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**Paths Towards The Informational
Society: A Comparative Analysis of
the Transformation of Employment
Structure in the G-7 Countries,
1920-2005**

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I. INTRODUCTION

The pace of social change has accelerated in the last quarter of the century under the combined impulse of a major technological revolution and a worldwide economic restructuring. One of the most direct expressions of structural change is the transformation of the employment and occupational structure. Indeed, theories of postindustrialism, informationalism, and the like, use as the strongest empirical evidence for the change in historical course the coming into being of a new social structure, characterized by the shift from goods to services, by the rise of managerial and professional occupations, by the demise of agricultural and manufacturing jobs, and by the growing information content of current work. Implicit in much of these formulations is a sort of natural law of economies and societies, that will follow a unique path along a trajectory of modernity in which the American society has led the way.

This paper aims at examining the empirical evidence of the transformation of the employment and occupational structure during the last seventy years for the seven largest market economies in the world, the so-called G-7 countries that form the core of today's world economy. In assessing such transformation, the paper tries to focus on the diversity of the process of historical transformation, while at the same time probing the existence of an underlying common pattern. By differentiating the internal composition of service employment, and by analyzing the differential evolution of the employment and occupational structure in each one of the seven countries (United States, Japan, Germany, France, Italy, the United Kingdom and Canada) between 1920 (circa) and 1990 (circa), the analysis presented here introduces an empirically grounded discussion on the cultural/institutional diversity of the new, informational society. This should lead to the recasting of the theories of postindustrialism and informationalism.

We will first briefly introduce the analytical issues researched in this paper, define the concepts we use, and describe the methodology and data sources, although the detailed presentation of the operational definitions and calculation procedures will be found in the Appendix to the paper, along with references to the documents and statistical sources we have used. Before proceeding with the analysis of the employment structure, we will

present an overview of the characteristics of the G-7 countries as informational societies. Then, we will analyze the data on the evolution of the employment structure in each country between 1920 and 1970, and between 1970 and 1990, following two data bases that we have tried to make analytically equivalent, in spite of not being statistically homogeneous. It will follow a comparative analysis of the evolution of the occupational structure. Finally, we will use projections on future employment trends in the United States and Japan to speculate on the long term tendencies of the transformation of their social structure. On the basis of these empirical observations, we will elaborate on the relationship between structural patterns and historical diversity in what we call the informational society, pinpointing at the complex linkages existing between material production, information processing, and service delivery activities in the functioning of the new economy and in the organization of the new social structure.

II. POSTINDUSTRIALISM, THE SERVICE ECONOMY, AND THE INFORMATIONAL SOCIETY: CONCEPTS, PREDICTIONS, AND DATA

The sociological theory of the postindustrial society was formulated twenty years ago (Pterion, 1969; Bell, 1973), before the full-fledged development and diffusion of information technologies: the microprocessor was invented in 1971, the personal computer in 1974/75, and the recombination of DNA took place only in 1973. It is one of the paradoxes of modern social theory that the most influential and thorough interpretations of the new, emergent social structure preceded the actual constitution of such social structure and the full diffusion of its technological basis. Thus, we could expect some historical twists in the profile of the existing "postindustrial" societies that ultimately may require the reformulation of the original theory.

The theory of postindustrialism combined three statements that are in fact analytically distinct:

- (1) The source of productivity and growth lies in the generation of knowledge, extended to all realms of economic activity through information processing.
- (2) Economic activity would shift from goods production to services delivery. The demise of agricultural employment would be followed by the irreversible decline of manufacturing jobs, to the benefit of service jobs that would ultimately form the overwhelming proportion of employment. The more advanced an economy, the more its employment and its production would be focused on services, while agriculture and manufacturing would occupy a subordinate position, both within each country and in the international division of labor.
- (3) The new economy would increase the importance of occupations with a high information and knowledge content in their activity. Managerial, professional, and technical occupations would grow faster than any other occupational position and would constitute the core of the new social structure.

Although various interpretations would extend the theory of postindustrialism in different versions to the realm of social classes, politics, and culture, the preceding three inter-related statements anchor the theory at the level of the social structure, the level

where, in Bell's thinking, the theory belongs.

Each one of these major assertions deserves qualification. In addition, the historical linkage between the three processes has still to be submitted to empirical verification.

First, knowledge and information seem indeed to be major sources of productivity and growth in advanced societies, as shown by various economic and social analyses on the information economy (Port, 1977; Nelson, 1981; Monk, 1989; Denison, 1985; Sautter, 1976 etc.). However, it is important to remember that theories of postindustrialism based their original assertion on research by Solow (1957), and by Kendrick (1961) both referring to the first half of the 20th Century in America at the height of the industrial era. This is to say that the knowledge base of productivity growth has been a characteristic of the modern economy even during the industrial economy when manufacturing employment was at its peak in the most advanced countries. Thus, although the late 20th Century economies are clearly different from the pre- World War II economies, the feature that distinguishes these two types of economies does not seem to be rooted primarily in the source of their productivity growth. The appropriate distinction is not between an industrial and a postindustrial economy, but between two forms of knowledge-based industrial production. What is most distinctive, in historical terms, between the economic structures of the first half and of the second half of the 20th Century is the revolution in information technologies, and its diffusion in all spheres of social and economic activity, including its contribution in providing the infrastructure for the formation of a global economy. The full development of a system of production based on knowledge and information processing could only take place after the blossoming of the information technology revolution, that built up for decades but became consolidated as a new system of production only around the 1970s (Guile, 1987; Forester, 1987). Therefore, we propose to shift the analytical emphasis from postindustrialism (a relevant question of social forecasting still without an answer at the moment of its formulation) to informationalism, as a techno-social paradigm organized around knowledge-based activities as the source of productivity realized in their economic potential through the new technologies developed by the information technology revolution. In this perspective, societies will be informational not because they fit into a particular model of social

structure, but because they organize their production system around the principles of maximizing knowledge-based productivity through the development and diffusion of information technologies and the pre-requisites for their utilization (primarily human resources and technological-industrial infrastructure).

The second criterion of postindustrialist theory to consider a society as postindustrial, concerning the shift to service activities and the demise of manufacturing, has come under increasing criticism in recent years. It is an obvious fact that most of employment in advanced economies is in services, and that the service sector accounts for the largest contribution to GNP (See Appendix). Yet, it does not follow that manufacturing industries are disappearing or that the structure and dynamics of manufacturing activity are indifferent to the health of a service economy. Cohen and Zysman (1987), among others, have forcefully argued that many services depend on their direct linkage to manufacturing, and that manufacturing activity (distinct from manufacturing employment) is critical to the productivity and competitiveness of the economy. For the United States, Cohen and Zysman estimate that 24% of GNP comes from the value added by manufacturing firms, and another 25% of GNP comes from the contribution of services directly linked to manufacturing. Thus, they argue that the postindustrial economy is a "myth", and that we are in fact in a different kind of industrial economy.

