Hukumchand established the first such enterprises just after the First World War. Another cluster of Indian companies were established in the late 1920s and others were registered in the 1930s. Yet at the beginning of the Second World War they still accounted for a very small proportion of the industry's capacity, certainly less than 15 per cent of the looms.

There is no evidence that conflict among mills grew more sharp with the appearance of Indian-managed enterprises. It is true that there was much tension during the inter-war period between interlopers and already established firms but problems arose because the mills were newcomers who threatened the sharing of the existing pie rather than because they were Indian-owned and managed. After all, similar difficulties were also provoked by European-dominated firms.

We do not need an elaborate explanation for the fact that Indian mills appeared on the scene when they did or that Marwaris played a substantial role in that process. These Indian pioneers developed considerable
authority in the new jute trade before 1914. Their expanding investment in the industry and growing familiarity with its working were part of a generalized learning process. Timberg's studies have shown how the proliferation of Marwari merchant activities across a broad front in northern India during the later nineteenth and early twentieth centuries created more sophisticated entrepreneurial skills and generated the increasing accumulation of capital with which to penetrate this sector of the industrial system. The development of a native network capable of international marketing added the necessary final touch.

The cotton textile industry

The great wartime boom lasted until 1922. From the literature of the period and scholarly accounts, one gets the impression that between 1922 and 1939 the cotton textile industry suffered from a continuous economic crisis that inflicted grievous economic losses all around. The industry, it is suggested, was buffeted by the disappearance of its foreign markets, by a domestic demand that was weakened by the perilous state of Indian agriculture and by the increasingly harsh competition from the Japanese who could outsell Indian producers across the board. Local mills could not meet the Japanese threat by reducing wages because that provoked wracking strikes. The industry could not reduce other costs because of the inflated capital burden accumulated as a result of the war and post-war boom and the speculative mentality of Indian entrepreneurs. Unable to meet foreign competition, companies failed, mills were dismantled, great Managing Agencies collapsed. Always the emphasis has been on the burden of foreign competition, in this period Japanese rather than British, with the analysis focused on the struggle for ever higher and more permanent protective tariffs.

It is necessary to redress the balance and tone of this description. First of all, the Indian predicament was not exceptional. Virtually all nations suffered grievously from the consequences of previous expansion. There was a worldwide crisis of excessive capacity and inflated costs. The British industry was affected much more harshly than the Indian, and Japan's mills achieved their considerable gains only because many inefficient firms were squeezed out and the industry underwent a major reorganization.

The long crisis of the Indian industry was essentially one that afflicted Bombay city. It was the centre of the largest segment of the cotton textile industry; what hurt it had great repercussions and cannot be dismissed. But Bombay was a diminishing part of a still-expanding industry. Much of the distortion of our perception derives from the implicit assumption that the part which had been greatest should always remain so. While
this might have been the understandable view of the Bombay participants, the economic historian should not be surprised by the tendency towards dispersion against which the Bombay producer could not stand without substantial and traumatic transformation. The very elements which had made it possible for the Bombay pioneers to grow so swiftly even though unprotected against Manchester's energetic competition now were gradually turned against the Bombay mills by newer competitors inside the country.

The technology of textile production was such that a region with a large unskilled labour force and limited capital had advantages, particularly in the production of coarser goods. There was considerable value added in manufacturing so that labour costs and not just raw-material costs were significant. Entry was easy. The basic economies were quickly achieved so that relatively small-scale enterprises could be competitive. And in a country like India where a traffic in textile products had long existed, new producers did not find it necessary to make great new marketing expenditures.

Simultaneously, in the developed regions of the country a more skilled labour force and capital had become somewhat more plentiful. This opened up an increasing number of alternative opportunities that competed with investment in the cotton textile industry. This combination of tendencies in new regions and in the established areas made it inevitable that a pioneering centre would tend to grow more slowly as a textile producer than a new area. The process of decentralization away from Bombay city was not novel. It had been occurring steadily throughout the history of the industry. The shifts in relative prices of capital and labour among regions dictated that if Bombay mills were to survive, they had to shift towards more sophisticated types of output.

Nor was Bombay's career before 1914 entirely easy. The decade of the 1890s was scarred by instability, including serious labour troubles. But as long as Indian mills held a small share of the Indian market, their aggressive expansion was felt mainly by foreign producers and handloom weavers. As their share of the total Indian market rose, further expansion by Indian mills tended to pit newcomers more directly against existing firms. To the extent that new regions grew more rapidly, the economic pressure tended to be felt most sharply by the established sector of the industry, particularly by Bombay.

If Bombay mills were to minimize the growing pinch of domestic competition, they had to diversify and upgrade the quality of their output, producing those commodities that newcomers were not yet able to produce. But it was precisely here that competition with foreign producers was most fierce. Foreigners had quickly given ground to Bombay mills in the markets for coarser products and concentrated their
Table 7.17  Index of value of net output of cotton textile products, all-India, 1918–19 to 1938–9 (constant prices) (1913–14 = 100)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of Net Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1918-19*</td>
<td>92.2</td>
</tr>
<tr>
<td>1919-20*</td>
<td>95.2</td>
</tr>
<tr>
<td>1920-1</td>
<td>100.9</td>
</tr>
<tr>
<td>1921-2</td>
<td>111.3</td>
</tr>
<tr>
<td>1922-3</td>
<td>111.3</td>
</tr>
<tr>
<td>1923-4*</td>
<td>80.9</td>
</tr>
<tr>
<td>1924-5</td>
<td>119.1</td>
</tr>
<tr>
<td>1925-6*</td>
<td>115.2</td>
</tr>
<tr>
<td>1926-7</td>
<td>134.8</td>
</tr>
<tr>
<td>1927-8</td>
<td>150.9</td>
</tr>
<tr>
<td>1928-9*</td>
<td>105.2</td>
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<tr>
<td>1929-30</td>
<td>137.8</td>
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<tr>
<td>1930-1</td>
<td>141.7</td>
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<td>1931-2</td>
<td>156.1</td>
</tr>
<tr>
<td>1932-3</td>
<td>172.2</td>
</tr>
<tr>
<td>1933-4</td>
<td>151.1</td>
</tr>
<tr>
<td>1934-5</td>
<td>160.9</td>
</tr>
<tr>
<td>1935-6</td>
<td>176.6</td>
</tr>
<tr>
<td>1936-7</td>
<td>173.5</td>
</tr>
<tr>
<td>1937-8</td>
<td>182.6</td>
</tr>
<tr>
<td>1938-9</td>
<td>214.3</td>
</tr>
</tbody>
</table>

* General strike during this year.

Table 7.18  Regional distribution of mill capacity 1913–14 and 1938–9 (in per cent)

<table>
<thead>
<tr>
<th>Year</th>
<th>Bombay City</th>
<th>Ahmedabad</th>
<th>Elsewhere</th>
<th>All-India</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913–14</td>
<td>31.4</td>
<td>18.0</td>
<td>50.6</td>
<td>100.0</td>
</tr>
<tr>
<td>1938–9</td>
<td>17.5</td>
<td>19.8</td>
<td>62.7</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Spindles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913–14</td>
<td>44.4</td>
</tr>
<tr>
<td>1938–9</td>
<td>28.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Looms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913–14</td>
<td>46.8</td>
</tr>
<tr>
<td>1938–9</td>
<td>33.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Average daily employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913–14</td>
<td>42.3</td>
</tr>
<tr>
<td>1938–9</td>
<td>25.7</td>
</tr>
</tbody>
</table>

sales to India in the finer counts. As Bombay was being forced to move up the scale of fineness, it entered the restricted arena where foreigners were most efficient and competition was most harsh. The consequences will be examined after the all-India industry's general pattern of performance is analysed.

Sivasubramonian's data in table 7.17 show that the value of net
output in constant prices — allowing for absolute declines caused by
great strikes in the Bombay industry — rose fairly steadily during the
whole inter-war period, including the deepest phase of the international
economic crisis. During the quarter-century 1913–14 to 1938–9, the
industry's capacity expanded substantially. The number of mills rose by
43.5 per cent, the number of spindles rose by 48.4 per cent, the number
of looms rose by 94.3 per cent and average daily employment increased
by 70 per cent. Expansion was uneven from period to period but growth
never entirely stopped. The data also show a much faster rate of loom
expansion compared with spindles, the result of increasing concentration
on finer yarn and the shift to clothmaking.\(^1\) All of this was accompanied
by a steady shift of capacity away from Bombay city, as is plainly
apparent in table 7.18. There was some shift in capacity to Ahmedabad
but most of the growth occurred outside of Bombay Presidency. No
other centre, however, grew to rival the dense geographical con-
centration of mills in Bombay city and Ahmedabad.

To what extent were yarn and cloth imports from Britain, Japan and
Japanese-controlled mills in China responsible for Bombay's economic
difficulties? By 1913–14 foreign yarn imports were already only
a small proportion — between 6 and 7 per cent — of total factory-
made yarn available in India. Although imports rose to a peak of 59.3
million lbs. in 1922–3, 34 per cent above the 1913–14 high, this still
was less than 8 per cent of total available machine-made yarn.
Thereafter, the absolute quantity of imports declined steadily and in the
1930s never amounted to more than 4 per cent of all factory-made yarn
available.

By 1913–14, 87 per cent of imported yarn was the finer counts (above
30s) which were sold mainly to handloom weavers. Only 13 per cent of
imported yarn by weight were 30s and below, the range where 97 per
cent of Indian mill yarn output was concentrated. In effect, before the
First World War foreign yarns supplied markets which Indian mills
were not yet prepared to supply. During the inter-war period, the
Japanese quickly discovered that their advantage also lay in the sale of
the finer counts so it was really the British manufacturer who bore the
brunt of their competition. The Japanese almost totally displaced the
British spinners in supplying yarns of from 26s to 40s count. The major
difference was that in the late 1920s Indian mills also began to expand
their fine-yarn output. By 1939, 19 per cent of the very much larger total
Indian output was above 30s count. In effect, they gradually penetrated
the yarn markets where foreign competition, now mainly Japanese, had
been concentrated for a long time.

\(^1\) These and subsequent data on regional distribution are calculated from statistics in BMOA
Annual Report for the appropriate years.
An analysis of cloth imports also suggests that the role of foreign competition during the inter-war period needs to be downplayed somewhat. The 3.2 billion yards imported in 1913–14 was an all-time high that was never again even approximated. The peak inter-war year was 1927–8 when 1.97 billion yards were imported, less than two-thirds the pre-war high. And of course those imports were a declining proportion of total factory-made cloth available, from 73 per cent in 1913–14 to an average of 46 per cent in the 1920s. By 1938–9 imports amounted to about 13 per cent of total factory cloth available in India.

As with yarn, foreign competition concentrated on the finer qualities and coloured goods. As late as 1927, the Indian Tariff Board estimated that Indian piecegood output was heavily concentrated in categories using yarns below 30s. Less than 8 per cent of Indian mill output used finer yarns. Unable to compete with Indian coarse products, 95 per cent of British shipments to India were made of 30s count yarn or above. The Japanese also learned the same lesson. By 1925–6, at least 60 per cent of their cloth shipments to India were in the finer counts and that concentration increased in later years, focused on the qualities where Indian mills had not yet developed a very substantial stake. As in the case of yarn, the increase of Japanese cloth sales in India was obtained not so much at the cost of the Indian producer as at the expense of Lancashire. But as the Indian mills, particularly in Bombay, increased their output of these finer products in order to escape the squeeze from domestic competitors, they moved into the sector where competition with the foreigner was most harsh and difficult.

There were occasional years of difficulty for spinning and/or weaving mills outside of Bombay city but the great burden of the long inter-war crisis was borne largely by the Bombay mills. While the BMOA attributed the local problem to Japanese competition, the Tariff Board Report of 1927 saw the problem differently. The Far Eastern yarn market peaked in 1906 and declined to virtual non-existence after the war. This was not offset either by an equivalent growth in foreign cloth markets or by increased demand for yarn by Indian handlooms. Yet during the decade after 1913–14 about 700 million yards of clothmaking capacity had been added – 300 million yards in Bombay and 400 million yards elsewhere in India – which had to find a domestic outlet. Even massive import substitution – the average reduction of annual foreign imports by about half between the pre-war quinquennium and the quinquennium ending in 1923–4 – was inadequate. The domestic market was not growing rapidly enough. The increasing domestic supply could only be absorbed if it was sold at prices lower than those which would keep the Bombay mills out of trouble.

The Bombay mills obviously could not prevent the growth of Indian
producers who could produce coarse products more cheaply in other parts of the country. They could not expand the foreign markets for their coarse products because they could not compete with Japanese and Chinese mills on their home ground. The only way Bombay could increase its sales was to shift to the production of finer and more sophisticated stuff where skilled labour and relatively cheaper capital could be advantageous. To do this required further changes in technology and organization. These turned out to be difficult to achieve.1

These difficulties are usually blamed on the 'speculative mentality' of the Bombay entrepreneurs, the lack of technical expertise among Bombay mill directors and weaknesses in the Bombay Managing Agency system. These are not very satisfactory explanations. The situation was no different before the war, yet Bombay mills had made a number of major adaptations in the two decades before 1914. Furthermore, the same criticisms can as well be applied to up-country mills. If anything, Bombay mills had much more professional managerial and technical talent than did their competitors in the desh. The problem was that the economy was not growing rapidly during the inter-war period. If Indian incomes and the effective demand for textile products had been growing swiftly, the Bombay mills could have made the needed adaptation with no more difficulty than they had faced in the pre-war period.

The only substitute for a rapidly expanding domestic market was the use of tariffs to reduce British and Japanese sales of those finer products which the Bombay mills had to sell if they were to survive at all. It is in this context that the Bombay preoccupation with protective tariffs has to be understood. In 1921 the government applied an 11 per cent duty on cotton cloth. In 1922, cotton yarn was subject to a new 5 per cent duty. From then on there were periodic increases of tariff protection, particularly directed against Japanese competition. The details are easily available; there is no need to recapitulate them here.

Although the search for tariff protection preoccupied the Bombay millowners, no tariff could expand their total market. Costs still had to be sharply reduced and a different mix of products produced. To accomplish this when domestic markets were limited and domestic competition was expanding involved a process that ruthlessly squeezed out those producers who were least responsive to innovation or least able to bear the cost. This is what the agony of the fifteen years after 1923-4 meant. While the Indian Tariff Board had not foreseen these

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1 Ahmedabad mills did not suffer as did the Bombay industry, apparently because they had begun to concentrate on finer count output much earlier.
implications in 1926, they were clear by 1932. The Tariff Board report of that year explained that tariff protection was not a device to eliminate competition but was the means by which 'foreign competition should be replaced by internal competition'. The Bombay mills, it said, had to expect to be 'faced with not less but greater competition than in the past. It will, moreover, be competition against which no tariff measures can provide any relief.'

Seen in these terms, it is possible to comprehend the otherwise paradoxical features of the industry's inter-war career. It becomes clear why the industry nationally was profitable enough to attract capital and expand in some regions while Bombay mills had so much trouble. The formulation also explains why many up-country areas did not find the protective tariff issue as important as did Bombay. It is also possible to understand why, despite increasing levels of tariff protection, the Bombay industry was still forced to undergo a ruthless thinning.

