Evolution of the Large Industrial Corporation: An Evolution of the Transaction-Cost Approach

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In this presentation I plan to pick up where Professor Williamson left off. That is, I plan to outline an agenda on a small but significant part of business history that would incorporate his proposals and in this way show how valuable the transaction-cost approach, which Williamson has pioneered, can be for business historians.

But first let me also be a bit autobiographical, for my awareness of the value of the transaction-cost approach comes largely from Williamson with some instruction from Douglass North. As I was finishing The Visible Hand, Williamson's Market and Hierarchies appeared. It elucidated and elaborated ideas I had earlier read in his Corporate Control and Business Behavior. As I was trained as a historian rather than as an economist, I found his analysis a bit rough going, for many of the technical terms were still unfamiliar. I did find his analysis of the multidivisional form, particularly its attributes as a miniature internal capital market, intriguing and most useful. My appreciation of the book's implications became more clear in the discussions I had with Williamson about his critique of The Visible Hand at the conference held at Harvard in 1977 on the publication of my book. (The papers presented at the conference later appeared in Managerial Hierarchies, edited by Herman Daems and myself). Clearly, my concepts of transaction-costs were much narrower than Williamson's. I consider these costs as an accountant would, that is, those involved in handling a specific transaction or set of transactions and not as the broader cost of planning, making, and implementing the transactions that moved the goods through the processes of production and distribution.

The real value of the broader definition only became clear to me when Williamson sent me a draft of his "Organizational

Innovation: The Transaction Cost Approach" -- a paper which is soon to be published. My reading of this paper on a long trip to Japan in the Fall of 1980 was one of those rare and pleasurable scholarly experiences -- the introduction to a perspective that gives fuller meaning to old data and opens challenging vistas. Correspondence with Williamson on this piece and a second major article, "The Modern Corporation: Origins, Evolution and Attributes," which appeared last winter in the Journal of Economic Literature, further enlightened my understanding of the transaction-cost approach. In the meantime, I was further educated by reading Douglass North's Structure and Change in Economic History; but as in the case of North's earlier work, I had difficulty in applying his broad concepts and definitions of transaction-cost to my more specialized and parochial questions and concerns.

What I would like to do in this paper, then, is to look at one arena of business history where the transaction-cost approach, as I understand it, is particularly relevant -- the evolution of the large industrial corporation which has long been managed through extensive hierarchies. In describing this evolution, which focuses on the American experience, I will suggest how transaction-cost economics helps to explain the historical evolution of that institution and to indicate what it may not explain and then suggest where it needs to be elaborated to explain.

THE EVOLUTION OF ENTERPRISE

In all advanced market economies the large industrial corporation with its extensive managerial hierarchies followed much the same underlying pattern of growth. Within the pattern there were major and fascinating differences. But the similarities are striking and fundamental. In the first place, modern industrial enterprises had their beginnings -- that is, began to create their hierarchies -- in all advanced economies at approximately the same period of time, namely the last decades of the nineteenth century, particularly the 1880s. Secondly, these large firms from the beginning clustered in industries with similar technological and market characteristics. Third, the initial growth of the firm came by vertical integration. That is, these manufacturing firms grew by investing personnel and facilities in nonmanufacturing functions -- in marketing, purchasing, and, in some cases, in the production of semi-finished materials, and in some cases in research and development. Expansion in marketing and purchasing

often took these enterprises overseas. Expansion in nonmanufacturing activities led, in turn, to further expansion of production facilities and personnel, both at home and abroad. By 1914 a good number of the leading industrial corporations in the advanced economies had become multinationals. Finally, in more recent years the growth of these industrial firms continued primarily through diversification into new product lines. Let us consider each of these sets of similarities in terms of transaction-cost economics.