Furthermore, the notion of "services" is often considered to be ambiguous at best, misleading at worst (Gershuny and Miles, 1981). In employment statistics, it has been used as a residual notion that embraces all that is not agriculture, mining, construction, utilities, or manufacturing. Thus, the category of services includes activities of all kind, historically originated from various social structures and productive systems. The only common feature for these service activities is what they are not (Castells, 1976; Stanback, 1979; Cohen and Zysman, 1987). Attempts at defining services by some intrinsic characteristics, such as their "intangibility", opposed to the "materiality" of goods, have been definitely void of meaning by the evolution of the informational economy. Computer software, video production, microelectronics design, biotechnology-based agriculture etc., and many other critical processes characteristic of advanced economies, merge the

information content inextricably with the material support of the product, making it impossible to distinguish the boundaries between "goods" and "services". To understand the new type of economy and social structure, we must start characterizing different types of "services", in order to establish definite distinctions that contribute to a more accurate analysis of society and economy. In our analytical perspective each one of the specific categories of services becomes as important a distinction as was the old border line between manufacturing and services in the preceding type of industrial economy. As economies become more complex, we must diversify the concepts through which we catalog economic activities, and ultimately abandon the old Colin Clark's paradigm based on the primary/secondary/tertiary sectors distinction that has become an epistemological obstacle for the understanding of our societies.

The third major prediction of the original theory of postindustrialism refers to the expansion of information-rich occupations, such as managerial, professional, and technical positions, as the core of the new occupational structure. This prediction also requires qualification. A number of analysts have argued that such trend is not the only characteristic of the new occupational structure. Simultaneous to this trend there is also the growth of low-end, unskilled, service occupations. These low-skilled jobs, despite their slower growth rate, may represent a substantial proportion of the postindustrial social structure in terms of their absolute numbers. In other words, advanced, informational societies, could also be characterized by an increasingly polarized social structure, where the top and the bottom increase their share at the expense of the middle (Rumberger and Levin, 1984; Kuttner, 1983; Bluestone and Harrison, 1988; Goldsmith and Blakely, 1992). In addition, there is a widespread challenge in the recent literature to the notion that knowledge, science, and expertise are the critical components in most of the managerial/professional occupations. A harder, closer look must be taken on the actual content of such general statistical classifications before we jump into characterizing our future as the republic of the learned elite.

Yet, the most important argument against a simplistic version of postindustrialism is the critique of the assumption according to which the three features we have examined coalesce in the historical evolution, and that such an evolution leads to a single model of

informational society. This analytical construct is in fact similar to the formulation of the concept of capitalism by classical political economists (from Adam Smith to Marx) exclusively based on the experience of English industrialization, only to find continuous "exceptions" to the pattern throughout the diversity of economic and social experience in the world. Only if we start from the analytical separation between the structural logic of the production system of the informational society and its social structure can we observe empirically if a specific techno-economic paradigm necessarily determines a specific social structure and to which extent. And only if we open up the cultural and institutional scope of our observation can we separate what belongs to the structure of the informational society (as a new paradigm) and what is specific to the historical trajectory of a given country.

To make some tentative steps in such direction, we have compared basic statistics between the seven largest market economies in the world, the so-called G-7 countries that have constituted themselves into the steering club of the world economy: the United States, Japan, Germany, France, Italy, the United Kingdom, and Canada (cited in the order of the size of their economies). After examining some indicators that clearly characterize all these countries as having entered the "informational age", we will analyze the evolution of their employment and occupational structure in the last seventy years, and consider some employment projections for the next decade.

The empirical core of our analysis consists in an attempt at differentiating between various service activities. To do so, we have followed the well known topology of services employment constructed by Singelmann almost twenty years ago (Singelmann, 1973, 1976). Singelmann's conceptualization is not without flaws, but has a fundamental merit: it is well adapted to the usual statistical categories, as shown in Singelmann's own doctoral dissertation that analyzed the change of employment structure in different countries between 1920 and 1970. Since the main purpose of our paper is analytical we decided to build on Singelmann's work, to compare the 1970-90 period with his findings for the 1920-70 period. Thus, we constructed a similar typology of sectoral employment, and we processed the statistics of the G-7 countries along roughly comparable categories, extending Singelmann's analysis to the critical period of development of informational

societies, from the 1970s onwards. Because we cannot assure the absolute equivalence of our decisions in classifying activities with those taken earlier by Singelmann, we present our data separately for the two periods: they must not be read as a statistical series, but as two distinct statistical trends made roughly homogeneous in terms of the analytical categories used to compile the data. We did find considerable methodological difficulties in establishing equivalent categories among different countries. We have opted for a very conservative approach, consolidating the data at the lowest common denominator possible, without making comparable what is not comparable. Thus, very often, entire categories were without available data for some countries in some dates, which forced us to merge the statistics into broader categories in order to calculate comparable series. For some countries we have found statistical sources that are different for different points in time. In such case, being unable to establish the compatibility of the categories, we have limited our comparison to points in time offered by the same source. The Methodological Appendix provides details on the procedures we have followed in building this data base, as well as advice about how to interpret the tables. In any case, we tried to establish terms of comparison that at least provide the broad picture of comparative evolution of the employment structure in a more diversified categorization than the one found in the usual statistical sources.

In analyzing our data we have used the simplest statistical procedures, always trying to show the actual trends in the social structure, rather than using analytical methods that could be unnecessarily sophisticated for the current level of elaboration of the data base. We have opted for using descriptive statistics that could simply suggest lines of new theoretical understanding. Only on the basis of such understanding that will provide the ground for more refined hypotheses, could then be worthwhile to attempt a more rigorous and more complex statistical analysis.

By adopting Singelmann's categories of service activities we have embraced a structuralist view of employment, dividing it up according to the place of the activity in the chain of linkages that start from the production process. Thus, distributive services refer both to the communication and transportation activities, as well as to the commercial distribution networks (wholesale and retail). Producer services refer more directly to those

services that appear to be critical inputs in the economy, although they also include auxiliary services to business that may not be necessarily high skilled. Social services include a whole realm of government activities, as well as collective consumption related jobs (Castells, 1978). Personal services are those related to individual consumption, from entertainment to eating and drinking places. Although these distinctions are admittedly broad, they do allow us to think differentially the evolution of the employment structure across countries, at least with greater analytical depth than the usual statistical accounts. We have also tried to establish a difference between the services/goods dichotomy and the classification of employment between information processing and goods handling activities, since each one of these distinctions belongs to a different approach in the analysis of social structure. To do so, we have built two elementary indexes of service delivery employment/goods producing employment, and of information processing employment/goods handling employment, and we have calculated these indexes for the countries and periods under consideration.

Finally, we have also calculated a simplified typology of occupations across countries, building the various countries' categories around those used by American and Japanese statistics. Although we have serious concerns for the definitions of such occupational categories that mix, in fact, occupational positions and the types of activities, using standard statistics that is widely available gives us the opportunity of looking at the evolution of occupational structures in roughly comparative terms. Throughout our effort of empirical study, we have kept in mind the ultimate purpose of this work: to recast the sociological analysis of informational societies by assessing in a comparative framework the differences in the evolution of their employment structure as a fundamental indicator for both their commonality and their diversity.

III. THE G-7 COUNTRIES AS INFORMATIONAL SOCIETIES: INDICATORS OF A NEW SOCIO-TECHNICAL PARADIGM OF PRODUCTION

In order to analyze the specific employment and occupational structure of informational society we must define, and measure, the informational society independently from its employment structure: otherwise, it becomes tautological.