The early efforts to grapple with the predicament involved attempts to reduce wages. The up-country mills were generally able to do this with a minimum of trouble. Ahmedabad mills went through a general strike in 1923 but obtained a 15.5 per cent reduction in wages. The Bombay mills found it virtually impossible — apart from the cancellation of the annual bonus at the beginning of 1924 — to cut wages collectively. Their efforts produced general strikes in 1924 and 1925. Ironically, it was possible to cut wage rates only in areas where wages were already lower than Bombay, thus adding to the relative competitive strength of the up-country mills.

Unable to reduce wage rates, the alternative was to reduce wage and other costs by a more efficient use of labour and by internal re-organization. A few Bombay mills began to fumble their way towards this, but it was the Tariff Board Report of 1927 that clearly spelled out the needed changes. The Board recommended ways to reduce the cost of material inputs, improve labour efficiency and increase output in each department, standardize industry wage rates, introduce more automatic machinery and go to double-shift working. It also proposed improvements in labour administration. Out of this came the so-called 'Efficiency Scheme', an effort by the mills to get workers to tend more machines while paying the participants higher wages. The rationalization required a thoroughgoing overhaul of mill practices, both technical and administrative. Most mills did not understand the implications of this. Moreover, this radical effort to revamp operations came at a time of increased labour force self-consciousness. A series of work stoppages culminated in general strikes in 1928 and 1929. While the young unions collapsed along with the 1929 strike, this did not make it easier for the millowners to carry out reform collectively. One
more collaborative attempt to reform a major part of the Bombay industry was proposed in 1930. This involved the amalgamation of thirty-four mills controlled by seven Managing Agencies into a single enterprise. The proposal was much too ambitious and did not get off the ground.

Unable to solve their problems in cooperation with the workforce, incapable of finding their own collective solutions, the Bombay mills coped with the deepening crisis of the early 1930s in an individualistic way. The Currimbhoy group, one of the city’s two greatest Managing Agencies – at its peak it controlled twelve cotton mills – collapsed in 1933. Between 1929 and March 1934 the number of working mills in Bombay dropped from seventy-seven to fifty-five. Unemployment increased. Individual mills slashed wages. Gradually, technical and administrative reorganization occurred. The Bombay industry that ultimately emerged from this purgation was smaller and more efficient. It had learned its lessons and was producing more diverse and finer-count products. For example, in the period 1921–2 to 1923–4 the annual average output of above 30s amounted to little more than 2 per cent of Bombay’s total output. In the three years 1937–9, these finer counts amounted to nearly a quarter of the total output.

But the Darwinian character of this market solution had other consequences. Following an unusually sharp spate of wage cuts by individual mills in 1933 and early 1934, another general strike broke out. As in 1928 and 1929, the strike was initially led by moderates but quickly came under communist control. This posed a threat to which the government reacted. Events had shown that voluntary collective action by the Bombay millowners on their own or in cooperation with trade unions to restructure the industry would not work. The government, discovering how easy it was for the workforce to come under communist influence, feared that it would turn into a threatening political force. This led the state to intervene directly to define the conditions of mill operations in the city. Its initial steps were informal. But beginning in 1934 its interventions – largely to set the framework of labour administration – took statutory form. By 1939 the basic pattern of state participation had been set for Bombay and was beginning to spread across the country. That and the consequent experience of the Second World War laid the foundations for its increasingly formidable involvement in the industry’s operations after 1947.

An important aspect of this development was that industry associations, beginning with the BMOA, began to undertake greater responsibility for individual mill practices. The BMOA had always represented all or almost all of the mills in Bombay city. But it confined
itself to innocuous activities — collection of statistics, political representations and some minor labour matters — on which the membership could find easy agreement. Until the mid-1920s the association was not an instrument through which internal changes in mill administration could be carried out. But the state needed a corporate institution through which the internal affairs of the industry could be properly shaped. Beginning with the recommendations of the Tariff Board in 1927, the state in a variety of ways stimulated first the BMOA and then other regional associations to undertake increasingly great responsibility for collective administration of mill affairs. The new intimacy that was to mark post-Independence relations between government and industry had their origins here.

Iron and steel

By the middle of the First World War, the small Tata enterprise — essentially a costly pilot project — had proved that steel could be produced profitably by an Indian enterprise. While only modest expansion was possible immediately, plans were developed to triple output as soon as wartime restrictions ended. This ‘Greater Extensions’ scheme was designed to begin operations by 1921 but post-war equipment shortages delayed completion until much later. This imposed very substantial financial burdens on the enterprise, large amounts of capital being unexpectedly tied up in uncompleted facilities. Moreover, by the time the expanded plant came into operation, new capacity abroad was also adding to world supply. International iron and steel prices began to fall sharply in 1921–2. This decline was reinforced by more general economic difficulties which led to sharp exchange devaluations by France and Belgium in 1926. Unprotected except by distance and light revenue tariffs and with a rupee that was probably overvalued, the Indian market was exposed to the full price impact of European competition. TiSCO not only found itself burdened by the larger than expected capital charges but also with very high break-in and initial operating costs which were partly tied with the need to employ a large number of foreign technicians. Financially pressed and unable to obtain more working capital in India, the company for the only time in its history had to go abroad in 1923 and borrow £2 million on the London market.

At the same time, the company asked for tariff protection against the very low prices of its foreign competitors. This was granted. The Indian Tariff Board’s justification was that TiSCO was an infant firm in an infant industry and required time to develop those inherent advantages which, it argued, would quickly free the company from the need for further
protection. This expectation was based on the experience of a more innocent era. In contrast with the pre-war situation, the inter-war period was characterized by the growth of international iron and steel production capacity at a rate that continuously outpaced the expansion of international demand. Under this pressure, the international market system, which had earlier worked reasonably well, collapsed. Steel industries did not respond easily to market adjustments within industrialized countries. Too many internal political and social stresses intervened. Producers and policymakers in the various steel-producing countries attempted to play a complicated game of price maintenance at home and dumping abroad which turned the international market into a shambles. As a result, the price of steel imported into India between 1923 and 1932 (net of duty) fell by about 60 per cent. Prices did not begin to recover until 1937.

Faced by this long-term international price pressure, TISCO required tariff protection throughout the inter-war era. Within a month of the government’s initial award in June 1924, it had to provide the company with added temporary protection to cope with the unanticipated foreign price declines and another seven years of protection had to be provided in 1926. When the subject of renewal came up again in 1933, it was clear, despite the company’s substantial operational improvements, that protection was going to be needed for a long time to come. By 1940, when the next statutory re-examination was due, the Second World War made the issue irrelevant. When the war ended and Independence came, the whole strategy of development had changed and tariff protection was only a minor part of a much more general programme of economic expansion.

Most discussions of the economic history of the inter-war period concentrate on tariff protection. It was the politically hot issue, a major manifestation of the conflict between nationalist and imperial objectives, and it generated an enormous literature on which scholars have concentrated their attention. But this focus has led to the neglect of other issues that TISCO and the economy faced. The company had to absorb continuing infusions of new technology, having to learn in the process how to transfer administrative and industrial work skills to Indians at every level. The problems that were faced and how they were solved tell us a great deal about the difficulties of economic development during the inter-war era.1

Table 7.19: Sources of saleable steel in India, 1913–14 to 1946–7 (a) (thousands of long tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>TISCO (2)</th>
<th>MISW (3)</th>
<th>SCOB (4)</th>
<th>Total (5)</th>
<th>Net imports (6)</th>
<th>Total apparent consumption (7)</th>
<th>Col. (2) as % of col. (7) (8)</th>
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<td>49</td>
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<td>–</td>
<td>49</td>
<td>1214</td>
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<td>–</td>
<td>122</td>
<td>769</td>
<td>891</td>
<td>14</td>
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<td>–</td>
<td>126</td>
<td>702</td>
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<td>15</td>
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<td>–</td>
<td>–</td>
<td>115</td>
<td>891</td>
<td>1006</td>
<td>11</td>
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<td>–</td>
<td>163</td>
<td>871</td>
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<td>–</td>
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<td>–</td>
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<td>914</td>
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<td>–</td>
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<td>56</td>
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<tr>
<td>1932–3</td>
<td>431 (c)</td>
<td>–</td>
<td>–</td>
<td>431</td>
<td>294</td>
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<td>59</td>
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<tr>
<td>1933–4</td>
<td>535</td>
<td>–</td>
<td>–</td>
<td>535</td>
<td>276</td>
<td>811</td>
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<td>–</td>
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<td>366</td>
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<td>–</td>
<td>661</td>
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<td>–</td>
<td>689</td>
<td>339</td>
<td>1028</td>
<td>66</td>
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<tr>
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<td>715</td>
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<td>–</td>
<td>738</td>
<td>240</td>
<td>978</td>
<td>73</td>
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<tr>
<td>1945–6 (d)</td>
<td>746</td>
<td>29 (e)</td>
<td>197</td>
<td>972</td>
<td>174</td>
<td>1146</td>
<td>65</td>
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<tr>
<td>1946–7 (d)</td>
<td>753</td>
<td>25 (e)</td>
<td>114</td>
<td>892</td>
<td>53</td>
<td>945</td>
<td>80</td>
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(a) Saleable steel: finished steel produced by integrated steel mills and semi-finished steel, primarily billets and tin bars produced by these mills and sold to rerollers and secondary producers.

(b) TISCO: Tata Iron and Steel Company
MISW: Mysore Iron and Steel Works
SCOB: Steel Corporation of Bengal.

(c) Prolonged strike seriously affected output.
(d) Converted from metric tons.
(e) Calendar years.

The original plant was designed with an annual capacity of 100,000 tons of finished steel. During the war it was possible to add one blast furnace and raise capacity to 125,000. The ‘Greater Extensions’ scheme of the immediate post-war years more than tripled capacity to 420,000 tons. The subsequent search for greater flexibility led to further additions. By the beginning of the Second World War, TISCO’s capacity amounted to about 800,000 tons of finished steel output. In effect, in the twenty-eight years between the beginning of production and 1939, TISCO expanded its capacity by about 8 per cent a year. If one ignores the

miniscule contribution of the Mysore Iron and Steel Works from 1936, the history of TISCO was the history of integrated iron and steel production in India. It was not until December 1939, when the Steel Corporation of Bengal began to produce steel, that India got a second integrated metallurgical enterprise.

While the production of steel in India steadily rose, demand during the inter-war period remained stagnant. During the eighteen years between 1920-1 and 1938-9 annual consumption averaged only 1.1 million tons, less than 85 per cent of the 1913-14 figure of 1.3 million long tons (table 7.19). In fact, there were only three inter-war years – 1927-8 through 1929-30 – when consumption, reflecting high demand by railways, rose above that pre-war peak.

Why was demand so slack? Unlike other countries, where private demand for steel for machinery, trucks, automobiles, ships, food containers, private construction, etc., contributed a great deal to total requirements, the major consumer of steel in India was government or government-related activities like railways, military and public works projects. In the absence of a rapid expansion of private demand, limited government expenditure was decisive.

Although total demand for steel products remained stagnant, TISCO's share of that feeble demand steadily increased from 14 per cent in 1920-1 to an average of 68 per cent in the three years 1936-7 through 1938-9. The company increased the number of finished steel products it was able to produce and was able to capture a rising proportion of the demand in each of these categories. In the two years before Independence, 1945-6 and 1946-7, TISCO satisfied nearly 72 per cent of India's consumption while the three Indian producers together provided all but 10 per cent of what was consumed.

The slackness of demand explains why there was no rush of new producers into the industry. There was room for only one optimal-sized firm for almost the entire period. The Indian Iron and Steel Company (IISCO), a pig-iron producer since 1918, gave up a plan to add steelmaking capacity because of unfavourable demand conditions after 1921. An enterprise projected in the early 1920s by a British steel firm and a Calcutta Managing Agency, Bird and Company, was dropped because the anticipated rate of return was not attractive even allowing for the possibility of tariff protection.

In the early 1930s, TISCO satisfied more than half of India's expressed need and there was little scope for another producer. The fact that the Mysore Iron and Steel Works undertook steel production in 1936 had little to do with efficiency considerations. It was only in 1937, when the worldwide defence boom began to push prices up, that IISCO and Bird and Company took up the project that had been dropped in the early
1920s. Based on already operating ironmaking facilities, the risks of this venture were relatively low.¹

TISCO’s inter-war experience was a story of learning, solving problems of appropriate technical balance, improving management and increasing labour efficiency. Having tripled the size of the original unit after the First World War, the company had a great many teething problems. But when the Tariff Board examined works costs in 1926, they found that the costs had already begun to fall significantly from what they had been in 1923. They continued to drop and the Indian Tariff Board concluded after its 1933 review that had world prices remained at their 1926 level, the company could have competed with foreign imports without tariff protection. Summing up a complex story, there was a steady decline in works production costs from the opening of the ‘Greater Extensions’ in 1923–4 through the inter-war period, although most gains were achieved by 1935–6 after which there was some levelling off.

How were these cost reductions achieved? Some came via continual technical improvement. For example, there was an increase in blast furnace capacity from 250 tons a day in 1920–1 to 780 tons in 1938–9 as well as expansion in the size of open-hearth furnaces. There were substantial improvements in equipment and process balance within and between departments. Improved integration permitted important fuel economies. And, of course, expanded output automatically gave the company reduced fixed costs per unit of output. In addition, there were at least two major cost-reducing achievements external to the plant. The discovery of the Katni limestone fields permitted TISCO to use limestone instead of dolomite, a less efficient substitute. And by 1939 there were five firms (including TISCO) producing refractory brick so that almost none of this expensive input had to be imported.

There were major improvements in labour utilization. At the peak in 1924, there were 229 foreign technicians employed. By January 1934 there were only sixty-four. As they were displaced by Indians who typically cost the company less than 50 per cent as much, this great burden on labour costs was gradually reduced. Simultaneously, TISCO manning scales dropped rather remarkably. There are some questions about how to read the data, but one can get a general impression from the fact that in 1923–4 the company employed 30,135 workpeople to

¹ An important advantage of the Indian industry was its ability to produce pig-iron very cheaply. TISCO was typically able to export iron when its domestic market for steel was weak. TISCO, of course, needed export markets to offset unstable domestic iron demand. One important result of the Ottawa Agreement of 1932 was that the British market increased its already important purchases of Indian iron. In 1933, Britain took 87 per cent of her pig-iron imports from India. This outlet for Indian iron provided an important base on which TISCO could depend when it subsequently moved into steelmaking.
produce 163,000 tons of saleable steel while in 1932–3 only 15,587 employees were needed to produce 431,000 tons. After that, employment began to rise but through 1935–6 it did not rise as rapidly as output. But from 1937 through the Second World War, labour productivity remained stagnant or even declined somewhat, suggesting that plant and equipment were being pushed very hard.