Why did so many of the large industrial firms have their beginnings, or begin to first build their hierarchies, in the 1880s? The answer seems clear. The new technology of transportation and communication permitted a single business enterprise to handle an historically unprecedentedly greater number of transactions within a specific period of time. The telegraph and the railroads, the cable and the steamship made possible for the first time in history both almost instantaneous communication and fast, all-weather, scheduled transportation. They were the technological prerequisites for modern mass production and modern mass distribution. The rapid spread of coal-using technology for heat and power in manufacturing was already making it possible for a single production establishment to produce daily a much greater number of units than ever before in history. Nevertheless, the potential of the scale economies of such production technology could not be realized without a steady, regular, high-volume flow of materials into, and finished goods out of, the plant; and the essential transportation and communication infrastructure that made possible these flows was not fully in place in the 1870s. The unprecedented expansion of the number of transactions handled by the managers of the single enterprise not only demanded a greater division of labor and a more systematic coordination of flow within the manufacturing plant but encouraged the managers to innovate organizationally to reduce the unit cost of handling the transactions involved in assuring a steady flow of materials into and out of the plant.

Tables 1 - 5 illustrate the second set of similarities. Table 1 indicates the clustering of the largest manufacturing enterprises in the world in 1973. In that year 263 (65 percent) of all the manufacturing enterprises in the world that employed more than 20,000 workers, 401 companies in all, were clustered in food, chemicals, machinery, oil, and metals. Only 21 companies (5.2 percent) were in apparel, lumber, furniture, leather, publishing and printing, instruments, and miscellaneous. The remaining, just under 30 percent, were in subcategories (that is in three-digit SIC groups) of larger

two-digit groups such as tires in rubber, newsprint in paper, plate glass in stone, glass and clay, cans and razor blades in fabricated metals, and mass produced cameras in instruments.

Table 2 shows that the large firms have clustered in these same industries throughout the twentieth century; and tables 3 - 5 show that the pattern is much the same in Britain, Germany, and Japan. The major difference in the clustering in these other nations is that they have fewer companies in oil and more in textiles. Since the United States was the major oil-producing country in the world until well after World War II, the large number of oil companies here is not surprising; and in the other three countries the number of textile firms in the top 200 dropped off dramatically during the twentieth century.

Except for textiles, the industries in which the large firms have clustered in all places and in all times have been capital-intensive and energy-intensive industries whose enterprises produced in high-volume for national and international markets. On the other hand, the industries in which few large firms appeared were much more labor-intensive, required less energy per unit of output for both heat and power, and sold more in regional and local markets. The relationship between capital- and energy-intensive technology of production for world markets to the volume of transactions can be illustrated by one example. In 1882 the Standard Oil Trust was formed so that the members of the Standard Oil alliance might be able to rationalize their extensive refining facilities.[1] In the resulting reorganization, over a quarter of the world's kerosene came to be produced in three refineries, with two-thirds of their product going overseas. (At this time refined petroleum products were by far the country's largest export of nonagricultural processed or manufactured goods.) Imagine the diseconomies of scale if a quarter of the world's production of flour, cotton textiles, or shoes were concentrated in three factories! Consider the many, many more transactions that one enterprise, Standard Oil, had to carry on daily to maintain steady flow through these works and to the world-wide distribution outlets than did any one maker of flour, shoes, or textiles. Thus, in terms of Williamson's "dimensions," large industrial firms quickly clustered in those high-volume industries where enterprises handled the greatest number of recurring transactions, where uncertainty of maintaining a continuing flow of recurring transactions created the greatest risk in return on capital invested, and where, therefore, transactions came to be supported by the largest investment in transaction-specific assets.