It is true that, as a definitional matter, one could label any society informational or postindustrial if its labor force is mainly employed outside agriculture and manufacturing. Yet, this is not what is implied or stated by theories of postindustrialism and informationalism. At the core of such theories there is an implicit assumption that a given type of society is, at the same time, defined by a socio-technical paradigm of production, by a particular employment/occupational structure, and by its performance as the most advanced type of economy, translated in its capacity to generate an ever greater level of surplus. But if we do not assume the necessary co-variation of the three characteristics we must start from a characterization of informational societies to investigate the commonality and/or dissimilarity of their social structures to make it a researchable matter.

The concept of information society/economy (the contemporary heir of the postindustrialist tradition) fundamentally refers, in most of the literature, to a socio-technical paradigm of production (Katz, 1988; Williams, 1988). It refers to a society where the generation and application of knowledge is the fundamental, direct source of productivity and power, the two pillars of social organization. Although the growth of the industrial economy of advanced societies, already in the first half of the 20th century was founded on sources of productivity distinct from either capital or labor (as we have argued above), the full development of the revolution in information technologies from 1971 onwards provided the technological basis for the constitution of a dominant socio-technical paradigm in which knowledge generation and the management of information became the fundamental factor in improving productivity and efficiency. We call such form of social organization an informational society, rather than "economy" because social organization and human resources become the most important production

factors in such economy. In other words, there cannot be a development of a true information-based economy without a broader process of social change that affects the entire society.

When attempting to measure the informational society, we must introduce an assumption: the design, production, and widespread use of information technologies are the indispensable instruments of the information society. They are not by themselves the informational society (since the concept encompasses non-technological dimensions) but such society cannot exist without the rapid development of information technologies, much alike the industrial society was not just electricity but its industrial growth could be measured in units of energy.

Thus, for the sake of simplicity, we consider that the best indicators of the existence of an information society in the late 20th Century are those related to the capacity of each country to design, and/or produce, and/or use information technologies. Because of the tight relationship between design/production/use of these technologies (Dosi et al., 1988) the ability to cumulate the three capacities increases the informational character of a given society. In addition, since all analysts agree on the strategic role of higher education, science and technology in inducing the informational capacity of each society, indicators measuring the potential of countries in these dimensions can also be used as approximations for measuring the degree of "informationalism".

When measured by these standards, the G-7 countries are all, at various degrees, informational societies. Let us examine the selected statistics presented in this section and in the Appendix to the paper.

Table 1 presents the share of global markets for high technology manufacturers for G-7 countries (minus Canada) between 1980 and 1990: together they account for 90.5% of world markets in 1990, and their share has grown since 1980. Table 2 gives an estimate of the production of high technology manufacturing for the six major countries. Japan, relative to the size of its economy is the most advanced high technology producer, and also the country where manufacturing is most skewed towards high technology (see Table 3). These Tables and the Graphs in the Appendix provide an estimate of the overwhelming high technology production capacity of these six countries vis a vis the rest

Table 1: Country Share of Global Market for High-tech Manufacturers, by Industry: 1980-1990.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988e	1989e	1990e
High-tech manufacturers											
France	6.2%	6.1%	6.1%	5.8%	5.3%	5.4%	5.2%	4.9%	4.7%	4.7%	4.7%
Germany	11.8%	11.7%	11.8%	11.8%	11.3%	12.0%	11.5%	10.5%	10.1%	9.5%	9.4%
Italy	3.9%	3.7%	3.4%	3.3%	3.2%	2.9%	3.2%	3.1%	3.1%	2.9%	2.8%
Japan	18.4%	19.7%	20.4%	21.6%	23.3%	23.6%	23.4%	25.1%	26.5%	28.4%	29.2%
United Kingdom	8.1%	8.1%	8.2%	8.0%	7.9%	8.2%	8.1%	8.2%	8.2%	8.4%	8.5%
United States	40.4%	39.5%	38.9%	37.8%	37.9%	36.3%	36.9%	37.5%	37.0%	36.0%	35.9%
Industrial Chemicals											
France	5.0%	5.2%	5.8%	5.5%	5.1%	5.3%	5.3%	4.9%	5.0%	5.1%	4.8%
Germany	16.2%	16.9%	17.9%	19.1%	19.5%	20.4%	20.4%	18.5%	18.7%	18.8%	18.4%
Italy	5.1%	5.2%	4.4%	4.4%	4.9%	4.9%	4.3%	4.3%	4.3%	4.3%	4.0%
Japan	16.1%	14.4%	15.3%	14.0%	14.1%	13.4%	12.1%	13.1%	12.7%	13.4%	14.1%
United Kingdom	8.8%	8.4%	9.0%	9.4%	9.7%	10.1%	9.5%	9.2%	9.2%	9.3%	9.1%
United States	32.7%	33.1%	29.8%	29.2%	28.0%	25.8%	28.5%	31.4%	31.2%	32.2%	32.5%
Drugs and Medicines											
France	5.6%	5.3%	4.7%	4.4%	4.3%	4.0%	3.8%	3.6%	3.8%	4.0%	3.9%
Germany	13.1%	13.1%	12.5%	12.5%	12.7%	12.3%	12.1%	11.4%	11.5%	11.4%	10.9%
Italy	5.5%	5.4%	5.6%	5.4%	6.1%	6.5%	5.8%	5.7%	6.2%	6.3%	6.2%
Japan	21.2%	21.7%	22.1%	22.0%	21.2%	20.7%	20.4%	19.9%	20.1%	20.1%	20.3%
United Kingdom	9.3%	8.8%	9.1%	8.8%	9.1%	9.0%	9.2%	9.4%	9.6%	10.0%	9.9%
United States	29.6%	29.6%	30.3%	30.3%	30.4%	30.0%	30.4%	31.4%	31.4%	30.8%	29.2%
Engines and Turbines											
France	6.8%	6.1%	5.6%	5.7%	5.9%	5.3%	4.9%	5.1%	4.9%	4.7%	4.9%
Germany	11.3%	9.9%	9.0%	9.4%	10.3%	11.2%	10.9%	11.2%	10.7%	10.8%	11.6%
Italy	4.2%	3.7%	3.1%	4.9%	5.5%	3.4%	3.2%	3.1%	3.0%	2.9%	3.0%
Japan	18.4%	16.1%	17.9%	18.8%	18.0%	17.0%	14.9%	15.7%	15.5%	15.8%	15.3%
United Kingdom	6.8%	18.3%	20.5%	18.3%	17.1%	19.7%	21.9%	20.9%	21.4%	22.6%	22.3%
United States	44.2%	37.9%	35.0%	33.0%	35.4%	34.8%	35.4%	35.4%	35.8%	35.2%	34.9%
Office and Computing Machinery											
France	3.9%	4.6%	4.4%	4.2%	4.3%	3.9%	3.6%	3.2%	2.9%	2.7%	2.6%
Germany	6.5%	7.4%	7.0%	7.0%	7.4%	8.3%	8.0%	7.1%	6.6%	5.5%	5.4%
Italy	2.1%	1.9%	1.6%	1.8%	1.7%	1.3%	3.2%	2.9%	3.1%	2.4%	2.3%
Japan	22.0%	23.0%	24.0%	27.2%	27.5%	30.2%	30.8%	31.8%	33.3%	34.6%	37.5%
United Kingdom	6.0%	4.7%	4.9%	5.3%	5.8%	6.9%	6.5%	7.4%	8.1%	8.1%	8.1%
United States	50.0%	49.0%	49.1%	45.2%	44.0%	39.6%	37.8%	38.1%	37.3%	35.6%	34.8%