There is an enormous body of data in the Indian Tariff Board records. Apart from Spiegelman’s study, there are no other systematic economic analyses of the changing character of the industry and there is a great deal to be learned about its behaviour during the inter-war period. For example, it is clear that TISCO’s learning process was protracted and benefits took time to reveal themselves. As a pioneering enterprise, the company had to train all its workforce, from the least skilled to the most skilled. It had to create its own technical institute and school for middle-range technicians. It had to build its own town and bear the high costs of providing a great deal of housing and other urban social overhead facilities. But the absence of these social externalities was not the only extra burden. India lacked markets for by-products such as coal tar and phosphates. This meant that costs of iron and steel production could not be distributed among a cluster of joint products on which steel producers in more developed countries could depend. All these factors affected company behaviour.

There are a number of unresolved issues about TISCO’s performance, one at least being worthy of note here. The company’s manning scales were always very high by Western standards. This is explicable as a rational adaptation to differences in relative factor costs in India and abroad. What is puzzling is the fact that although there were rather substantial gains in labour productivity over the years, TISCO labour requirements remained very high when compared on a department-by-department basis with the other local iron and steel enterprises.

Two other integrated iron and steel producers came on the scene during the inter-war period. The minor producer was the Mysore Iron and Steel Works, a small enterprise of the princely state which was set up with TISCO assistance in 1923 to exploit local iron deposits and the state’s large forest reserves as fuel. With a capacity of 28,000 tons of pig-iron, the plant, one of the last charcoal iron-producers in the world, depended on its ability to sell the by-products of its charcoal production at the high prices that existed at the end of the war. Unfortunately, technological changes completely outmoded the wood distillation process even before the plant was erected. The firm was an economic failure. Apart from all else, it was badly located. South India, lacking any large-scale engineering activity, offered no substantial market for pig-iron. The firm was
kept in operation by the Mysore government in order to supply cast-iron pipe. In the mid-1930s, 30,000 tons of steelmaking capacity was added to create another market for its pig-iron.

A much more important enterprise was founded in 1918 when the Indian Iron and Steel Company (ISICO) established an ironmaking plant at Hirapur in Bengal. While it was designed with the intent to expand into steel production, the post-war collapse of prices foreclosed that hope. ISICO maintained very close links with the old Bengal Iron Company at Kulti. Following a series of very complicated agreements, the two companies were amalgamated in 1939 as an integral part of the organization in 1937 of a separate company, the Steel Corporation of Bengal (SCOB). SCOB absorbed a large proportion of the combined iron output of the Kulti and Hirapur plants and was able to produce about 200,000 tons of saleable steel annually during the Second World War. However, the plant was too small to be a low-cost producer and it faced serious economic problems for a long period after 1945.

There was only one other domestic source of finished steel, rerollers who converted billets and scrap into finished products. There were only a few as late as the early 1930s, but the tariff revision of 1934 which required TISCO to provide the basic material to rerollers at low prices stimulated rapid entry of firms into that branch of the industry. By 1939 there were thirty-five units with a combined capacity of 140,000 tons. Although they were responsible for only 9 per cent of total finished steel output in 1938–9, they played a fairly important role, filling rush orders or producing merchant mill products which were not rolled by TISCO.

From the very beginning, TISCO’s management expected that their company’s activity would be quickly followed by the emergence of clusters of metal-using firms in and near Jamshedpur. In the flush of wartime and immediate post-First World War anticipations, at least seventeen different complementary industrial units were projected. Only a few came into operation. Probably the most successful was the Tinplate Company, formed in 1922 as a joint TISCO-Burmah Oil Company project to manufacture the material used in containers for the petroleum firm as well as for packing tea and biscuits.

When the US developed its tinplate industry in the late nineteenth century, it had to import large numbers of skilled workers from Wales. It also had to modify the imported technology to substitute capital for some skilled labour and the industry had to shelter behind high protective tariffs. The Indian experience was much the same. Skilled workers were important but the new plant was designed along highly capital-intensive lines so that semi-skilled workers could substitute for some costly imported labour. The enterprise was relatively successful. The Indian Tariff Board reports of 1926 and 1934 both remarked
favouredly on its ability to reduce dependence on European supervision while steadily increasing efficiency. Nevertheless, there were no further entrants. There was only a limited demand for tinplate in the economy and the one company was able to satisfy it.

In 1922–3, India consumed about 53,000 tons of imported tinplate. The new company was successful because it was able, with the aid of tariff protection, to replace foreign imports very quickly. During the 1930s, it was able to satisfy about 88 per cent of a nearly stable demand. Unlike Western countries, India did not have a rapidly expanding food-canning industry which could take increasingly large quantities of tinplate. Lacking this or any other new uses, the Burmah Oil Company continued to take about 70 per cent of the relatively small, fixed national demand.

Other enterprises, producing railway wagons, agricultural implements, steel-wire products, cable and enameled ironware were less successful. In general, these firms faced interrelated problems of high costs and restricted demand. For example, immediately after the end of the First World War it was estimated that there could be an average annual demand for 8,000 railway freight wagons for a long time to come. Several existing engineering firms entered the wagon-building field but demand for their output never reached this level, partly because government railway investments were cut back and partly because domestic firms were never able to achieve competitive cost levels even though their British competitors had to overcome heavy ocean transport costs and a 15 per cent tariff.

There were other disappointing ventures like the Agricultural Implements Company (Agrico) which was set up to produce factory-made handtools. The Indian demand for these agricultural implements was certainly greater (in terms of metal content) than for tinplate, wagon-building and wire products combined, but Agrico was never able to capture much of it. The demand for factory-made products came mainly from the plantations which were not a growing sector. And Agrico could not compete against the very cheap tools made out of scrap by village blacksmiths and local workshops to satisfy the vast rural market that did exist. Unable to continue, this private firm was finally taken over by TISCO and operated as a never terribly successful department of the steel works.

Some projected enterprises, like the scheme to produce sulphuric acid from TISCO by-products, could not even get off the ground because it was discovered that there were no great Indian users of this basic industrial chemical. The domestic market was far too small to sustain even one efficient producer and most of the country’s requirement had to be satisfied by imports.
The inter-war experience of the Tata Iron and Steel Company and the largely discouraging efforts by many individuals and groups to create complementary enterprises illustrate the complex problems which faced these pioneering efforts. Initial costs were often high; capital willing to undertake considerable risk for long periods was scarce and costly; technical and institutional problems of marketing were formidable; and the very slow-growing total demand for various products all combined to throw up formidable barriers to any massive expansion in this basic cluster of industrial activities. Nor could these be overcome simply by raising tariffs. For example, grants of protection to TISCO and to other enterprises raised the price of the inputs to their users, as complaints to the Tariff Board from engineering firms and other manufacturers made clear. And attempts to provide subsidies to offset higher costs to them and to consumers were limited by the government’s reluctance to raise taxes more than was required by the need to offset the loss of import revenues which protective tariffs caused.

Cement

Indian consumption of Portland cement grew rather steadily from an annual average of 149,000 tons in 1915–19 to an annual average of 1,067,000 tons in 1935–6 to 1937–8. It is not clear how much of this increased consumption was new demand and how much a shift as cement prices fell relative to those of other materials. Whatever the causes, the share taken by Indian cement makers of this rising total demand expanded rapidly. As early as 1920–4, Indian factories supplied 57 per cent and by 1935–6 to 1937–8, they supplied an average of 95 per cent of all cement consumed in the country.

Entry into the industry was not difficult. While the capital required was substantial, the manufacturing process was quite simple. Transport costs were an important part of total costs and provided a significant locational advantage against foreign competitors. As a result, seven new companies entered the industry between the end of the First World War and 1925 and the three firms founded during the war also expanded. Excess capacity quickly appeared and prices steadily fell in the mid-1920s with accompanying profit squeezes. This was not a situation where protection could have helped. Instead, the Indian Tariff Board recommended that the industry, dominated by Bombay-financed companies, cooperate to stabilize the market. This led in 1926 to the formation of an association to reduce competition by fixing common sales prices, and in 1930 to a Cement Marketing Company to regulate all sales and distribution activities. These price stabilization efforts inevitably ran into difficulties because there was no effective control of individual firm
production. Moreover, costs tended to be high because of the inefficient use of existing capacity and excessive cross-hauling. In an effort to cope with these problems, the two main groups which together owned ten of the eleven plants then in operation merged in 1936 into a new firm, the Associated Cement Companies. However, this attempt at monopoly output and price-fixing was quickly undercut by the entry of five new plants in eastern India sponsored by the Dalmia-Jain group. Once again prices and profits tumbled. This experience in 1937–8 and after was enough to lead to the establishment of joint price-fixing and marketing arrangements between the two competing groups. Whatever potential problems may have been inherent in this arrangement, they did not appear during the Second World War when the industry’s capacity was stretched to its maximum to satisfy expanded demand.

**Pulp and paper**

Paper and pasteboard consumption more than doubled during the interwar years, rising from an annual average of about 108,000 tons in the period 1923–4 to 1925–6 to 218,000 tons a year in 1936–7 to 1938–9. Although tariff protection, initially granted in 1925, helped stimulate production along some lines, the share supplied by local producers remained constant at about one-quarter of total Indian consumption. This was quite different from the experience in textiles, iron and steel and cement, where local producers greatly strengthened their position against foreign competition. The failure of the paper industry to grow more rapidly was largely a matter of supply constraints that tariff protection could not offset.

The major obstacle was the lack of satisfactory indigenous pulping materials. At the beginning of the inter-war period, sabai grass was the most largely used domestic material. It was not only in short supply but its sources were badly located and its users were burdened with very high transport costs. When the Tariff Board recommended protection in 1925, it stated that the industry could never become self-sustaining if it continued to depend on sabai and other materials then used. The obvious alternative was bamboo but there were technical problems of converting it into pulp. The Board made its award in order to give the industry time to shift over to bamboo, for which the Government Forest Research Institute had developed a potentially satisfactory pulping process.

The new process took some years to improve. In the meantime, the initial effect of protection actually increased the use of imported woodpulp. Although the use of bamboo also rose, it was not until a special grant of protection to bamboo pulp was made in 1932 that its
share of the market rose very swiftly (table 7.20). Despite that rapid substitution, bamboo pulp could not be used for newsprint and no other local material — bagasse, salai wood, etc., — was developed before 1947 to replace imported woodpulp for that large segment of domestic demand.

There were other difficulties which kept costs of the paper industry relatively high, such as the shortage of sites with adequate year-round clean water supplies and the need to depend on imported chemicals. Moreover, there were factors which kept the industry geographically very concentrated. As late as 1937, 90 per cent of domestic paper production was located in Bengal, not only because of the large market demand but also because of the locational pull of cheap fuel, adequate water and good sources of raw materials. The shift to bamboo pulp encouraged the development of mills elsewhere, a process that was further stimulated by the development of fuel sources outside Bengal.

The industry was fairly capital intensive and great economies of scale encouraged concentration of output. In 1924, there were still only nine mills in the country. The two large European-controlled firms, Titaghur and Bengal Paper Mills, dominated the industry as thoroughly during the inter-war period as they had before 1914. In the 1920s they were responsible for nearly 85 per cent of total domestic output. Protected by tariffs after 1925, the two firms sought to avoid costly competition, satisfying increased demand by greater use of existing plant rather than by expanding capacity. This enabled them to generate high and apparently steadily rising profits from the early 1930s which after 1936 finally encouraged the entry of five large Indian firms.

The new Indian investment was stimulated by the combined influence of protection, generally improved business conditions, the strong rise in

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the demand for paper expected from the expansion of educational facilities after 1935, and the rather passive cautiousness of the dominant European producers. As the Europeans had feared, the influx of new capacity and output very quickly led to sharp competition and a drop in prices in 1938 and 1939. This ended with the outbreak of the war and the change in demand conditions. In this new context, the output of the aggressive Indian producers rose rapidly. By 1943 the share of the two main British firms had fallen to 42 per cent of total domestic production. Nevertheless, the newcomers did not effectively challenge European dominance in the industry until after 1947.

Sugar manufacturing

Sugarcane has always been an important crop in India, one from which three sweetening agents, gur, khandari and (more recently) factory-refined sugar have been produced. In the seventeenth and eighteenth centuries, India was an exporter of khandari. In the nineteenth century, the development of beet sugar and the improvement of cane quality and extraction methods elsewhere not only led to the disappearance of the export trade but also to India becoming an importer of factory-made sugar. A few modern refineries were set up in India after 1900, but the industry grew very slowly. In 1919–20 there were apparently only eighteen factories at work. They were quite small, their combined output being no greater than the production of three average-sized factories in Java. Although a few more were added during the next decade, modern sugar mills remained a trivial feature on the industrial landscape. Indians generally used gur and the country still imported a large part of what refined sugar it consumed. The figures that are available suggest that in the five years 1926–7 to 1930–1, total consumption of sugarcane products averaged 3.2 million tons. Of this, 64.2 per cent was in the form of gur, 6.2 per cent was khandari, 25.9 per cent was imported sugar and only 3.7 per cent was refined sugar produced by Indian factories.

During the 1920s, peasants began to plant increasing amounts of improved cane varieties developed in government research stations. Rising productivity combined with rapidly falling world sugar prices threatened a major glut in India. In 1929, the Indian government was cautioned by the Imperial Council of Agricultural Research that unless a much larger domestic refined sugar industry was developed to replace foreign imports, cultivators were certain to face serious economic consequences. The matter was referred to the Indian Tariff Board which concluded that the predicted results would be particularly disastrous in three provinces of northern India – the United Provinces where 50 per
cent of the country’s cane acreage was concentrated, the Punjab which had 15 per cent and Bihar and Orissa where 10 per cent of the country’s cane acreage was worked.

This was the first time that the Tariff Board had faced the issue of protecting agricultural interests. In lieu of a revenue duty which had been increased in 1930, the government accepted the Tariff Board recommendation and imposed a protective duty amounting to an ad valorem rate of 190 per cent. The impact was startling. Net foreign imports quickly declined from a peak of 933,000 tons in 1929–30 to nothing by 1936–7. The great profit margin promised by duty increases and the very low prices of sugar refining equipment in the depressed international market of the early 1930s encouraged existing enterprises to expand their capacity and a host of new middle-sized entrepreneurs to flock into the industry. The number of modern sugar mills increased from 27 to 150 between 1929–30 and 1936–7. Rosen calculates that by 1938–9 sugar refining ranked third among all organized industries in total capital and fourth in fixed capital invested; and table 7.13 above shows that the industry ranked fourth—after cotton textiles, jute and iron and steel—in value of industrial output.

Simultaneously, Indian cultivators expanded their output. Between the five years 1926–7 to 1930–1 and 1936–7, average annual acreage rose 59 per cent and raw sugar output (aided by the spread of improved cane varieties) more than doubled. Total sweetening products available in India rose from an annual average of 3.2 million tons to 5.5 million tons in the same period.