These characterisics, in turn, led to the third similarity, growth through vertical integration. The potential economies and the enlarged risk (that which would result from operating at low volume or from shut down) brought investment in transaction-specific assets in marketing, purchasing, and, then, in research and development and in central office personnel and facilities. Of this investment that in human capital was much more important than that in physical facilities to the continuing growth and health of the firm. An awareness of the historical sequence involved in these investments is essential to understanding the impact of transaction-cost economies on the growth of the firm. In nearly all cases neither scale production economies nor transaction-cost economies could be realized, nor the risks involved in making the capital intensive investment in production facilities be reduced without constant, careful, detailed scheduling of the flows from the sources of raw materials into the plants and from the plants to the retailers or final customers. In addition, many of the products of these industries required investment in specific marketing and purchasing services if the goods were to be sold in the volume in which they could be made and distributed. It was such scheduling and services that I described in The Visible Hand by the term of "administrative coordination." It was the need to reduce such transaction costs that caused the manufacturers to replace the outside wholesaler, commission agent, or other middle men with their own personnel and facilities, or, in other words, to alter the governance structure of the transactions from that of contractual arrangements to that of administrative coordination and control.

Let me review briefly how these requirements brought into existence the visible hand of management in food, chemicals, and machinery -- the industries where the large firms have always clustered.

In food and in drink, tobacco, and consumer chemicals (the last included soap, cosmetics, paints, and pills) the central need was scheduling. Nearly all large enterprises in these industries produced small-unit packaged products that could be placed directly on retailers' shelves. The mass production of such products was new. Hitherto they had been packaged by the wholesaler, or even the retailer. In the 1880s, however, innovative technology in canning, packaging, and bottling machinery suddenly eliminated one of the major functions of the wholesaler which was to break down large packages into small ones. Because the manufacturer now did the final packaging, he, not the wholesaler, did the branding and, therefore, the advertising. These manufacturers often continued to use the

wholesalers to distribute physically the cans, tins, or bottles; but their salesmen made the sales to the retailers; and then their central offices, in direct and constant communication with the sales force, scheduled the flows. As most of these packaged goods were not opened until the final consumer used them, the lowering of transaction-costs involved in inventory control were historically a greater incentive for forward integration than those involved in maintaining quality control.

In the production and distribution of perishable food, such as meat, beer, and bananas, the scheduling of flows were even more critical than in that of semiperishable, packaged, branded products. In addition, to prevent spoilage distribution required a massive investment in refrigerated railroad cars, ships, and warehouses. Armour and Swift were by 1900 butchering 6 to 7 million cattle annually (in addition to the large number of pigs, lambs, and sheep) and distributing this perishable food to all parts of the United States and the world, particularly Europe. Here the transaction-specific investment required to handle the volume and reduce the risk of recurring transactions permitted, in turn, a major increase in specialization and the economies of scale in processing.

The machinery producers (those in SIC Groups 35, 36, 37) nearly all produced standardized machines through the fabrication and assembling of interchangeable parts. High volume production here required almost as careful scheduling as did production and distribution at Armour and Swift. By the mid 1880s, for example, Singer Sewing Machine was producing in each of its plants 10,000 machines a week, calling for a wide variety of raw and semifinished materials. At the same date McCormick Harvester was making 55,000 harvesters and reapers a year, and by the end of the 1890s General Electric was filling over 100,000 orders a year. These, like other machinery firms, marketed their products throughout the world. To be sold in volume, the machines needed to be demonstrated and often to be installed. They called for continuing after-sales service and repair; and, because they were expensive, they had to be sold on credit. Similarly, technologically advanced chemicals required specialized instructions on their use and specialized tank cars and warehouse facilities for their distribution.

Wholesalers rarely had the skills or the funds to provide these services. Faulty installation and maintenance of electrical equipment by untrained personnel could lead to death or fire. Faulty handling of the new explosive, dynamite, could be even more dangerous to the wholesaler or customer. In agricultural machinery, office machinery, and even sewing machines, reliability of service to maintain the machines

operations and the availability consumer credit quickly became essential to continuing sales and, thus, to a more effective competitive weapon than price. Therefore, to assure the provision of the necessary specialized services, as well as the essential scheduling and inventory control, the firms internalized the wholesaling activity by making an extensive transaction-specific investment in an international branch-office network.