Table 1: Country Share of Global Market for High-tech Manufacturers, by Industry: 1980-1990.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988e	1989e	1990e
Radio, TV & Comm. Equipment											
France	5.4%	5.1%	5.2%	4.7%	4.2%	5.1%	5.1%	4.5%	4.1%	4.1%	4.4%
Germany	12.0%	11.4%	11.4%	11.1%	9.8%	11.3%	11.6%	10.3%	9.6%	9.5%	10.0%
Italy	2.2%	1.9%	1.9%	1.9%	1.5%	1.4%	1.6%	1.6%	1.5%	1.5%	1.5%
Japan	26.4%	30.5%	30.7%	32.2%	35.5%	34.0%	33.0%	36.5%	39.3%	42.9%	42.0%
United Kingdom	7.1%	6.5%	6.5%	6.6%	6.5%	6.4%	6.4%	6.2%	6.0%	5.9%	6.2%
United States	36.6%	34.8%	35.0%	34.0%	33.8%	32.9%	32.8%	32.3%	31.5%	29.9%	30.6%
Aircraft											
France	13.9%	13.9%	14.2%	15.1%	13.7%	13.0%	11.9%	12.0%	12.9%	13.9%	13.7%
Germany	4.8%	5.3%	6.0%	5.4%	5.0%	5.0%	4.4%	4.6%	4.7%	4.6%	4.8%
Italy	3.9%	3.5%	3.6%	3.1%	2.9%	3.4%	2.8%	3.0%	3.0%	3.0%	3.0%
Japan	2.2%	2.4%	2.3%	2.4%	2.5%	2.9%	2.5%	2.8%	3.2%	3.6%	3.6%
United Kingdom	12.0%	12.5%	11.7%	12.5%	11.7%	11.8%	12.7%	13.1%	11.2%	13.2%	13.5%
United States	57.6%	56.4%	56.6%	55.8%	58.7%	57.9%	59.5%	58.7%	59.2%	56.4%	55.9%
Scientific Instruments											
France	4.4%	4.1%	4.2%	4.4%	4.4%	5.4%	5.5%	5.6%	5.8%	5.9%	6.1%
Germany	11.4%	10.8%	10.2%	9.8%	9.8%	10.8%	11.1%	11.1%	11.4%	10.8%	11.1%
Italy	5.5%	5.5%	5.2%	5.1%	4.9%	4.1%	4.1%	4.4%	4.8%	4.5%	4.1%
Japan	17.6%	19.2%	18.1%	19.0%	19.0%	19.7%	18.9%	18.1%	16.2%	16.1%	15.4%
United Kingdom	5.4%	4.7%	5.3%	4.9%	4.8%	5.1%	5.3%	5.6%	5.9%	5.8%	5.9%
United States	49.1%	49.0%	50.5%	50.0%	50.4%	48.4%	48.4%	50.8%	51.5%	52.7%	53.4%

NOTE: Figures from 1988 to 1990 are estimates.

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix table 6-3.)

Table 2: Global Production of Manufactured Products, by Selected Countries, 1980-1990.
(in Millions of constant 1980 U.S. dollars)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988e	1989e	1990e
TOTAL MANUFACTURERS											
France	322,494	313,581	323,348	328,541	342,960	377,864	377,704	379,183	397,797	417,814	424,220
Germany	516,797	515,167	520,975	537,401	581,057	636,783	637,013	629,509	651,060	684,894	714,699
Italy	201,452	202,271	198,030	209,718	227,159	230,267	239,853	247,278	252,985	259,487	263,150
Japan	796,676	814,485	843,104	895,261	957,703	1,043,767	1,018,609	1,065,679	1,105,732	1,224,983	1,279,649
United Kingdom	311,322	284,324	289,596	303,221	331,034	351,554	349,332	371,496	406,626	425,265	430,881
United States	1,430,747	1,435,326	1,344,149	1,399,916	1,542,762	1,547,177	1,561,688	1,685,110	1,769,769	1,809,062	1,815,580
High-tech manufacturers											
France	43,971	45,923	47,452	49,060	52,945	59,272	59,915	61,061	64,448	69,693	71,607
Germany	83,262	88,174	91,754	100,589	113,293	130,157	132,259	131,740	138,656	140,793	145,143
Italy	27,798	27,796	26,231	28,017	31,589	31,461	36,170	38,771	43,067	43,116	42,776
Japan	130,154	147,610	158,132	183,491	232,905	257,099	268,419	313,916	363,772	422,216	449,442
United Kingdom	57,388	60,779	63,409	68,332	79,017	89,242	92,206	102,634	112,624	125,326	130,753
United States	286,239	296,433	301,567	320,752	378,567	395,288	421,981	496,626	507,279	534,818	552,231
Other manufacturers											
France	278,523	267,658	275,896	279,481	290,015	318,592	317,789	318,122	333,349	348,121	352,613
Germany	433,535	426,993	429,221	436,812	467,764	506,626	504,754	497,769	512,404	544,101	569,556
Italy	173,654	174,475	171,799	181,701	195,570	198,806	203,683	208,507	209,918	216,371	220,374
Japan	666,522	666,876	684,972	711,770	724,798	786,668	750,190	751,763	741,960	802,767	830,207
United Kingdom	253,934	223,545	226,187	234,889	252,017	262,312	257,126	268,862	294,002	299,939	300,128
United States	1,144,508	1,138,893	1,042,582	1,079,164	1,164,195	1,151,889	1,139,707	1,188,484	1,262,490	1,274,244	1,263,349

NOTE: Figures from 1988 to 1990 are estimates.

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix table 6-7.)

Table 2a: Global Production of Manufactured Products, by Selected Countries, 1980 - 1990.
Country Share in OECD countries

Country 1980 1990e
=====

TOTAL MANUFACTURERS

France	7.6%	7.2%
Germany	12.1%	12.1%
Italy	4.7%	4.4%
Japan	18.7%	21.6%
United Kingdom	7.3%	7.3%
United States	33.5%	30.7%

High-tech manufacturers

France	6.2%	4.7%
Germany	11.8%	9.4%
Italy	3.9%	2.8%
Japan	18.4%	29.2%
United Kingdom	8.1%	8.5%
United States	40.4%	35.9%

Other manufacturers

France	7.8%	8.0%
Germany	12.2%	13.0%
Italy	4.9%	5.0%
Japan	18.7%	18.9%
United Kingdom	7.1%	6.8%
United States	32.2%	28.8%

NOTE: 1990 figures are estimates.

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix table 6-7.)

Table 3: High-tech Manufacturer's Share of Total Manufacturing Output, by Country: 1980-90.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988e	1989e	1990e
France	13.6%	14.6%	14.7%	14.9%	15.4%	15.7%	15.9%	16.1%	16.2%	16.7%	16.9%
Germany	16.1%	17.1%	17.6%	18.7%	19.5%	20.4%	20.8%	20.9%	21.3%	20.6%	20.3%
Italy	13.8%	13.7%	13.2%	13.4%	13.9%	13.7%	15.1%	15.7%	17.0%	16.6%	16.3%
Japan	16.3%	18.1%	18.8%	20.5%	24.3%	24.6%	26.4%	29.5%	32.9%	34.5%	35.1%
United Kingdom	18.4%	21.4%	21.9%	22.5%	23.9%	25.4%	26.4%	27.6%	27.7%	29.5%	30.3%
United States	20.0%	20.7%	22.4%	22.9%	24.5%	25.5%	27.0%	27.9%	28.7%	29.6%	30.4%

NOTE: Figures from 1988 to 1990 are estimates.