Cultivators had a variety of options which complicated the outcome. Cane was produced by peasants who were largely free to shift from sugar to other crops. If they produced cane, it could be processed into gur, khandsari or refined sugar. The choice depended on the relative prices received by cultivators as well as the processing costs and market prices which confronted the various producers. Costs of production, in turn, were affected by government efforts, beginning in 1934, to fix minimum prices for cane in order to support cultivator incomes and to impose an excise on manufactured sugar in order to recoup revenue lost because of the disappearance of sugar imports.

It is clear that demand for refined sugar in India during the 1930s did not increase as rapidly as output. Prices began to decline after 1931, agricultural incomes were unstable, and by 1937 the factory industry was faced by a serious profit squeeze. The provincial governments responded with attempts to reduce acreage fluctuations and diminish what seemed to be the monopsonistic power of manufacturers over cultivators. The sugar mills in their turn sought to overcome the effects of excess supply by establishing a Sugar Syndicate in 1937 to control sales. Although ninety-two mills joined the syndicate, a substantial
number, including some of the largest and most efficient, either refused to cooperate or quickly withdrew and the scheme foundered. A number of mills shut down. The Bihar and United Provinces governments, anxious to maintain cultivator incomes, were induced in 1938 to restrict crushing rights only to syndicate members. Given this monopoly power, the syndicate promptly raised prices in 1939 to double the 1937 level. Disturbed by the effect on consumers, the two provinces repealed their authorization in June 1940. This immediately resulted in a collapse of prices and a near disruption of the industry. Order was restored shortly after when the Provinces once again required all refiners to become syndicate members, but only after the mills agreed to accept provincial regulation of prices that could be charged and quantities that could be sold. In 1942, the Government of India, faced by increased wartime incomes and consumer demand that put persistent upward pressure on prices, took control of all price and distribution policies and instituted a rationing system that lasted beyond the colonial period. In effect, the provincial intervention of the late 1930s which was urged by cultivator and manufacturing groups, marked the beginning of that sustained state intervention that has characterized the industry ever since.

Miscellaneous activities

There had been serious shortages of heavy chemicals during the First World War, but this did not lead to any important subsequent developments. The slow inter-war growth of users of heavy chemicals — fertilizer, soap, glass, dyestuffs and drug manufacturing, to name a few — kept demand far below what was required for efficient indigenous production. For example, the demand for sulphuric acid in India reached a peak of about 28,000 tons before the Second World War. This was a trivial amount — in 1920 the US consumed about 5 million tons — and the consumers were scattered about the country. The few producers were necessarily very small and high cost.

The situation with caustic soda was slightly different. Demand for this important industrial chemical — used in textile, soap, vegetable oil production, etc., — was fairly substantial. However, the most efficient technique, the electrolytic process, was economic only to the extent that the simultaneously produced chlorine could also be sold. Lacking a big domestic or foreign market — the paper industry was the only important local consumer of chlorine — a potential Indian producer had to load his costs entirely on the caustic soda, thus effectively pricing himself out of that market.

Given such conditions, Indian chemical requirements were satisfied either by imports or were produced by very small, inefficient units. In an
effort to encourage cost reduction via reorganization of units in this important industry, the government established temporary protective duties in 1931 on a variety of heavy chemicals. The hope that protection would encourage rationalization and output on an economic scale proved fruitless. Demand was a major barrier. For example, the Indian Council of Agricultural Research concluded that the demand for superphosphates for fertilizers was neither large nor promising and that it was impossible to manufacture the product at a cost that could compete with imports. The government therefore allowed protection for heavy chemicals, except for magnesium chloride, to lapse in 1933. Even so, very stiff revenue duties and substantial transport cost advantages remained. Nevertheless, nothing further occurred before 1947 to stimulate the growth of this cluster of industries, so important to general industrialization.

During the inter-war period, the government imposed increasingly high revenue duties on many imports and also increased the preference given by its purchasing policies to Indian-made products. This stimulated the development of a fair amount of small- and medium-scale workshop activity. In addition, a number of new industrial companies were set up to avoid the tariffs and be able to bid more effectively for public contracts. Typically, these firms — producing cigarettes, soap, paints, tyres, certain chemicals, etc. — were branches of British or other foreign firms. One of the earliest and most important developments of this sort occurred in match production.

Until the end of the First World War, Indian matchmaking was almost entirely a handicraft activity. The local market for higher-quality machine-made products was satisfied by imports. In 1922, a high revenue duty was levied on imports. This encouraged a number of local entrepreneurs to import machinery to manufacture matches. But most important was the formation of the Swedish-controlled Western India Match Company (WIMCO). The Swedes had been the biggest suppliers of imported matches before 1922 and after the revenue duty was imposed, they moved to protect their large market. The parent Swedish firm provided advantages of capital, knowledge and a dominant international position against which other foreign producers were relatively helpless. WIMCO was able to push its economic advantages quite systematically both against the new Indian factories and the handicraft sector. With its resources, it was able to develop local wood supplies which almost entirely replaced imported timber for the production of splints and veneers. Its multi-plant operations very quickly enabled the company to dominate the entire industry, supplying about 80 per cent of all matches produced in India.

WIMCO found it profitable to develop indigenous sources of most of the raw materials it used. The same pattern did not necessarily repeat
itself in other industries where modern factories were established. Many
continued to depend on imported raw materials. For example, at the
outbreak of the Second World War, about two-thirds of all paint and
almost all soap consumed in India came from domestic manufacturers.
While this was a major change from the situation twenty years before,
the paint producers still had to import the finer pigments and the soap
manufacturers still had to depend on imported soda ash.

Looked at overall, the inter-war period was characterized by the
spread of industrial processes and factory organization into sectors of
the economy previously served only by handicrafts or by imports. But
diversification was very slow and the transformation of the economy
that occurred as a result was only marginal. One measure of the small
effect of the industrialization process was the limited scale of indigenous
innovative activity. This can be estimated from the very small number of
patents applied for. For example, of the 1,099 applications made in
1930, 80 per cent were filed from abroad by Europeans and were
intended mainly to establish pre-emptive claims for improvements
elsewhere. Of the 212 that originated in India, some were for improved
charkhas and reflected the specific enthusiasms of the Nationalist
movement. The bulk of the remainder were for agricultural
improvements – ploughs, waterwheels and lifts, husking machines and
sugar-crushers. There were, for example, only three applications in the
field of electrical engineering.

Not only was expansion slow, but activity in virtually every sector of
modern industry founded in the twentieth century was carried on by one
or at most by a few units. As should be expected where there was
monopoly or oligopoly, enterprises sought to regulate their output and
fix their prices. In iron and steel, cement, paper- and matchmaking, to
name the most obvious cases, there were continual efforts to control
prices and output by various formal and informal marketing and
pooling arrangements. But even where there were fairly numerous
producers – in cotton textiles and sugar refining as well as in jute
manufacturing – there were persistent efforts to stabilize prices above
those that free competition dictated.

There has been little attempt to explore this general phenomenon
even though the record makes it amply clear that it was widely at work
throughout the modern industrial sector. Equally little has been made of
the role of the government in contributing to this ubiquitous pheno-
menon. I have already noted how the state, during the 1930, was drawn
in to contribute a framework of stability to the working of the cotton
textile, jute and sugar-refining industries. The Indian Tariff Board
played an important role in that process.

The Indian Fiscal Commission of 1921–2, which explicitly laid down
the terms on which industrial protection should be granted, warned of
the serious adverse consequences that haphazard protection might
generate. Improperly designed tariffs could actually impede industrial
development by raising the prices of raw materials and semi-
manufactures. They could raise costs to important segments of the
agricultural community and lead to the exploitation of consumers by the
protected industries. The Tariff Board worked within a framework
which, however closely confined, required it to balance the objective of
stimulating specific industrial development with the often conflicting
interests of consumers, traders and other producers. It was not an easy
task and there were no easy solutions. The Board was forced into a more
general range of concerns than its original charge might lead one to have
expected. In the course of its many enquiries – between 1923 and 1939
there were fifty-one – the Tariff Board did more than make recom-
recommendations about protection. It also encouraged various forms of
industrial rationalization, consolidation and cooperation among com-
peting firms as ways of increasing efficiency within industries. The
objective effect was to contribute to a general pattern of state
involvement in the affairs of the private industrial sector. Reinforced by
the necessities of the Second World War, this furnished the groundwork
for the more self-conscious and coherent policy of planning and
regulation that became explicit after 1947.

1939 – 47

The expansion of industrial output of large-scale enterprises between
the outbreak of the Second World War and Independence is shown in
table 7.21. During the six wartime years, 1939–40 to 1944–5, annual
output of manufacturers averaged about 29 per cent above the last pre-
war year but the bulk of that increase came in response to the widening
of the war into the Far East at the end of 1941. Expansion of output was
accompanied by a continuation of the industrial diversification that
characterized the inter-war period. All in all, the combined share of the
eight industries whose output was individually reported continued to
decline and the share of non-reporting large-scale manufacturing
industries (‘All others’) continued to rise.

The Indian economy during the Second World War was not only able
to produce a greater total output but also a much wider range of
manufactured products than had been possible during the First World
War. It was able to produce most kinds of steel, except for some special
alloys; it was also able to produce cement, most paper, matches, etc. But
the wartime performance also exhibited the gross frailty of the
manufacturing sector at the end of the colonial era. India still did not
possess a capital goods sector. It therefore lacked the ability to expand or
Table 7.21  

Net value of output of all large-scale manufacturing activity, 1938–9 to 1946–7  
(1938–9 prices)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of output (million Rupees)</th>
<th>Index of output (1938–9 = 100)</th>
<th>Index of factory employment (1938–9 = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1938–9</td>
<td>1,701</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1939–40</td>
<td>1,751</td>
<td>102.9</td>
<td>100.8</td>
</tr>
<tr>
<td>1940–1</td>
<td>1,779</td>
<td>104.6</td>
<td>105.9</td>
</tr>
<tr>
<td>1941–2</td>
<td>2,139</td>
<td>125.7</td>
<td>124.4</td>
</tr>
<tr>
<td>1942–3</td>
<td>2,330</td>
<td>137.0</td>
<td>132.4</td>
</tr>
<tr>
<td>1943–4</td>
<td>2,599</td>
<td>152.8</td>
<td>142.1</td>
</tr>
<tr>
<td>1944–5</td>
<td>2,548</td>
<td>149.8</td>
<td>147.5</td>
</tr>
<tr>
<td>1945–6</td>
<td>2,749</td>
<td>161.6</td>
<td>159.0</td>
</tr>
<tr>
<td>1946–7</td>
<td>2,173</td>
<td>127.7</td>
<td>143.1</td>
</tr>
</tbody>
</table>

Table 7.22  

Share of net output of all large-scale manufactures produced in selected industries, 1913–14, 1938–9 and annual average of 1939–40 to 1946–7  
(in per cent)

<table>
<thead>
<tr>
<th>Industry</th>
<th>1913–14</th>
<th>1938–9</th>
<th>1939–40 to 1946–7 (annual average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Cotton textiles</td>
<td>36.2</td>
<td>29.0</td>
<td>23.2</td>
</tr>
<tr>
<td>(2) Jute manufactures</td>
<td>15.0</td>
<td>8.0</td>
<td>5.3</td>
</tr>
<tr>
<td>(3) Refined sugar</td>
<td>1.6</td>
<td>3.4</td>
<td>4.1</td>
</tr>
<tr>
<td>(4) Paper products</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>(5) Cement</td>
<td>-</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>(6) Wool cloth</td>
<td>0.3</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>(7) Iron and steel</td>
<td>0.8</td>
<td>4.4</td>
<td>3.6</td>
</tr>
<tr>
<td>(8) Matches</td>
<td>-</td>
<td>1.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Total (1)–(8)</td>
<td>54.3</td>
<td>47.8</td>
<td>39.2</td>
</tr>
<tr>
<td>All other large-scale manufacturing</td>
<td>45.7</td>
<td>52.2</td>
<td>60.8</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Net value of all large-scale manufacturing output (Rs millions in 1938–9 prices)  

| 1938–9 | 1,701 | 2,258.5 |

1 Sivasubramonian, 'National Income of India', table 4.16.
2 Sivasubramonian, passim.
even to reproduce its existing productive capacity. The system remained, as it always had been, dependent on imports of machinery, transport and electrical equipment, heavy and fine chemicals, and other basic industrial inputs. Above all else, it lacked adequate technical skill and any significant facilities to train technicians. Output was significantly increased during the war only where considerable excess capacity existed at its beginning. Otherwise, war needs were met by diversions from civilian consumption and neglect of repair and maintenance. The Indian manufacturing sector emerged at the end of the war with a seriously overworked plant, badly in need of replacement and modernization and with very limited ability to provide this from its own capacities.

However, the possibilities for industrial development at the time of Independence were substantial. Vast though the problems of this grimly poor system were, it did have some framework of modern manufacturing activity on which to build. While it lacked anything like an adequate scientific and technical cadre or the facilities for training them, it had a pool of literate people that was absolutely large, and it had seventeen universities and a number of national scientific organizations on which to draw and build.

By the end of the war, government policy was firmly committed to large-scale planned industrial development. In April 1945, the government issued a statement that 'a vigorous and sustained effort is necessary in which the state, no less than private industry, must take a part, and that Government have decided to take positive steps to encourage and promote the rapid industrialization of the country to the fullest possible extent'. Nor was this merely a rhetorical flourish. Wartime requirements had forced the development of administrative structures and practices which however frail and inadequate they were, gave the planners of the newly independent countries of south Asia experience on which they were able to draw after 1947.

The industrial labour force

Whatever their ultimate implications, the direct impact of the industrial developments of the colonial period on the occupational distribution of the Indian labour force was miniscule. After nearly a century of growth of modern factory activity, average daily employment in registered factories, while increasing more than five-fold between 1900–1 and 1946–7 from 539,000 to 2,654,000, still amounted to less than 2 per cent of the Indian labour force in the latter year.¹

¹ The data have been taken from Sivasubramonian, 'National Income of India'.