Vertical integration in those industries whose characteristics permitted transaction-specific investment to reduce transaction-costs substantially by means of scheduling and services led to another type of nonmanufacturing investment. Not only in the more technologically advanced industries, but also among some makers of branded packaged products, the completion of selling and buying networks was followed by the formation of specialized research and development departments. In the United States investment in such facilities and personnel almost never appeared before the building of the marketing organization. To coordinate the needs of the customer with rapidly changing technology required the trained sales force to be in constant touch with the factory manager, the product designer, and the research laboratory. The resulting network of information flows within the enterprise became a major force for technological innovation in these industries. Again, the sequence is significant. The reason for investment in marketing, distribution, and purchasing was much more to assure scheduling and provide services than to obtain specialized information. Once the organization was in place, the R&D investment was then made to exploit more fully the knowledge generated by and through the network.

Finally, an expansion in marketing and research brought further investment in production facilities, usually at a distance from the company's original manufacturing establishment. And, of course, all these investments in personnel and facilities in turn required an enlargement of the corporate office that coordinated, monitored, and allocated resources for the operating units of these enlarged centralized functionally departmentalized organizations.

The firms that grew large by following a strategy of vertical integration in the 1880s and 1890s did so in two ways, either by direct investment or after merger. Increasingly, vertical integration came after mergers, particularly during and following the great merger movement of the turn of the century. Although mergers were often a precondition to rationalization and to increased output and lower production and transaction-costs through vertical integration, relatively few

were planned with these goals in mind. The majority resulted from a strategy of horizontal combination intended to control price and production among a number of small manufacturing enterprises competing in the same market. The resulting holding company provided the legal means to enforce pricing and production decisions of the constituent companies. Nevertheless, in the United States these legal consolidated enterprises created for such strategic considerations rarely remained among the top 200, unless they did change their strategy. They rarely were able to maintain their anticipated rate of return on investment or market share unless they made two major moves. First they had to rationalize facilities and centralize their administration under a single office. Then they had to integrate forward and backwards by making the necessary transaction-specific investment and by creating a managerial hierarchy to coordinate, monitor, and allocate the resources of the operating units. Even then they were rarely successful unless they were in industries whose characteristics favored scale and transactions costs economies.

These industries where high-volume production and distribution permitted a sharp reduction in production and transaction costs quickly came to be dominated by a few firms. The first to integrate had what Williamson has called "first mover advantages" [5, pp. 34-35]. Competitors' output had to reach a comparable volume if they were to achieve competitive unit production costs. They had to create a comparable sales, distribution, and purchasing organizations to assure the essential scheduling and to provide the essential services. In the United States, but less so abroad, competitors did appear but only in small numbers. The result was an oligopolistic structure for many specific industries: cigarettes, matches, breakfast cereals, soap, margarine, kerosene, whiskey, cola and other branded bottles and packaged products; fresh meat, and beer sold nationally; sewing, agricultural, office, and electrical machinery, automobiles and, later, aircraft; explosives, alkalis, dyes, nitrates, film, rayon and other synthetics; and iron and steel, copper and other metals. In these industries competition was rarely on price, for all could achieve prices lower than new entrants could typically afford to charge. "Price leadership," based on the roughly similar costs of the few large integrated enterprises, became standard in nearly all. Instead, competition for increased share of the market or higher rates of return on investment rested much more on the product differentiation and product development; on the more efficient use of resources invested in each of the functional activities in production, distribution, purchasing,

research and development, and on effective corporate office coordination and monitoring. In this way, therefore, oligopolistic competition brought a continuing concentration on improving the nonmanufacturing functions of the large industrial corporation. It was this investment, particularly in marketing and purchasing and in research and development, that led to the second stage of growth of the large industrial corporation in the United States and Europe and, to leser extent, in Japan -- that of growth through diversification.