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix table 6-4.)

of the world, and of the dominance of both the United States and Japan in the volume and growth of high technology manufacturing.

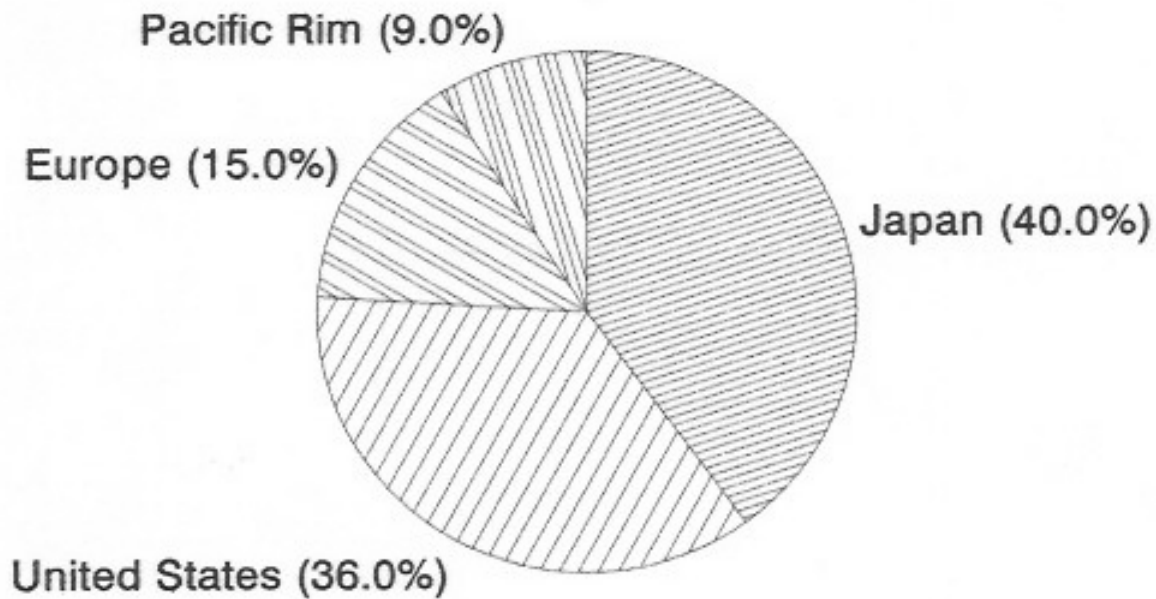
Considering the use of advanced information technology, in 1990 Japan is estimated to be the largest market for semiconductors. Japan, the United States, and the European Community have been estimated to account for 91% of world semiconductor markets (see Graph 1). Table 4 presents selected data concerning the use of various information technologies standardized per capita. The United States clearly has the lead in terms of computer power, computers per person, use of telephones and of TV sets. Canada lags in computer use, and Italy is behind in computer power. However, the seven countries together account for 76.9% of computers used in the world, and for 80.4% of global computer power, and they are all above the 0.5 telephone per person ratio. When measures concern the use of information technology in manufacturing, such as the use of industrial robots, Japan overtakes all the countries, followed by Western Europe, ahead of the United States (See table 5). Table 6 and Graph 2 also show the overwhelming dominance of the United States and Japan, at a similar level, in major world electronics markets. Together with Western Europe, they represent the bulk of the information technology industrial potential in the planet.

Turning to indicators concerning the scientific and human resources potential of each country, we observe the clear lead of Japan in scientists and engineers per inhabitants, and the fast increase of such figure in both Japan and Germany in the 1970-87 period. Although the United States still ranks second in the index, in the last two decades it has been substantially outperformed by all G-7 countries in the training of scientists and engineers.

The distance between G-7 countries and the rest of the world is abysmal. To remind just one figure, according to UNESCO in 1985 the world average of scientific and technical manpower per million population was 23,442; the same figure for developing countries was 8,263; for developed countries it was 70,452; and for North America, it was 126,200, that is more than five times the world average and more than 15 times the level of developing countries.

R&D expenditures, standardized by GNP, are the most direct indicator of the

**Graph 1: World Semiconductor Markets
1990 (Total: US\$47.8 billion)**



SOURCE: Electronics (January 1990, p.55).

Table 4: International Comparison of Information Technology Use, 1989.

Country	Telephone Use		TV Use		Computer Use		Computer Power (MIPS*)	
	No.(in Millions)	Per Person	No.(in Millions)	Per Person	No.(in Millions)	Share (World=100%) Per Person	MIPS (K)	Share (World=100%) MIPS/1,000 Persons per capita(U.S.=100)
Canada	21.0	0.80	16.5	0.63	2.93	2.8%	2384	2.6%
France	36.4	0.65	24.1	0.43	3.83	3.7%	3115	3.4%
Germany	41.5	0.68	24.7	0.41	5.01	4.8%	4071	4.4%
Italy	29.8	0.52	16.0	0.28	2.49	2.4%	2080	2.3%
Japan	73.9	0.60	75.4	0.61	9.23	8.9%	7048	7.6%
United Kingdom	32.5	0.57	32.7	0.57	6.49	6.2%	5138	5.6%
United States	239.0	0.96	224.0	0.90	50.19	48.1%	50372	54.5%

NOTE: *MIPS (Millions of instructions per second)

SOURCE: Computer Industry Almanac 1991.

Table 5: Use of Industrial Robots in United States, Japan and Europe

Year	United States		Japan		Europe		Total	
	No. of Units	%	No. of Units	%	No. of Units	%	No. of Units	%
end 1980	4,950	21.1%	14,250	60.7%	4,265	18.2%	23,465	100.0%
end 1985	21,032	15.0%	93,000	66.2%	26,489	18.9%	140,521	100.0%
end 1987	29,000	13.8%	141,000	67.3%	39,578	18.9%	209,578	100.0%

NOTES: The figures do not include manual manipulators and fixed sequence robots.

Source: (Nihon Sangyoyo Robotto Kogyokai [approx. translation: Japan Industrial Robots Association]), August, 1988.

Table 6: Major World Electronics Markets
(in Billion U.S. Dollars).

		Computers and Office Equipment	Communications	Consumer	Semiconductors	Capital Equipment, etc.*
Japan	1991	58.0	11.0	18.5	19.5	5.7
	1992	54.0	12.0	20	23.8	5.7
United States	1991	96.0	32.0	26.7	17.7	10.1
	1992	102.9	35.8	35	17.0	10.5
Europe	1991	46.0	33.0	18.8	8.7	4.3
	1992	49.3	35.9	31.9	11.1	3.8

NOTE: Figures projected by "Electronics". *Includes Test, CAD/CAE, and bench instruments.

SOURCE: Electronics (January 1991/January 1992).