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Table 7.23 | Specific industry shares of total manufacturing employment in large perennial factories in all-India, 1900-1 to 1946-7 (per cent)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cotton (1)</th>
<th>Jute (2)</th>
<th>Paper (3)</th>
<th>Cement (4)</th>
<th>Woollens (5)</th>
<th>Iron and steel (6)</th>
<th>Matches (7)</th>
<th>Total of (1) thru (7) (8)</th>
<th>All other manufacturing employment (9)</th>
<th>Total manufacturing employment (10)</th>
<th>Total manufacturing employment (thousands) (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900-1</td>
<td>32.1</td>
<td>20.6</td>
<td>0.9</td>
<td>–</td>
<td>0.5</td>
<td>–</td>
<td>–</td>
<td>54.1</td>
<td>45.9</td>
<td>100</td>
<td>539</td>
</tr>
<tr>
<td>1913-14</td>
<td>28.3</td>
<td>23.5</td>
<td>0.5</td>
<td>–</td>
<td>0.4</td>
<td>0.9</td>
<td>–</td>
<td>53.6</td>
<td>46.4</td>
<td>100</td>
<td>918</td>
</tr>
<tr>
<td>1918-19</td>
<td>26.6</td>
<td>25.1</td>
<td>0.5</td>
<td>0.2</td>
<td>0.4</td>
<td>1.5</td>
<td>–</td>
<td>54.3</td>
<td>45.7</td>
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<td>1,101</td>
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<tr>
<td>1923-4</td>
<td>26.4</td>
<td>24.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.7</td>
<td>1.6</td>
<td>–</td>
<td>53.9</td>
<td>46.1</td>
<td>100</td>
<td>1,350</td>
</tr>
<tr>
<td>1928-9</td>
<td>23.8</td>
<td>23.6</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>1.3</td>
<td>1.1</td>
<td>51.3</td>
<td>48.7</td>
<td>100</td>
<td>1,457</td>
</tr>
<tr>
<td>1933-4</td>
<td>28.3</td>
<td>18.9</td>
<td>0.5</td>
<td>0.5</td>
<td>0.6</td>
<td>1.2</td>
<td>1.3</td>
<td>51.3</td>
<td>48.7</td>
<td>100</td>
<td>1,360</td>
</tr>
<tr>
<td>1938-9</td>
<td>23.8</td>
<td>15.9</td>
<td>0.5</td>
<td>0.7</td>
<td>0.6</td>
<td>1.1</td>
<td>0.9</td>
<td>43.5</td>
<td>56.5</td>
<td>100</td>
<td>1,854</td>
</tr>
<tr>
<td>1946-7</td>
<td>18.4</td>
<td>11.8</td>
<td>0.8</td>
<td>1.0</td>
<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
<td>34.2</td>
<td>65.8</td>
<td>100</td>
<td>2,654</td>
</tr>
</tbody>
</table>

1 Sivasubramonian, ‘National Income of India’, *passim*. No employment data are available for the sugar industry. Total manufacturing employment has been adjusted to minimize the effect of seasonal industries. See *ibid.*, table 4.16, col. 3.
Although the overall effect on Indian economic activity was small, two qualifications ought to be kept in mind. First, the absolute numbers were not insignificant. Employment in the cotton textiles and jute industries, for example, was very large when compared with employment in the same industries in foreign countries. Moreover, factory employment tended to be concentrated in specific districts and probably had a somewhat greater effect than all-India averages might suggest. The employment data for specific industries in table 7.23 reveal some interesting characteristics. As one might expect, employment grew at different rates and the relative importance of the oldest industries – cotton textiles and jute – declined. None of the important newer industries ever provided employment on their scale. Actually, employment in the group of seven listed industries declined as a proportion of employment in all large-scale manufacturing activities (col. 8). The growing weight of employment in the ‘other’ manufacturing category (col. 9) could be interpreted as showing that large-factory activity was diversifying into newer fields. While probably true to some extent, it is worth noting that employment in the cols. (1) through (7) group remained fairly stable between 1900–1 and 1933–4. Only after 1933–4 did employment in this cluster of industries as a share of total manufacturing employment exhibit a steady relative decline. This conjuncture suggests that the broadened coverage of the 1934 Factory Act may account for part of the phenomenon.

We should also mention the growing importance of large-scale factory employment in the princely states after the First World War. In 1923 it represented 8.7 per cent of all-India factory employment. It rose steadily until in 1938 it amounted to 17.2 per cent, a reflection of what was apparently a more rapid rate of industrial development in the princely states than in British India. From then on the proportion fluctuated, and in 1946 industrial employment in the princely states was 17.1 per cent of the all-India factory labour total. But we need to be cautious in our interpretation of the shifting pattern. There is some evidence from the 1930s that a larger proportion of registered factory employment in the princely states than in British India was in seasonal enterprises.¹

Among the less expected features of the factory labour force – at least, as compared with the early experience of other nations – were the relatively small proportions of female and child labour and the stability of those proportions.

Table 7.24 shows that in the years from 1892 (when the first

¹ Data calculated from factory employment statistics in the annual Statistical Abstract for British India.
Table 7.24 1 Average daily employment of men, women and children in registered factories as percentage of total factory employment 1892–1946 (British India)

<table>
<thead>
<tr>
<th>Year</th>
<th>Men</th>
<th>Women</th>
<th>Children</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1892</td>
<td>80.2</td>
<td>13.8</td>
<td>6.0</td>
<td>100</td>
</tr>
<tr>
<td>1913</td>
<td>78.7</td>
<td>15.3</td>
<td>6.0</td>
<td>100</td>
</tr>
<tr>
<td>1928</td>
<td>80.0</td>
<td>16.6</td>
<td>3.4</td>
<td>100</td>
</tr>
<tr>
<td>1939</td>
<td>85.6</td>
<td>13.9</td>
<td>0.5</td>
<td>100</td>
</tr>
<tr>
<td>1946</td>
<td>87.8</td>
<td>11.8</td>
<td>0.4</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 7.25 2 Women and children as percentages of total workforce in Bombay cotton mills and British India 1892–1946

<table>
<thead>
<tr>
<th>Year</th>
<th>Bombay cotton mills</th>
<th>All British India</th>
<th>Bombay cotton mills</th>
<th>All British India</th>
</tr>
</thead>
<tbody>
<tr>
<td>1892</td>
<td>24.6</td>
<td>13.8</td>
<td>5.6</td>
<td>6.0</td>
</tr>
<tr>
<td>1913</td>
<td>20.6</td>
<td>15.3</td>
<td>3.9</td>
<td>6.0</td>
</tr>
<tr>
<td>1928</td>
<td>21.8</td>
<td>16.6</td>
<td>0.0</td>
<td>3.4</td>
</tr>
<tr>
<td>1939</td>
<td>14.9</td>
<td>13.9</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>1946</td>
<td>11.7</td>
<td>11.8</td>
<td>0.0</td>
<td>0.4</td>
</tr>
</tbody>
</table>

reasonably accurate data became available) through 1928 the proportion of women and children combined never rose above 22 per cent nor fell below about 20 per cent of the total. The situation was apparently not much different before 1892, so it cannot be argued that the several Factories Acts had any great influence on the pattern. In the 1930s and 1940s that proportion slowly declined to the 1946 low of 12.2 per cent. Child labour was affected only after the First World War when the always small proportion gradually dwindled to insignificance. What is interesting is how constant the proportion of women employed remained throughout – never rising above 16.7 per cent (in 1930) nor falling below 14 per cent until 1939.

We do not yet have any careful studies of the distribution of female

1 Calculated from Statistical Abstract. 'Children' are as defined by various statutes. Beginning in 1935, workers aged 16 and 17 were classified as 'adolescents'. Here they have been allotted to the 'men' and 'women' columns.

employment among the several factory industries. We know that some industries and some regions tended to employ larger proportions of women. For example, beginning in 1931 the *Statistical Abstract* offers some evidence that women were used in larger proportions in seasonal factories than in perennial ones, but we do not know whether or not this phenomenon was of recent origin. We know that in earlier years the Bombay cotton mills employed women in much larger proportions than the British India average but this difference dwindled away by the end of the colonial period. On the other hand, the Bombay mills always used children in much smaller proportions (table 7.25). Gadgil, while noting that social attitudes could influence overall employment patterns and regional differences, ultimately decided that the very limited employment of women in modern factory industry ‘would appear to result from the chronic redundancy of labour in India’. This is also the conclusion of a study of the Bombay cotton mills labour force.²

Some attempts have been made to estimate real wage movements in factory industry, but none can be taken too seriously. More heroic assumptions have been introduced than the very frail data can bear. The best series both in terms of care of construction and explicitness of assumptions is by K. Mukerji. The pattern through 1937–41 is more

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or less consistent with other sources. It shows relative stability (or slight declines) until just before the First World War. From 1907–11 until immediately after the First World War there was an obvious fall while the inter-war period saw fairly significant rises in real wages. Mukerji's data deviate from conventional wisdom in their suggestion that real wages did not decline during the Second World War.

Even if we accept these data as close to the truth — and I am not prepared to accept the results on the basis of the skimpy statistical evidence we now have — we cannot deduce any welfare conclusions whatsoever until a further series of adjustments have been made. As Mukerji himself recognized, we have to allow for changes in the length of the working day, variations in the levels of employment and a host of other factors.

At an earlier stage of work on the subject, it was assumed that the new industrial establishments had difficulty recruiting labour from the countryside. Recent research, limited though it is, makes it clear that modern industrial development was not inhibited by any exceptional difficulty in recruiting raw labour for factories. A historical study of the recruitment process in the Bombay cotton textile industry shows that in the fifty years from the opening of the first mill to the outbreak of the First World War, average daily employment rose to 110,000 people. With the exception of a short period after 1896 when bubonic plague drove a large part of Bombay's population out of the city, the cotton mills never suffered from any shortage of raw or semi-skilled labour. This view is supported by the apparent stability of cotton mill wages in the decades after 1875, a stability that is all the more remarkable because the demand for labour by other occupations in Bombay was also growing.1

A society that is at the beginning of its industrialization process can be expected to suffer from a shortage of skilled technicians and managers. The Bombay cotton mills initially had to recruit these people from abroad. As Indians developed technical and managerial experience — most of them via an apprenticeship pattern more or less taken over from Manchester — the foreign cadres became a declining proportion of the total group. Fragmentary evidence suggests that the increased supply of native technical and administrative talent probably was accompanied by some decline in the real cost of this kind of labour.

The Tata Iron and Steel Company, although offering only the evidence of a single firm, reinforces the interpretation derived from

1 Supply and demand forces clearly worked in the Bombay labour market. During the plague period 1896–8, labour was not available in quantities needed by employers. The supply of labour dropped sharply because workers fled the city but favourable conditions in the yarn export market kept demand for labour high. Wages rose very sharply. When the fear of plague dwindled and the normal flow of labour was restored, wages dropped.
Map 7 Factory employment 1931; data by districts. Data are for 'registered factories', i.e. those with power employing over twenty workers or those without power employing over fifty workers.
Map 8 Factory employment 1961. Data in India and Pakistan are by districts.
Bombay. The steel plant was established in an area thinly populated by tribal groups. An official survey in 1906 cautioned that the district was 'not to be recommended as a field of recruitment for any industry'. Despite this and the distance from existing pools of industrial labour, there do not seem to have been any shortages of raw or semi-skilled labour in Jamshedpur at any time from the beginning of construction in 1908 to the end of our period. Some unskilled labour was recruited for construction work from local tribes and many were kept on as production labourers. Wage labour was not entirely novel to these people. Many had previously been employed in railway construction. As word of the new enterprise spread, unskilled labour from settled agricultural groups also began to appear at the worksite from as far as 300 miles away. Skilled native artisans were recruited partly from Bombay and Calcutta and partly from railway workshops elsewhere in the country. Indian supervisory and administrative staff were mobilized from various Tata enterprises and in rather casual fashion from other sources. Skilled technicians and managers were imported from abroad – in this case from Germany and the US as well as England.

We have no quantitative studies of wages and earnings that would test the conclusion derived from the qualitative evidence that TISCO was not burdened by any shortage of raw and semi-skilled labour. All we know is that Jamshedpur grew on a virtually unpopulated site to a town of 218,000 in 1951. At the peak before 1947, the steel company had over 32,000 employees on the rosters of its operating departments. And as with the Bombay cotton mills, the TISCO records indicate a significant amount of geographical mobility among the workforce, much of which had migrated long distances to get employment. For example, nearly a third of the more than 14,000 workers hired between 1932–7 had been born more than 350 miles from Jamshedpur.¹

Ranajit Das Gupta's recent study comes to similar conclusions for jute manufacturing and other industries in the Calcutta area.² While railways are outside the scope of this chapter, they share with modern industry the dependence on wage labour and the need for factory-type discipline. Neither in the operating branches nor in the workshops is there evidence that the development of railways was inhibited by difficulties in mobilizing a labour force. In fact, the railway administrations restricted

¹ Morris David Morris, 'The Labor Market in India', in Labor Commitment and Social Change in Developing Areas. Edited by Wilbert E. Moore and Arnold S. Feldman (New York, 1960.) It has been estimated that in 1931 about 28 per cent of the Bombay cotton mill workforce came from places more than 400 miles away. The fact that much labour moved long distances does not necessarily imply that it was hard to recruit labour at shorter distances. We shall see below that it is more probable that supply and demand forces operated in the labour markets to produce such results.

access to certain kinds of jobs to specific groups of the population.

I have already suggested that the initial scarcity of skilled labour, trained technicians and experienced managers was a phenomenon to be expected in a newly developing economy which was borrowing technology from elsewhere. In India the situation was made more difficult by the very limited social investment in human capital. This affected not only the much emphasized level of technical training but (probably more important) it sharply restricted the spread of even simple literacy. This slowed down the rate at which the superior kinds of labour could be reproduced, kept the cost of that kind of labour higher than it otherwise might have been and probably also inhibited the rate at which technological innovation could occur.

Research during the past three decades has revised our long-held views about the traditional social system. It was on the whole neither as harmonious nor as egalitarian as was earlier assumed. What has been described as the stability of such systems was—in the absence of alternative opportunities—sustained by the brutal working of the Malthusian checks. War, famine and disease resolved problems. To the extent that genuine opportunities offered themselves, people in the nineteenth and twentieth centuries were prepared to and did move short or long distances to take advantage of them. Not only were countryfolk prepared to move in ways that hopefully would leave them better—or at least less badly—off, but they were not entirely unfamiliar with exchange relations. It is within this framework of experience that Indian migration to towns and to new industrial occupations must be considered.1

Attempts to explain why rural people migrate to towns and to factory employment often distinguish the forces which 'push' people out of the countryside and those which 'pull' them to the towns. While such a formulation has a certain taxonomic value, the stress on 'push' or 'pull' is about as helpful in understanding the working of the labour market as an attempt to identify which blade of a pair of scissors does the cutting. It is more useful to visualize migration in south Asia as the consequence of people choosing among alternative actions each of which possesses advantages and costs. Even the truly distressed landless labourer did not change his place unless he felt that among his very unsatisfactory range of choices migration to the city was for some combination of reasons less bad than staying where he was. Among the elements that entered into the calculus of choice were (to name a few) the number of contacts in the

1 Not all factory employment was found in great towns but virtually all historical research has concentrated on large cosmopolitan centres like Bombay, Calcutta, Jamshedpur which has given an apocalyptic quality to the analysis. Fragmentary evidence suggests that the growth of factory industry in smaller centres probably made the process of creating the needed labour force less dramatic than is implied by the evidence so far at hand.
city, the expectation of getting a job, potential earnings and costs (including whether the migrant went alone or with his family) and the physical and social attractions of the city as against its unattractive features.

To describe the historical process of migration as a calculus of complex choice enables us to go beyond a mere listing of 'push' and 'pull' forces toward an understanding of the dynamic manifestations of the migratory process on the sub-continent in the nineteenth and twentieth centuries. In effect, migrants to towns and to factory employment were not the atomized flotsam and jetsam of Indian civilization. There was clearly a social structure within which the migrants operated, which helped them to make decisions about movement, defined the channels through which migration occurred, and provided the framework of social organization within which they functioned in the town and at the workplace.