GROWTH THROUGH DIVERSIFICATION

After World War I in the United States and after World War II abroad, the large integrated firms operating in national and international markets grew more by diversifying into new product lines than by expanding their existing facilities and skilled personnel to increase the output of their original line of products. In most cases the enterprises first developed a full line for much the same broad market. While this often required the construction of new producing facilities, it permitted fuller utilization of research and marketing facilities. Thus, reaper and plow companies began to compete directly by developing a full line of agricultural implements. So automobile manufacturers developed a full line of cars, trucks, and other commercial vehicles. Then in the United States (between the wars) and in Europe and Japan (after World War II) large enterprises diversified into related products that could use their research and marketing personnel and facilities for different markets. To manage this diversification they quickly adopted a multidivisional form of internal organization with its integrated product divisions for each major market and its extensive corporate office with its general executives and large advisory staff.

The value of the transaction-cost approach to explain the strategy of diversification is still not clear. Williamson has analyzed brilliantly the value of the multidivisional structure as a check on managerial discretion and as a miniature capital market, but as yet he has published little about the process of growth through diversification that in the great majority of cases led enterprises to adopt the multidivisional form. I believe continuing growth of the enterprise through diversification can be more precisely understood in terms of resources utilization than in terms of transaction costs and particularly in terms of the utilization of human resources that were generated through transaction-specific investment. For

this approach I find the recent work of Scott Moss has a special relevance.[1]

The relationship between vertical integration and diversification can be defined in the following way: The needs of transaction-costs economizing resulted in transaction-specific investment in human skills and physical facilities. These skills were honed and facilities improved by oligopolistic competition. Such skills and physical assets were, of course, product-specific, but often less product-specific than the original investment in production facilities and personnel; that is, the technical and managerial skills of the personnel and to a lesser extent the capabilities of the physical facilities were applicable to other product lines in a way that gave the enterprise competitive equality or even a competitive advantage in product markets other than that of its original line.

Both internal and external pressures encouraged such a transfer of resources. Internally, research, marketing, and purchasing resources were often underutilized, for the investment in such resources was quite lumpy. Often too the limits in the development of the product, processing, and marketing of the existing line had reached its limits, and the organization was looking for new worlds to conquer. In addition, as the industry matured, the rate of return on assets declined, and so top managers were pressed to employ their resources in product lines with higher rates of return on assets. However, the underlying cause for diversification remained the underutilized resources that resulted from the fact that the firm's investment in nonmanufacturing resources was often less product-specific than its investment in manufacturing plant and personnel. Nitrocellulose technology, for example, could be applied to many products beside smokeless powder. The marketing personnel and facilities of one packaged, branded product could be easily applied to another. Thus the potential for growth through diversification was encouraged or constrained by the product specificity of the earlier transaction-specific investments. The more product-specific the investment, the more difficult was the transfer of resources. Or to put it another way, the easier a transaction-specific investment made for one purpose could be used for others, the greater potential for growth by diversification.

In any case, the historical sequence is clear. In the 1920s in the United States and after World War II in Europe, makers of branded, packaged products seeking a more efficient use of marketing resources and chemical and machinery companies desiring to make fuller use of both their marketing and their

research and development resources began to move beyond a full line into related products. On the other hand, the metal makers and a number of machinery manufacturers whose market and research resources were more product-specific than those of the branded, packaged product producers, or that of the chemical companies and the makers of electrical machinery continued to concentrate on their single product line.

In all cases the move into new product lines led to further investment in marketing, research, and central office personnel facilities, that is the transfer of resources brought new transaction-specific investment. In food and consumer chemicals, the move into market-related product lines required the building of new production and often purchasing facilities and in chemicals and in electrical and other machinery, the move into new research-related products and sometimes production-related ones as well, required investment in marketing and distribution personnel and facilities. Such continued expansion into new product lines, of course, increased the activities and enlarged the resources of the central corporate office.