Graph 2: Major World Electronics Markets
(in Billion U.S. Dollars)

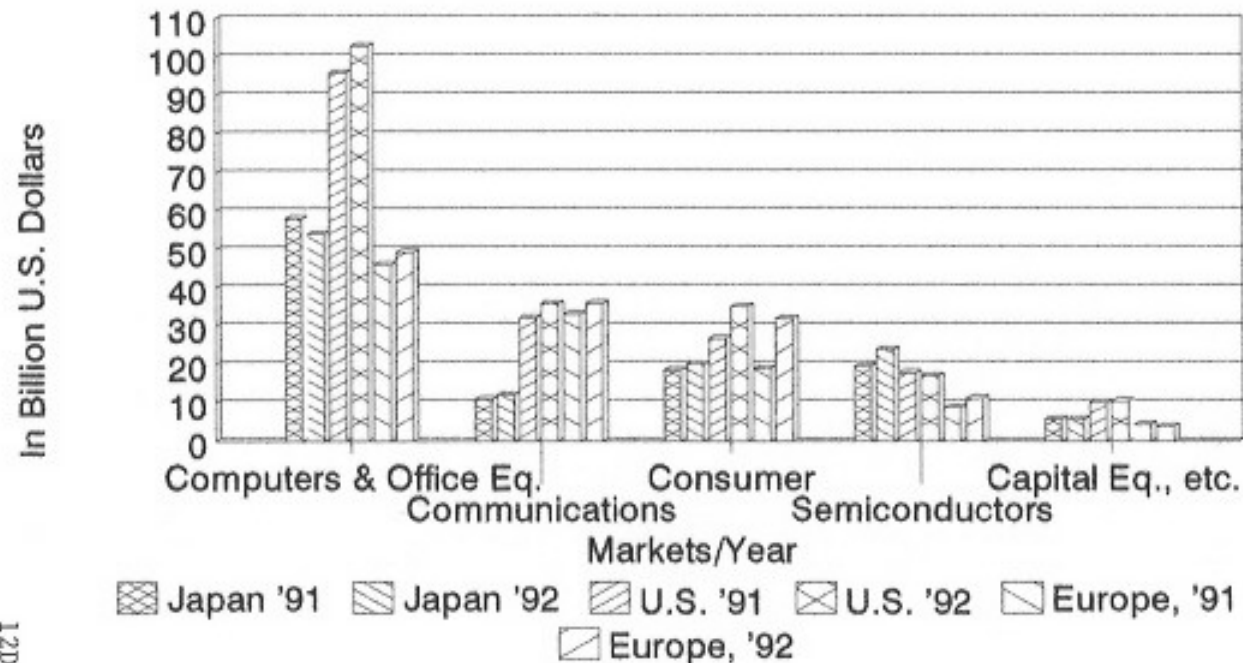


Table 7: Number of Scientists and Engineers per 100,000 Inhabitants, 1970-1987.

Country	Number of Scientists and Engineers per 100,000 Inhabitants			% Growth	
	1970	1980	1987	1970-80	1980-87
Canada	96	122	224	27.1%	83.6%
France	116	139	197	19.8%	41.7%
Germany*	149	202	272	35.6%	34.7%
Italy	51	83	123	62.7%	48.2%
Japan**	286	378	503	32.2%	33.1%
United Kingdom***	138	154	---	11.6%	---
United States	268	289	332	7.8%	14.9%

NOTES: *Data for 1970 and 1980 refer to that of 1971 and 1981, respectively.

Figure used for 1987 is that of 1988. *Data used are that of 1972 are 1978.

SOURCE: UNESCO (Statistical Digest, 1991).

importance accorded by each society to science and technology as the key to productivity and power, thus being the clearest expression of the organizing principle of the informational society. In 1990 North America accounted for 42.8% of the world's R&D expenditures, while Africa and Latin America together represented less than 1% of the world total.

Table 8 shows the percentage of GNP dedicated to R&D by the G-7 countries. By level, Japan and Germany are slightly ahead of the United States in 1989 (3.0% and 2.9% of the GNP). Also while Italy, Japan, and Germany have increased their share of R&D in GNP by over 100% in the 1960-89 period, the United States has remained flat in its progression, and the United Kingdom has regressed. Furthermore, when we consider the share of non-defense research expenditures, the United States falls far behind Japan and Germany as does the United Kingdom. The number of researchers in both electronics and manufacturing (Table 10) has grown considerably in the 1975-85 period in all G-7 countries, but during the 1980s, the United States also lagged in this category vis a vis its competitors/allies.

Thus, overall, G-7 countries together are the technological power house of the world, and they have all made their shift to the production and widespread use of advanced information technologies. They have swelled with new recruits their universities and research centers, increased substantially their engineering and research potential, and invested heavily in R&D. The United States and the United Kingdom, while maintaining a comparable level of technology intensive production structure, have lagged in their technological and civilian research effort during the last two decades.

How do these differences in the technological/research infrastructure of G-7 countries reflect in their economic performance? Data included in the Appendix provide some indication, although the story is well known. In terms of GDP per capita increases for the 1960-90 period, Japan has outperformed all the other countries (5.3% annual average), followed by Italy (3.4%), France and Canada (2.9%), and Germany (2.6%), with the U.K (2.1%) and the United States (2%) lagging. There have been substantial differences in productivity increases, with the United States and Canada being the worst performing economies in the 1979-90 period, while Japan and France have substantially

Table 8: R&D Expenditure and R&D as percentage of GNP, 1961-1989*
(In Billions of 1982 constant U.S. dollars).

Country		1961	1971	1981	1989	% Growth			
						1961-71	1971-81	1981-89	1961-89
France	in U.S. Billions	3.2	7.8	10.9	15.0	143.8%	39.7%	37.6%	368.8%
	% of GNP	1.4%	1.9%	2.0%	2.3%	35.7%	5.3%	15.0%	64.3%
Germany	in U.S. Billions	4.2	11.0	16.1	21.9	161.9%	46.4%	36.0%	421.4%
	% of GNP	1.2%	2.2%	2.5%	2.9%	83.3%	13.6%	16.0%	141.7%
Italy	in U.S. Billions	1.5	3.1	4.6	8.2	106.7%	48.4%	78.3%	446.7%
	% of GNP	0.6%	0.9%	1.0%	1.3%	50.0%	11.1%	30.0%	116.7%
Japan	in U.S. Billions	3.9	13.5	25.8	45.9	246.2%	91.1%	77.9%	1076.9%
	% of GNP	1.4%	1.9%	2.3%	3.0%	35.7%	21.1%	30.4%	114.3%
United Kingdom	in U.S. Billions	8.1	9.3	12.2	13.2	14.8%	31.2%	8.2%	63.0%
	% of GNP	2.5%	2.1%	2.4%	2.0%	-16.0%	14.3%	-16.7%	-20.0%
United States	in U.S. Billions	45.8	60.4	76.6	111.1	31.9%	26.8%	45.0%	142.6%
	% of GNP	2.7%	2.4%	2.4%	2.7%	-11.1%	0.0%	12.5%	0.0%

NOTES: *Or the nearest available years.

SOURCE: National Science Board (Science and Engineering Indicators, 1991, Appendix table 4-26).

Table 9: Non-defense R&D Expenditure and Non-defense R&D as percentage of GNP, 1971-1989*
 (In Billions of 1982 constant U.S. dollars).