This stress on opportunity costs seems to explain many of the features of urbanward migration but it does not automatically tell us why some groups from an area tended to flow at higher rates into towns or into specific occupations than apparently similar groups from the same district or region. Some of the difference seems to have been accidental, an initial advantage which reduced the burdens of movement and increased the opportunities of a group. Much of that clustered flow persisted for quite rational reasons. Industrial employers often found it cheaper to recruit labour, particularly for unskilled and semi-skilled jobs, in very personalized ways, using labour contractors or foremen rather than personnel offices. This certainly circumscribed the pools from which workers would be selected. At the same time, workers sought to find places for others known to them while the very presence of familiar groups in a city made it easier for potential migrants to move. The information about job opportunities became more explicit and the burdens of urban survival were reduced. Such influences not only increased the flow of workers from specific places but also favoured their concentration in specific occupations. And this tendency of groups to cluster encouraged employers to develop cultural stereotypes about which groups were best at doing specific kinds of work. This in turn intensified existing recruitment and migration patterns.

There are at least two more issues about migration patterns that ought

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1 There is deliberate ambiguity in the use of the term 'group'. The earlier literature tended to stress the significance of caste in determining the specific kinds of workforce clustering, but evidence from industrial centres like Jamshedpur and Bombay suggests that locality and linguistic affinity were of greater importance. Some historical evidence from smaller industrial centres suggests that the more local were the sources from which labour was recruited, the more probable it was that sub-caste (jati) would be significant in determining migration and occupational clustering.
to be considered. Why, in some cases, did labour flow from some districts and not from others that seem geographically as accessible? The Morris study of Bombay labour indicates that cotton millworkers came from the Konkan, the Deccan and later from northern India but not from Gujarat. The answer seems to be that the rapid expansion of Bombay as a market for food and raw materials in the nineteenth and twentieth centuries also offered special opportunities to regions whose resources favoured agricultural specialization. The region north of Bombay city apparently had special advantages in agricultural production which offered higher incomes to those who could adapt their agricultural activities to meet that demand. At any given wage-rate and income that could be anticipated in Bombay city, agricultural labourers as well as peasants of this region could in general do better (earn higher incomes) by remaining on the land to take advantage of the agricultural opportunities which actually were offered by the growth of Bombay city, Ahmedabad and other urban centres in Gujarat. Peasants and agricultural workers of the Deccan and Konkan, less well favoured by nature and by the pressures of population on resources to compete in the supply to the towns of food and raw material, offered their labour services instead.

The second matter that has to be explained is why labour from these districts did not totally inundate the urban areas and the factories? Superficially, it may seem that rural labour did flood into the cities in uncontrolled quantities, but the serious student quickly discovers that there was at any instant some limit to the number of workers available in a town or to firms in an industry. Some mechanism was at work in Bombay, in Jamshedpur, in Calcutta that kept the flow of labour from the countryside under control. Again, it seems to be the opportunity cost calculus that operated.

The labour that migrated into the towns was not perfectly substitutable for workers already employed, particularly in factories where experience and informal training certainly counted for something. Newcomers without skills typically started as substitutes. Not regularly employed, their average monthly income was lower than that earned by the established members of the factory or the industry. The more substitutes there were, the less was the average income each substitute would earn. If competition got too great, average expected incomes fell below that which could be earned in the countryside – making allowance for the higher costs of getting to and staying in the city plus other disadvantages – and the flow of people seeking factory employment in the town slowed down. On the other hand, if factory employment was expanding secularly, more labour was needed. Substitutes earned more because they worked more days. They also had
a better chance to be taken on as permanent employees. This experience would encourage a more rapid flow of labour from the countryside which would continue until the rising supply of newcomers or the falling demand from factories, or both, would once again reverse the process.

Most groups in the countryside who were likely to migrate seem also to have been exposed to some exchange relationships in their native environment and were certainly capable of making at least the basic estimates on which this mechanism depended. The flow of people back and forth as well as the existing clusters of people in towns were the elements of an informal system by which information was passed on and market testing occurred. An interesting example of the process arose from the attempt urged by J.N. Tata and sponsored by the Bombay Millowners Association (BMOA) to recruit labour in northern India in 1897. The scheme failed because the employers attempted to rig wages well below the going rates but in later years labour from these same north Indian districts began to flow into Bombay mills without any effort by employers.

As compared with the countryside, towns required a very much broader spectrum of skills and a greater proportion of literates. The higher level of skill that was required, the more likely it was that the job would be filled by someone who had been born in the city or had lived there for a long time. The city was the place where literacy and other modern skills were most rapidly generated and most easily accessible. Schools were much more highly concentrated there and specific skills were most easily developed and transmitted by formal and informal arrangements.

Even if economic development was generally slow, the urban occupational structure was not static during the colonial era. New industries and commercial and administrative activities required new skills and more of them. Demand could not be satisfied merely by drawing more labour in from the countryside and training each group for a specific function. Groups do not seem to have remained permanently fixed in the urban niches into which they initially settled. As a group became more urbanized, its literacy rate and its access to skills – some of these could be as simple as a knowledge of town ways or of the general discipline of the workplace – tended to rise. Members of the group gradually penetrated into better-paying classifications, either those which existed or new jobs that were being created, while the less skilled and unskilled vacancies tended to be taken over by newcomers. This seems to have happened when the Bombay cotton mills began to add looms at a very rapid rate between 1893 and 1913. Mills that were expanding seem to have encouraged experienced workers to shift from
spinning to weaving. Newcomers, including Untouchables, flowed in to fill the gaps in spinning. Studies suggest that some similar mobility process can explain the gradual flow and present dominance of Bengal Mahisyas in the engineering industry of Howrah district. And evidence suggests that the reduced importance of Bengali workers in the jute industry may be better explained by taking into account the response of urbanized groups to the advantages offered by the expanding occupational structure of Calcutta and its environs than by attributing unchanging cultural characteristics to Bengalis.

There are data which the Royal Commission on Labour (1931) interpreted as illustrating very high labour turnover and absenteeism rates and thus evidence of the persistence of a lack of worker commitment to industrial factory employment. These figures are grossly defective, typically including employer-instigated layoffs and dismissals. Where they can be adjusted to reflect only employee choices, they usually show that average turnover and absenteeism rates were very low, suggesting levels comparable to those in the West.  

Most industries tend to employ some combination of permanent and temporary employees, the latter being used to meet fluctuating needs without burdening the employer with the continuous labour costs of a permanent staff. The variation in mix among and within Indian industries was a function of many factors, not all of which can be examined here. Industries like railways and iron and steel, where demand was reasonably stable or steadily expanding, where technology and the relation of fixed to working costs tended to favour smaller output fluctuations, and which depended on a broad spectrum of skills, went to considerable effort to commit those workers whose loss or absence would make operations more difficult and costly. They systematically set out to create bodies of permanently attached employees. For example, while TISCO maintained a large, flexible pool of unskilled workers who were employed by day or week or as contract labour, scarcer skilled labour from the very earliest period was identified as permanent, paid monthly and gradually was provided with housing, retirement benefits and the like. In the case of skills that were in exceptionally short supply, commitment was reinforced by contracts of service. A similar pattern also seems to have developed rather quickly on the railways.

The situation was different in the cotton and jute mills. Supplies of labour were easily available; the skill requirements of these industries were far smaller and more easily reproducible; and demand tended to be quite volatile. Under these conditions, individual employers made few if any efforts on their own to create specific bodies of employees who

would be permanently attached to their own enterprises. Within rather broad limits it was sufficient if firms could draw on large pools of more-or-less substitutable workers from the existing labour market as economic conditions dictated. Thus, they were able to respond flexibly to changing demand conditions at the lowest possible cost.

The difference in the degree to which enterprises depended on a labour force that was permanent (in the sense of being attached to a specific firm) resulted in different methods of labour recruitment and administration. Where a particularly stable group of workers was essential to profitable operation, as in the steel industry or railways, recruitment and administration tended to become a direct management responsibility. Either the manager handled these matters or a specialized personnel office was established to screen, hire and oversee the efficient performance of the workforce. Where the labour needed was unskilled or semi-skilled and was easily available in a neighbourhood labour pool, the employer typically sought to avoid both the costs of paying labour for which he had no immediate need and the costs of maintaining specialized internal decision-making apparatus for hiring, disciplining and dismissing labour. Conditions favoured the emergence of at least two arrangements that kept down the employer's direct responsibility. One made use of the labour contractor and the other depended on the jobber.

The contractor was used in two different ways. In some circumstances, as in the tea plantations, he was paid to recruit labour but the employer directed the workforce. An alternative was that the contractor agreed to perform a task and recruited and administered his own labour to do it, as in the construction sector. The Royal Commission on Labour and R.K. Mukerjee both concluded that in India contractors were used in large-scale industry to perform normal industrial operations to a much greater extent than in other countries. In effect, they functioned as subordinate employers. Lacking adequate analysis of the phenomenon, it is not possible to say that this and other uses of contract labour were proportionately more extensive than during the early stages of industrialization in (for example) Great Britain.

The jobber, by contrast, was an overseer or foreman whose extensive responsibility for recruiting and managing his group of workers flowed from his responsibility to maintain the employer-determined level of output in his unit. The employer made the basic decisions about the Manning requirements per machine, the wage scales, and the specific rate of output at any time. It was up to the jobber to see that labour was present at the machines and that management output targets were fulfilled. It was commonly assumed that because he could exact bribes from job-seekers and job-holders, he maximized his income by
maintaining high rates of absenteeism and labour turnover to the
detriment of the industry. There were continual efforts by outsiders to
get textile mill employers to eliminate jobber power over the workforce.

Employers in the cotton textile industry took an equally unyielding
position in defence of the jobber’s role, claiming that the jobber was the
only instrument by which adequate supplies of labour could be made
available to the individual mills. They were unresponsive to evidence
that labour was almost invariably available (if not always recruited) at
the mill gates. They argued that only the jobber, coming from the same
social group and speaking the same language as the workers he
recruited, could properly screen and supervise them. But cultural
differences between workforce and employers were smaller in the cotton
textile mills than in other factory-type industries—iron and steel,
railway operations and workshops, government arsenals and engineer-
ing workshops—where the jobber did not exist and was not found
necessary. Why were employers in the cotton mills so adamantly
unwilling to explore alternatives which existed elsewhere and seemed to
function at least as well?

Initially, managers and technicians had to be recruited in Britain. This
talent was costly and Indian mills were organized to economize on its
use. Even though it was gradually replaced—by 1895 more than half the
managers, weaving and spinning masters and engineers in Bombay mills
were Indian—the skills remained relatively scarce and employers
typically tried to hold their possessors with long-term contracts. It is
clear that millowners were reluctant to burden their factories with
commitments for more than the bare minimum of inflexible supervisory
and administrative costs. This seems to have been a major influence in
determining how mills organized to administer their labour force.

When a mill was set up, performance specifications and wage rates
were established on a so-called muster roll for each department and
machine. Muster roll rates were intended to be able to attract and hold
fully experienced workers in a market in which the demand for such
labour was steadily expanding. These muster rates, however modified
over time, furnished a simple formula by which the millowner could
estimate the labour cost of each output decision. Where labour was
easily trained, it was convenient and efficient, because no costly
specialized managerial staff were needed, to have the jobber furnish the
labour needed to man the machines in his unit. He was free to offer every
post at what in effect amounted to public auction. The price (dasturi, the
so-called bribe) reflected the competition for going jobs and supple-
mented the basic wage the jobber got as foreman. If there were many
job-seekers, dasturi paid to the jobber rose; if the supply of job-seekers
fell relative to the demand, dasturi payments fell. In fact, when labour
was in absolutely short supply during the plague period of 1896–8, dasturi vanished and workers were paid premiums to take jobs.

The persistence of dasturi payments reflected something more than the easy availability of labour. It suggests that to the extent that they paid the muster roll rate the employers were usually paying above the equilibrium price for millhands. There were workers who were willing to work for less but the jobbers pocketed the difference. Employers favoured the system because it was clearly the cheapest way to get the labour supply they needed with the flexibility they preferred. All the system cost them was the fluctuating amount that the jobbers extracted from the workers under them. In return, the jobbers bore the responsibility for organizing the labour market and suffered the variation in wage costs. For the employers the alternative involved the necessity of hiring permanent personnel officers which would certainly have been more costly and would have added substantially to the fixed management charges they were so anxious to keep low and flexible. In this sense, millowners were right when they said that managers and technicians could not do the job. If recruitment was to be done differently, an elaborate bureaucracy would have had to process the recruits. Also, a more formal training programme would have been needed as a substitute for the informal methods of training the jobbers provided.

It has been argued that a system that put such powers in the hands of the jobber to hire, manage and dismiss (and thus to exact bribes from his subordinates) encouraged a higher rate of labour turnover and absenteeism and thus a lower level of efficiency than would otherwise have been the case. In fact, productivity (efficiency) was determined by the employer through the muster roll which not only set the wage rate per job but assumed an output that could only be achieved by a fully experienced millhand. The jobber could not fill posts with any kind of worker. His job depended on his ability to achieve the specified output and this limited his power to manipulate the workforce in ways that would adversely affect productivity. He could only turn labour over if he had a pool of more less equally experienced millhands on which to draw. So long as the industry was expanding and fully experienced workers were in limited supply, the jobber had to try and maintain his group of experienced workers from whom as a consequence he could not collect much dasturi. Dasturi could only be collected from (a lower wage could only be paid to) new and inexperienced job-seekers. These people, in effect, were paying the jobber to arrange training for them and to cover somehow for their lower-level experience.

To put the matter very generally, there was typically a two-tiered wage scale for each occupation during the period when the industry was expanding. Experienced labour more-or-less got the muster roll rate.
Newcomers in search of permanent jobs and workers who were looking for temporary employment got less than the muster rate by the amount of dasturi they were willing to pay and this was set by the existing demand for a supply of labour. If this lesser rate fell very much – in other words, if lots of people were looking for work and a high dasturi had to be paid – it served as a signal to workers in the countryside that earnings in the textile industry were no longer as attractive and the flow of labour seeking temporary or permanent work dwindled.

After 1922, the Bombay textile industry stopped expanding. Not only did underemployment increase during the inter-war years, but between 1927 and 1934 the mills cut overall employment by about a third. As one would expect, the two-tiered system of wage rates disappeared. Unlike the railways or the Tata Iron and Steel Company, the Bombay mills had not established any formal system of permanent employees. The jobbers were free to extend the system of the public auction and collect dasturi from experienced workers already employed. Those who did not pay could now easily be replaced from the pool of experienced unemployed. In effect, real wages probably fell much more during this period than the data suggest.

This analysis explains the swift growth after 1922 of bitter millhand opposition to the jobber system. The jobber collecting dasturi was one instrument through which the harsh post-1922 market forces worked on the labour force. But now employers were unwilling to allow jobbers to benefit from this secular shift in supply-demand forces. Faced by their own crisis, the millowners sought to capture the benefits by sharp across-the-board wage reductions. This provoked very hostile reactions from the jobbers. In effect, a savage three-way struggle developed among workers, jobber-foremen and employers from which no new stability could emerge without state intervention.