The successful growth of the makers of food, consumer chemicals, and other branded, packaged products of chemical, electrical, and other machinery firms -- their securities were the blue chips of the 1950s and 1960s -- brought imitation and the rise of a new type of enterprise, the conglomerate. The conglomerates differed from the large diversifiers in that they grew wholly by acquisition rather than by direct investment, and by acquisition into nonrelated product lines or businesses. They were of three types. Some were related diversifiers whose managers decided to experiment in nonrelated lines. Others were the creations of entrepreneurs who decided to create a conglomerate of unrelated companies. The largest number, however, of the conglomerates among the top 200 to 250 firms in 1973 were enterprises whose existing resources were highly product- or service-specific and so were not easily transferable to other product lines. They included utilities and transportation lines such as Grace, Greyhound, Northwest Industries, Illinois Central Industries, Tenneco, and ITT; or they were manufacturing firms with highly product-specific research and marketing organizations such as White, Avco, Martin Marietta, SCM, Brunswick, and Electra. These and other single-business enterprises began to diversify by acquiring companies in unrelated lines; but, as the record of the 1970s and even 1960s appears to demonstrate, the long-term rate of return on investment was below that of the related diversifiers. [2, 3]

Such conglomerates may be more efficient in capital markets

than the national security markets themselves. They do have specialized financial and planning staffs. However, because they have fewer transferable resources and because the corporate office has had little experience or trained personnel to assist in evaluating the potential of existing human and physical resources within the enterprises they control, particularly marketing and research and development resources, the conglomerates remain less efficient as internal capital markets than the firms that diversified into related industries. Their central office managers have become managers of portfolios rather than managers of businesses. Their activities, and therefore their functions in the economy, are closer to those of an investment trust than a large diversified industrial enterprise. Their investment can be considered strategic. It was made more for short-term financial reasons than for long-term transaction-cost economies or efficient resource utilization.

CONCLUSION

In this description of the evolution of the large hierarchical industrial corporation, a central institution in all advanced economies during the twentieth century, I have attempted to indicate the explanatory value of transaction-cost economics. The approach clearly has great merit in explaining why the large industrial corporation came at the time it did, in what industries it did, and in the way it did. However, the approach as described by Oliver Williamson still presents some problems. Transaction-specific investment is still a vague term. It accurately describes investment in marketing and purchasing activities, but it may not be the right term for investment in research and development and in central office personnel and facilities. More serious are its limitations in explaining growth through diversification. Here there needs to be a more careful spelling out of the correspondence between transaction-specific investment and the continuing utilization of resources of the firm initially created by vertical integration. Nevertheless, I believe that the transaction-cost approach can be, and, indeed, is being refined to meet these problems.

Moreover, while the transaction-cost approach does not necessarily replace other approaches to analyzing the growth of the large managerial firm such as those of technology and markets or of strategic behavior, it can help to make the implications of each more precise; just as a deeper

understanding of these two approaches enriches the explanatory value of the transaction-cost approach.

Changing technology, like changes in demand, have had a more continuing and critical impact on the nature of transaction-cost than Williamson gives them credit for. The technological transformation of transportation and communications was the essential precondition for the massive increase in transactions that initially created the needs for new governance structure to permit transaction-cost economizing. And it was the introduction of new technologies of mass production that encouraged the adoption of new governance structures in some industries and not others. Moreover, just as technology has constantly changed the processes of production and distribution, during the past century of the existence of the large managerial enterprise, so too have markets. Increasing population, rapid urbanization, and then suburbanization, and rises in per capita income altered the demand for the products and services of these enterprises. Nevertheless the transaction-cost approach provides one of the sharpest, most precise means yet devised to analyze the impact of technological and market changes on the structure of the enterprises and the industries in which they operate and to explain why hierarchies replace markets in coordinating the flow of goods through the economy and in allocating resources for future production and distribution.