Country	1971	1981	1989	% Growth			
				1971-81	1981-89		
France	in U.S. Billions	6.0	8.2	11.8	36.7%	43.9%	96.7%
	% of GNP	1.5%	1.5%	1.8%	0.0%	20.0%	20.0%
Germany	in U.S. Billions	10.2	15.4	20.9	51.0%	35.7%	104.9%
	% of GNP	2.0%	2.4%	2.8%	20.0%	16.7%	40.0%
Italy	in U.S. Billions	3.1	4.4	7.7	41.9%	75.0%	148.4%
	% of GNP	0.9%	1.0%	1.2%	11.1%	20.0%	33.3%
Japan	in U.S. Billions	13.3	25.7	45.5	93.2%	77.0%	242.1%
	% of GNP	1.9%	2.3%	3.0%	21.1%	30.4%	57.9%
United Kingdom	in U.S. Billions	6.9	8.7	10.4	26.1%	19.5%	50.7%
	% of GNP	1.5%	1.7%	1.6%	13.3%	-5.9%	6.7%
United States	in U.S. Billions	41.8	56.9	79.0	36.1%	38.8%	89.0%
	% of GNP	1.7%	1.8%	1.9%	5.9%	5.6%	11.8%

NOTES: *Or the nearest available years.

SOURCE: National Science Board (Science and Engineering Indicators, 1991, Appendix table 4-26).

Table 10: R&D Employment and Expenditure Growth
Electronics Group, 1975-1985

Country	Number of Researchers		Growth 1981-85		1985 Electronics share in manufacturing researchers
	Growth 1975-81 1975=100	Electronics Manufacturing	Growth 1981-85 1981=100	Electronics Manufacturing	
Canada	---	149	176	129	45.9%
France	133	117	131	125	36.7%
Germany	115	126	126	121	41.0%
Italy	106	133	157	140	31.4%
Japan	174	135	153	131	28.9%
United Kingdom	238	130	---	---	---
United States	146	138	116	113	26.8%

Country	R&D Expenditure		Growth 1981-85		1985 Electronics share in manufacturing expenditure
	Growth 1975-81 1975=100	Electronics Manufacturing	Growth 1981-85 1981=100	Electronics Manufacturing	
Canada	178	171	190	122	42.7%
France	137	130	123	121	28.3%
Germany	125	145	131	124	27.2%
Italy	98	128	167	154	23.4%
Japan	218	167	193	156	26.6%
United Kingdom	220	130	113	107	36.7%
United States	142	137	141	129	22.7%

NOTES: Figures for electrical engineering (ISIC 383) was used for Germany, and 1981-85 figures for the U.S.
SOURCE: Technology and Productivity, OECD 1990, p.255, Table 4.

increased their productivity in total factor productivity. In terms of absolute levels of productivity in 1989 (the latest available figure) in manufacturing output per worker, Japan stands at the highest level, followed very closely by the United Kingdom, and the United States. Finally, in international trade, it is well known the rise of Germany and Japan as the world's main exporters, and the substantial deterioration of the U.S. trade balance. Japanese domination in manufacturing exports has extended during the 1980s to high technology products, as shown in the Appendix.

In sum, G-7 countries are all informational societies that have geared up their economies to a new socio-technical paradigm that accounts for their overwhelming dominance in the world economy. However, their economic performance in the last two decades at the time of their transition to informationalism has been uneven. Overall, we have witnessed the rise of Japan as the most dynamic economy, followed by Germany, Italy, and France, with Canada taking an intermediary position, and the United Kingdom and the United States clearly lagging in their productivity growth and competitiveness. This, however, does not mean that the United States or the United Kingdom are less "informational" because they export less: the source of their economic ills may be found elsewhere, perhaps in the relationship between Government and business firms. But what has been proven by this exercise is that societies and economies of Japan, or Germany, or France, are at least as much informational societies and economies as that of the United States or the United Kingdom. In sum, the main result yielded by our reading of indicators of informationalism is that all G-7 countries share a largely common techno-economic structure, yet differ significantly in economic performance in the last twenty years.

The focus of our analysis will now turn to examine the similarities and variations of the employment/occupational structure of these different historical versions of the informational society.

IV. THE TRANSFORMATION OF THE EMPLOYMENT STRUCTURE, 1920-1970 AND 1970-1990

The observation and analysis of the evolution of the employment structure of the G-7 countries must start from the distinction between two periods that, coincidentally, match our two different data bases: 1920-1970 (circa), and 1970-1990 (circa). The major analytical distinction between the two periods stems from the fact that during the first period the societies under consideration became post-agricultural, while in the second period they did become postindustrial, understanding obviously by such terms the massive decline of agricultural employment in the first case and the rapid decline of manufacturing employment in the second period. Indeed, all these countries maintained or increased (in some cases substantially) the percentage of their employment in transformative activities and in manufacturing between 1920 and 1970. Thus, if we exclude construction and utilities in order to have a sharper view of the manufacturing labor force, England and Wales almost maintained the level of its manufacturing labor force from 36.8% in 1921 to 34.9% in 1971; the United States increased manufacturing employment from 24.5% in 1930 to 25.9% in 1970; Canada from 17.0% in 1921 to 22.0% in 1971; Japan saw a dramatic increase in manufacturing from 16.6% in 1920 to 26.0% in 1970; Germany (despite difference in national territory) increased its manufacturing labor force from 33.0% to 40.2%; France, from 26.4% to 28.1%; and Italy, from 19.9% to 27.4%. Thus, as Singelmann argues, the shift in the structure of employment in this half-century (1920-1970) was from agriculture to services and construction, not out of manufacturing.

The story is a very different one in the 1970-90 period, when the process of economic restructuring and the technological transformation that took place during these two decades led to a reduction of manufacturing employment in all countries. However, while such trend was general, the shrinkage of manufacturing employment was very uneven, clearly indicating the fundamental variegation of social structures according to differences in economic policies and in firms' strategies. Thus, while the United Kingdom, the United States, and Italy, experienced rapid de-industrialization

(reducing the share of its manufacturing employment in 1970-90 from 38.7% to 22.5%; from 25.9% to 17.5%; from 27.3% to 21.8%, respectively), Japan and Germany reduced its share of manufacturing labor force moderately: from 26.0% to 23.6% in the case of Japan, and from 38.6% to a still rather high 32.2% in 1987 in the case of Germany. Canada and France occupy an intermediate position, reducing manufacturing employment from 19.7% (in 1971) to 14.9%, and from 27.7% to 21.3%, respectively.

In fact, England was already a post-agricultural society in 1921, with only 7.1% of its labor force in agriculture. The United States, Germany, and Canada still had a sizable agricultural population (from a quarter to a third of total employment), and Japan, Italy, and France were, by and large, societies dominated by agricultural and commercial occupations. From this differential starting point in the historical period under study, trends tended to converge towards an employment structure characterized by the simultaneous growth of manufacturing and services at the expense of agriculture. Such convergence is explained by the very rapid processes of industrialization in Germany, Japan, Italy, and France, that distributed the surplus of agricultural population between manufacturing and services.