The fact that the jobber did not have an entirely free hand in the manipulation of the labour force even in those industries where he played a great role, leads to a consideration of the meaning of absenteeism and labour turnover rates. The data, frail though they are, tend to support two propositions. First, they show that these rates tended to be in fact much lower than the rates reported. Secondly, absenteeism and labour turnover tended to vary inversely with the level of skill and experience that jobs required. The evidence from most industries is relatively clear on this point. Generally speaking, workers in jobs that required considerable skill or experience, particularly team experience, tended to be the permanent and stable part of the industrial workforce. Unskilled or otherwise easily substitutable labour, largely irrelevant as individuals to the efficient functioning of a firm or industry, tended to be the casual or temporary and unstable part of the workforce.
of which so much has been written. It was this portion of the workforce, uncertain of employment and subjected to the fullest rigours of price competition in the urban market, which tended to maintain rural links because it had no choice. This was the labour that moved back and forth between rural and urban employment in response to income fluctuations. Its behaviour was much more a function of the way the labour market worked than a manifestation of tradition-oriented attitudes.

In effect, we can conclude that the general level of stability and commitment exhibited by different parts of the workforce was more a function of specific employer policy than of cultural characteristics. It is true that employers almost always wanted more commitment than they got, but they were able typically to get the quality of workforce stability for which they were willing or required to pay. The supply of and demand for specific kinds of labour determined how employers behaved and — as the experience of the tea plantations, railways and Tata Iron and Steel Company indicated — what could be done to create a permanent workforce where technical conditions required it. Government action which statutorily stabilized labour requirements in Bombay cotton mills after 1947 also seems sharply to have reduced both absenteeism and turnover.

Another implication to be drawn from the historical record is that the nature of employment opportunities and employer methods of recruitment tended to encourage immigrant selectivity by age, sex, family status, and place of origin. Such selectivity tended to minimize the problem of industrial discipline about which social scientists have written so much.

All occupations, rural and urban, have disciplinary requirements. Discipline in urban occupations was not necessarily nor invariably harsher and more 'unnatural' than in the countryside. Generally speaking, the lower the level of skill required by a factory job, the smaller was the difference between the discipline set for that job and the rural discipline with which the immigrant was familiar. Given the cheapness of such labour, unskilled work could efficiently be organized in ways that made few novel demands on workers.

As the skill requirements increased and the value of capital used per worker rose, the differences between the disciplinary practices of traditional employment increased substantially. At the same time, however, it became more likely that the task would be taken by an urban-born person or one who already had accumulated a great deal of urban factory experience. These were the people who had accumulated the appropriate prerequisites and for whom then the problem of adaptation was not great. In other words, the century-long history of Indian industrial labour shows that there existed within modern
industry mechanisms of stratification by occupation and selectivity by investment in human capital that effectively minimized the difficulties of creating a disciplined factory workforce, both from the point of view of the entrepreneur and the workforce.1

Looked at overall, the state — referring to both provincial and central governments — played only a modest role in the regulation of the conditions and the consequences of factory employment. The first legislation which directly affected industrial workers was the Factory Act of 1881. It was urged by a combination of English and Indian humanitarians and Manchester millowners and applied only to manufacturing establishments using mechanical power, employing more than a hundred persons and working more than four months in the year. The Act was subsequently revised and its coverage extended in 1891, 1911, 1922, and 1934. The statutes limited the hours and days of work first of children (also setting minimum ages for their employment), then of women and finally (in 1911) of males. They also provided for the regulation of health and sanitary conditions. It is not clear that the Factory Acts had decisive effects on the use of labour in the factories. The proportions of women and children employed in large perennial factories was relatively small before 1881. As I earlier pointed out, available statistics do not suggest that their employment was immediately affected nor do there seem to have been any spillover effects that benefited adult males as there had been in Britain in the nineteenth century. The statutes clearly restricted the hours and days of work on the average below what otherwise would have been the case. The rising age at which it was legal to employ children did reduce their initially small proportions to ultimate insignificance. It seems that it was the prohibition against night work by women that ultimately was the major factor in reducing their proportion (but not their absolute numbers) in the factory workforce. As increasing numbers of plants went to second and third shift-working in the 1930s and 1940s, only men could be employed and this automatically reduced the proportions of women.2

Apart from the Factory Acts, an Indian Workmen’s Compensation Act was passed in 1923 and a series of provincial maternity benefit laws was introduced, beginning in Bombay Presidency in 1929. While the popular ministries that came into office in 1937 enthusiastically explored the possibilities, no additional protective welfare legislation was passed until after Independence. The discussion of statutes affecting the

1 For example, there is some evidence that seasonal migration tended to be selective. The groups that worked at seasonal industrial occupations often were those who treated it as supplemental and who maintained genuine economic links with the countryside.

2 The worst working conditions and the greatest evasions of the law occurred in the small units and seasonal factories — e.g., the cotton gins — which are outside the scope of this essay.
development of trade unions and collective bargaining can best be examined in the context of rising labour unrest of the inter-war period.

Whatever the specific forms of labour administration in perennial industries, collective action appeared quite early. The records have not yet been combed systematically but at least as early as 1874 departmental strikes were occurring in Bombay textile factories in reaction to employer efforts to change wage levels and working conditions. Mentions of strikes become more frequent thereafter and in 1892 the Indian Textile Journal referred to 'a strike mania'. By then multi-mill strikes were not unknown and seem to have entered into employer calculations. A strike in 1901 shut down twenty mills in one of Bombay's mill districts and in January 1919 came the first of the industry's many city-wide shut-downs. At Jamshedpur, departmental strikes occurred and in 1920, less than ten years after the steel plant went into production, a general strike shut down the entire operation for a month.

The inter-war period was scarred by continual small-scale industrial unrest in all industries and by occasional great strikes in major industrial centres. The cotton textile industry, particularly in Bombay city, was notable for the intensity and duration of its disputes. These strikes in the various industries, particularly the larger ones, exhibited some workforce capacity for informal organization and an ability to transcend narrow provincial and parochial considerations. But with rare exceptions under rather special circumstances, they did not lead to the emergence of any effective permanent trade unions within individual industries.

Although there were a few efforts to organize millworkers in Bombay and elsewhere before 1918, no trade unions of factory labour appeared until the end of the First World War. Statistics on the subject are unsatisfactory. Official data are available only from 1927–8 and relate only to organizations that registered under the provisions of the Indian Trade Union Act of 1926. Between 1926–7 and 1946–7, membership of registered organizations in all sectors of the economy rose from 101,000 to 1.3 million. The only mainly factory industry with a substantial portion of its workforce unionized was the textile group (cotton, jute, silk and woollens), where unions claimed a membership of 348,000 or about 26 per cent of the total union membership in 1946–7. In that year, unions in the engineering industry which included iron and steel claimed 56,000 members. While the figures do not include the memberships of unregistered and non-reporting unions and thus understate the total, detailed examination suggests that on balance union membership claims were grossly inflated. The frequent strikes during the last quarter century of our period, particularly in the cotton textile
industry, reflected a growing capacity for occasional militancy but whatever the membership claims at any moment, the numbers could not be translated before Independence into stable, permanent, effective organizations of factory workers.

To some extent, this weakness has been glossed over as scholars concentrated on the political manoeuvrings of the national federations – 'the labour movement' – to the almost complete neglect of the careers of specific trade unions. But however we measure the vitality of these unions – by their ability to make wage-welfare gains, by their power to discipline workers into accepting agreements made between leaders and employers or even by their mere ability to survive – we must conclude that these organizations were unable to establish themselves as effective forces in factory industry.

In the absence of trade unions or other formal institutions through which grievances could be expressed, worker protest often erupted with great suddenness. Employers, government officials and outsiders sympathetic to worker demands expressed concern at their inability to find leaders with whom firm solutions could be arranged. Strikes not infrequently just played out. Some have interpreted such strikes and the fierceness with which even insignificant changes were often resisted as irrational expressions of protest by tradition-bound workers against the factory system itself. It is more likely that any generalized hostility to the discipline of industrial employment would have expressed itself by flight from the system rather than by strikes within it. The forms that protest took and the inability to develop effective voluntary associations of wage-workers during the colonial period reflect the specific conditions of the Indian setting.

The labour force was mainly unskilled and employers did not have great difficulty replacing troublesome workers. Where growth of an industry was rapid, the workforce was constantly being diluted by new entrants and by the movement of labour from one enterprise to another. Where the workforce was cosmopolitan – Bombay, Calcutta, Jamshedpur were notable examples – there were differences of language, religion, creed, and tradition to overcome. The rural sector from which the workforce flowed provided little if any experience which could be brought to bear directly on the problems of urban factory organization. Moreover, the fact that almost all workers were illiterate made all tasks of organization very much harder.

The appearance of effective trade unions did not depend only on the emergence of common grievances and a sense that collective action was necessary. Specific administrative experience and skills were needed to make a voluntary association work. Such a task of organization was difficult enough in the early stages of Western industrialization, though
it typically proceeded along craft lines and had the advantage of initially appealing to skilled, relatively well-paid and literate workers. In the West the experience gained by craft unions was subsequently employed in the much harder task of organizing industrial-type unions.

The problem was more formidable in India. Industrial development coming later than in the West tended to be relatively large-scale from the start. There were few circumstances where unions of skilled, literate factory craftsmen could initially develop. Conditions generally dictated that unions had to be organized along industrial lines, incorporating the very large numbers of unskilled and semi-skilled as well as skilled workers. This was a task which proved to be too great to be solved by the typical Indian factory workforce from its own resources during the colonial period. Such circumstances made it almost inevitable that the growing labour unrest of the inter-war period would be linked with the rise of demands for political independence. This conjunction produced the distinctive characteristics which shaped labour relations in India.

One feature of labour relations was the role of ‘outsiders’, typically middle-class professionals or intellectuals who became the organizers and leaders of trade unions. Not employed in industry, they could afford the risks of leadership. They were often well educated and able to undertake the tasks of organization. Even before the First World War a few middle-class humanitarians had attempted to organize the workers into self-help organizations. After the war, middle-class nationalists began more vigorous attempts to organize groups in the urban workforce because they offered access to concentrated political power of enormous potency which could be deployed in the struggle for independence. Wage-workers, frustrated by their limited power at the workplace, often responded to the broader appeals. However, the incorporation of worker protests into wider nationalistic objectives made it even more difficult to establish direct collective bargaining relations between employers and their immediate employees. The middle-class leaders, typically more concerned to build a labour movement rather than individual unions which would inevitably focus on parochial workplace issues, tended to formulate demands in ways that made compromise at the plant level difficult to achieve. Labour force militancy was often sharpened because the nationalist movement threw up competing groups with different long-run socio-political

1 There were highly skilled and literate groups of workers in various industries. Some, for example, at the Tata Iron and Steel Company in Jamshedpur, seem to have been the nuclei of specific protests, but they apparently did not generate permanent organizations. It is possible that the long-run survival of such groups was adversely affected by the fact that a large proportion of highly skilled workers were foreigners. The apparent success of the Textile Labour Association of Ahmedabad must be attributed to the very exceptional circumstances of Gandhi’s influence on both workers and employers in that city.
objectives. They vied for the loyalty of workers by expanding the demands which the workers were encouraged to make of their employers. Such developments tended to intensify labour unrest without making it more effective in any sustained confrontations with employers.

This pattern showed itself most explicitly in the Bombay city cotton textile industry where conflict during the 1920s and 1930s was much more bitter and prolonged than anywhere else. Apart from continual unrest in individual mills, the entire Bombay industry was shut down in 1918–19 and 1920, 1924, 1925, 1928, 1929 and 1934. Moreover, beginning about 1927 the Communist Party began to play an increasingly active role in these confrontations.

The events of 1924–5 showed that the labour utilization policies which the millowners had established in an earlier era had become frozen into practices which were difficult to change. Employers were unable to resolve their economic predicament by imposing unilaterally a new pattern of discipline on the workforce. But voluntary collective solutions also were not possible. The millhands had developed a strong sense of militancy but they were not able to create unions which could focus and discipline that militancy for collective bargaining purposes. Simultaneously, the intrusion of the communists showed how easily the millhands — more than half of Bombay’s factory labour force — might be turned into a political threat to the established order. The Indian Trade Union Act (1926) which gave registered unions and their members legal immunity from liability arising from strikes, was of little help in easing tensions. Under these circumstances, the state intervened to create limited and non-revolutionary channels through which worker grievances could be aired. Between 1934 and 1938, a series of acts was passed — the Bombay Trade Disputes Conciliation Act (1934), the Payment of Wages Act (1936) and the Bombay Industrial Dispute Act (1938) — which permitted the state to impose a rule-bound system of labour discipline within each cotton mill and to restrict the right of direct employer-employee confrontations by enforcing conciliation procedures. During the Second World War the government played an increasing (albeit informal) role in mill wage policy as well. This process culminated in a 1947 Industrial Court decision which established the state's right to determine the level of wages and to impose a system of standardized and uniform wage rates on the industry. In the previous year the state — by the Bombay Industrial Relations Act (1946) — sought directly to encourage the growth of ‘sound (union) organizations’ which would support official policies.

Bombay served as the centre where new mechanisms were forged to cope with specifically Indian conditions. From there they were general-
ized. The same or similar techniques spread to other provinces and were adopted by the central government. Unlike the situation in the already developed nations of the West to which Indian policymakers initially looked for their models, the state took on an increasingly interventionist role. Much of the development of government involvement on a national scale was a response to the inability of the industrial workforce to create its own collective institutions. And where, as in Bombay, a beginning was made, the state sought to channel trade union behaviour along lines deemed desirable.

Handicrafts and small-scale industry

It is generally accepted that foreign factory-produced products flooded into India after 1800, undermining and destroying handicraft production. But the point is made so generally that it tells us little about the actual responses of the Indian economy— the rate at which the process occurred, the varied behaviour of different parts of the handicraft sector or of different regions of the country. Because it is not specific, the generalization does not contribute to our comprehension of the complexity of Indian economic history in the nineteenth and twentieth centuries. Despite the importance of the enormously varied handicraft activities and the considerable— sometimes overwhelming — detail that is available about them, the only one to which scholars have paid much attention is the textile industry. While it is not yet possible to be definite about its history evidence is beginning to accumulate that suggests that what happened to the textile industry was much more complex than we had previously realized.¹

The technology of the Industrial Revolution in Britain did not develop simultaneously in the cotton-spinning and weaving sectors. The truly dramatic effects occurred first in spinning. By 1812, largely as a result of productivity increases, yarn prices had fallen to an average of about 10 per cent of what they had been in 1779. The technical problems of mechanical weaving were resolved much more slowly. Power looms did not begin to spread until the 1820s and Robert's automatic loom was not widely adopted until the mid-1830s. Even then, power looms had a substantial advantage over handlooms in Britain only for a restricted range of products.²

The implications of the timing of these technical developments can be stated briefly. Until about 1830–5, British price competition would have been felt almost entirely by Indian hand-spinners. To the extent that Indian handloom weavers were able to buy factory-spun yarn from Britain, they should have experienced no special disadvantage against British cloth which was also being mainly produced on handlooms. The suffering of weavers in this earlier period—so vividly described by the Abbé Dubois, and testimony before parliamentary committees in 1830–1 and 1840, and by Marx—was more probably caused by weather instabilities which periodically caused crop failures, by declines in agricultural incomes, and by steep falls in local demand for cloth.