The strategic behavior which Williamson refers to in other articles, particularly that on "Organizational Innovation," was clearly a part of the explanation of the coming and continued growth of the large industrial enterprise throughout the world during the eighteenth and nineteenth centuries. Growth through horizontal merger is a good example of such strategic behavior. Except where it was explicitly a precursor of rationalization, centralization, and vertical integration, horizontal combination did little to achieve transaction-cost economies, primarily because no transaction-specific investment was originally intended. The purpose of such combinations was to acquire the legal means to assure market power to control price and output. Such strategic vertical integration without transaction-specific investment can assure the availability of supplies and outlets or prevent competitors from obtaining them, but such a strategy cannot reduce costs until the investment is made to provide the necessary scheduling and services. Nor can growth through unrelated diversification be considered to have much of a cost-reducing or resource-improving value. Its strategic purpose has been to improve the quality of a managed portfolio. However, the relative failure of such strategies in terms of continuing profitability and growth of the enterprise itself

emphasizes the central role played by transaction-cost economies and improved resource utilization to the creation, health, and continuing growth of the large industrial enterprise.

In these many ways, therefore, the transaction-cost approach offers business historians, particularly those studying the evolution of the large managerial enterprise and its place in modern market economies, an invaluable tool of analysis. I can only applaud the pioneering energy and intellectual contributions of Oliver Williamson and be grateful for his imperialistic efforts to join transaction-cost economics with business history.

NOTES

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1. [6, pp. 475-89] By 1870 in the larger refineries oil moved through the refining process untouched by human hands. The output of the steam driven refinery was increased through more intensive use of heat in the refining process by employing superheated steam and a "cracking" process [6, ch. 11]. Also by the 1880s refined petroleum products were the nation's largest processed or manufactured export, except for possibly flour (the Census combines the figures on wheat and flour). In 1885 the value of petroleum exported was $52 million of which 87 percent was refined products. The second largest manufactured export was cotton textiles valued at $12 million [6, p, 489].

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Table 1

The Distribution of the Largest Manufacturing Enterprises with more than 20,000 Employees, by Industry and Nationality, 1973

S.I.C.		U.S.	Outside of the U.S.	U.K.	Ger.	Jap.	Fr.	Others	Grand Total
20	Food	22	17	13	0	1	1	2	39
21	Tobacco	3	4	3	1	0	0	0	7
22	Textiles	7	6	3	0	2	1	0	13
23	Apparel	6	0	0	0	0	0	0	6
24	Lumber	4	2	0	0	0	0	2	6
25	Furniture	0	0	0	0	0	0	0	0
26	Paper	7	3	3	0	0	0	0	10
27	Printing	0	0	0	0	0	0	0	0
28	Chemical	24	28	4	5	3	6	10	52
29	Petroleum	14	12	2	0	0	2	8	26
30	Rubber	5	5	1	1	1	1	1	10
31	Leather	2	0	0	0	0	0	0	2
32	Stone, Clay and Glass	7	8	3	0	0	3	2	15
33	Primary Metal	13	35	2	9	5	4	15	48
34	Fabricated Metal	8	6	5	1	0	0	0	14
35	Machinery	22	12	2	3	2	0	5	34
36	Electrical Machinery	20	25	4	5	7	2	7	45
37	Transportation Equipment	22	23	3	3	7	4	6	45
38	Measuring Instrument	4	1	0	0	0	0	0	5
39	Miscellaneous	2	0	0	0	0	0	0	2
	Diversified/Conglomerate	19	3	2	1	0	0	0	22
	Total	211	190	50	29	28	24	59	401

Source: *Fortune*, May, 1974 and August, 1974

Table 2[a]

The Distribution of the 200 Largest Manufacturing Firms
(Ranked by Assets, by Industry)

The United States S.I.C.		1917	1930	1948	1973
20	Food	30	32	26	22
21	Tobacco	6	5	5	3
22	Textiles	5	3	6	3
23	Apparel	3	0	0	0
24	Lumber	3	4	1	4
25	Furniture	0	1	1	0
26	Paper	5	7	6	9
27	Printing	2	3	2	1
28	Chemical	20	18	24	29
29	Petroleum	22	26	24	22
30	Rubber	5	5	5	5
31	Leather	4	2	2	0
32	Stone, Clay and Glass	5	9	5	7
33	Primary Metal	29	25	24	19
34	Fabricated Metal	8	10	7	5
35	Machinery	20	22	24	18
36	Electrical Machinery	5	5	8	13
37	Transportation Equipment	26	21	26	20
38	Measuring Instrument	1	2	3	4
39	Miscellaneous	1	1	1	1
	Diversified/Conglomerate	0	0	0	15
	Total	200	200	200	200