It is in the period 1835–70, when the power loom and factory production triumphed in Britain, that we would expect to encounter the great competitive squeeze on handloom weavers. Yet oddly, their condition did not receive the public attention during these years that had been devoted to them earlier or later. It could be that officials and others were elsewhere preoccupied. Or it is possible that handloom weavers were able to offset some of the pressures produced by British imports. The dramatic decline in cloth prices that came as a consequence of cheaper yarn and power-looming should have stimulated a substantial rise in cloth demand. We do not know whether demand elasticity and population growth after 1835–40 increased the market rapidly enough to enable Indian producers to retain their absolute share of the market, but these factors certainly seem to have cushioned some of the impact.

The Indian factory textile industry began its swift growth in the early 1870s. While many of the early mills installed some looms, the primary emphasis was on the production of cotton yarn for handlooms, proof of their still vigorous existence in many parts of the country. As far as we can tell, throughout the nineteenth century British producers sold only medium and fine-count yarns in India, apparently never below 25s. Thus the vast bulk of yarn required by Indian weavers, that used in the production of coarse cloth, was probably still being produced by hand as late as the last quarter of the nineteenth century. The Indian mills started and proliferated by producing these coarse-count yarns which did not require them to compete with British mills but only with local hand-spinners. The cost structure was such that cheap labour made it impossible for the British to penetrate the coarse-yarn market; hand-spinners did not have that same advantage against Indian mills. Now there was no place for hand-spinning to hide. Fine-count yarn came in from abroad; coarse-count yarn was produced by Indian factories. It was this new industrial competition—native rather than foreign— which ultimately gave the death blow to the hand-spinning sector. But that effect was a delayed one.
After 1870 there was probably something like a repetition of 1780–1835 but in a different segment of the market. Cheap Indian mill yarn certainly undermined the hand-spinners but simultaneously made it possible for coarse handloom cloth prices to fall sharply. Demand could expand without necessarily having an immediately adverse effect on the income of weavers of these products. The cotton mills introduced looms relatively slowly, seeking to satisfy only the stable parts of local demand for simple kinds of cloth. For example, as late as the First World War the famous Tata Empress Mill at Nagpur consumed only 30 per cent of the yarn it produced in the manufacture of its own cloth. It sold 20 per cent of its yarn to China and half of its total yarn output was sold to local handloom weavers. While their relative share of the Indian market certainly fell steadily, the combined influence of growing population and price elasticity of demand permitted hand-weavers to maintain a much larger amount of the growth market than has hitherto been suspected. Quantitative evidence is available only from the end of the nineteenth century. It shows that as late as 1896–9 handlooms still produced a minimum of 31 per cent of all cloth consumed in India. Although their relative share of output steadily declined through the twentieth century, their absolute output certainly expanded. At the beginning of the First World War handlooms were using 10 to 12 per cent more yarn than they had two decades before. While the use of the fly-shuttle was increasing, it was still an insignificant influence. In the absence of any significant technological developments which increased productivity per weaver, it is likely that the number of handloom weavers did not decline—and may even have increased somewhat.

During the First World War, mills consumed very much more of the yarn they previously sold and this forced a considerable reduction of handloom activity during the boom period. What happened between the end of the First World War and the second is a matter of considerable debate. There is no doubt that the handloom share of the market continued to decline. The disagreement is over what happened to absolute output and this depends on how one estimates the supply of ‘free yarn’ available. The Fact Finding Committee of 1942 concluded that yarn available to handlooms continued to rise so that in 1936–9 the supply averaged nearly 37 per cent more than in 1906–9. S.D. Mehta, on the other hand, estimated that ‘free yarn’ supplies available to the  

1 Handspun yarn continued to be used wherever families converted their own cotton into yarn and were able to exchange it with weavers. This practice continued on a considerable scale even to the end of the colonial period. But it served only so long as families had spare time to spin and weavers had idle capacity. In effect, hand-spinning survived under conditions where opportunity costs of labour were close to zero. J. Krishnamurty calculates that the number of hand-spinners—excluding the effect of khadi promotion—remained fairly stable at slightly over 500,000 during the twentieth century.
non-factory sector stagnated. But Mehta's conclusion follows from his choice of triennial periods for comparison. Using Mehta's data differently, Krishnamurty estimates that handloom output rose from an annual average of 965 million yards in the period 1902–3 to 1912–13 to at least 1,068 million yards in the period 1930–1 to 1937–8.

As we can see, what happened to handloom cloth output in the long run is very complicated. There is no doubt that the share of total output fell steadily from 1813 to 1947, being undercut first by foreign and then Indian mill competition. But what happened to absolute output on an all-India scale is much less clear. Allowing for the rise in demand that was associated with population growth and price elasticity, it is hard to believe that absolute output declined very much if at all.¹

None of this says anything about the real incomes earned by handloom weavers. The preceding analysis suggests only that a decline in cloth prices is not automatic proof that weavers' incomes fell. But of course where power-looms in workshops began to increase their share of non-factory cloth output, it did put pressure on wage rates and incomes. Precisely what sort of pressure and at what time has yet to be determined. Despite the general assumption that weavers were always recruited from traditional caste groups, new groups were constantly moving into the activity and old groups were constantly moving out. This is to be expected in any dynamic situation. Those moving out were not always moving down the income scale—whether they went into agriculture or trade—and newcomers into the activity were possibly improving themselves at least marginally.

It is difficult to say what the earnings were for rural weavers who produced for local demand either as part of a general system of subsistence exchanges or to individual order or by casual peddling. But in the commercial sector incomes must certainly have been generally low, being determined by the incomes of agricultural labourers because it was quite easy to recruit new producers for the coarser-count materials. The incomes of weavers who produced finer-count and patterned products which required greater skills fluctuated with the state of demand and the competition from factory products which was not systematically sustained on every front. The adaptive capacities of the handloom sector—not only in terms of groups moving in and out—were considerable. There was scope for weavers to shift production from types of cloth where mill competition had become very severe to others where it was less severe or non-existent. This was achieved not only by shifts among types of cotton cloth but by movements among types of material, between silks and cotton but also

¹ See Chapter vi. Employment trends in the handloom sector are also discussed there.
(after the First World War) rayon.¹ There was also considerable 
flexibility in the geographical location of handloom weaving. The 
decline of activity in one district was often offset by expansion 
elsewhere. Sometimes this would mean the movement of a group, as 
when the Kashmir woollen-shawl producers migrated to the Punjab in 
the first half of the nineteenth century. On other occasions it might 
involve the decline of one group and the expansion of another as 
between the two world wars when the number of weavers declined in 
Bengal but rapidly expanded in Madras. The bewildering variety of 
adaptations—not yet sorted out—makes it impossible for anything 
significant to be said about the movements of real incomes of the 
industry on an all-India basis.

During the Mughal period handloom weaving consisted of two parts, 
a relatively small segment which was devoted to long-distance trade and 
the very greatest part that satisfied local and district requirements. The 
division continued throughout the colonial period but the actual weight 
of these two segments continually changed. Even at the end of the 
colonial era there was a very large number of weavers, typically in the 
countryside, usually independent or partly so, often earning part of their 
income in other employments, who still produced plain coarse cloth. 
Some of this continued to be based on the exchange of handspun yarn 
for cloth but most of it depended on sales in local markets. This was a 
relatively passive part of the system and was gradually undercut by the 
inroads of more elaborate commercial relations.

The other segment was expanded by the declining cost of transport in 
the nineteenth and twentieth centuries. Accurate market information 
and increasingly large amounts of working capital were absolutely 
essential to obtain the foreign and domestic factory yarn and to make 
possible the geographical expansion of markets not only in India but in 
other parts of Asia and Africa. None of this could be provided by 
individual weavers. It depended on people capable of financing a 
network of middleman functions.²

The history of these modern commercial developments is hardly 
known but we can identify certain major tendencies that have emerged

¹ It is not the case that hand-weavers were forced to concentrate only on very coarse cloth. While 
some of the splendid luxury types of the Mughal era vanished from the scene, a very large market 
for fine- and medium-quality cloth existed and may even have expanded. Imported yarn was finer 
count and virtually all of it was used by handloom weavers.

² It has been estimated that during the twentieth century about 10 per cent of India's handloom 
output, much of it from Madras, was exported. This is pure guesswork at this stage. On the other 
hand, the existence of this very considerable trade, its survival and expansion in neutral third 
markets against foreign and domestic factory cloth competition, is further evidence of the 
complex tale that still has to be told.
particularly in the twentieth century. There was the increasing concentration of professional weavers under the aegis of master weavers or merchant manufacturers typically in or near larger urban areas. Workshop organization seems to have become more common. Geographical specialization in the production of certain types of products apparently increased. All this was connected with the shift to fly-shuttles among handloom weavers and – beginning in the 1930s – the emergence of a non-factory power-loom sector. The expansion of small-scale power-loom operations typically occurred in areas where there was already considerable handloom activity. At the end of our era the greatest concentration existed in Bombay Presidency. The power-loom offered substantial advantages, at least in a restricted range of products, over the factory on one hand and handlooms on the other.

These tendencies imposed a necessity for increased amounts of working capital and this inevitably changed the position of handloom weavers. The few attempts to furnish capital and marketing outlets on a cooperative basis failed. Weavers became more dependent on those who provided the financial resources and had access to markets. Dependence on merchants was certainly not a new phenomenon but in the earlier stages it was more likely to resemble a form of indebtedness. The novel feature of the period between the two wars was the spread of what increasingly resembled a wage-labour relationship.

The discussion of cotton textiles does emphasize certain analytic insights, most important being that the path of traditional handicrafts was not inexorably downward. For a long while, transport barriers offered considerable protection in many parts of the country. Even where the traditional product was directly confronted by machine-competition – cotton spinning is the obvious instance – the process of decay (whether measured by employment or even income) could be quite protracted.\(^1\) In many cases modern factory production reduced the cost of handicraft factor inputs, thus strengthening the demand for the final handicraft products at least for a while. Handicraft systems often showed considerable adaptability to available materials and market needs which enabled them to evade some of the worst impact of direct competition from factories. For example, iron-smelting is a process that seems to have suffered grievously from modern competition, but the cheapening of factory-made semi-fabricated metal bar, rod, and sheet certainly vastly expanded the market for blacksmiths and other

\(^1\) This is a point that M. Dobb, *Studies in the Development of Capitalism* (1946), 263ff, made about the British experience.
metalworkers. The enormous increase in the use of metal in India – e.g., railway ties and track – also contributed to the availability of scrap materials, further reducing input prices and expanding the potential vitality of sectors that could put them to use. The introduction of new materials like aluminium and the cheapening of brass vastly expanded the market for handicraft output along certain lines but probably also reduced or restricted it for others, notably potters. Leatherworkers were probably hurt as cultivators substituted galvanized-iron buckets for leather bags in their wells but on the other hand the demand for leather footwear rose substantially. Similarly, woodworking skills which had expanded in the nineteenth and early twentieth centuries to produce country carts that hauled the increased agricultural output probably suffered during the inter-war period from the development of automobiles, buses and trucks; at the same time there was certainly an increased need to maintain and repair this equipment and to cope with the spread of bicycles.

In the existing state of our knowledge, we are unable to draw conclusions about the real income effects of these diverse changes. The inclination is to assume that there was a constant worsening of real income not only relatively but absolutely. This is reinforced by the abject poverty of many artisan groups. But the poverty that we note at any moment can be the expression of three quite different possibilities. It can reflect the culmination of a long-run decline in well-being; it can represent the historic poverty from which the group always suffered; or it can be the consequence of an adverse phase in the weather cycle which periodically afflicts the Indian economy. Given what has been said about the adaptive possibilities of the various handicrafts, we must resist the temptation to assume in the absence of detailed study that the first possibility is necessarily the correct one.

Beyond the effects of traditional handicraft activity, the spread of commercial relationships required additional and often novel local capacities to process, fabricate, shape and repair. Among such developments were activities like cotton-ginning and pressing, sawmilling, rice-hulling and polishing, flour- and oil-milling; the making of furniture, metal trunks, locks, lanterns, cutlery and other housewares; artificial drying of tea and coffee; and small engineering linked with the maintenance of bicycles, sewing machines and the like. Many of these could be carried on quite traditionally, depending mainly on the application of various amounts and types of labour. Even though they were not accompanied by great technical changes, there seem to have been a fair number of modest innovations, small improvements in tools and hand-operated equipment which increased labour productivity in many ways. Even where mechanical power was widely applied – as in
cotton-ginning and pressing and sawmilling – the units of production remained small and the system continued to be characterized by the extensive use of labour. The introduction of the small-horsepower gas engine in flour-milling, rice-polishing and a variety of other tasks during the inter-war era produced few visible consequences. Certainly the reports of the various inter-war committees which dealt with small-scale industry in the United Provinces, Bombay Presidency, Bengal and elsewhere, leave us with the impression that their impact as late as 1947 was insignificant.

The introduction of a mechanical source of power may have created the need for a centralized workplace but the entrepreneur typically operated these small enterprises as workshops and not as factories. There was a variety of forms but generally he would not own the materials from the beginning of a process to its end or he would not maintain complete control of the labour that did the work. In activities like cotton-ginning, rice-polishing and flour-milling the entrepreneur merely provided the machine and its maintenance and charged a fee for processing the patron’s material. In other situations he controlled his work-space and machines but labour was supplied on a contract basis. And in still other circumstances he may have exercised specific and direct control over material and labour only at limited states of the work that went on in the shop. In effect he avoided many of the financial, managerial and technical responsibilities that characterize true factory production. He sought to share them with others wherever possible.

Why was there apparently so little proliferation of mechanical power even where foreign competition was unimportant? Why did all the mentioned developments singly and in total add up to so little at the end of the colonial era? The answer is fairly obvious. The local markets for these products were small and seem not to have grown rapidly. The situation did not encourage any rapid expansion of existing techniques, much less did it stimulate innovation. (The infinitesimal number and types of patents filed by Indians during the inter-war period is one measure of this.) Simultaneously, mechanical expansion required certain factors of production – easy capital and credit, some skilled labour and technical knowledge, etc. These were not generally available at costs that made machine processes really competitive against the cheap labour that was available. The structure of demand and factor supply costs – in effect, the generalized poverty of India – was unfavourable to rapid mechanization in the small-industries sector.

While this general conclusion is not likely to be revised, there is some evidence that suggests that it may be necessary to modify the interpretation as regards timing and geographical distribution. One gets the impression that as distinguished from the 1920s, the 1930s was a
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decade during which there was a fairly rapid spread of some small-scale industrial activities. There is also the further impression that by 1947, at least in some parts of the country such as Bombay Presidency, the developments had become quite important. At the moment such suggestions are supported by only the frailest evidence about a sector which is almost totally terra incognita.