[a] This and the following tables were prepared primarily by Takashi Hikino based on information from *Moody's Manuels* and from comparable compilations for the other countries supplemented by information from annual corporate and other reports. (All these tables are still in the process of being revised)

Table 3

The Distribution of the 200 largest Manufacturing Firms, by Industry[a]

United Kingdom		1919	1930	1948	1973
20	Food	63	64	52	33
21	Tobacco	3	4	8	4
22	Textiles	26	24	18	10
23	Apparel	1	3	3	0
24	Lumber	0	0	0	2
25	Furniture	0	0	0	0
26	Paper	4	5	6	7
27	Printing	5	10	7	7
28	Chemical	11	9	15	21
29	Petroleum	3	3	3	8
30	Rubber	3	3	2	6
31	Leather	0	0	0	3
32	Stone, Clay and Glass	2	6	5	16
33	Primary Metal	35	18	28	14
34	Fabricated Metal	2	7	8	7
35	Machinery	8	7	7	26
36	Electrical Machinery	11	18	13	14
37	Transportation Equipment	20	14	22	16
38	Measuring Instrument	0	1	4	3
39	Miscellaneous	3	4	3	1
	Diversified/Conglomerate	0	0	0	2
	Total	200	200	200	200

[a]Ranked by sales for 1973 and by market value of quoted capital for the other years

Table 4

The Distribution of the 200 Largest Manufacturing Firms, by Industry[a]

S.I.C.	Germany	1913	1928	1953	1973
20	Food	23	28	23	24
21	Tobacco	1	0	0	6
22	Textiles	13	15	19	4
23	Apparel	0	0	0	0
24	Lumber	1	1	2	0
25	Furniture	0	0	0	0
26	Paper	1	2	3	2
27	Printing	0	1	0	6
28	Chemical	26	27	32	30
29	Petroleum	5	5	3	8
30	Rubber	1	1	3	3
31	Leather	2	3	2	1
32	Stone, Clay and Glass	10	9	9	15
33	Primary Metal	49	47	45	19
34	Fabricated Metal	8	7	8	14
35	Machinery	21	19	19	29
36	Electrical Machinery	18	16	13	21
37	Trnasportation Equipment	19	16	14	14
38	Measuring Instrument	1	2	4	2
39	Miscellaneous	1	1	1	1
	Diversified/Conglomerate	0	0	0	1
	Total	200	200	200	200

[a]Ranked by sales for 1973 and by capital for the other three years

Table 5

The Distribution of the 200 Largest Manufacturing Firms, by Industry Ranked by Assets

	Japan	1916	1930	1954	1973
20	Food	31	30	26	18
21	Tobacco	1	1	0	0
22	Textiles	54	62	23	11
23	Apparel	2	2	1	0
24	Lumber	3	1	0	1
25	Furniture	0	0	0	0
26	Paper	12	6	12	10
27	Printing	1	1	0	2
28	Chemical	23	22	38	34
29	Petroleum	6	5	11	13
30	Rubber	0	1	1	5
31	Leather	4	1	0	0
32	Stone, Clay and Glass	16	14	8	14
33	Primary Metal	21	22	28	27
34	Fabricated Metal	4	3	6	5
35	Machinery	4	4	10	16
36	Electrical Machinery	7	12	15	18
37	Transportation Equipment	9	11	18	20
38	Measuring Instrument	1	1	3	5
39	Miscellaneous	1	1	0	1
	Diversified/Conglomerate	0	0	0	0
	Total	200	200	200	200

Labor Markets and the Industrial Work Force