Thus, if we calculate the employment ratio of services/industry (our indicator of the "service economy") it shows only a moderate increase for most countries between 1920 and 1970. Only the United States (change from 1.1 to 2.0) and Canada (1.3 to 2.0) witnessed a significant increase of the relative proportion of service employment during the period that we call post-agricultural. In this sense, it is true that the United States was the standard-bearer of the employment structure characteristic of the service economy. Thus, when the trend toward service employment accelerated and generalized in the postindustrial period, the United States and Canada increased even more their service predominance, with indexes of 3.0 and 3.3 respectively. All other countries followed the same tendency, but with different speed, thus reaching different levels of de-industrialization. While the United Kingdom, France, and Italy seem to be in the same path that North America, Japan and Germany clearly stand out as strong industrial economies, with lower rates of increase of service employment, and lower

Table 11: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
UNITED STATES, 1920-1970

Industry/Year	1920	1930	1940	1950	1960	1970
I. Extractive						
Agriculture	28.0%	25.4%	21.5%	14.4%	8.1%	4.5%
Mining	2.6%	2.5%	2.1%	1.7%	1.1%	0.8%
II. Transformative						
Construction	^	6.5%	4.7%	33.9%	35.0%	33.1%
Utilities	^	0.6%	1.2%	1.4%	6.2%	5.8%
Manufacturing	^	24.5%	23.0%	26.2%	28.5%	25.0%
Food	^	2.3%	2.7%	2.7%	3.1%	2.0%
Textiles	^	4.2%	2.6%	2.2%	3.3%	3.0%
Metal	^	7.7%	2.0%	3.6%	3.9%	3.5%
Machinery	^	^	2.4%	3.7%	7.5%	8.3%
Chemical	^	1.3%	1.5%	1.7%	1.8%	1.6%
Misc. Mfg.	^	9.0%	11.8%	12.3%	8.7%	7.7%
III. Distributive Services						
Transportation	18.7%	19.6%	20.4%	22.4%	21.9%	22.5%
Communication	7.6%	6.0%	4.9%	5.3%	4.4%	3.9%
Wholesale	^	1.0%	0.9%	1.2%	1.5%	1.5%
Retail	11.1%	12.6%	2.7%	3.5%	3.0%	4.1%
IV. Producer Services						
Beating	2.8%	^	4.6%	4.8%	6.0%	8.5%
Insurance	^	1.3%	1.1%	1.1%	1.6%	2.6%
Real estate	^	1.1%	1.2%	1.6%	1.7%	1.8%
Engineering	^	0.6%	1.1%	1.0%	1.0%	1.0%
Accounting	^	^	1.7%	0.2%	0.5%	0.4%
Misc. bus. serv.	^	^	^	0.2%	0.3%	0.4%
Legal services	^	0.1%	^	0.6%	1.2%	1.8%
V. Social Services						
Medical, health serv.	8.7%	9.2%	10.0%	12.4%	16.3%	21.9%
Hospital	^	^	2.3%	1.1%	1.4%	2.2%
Education	^	^	^	1.8%	2.7%	3.7%
Welfare, relig. serv.	^	^	3.5%	3.8%	5.4%	8.6%
Nonprofit org.	^	^	0.9%	0.7%	1.0%	1.3%
Postal service	^	^	^	0.3%	0.4%	0.4%
Government	^	0.6%	0.7%	0.8%	0.9%	1.0%
Misc. social services	^	2.2%	2.6%	3.7%	4.3%	4.6%
VI. Personal Services						
Domestic serv.	8.2%	11.2%	14.0%	12.1%	11.3%	10.0%
Hotel	^	6.5%	5.3%	3.2%	3.1%	1.7%
Eating, drinking places	^	2.9%	1.3%	1.0%	1.0%	1.0%
Repair services	^	^	2.5%	3.0%	2.9%	3.3%
Laundry	^	^	1.5%	1.7%	1.4%	1.5%
Barber, beauty shops	^	^	1.0%	1.2%	1.0%	0.8%
Entertainment	^	0.9%	^	^	0.8%	0.8%
Misc. personal serv.	^	0.9%	0.9%	1.0%	0.8%	0.8%
TOTAL	100%	100%	100%	100%	100%	100%

NOTES: The digit "0" signifies that the figure is included in the above category. The numbers may not add up due to rounding.

SOURCE: 1920-1970, Siegelman (1978).

Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
UNITED STATES, 1970-1991

Industry/Year	1970	1980	1985	1990	1991
I. Extractive					
Agriculture	4.0%	4.5%	4.0%	3.5%	3.5%
Mining	3.7%	3.6%	3.1%	2.8%	2.9%
Mining	0.6%	1.0%	0.9%	0.6%	0.6%
II. Transformative					
Construction	33.0%	29.6%	27.2%	25.6%	24.7%
Utilities	6.0%	6.2%	6.5%	6.5%	6.1%
Manufacturing	11.1%	12.8%	12%	11%	11%
Food	25.9%	22.2%	19.5%	18.0%	17.5%
Textiles	1.9%	1.9%	1.7%	1.6%	1.5%
Metal	1.3%	0.8%	0.7%	0.6%	0.6%
Machinery	3.1%	2.7%	2.0%	1.8%	1.7%
Chemical	5.1%	5.2%	4.5%	3.8%	3.7%
Misc. Mfg.	1.5%	1.6%	1.3%	1.3%	1.3%
Misc. Mfg.	12.9%	10.0%	9.4%	8.9%	8.6%
III. Distributive Services					
Transportation	22.4%	21.0%	20.0%	20.0%	20.0%
Communication	3.9%	3.7%	3.5%	3.5%	3.6%
Wholesale	1.5%	1.5%	1.5%	1.3%	1.4%
Retail	4.0%	3.9%	4.1%	3.9%	4.0%
Retail	12.9%	11.9%	11.9%	11.8%	11.7%
IV. Producer Services					
Beating	8.5%	10.5%	12.7%	14.0%	14.0%
Insurance	2.2%	2.6%	2.9%	2.9%	2.8%
Real estate	1.8%	1.9%	1.9%	2.1%	2.1%
Engineering	1.0%	1.6%	1.7%	1.8%	1.8%
Accounting	0.4%	0.6%	0.7%	0.7%	0.7%
Misc. bus. serv.	0.4%	0.5%	0.5%	0.5%	0.6%
Legal services	1.8%	2.6%	4.0%	4.9%	5.6%
Legal services	0.5%	0.8%	0.9%	1.0%	1.1%
V. Social Services					
Medical, health serv.	22.0%	23.7%	24.6%	24.9%	25.5%
Hospital	2.4%	2.3%	3.6%	4.3%	4.5%
Education	3.7%	5.3%	4.0%	4.0%	4.1%
Welfare, relig. serv.	8.5%	8.3%	7.8%	7.9%	8.0%
Nonprofit org.	1.2%	1.6%	2.2%	2.6%	2.7%
Postal service	0.4%	0.5%	0.4%	0.4%	0.4%
Government	1.0%	0.7%	0.7%	0.7%	0.7%
Misc. social services	4.5%	4.7%	4.7%	4.6%	4.6%
Misc. social services	0.3%	0.4%	0.2%	0.2%	0.2%
VI. Personal Services					
Domestic serv.	10.0%	10.5%	11.7%	11.5%	11.7%
Hotel	1.7%	1.2%	1.2%	0.9%	0.9%
Eating, drinking places	1.0%	1.1%	1.4%	1.5%	1.6%
Repair services	3.2%	4.4%	4.9%	4.8%	4.9%
Laundry	1.4%	1.5%	1.5%	1.4%	1.4%
Barber, beauty shops	0.8%	0.4%	0.4%	0.5%	0.4%
Entertainment	0.9%	0.7%	0.8%	0.7%	0.7%
Misc. personal serv.	0.8%	1.0%	1.2%	1.3%	1.3%
Misc. personal serv.	0.3%	0.3%	0.4%	0.4%	0.4%
TOTAL	100%	100%	100%	100%	100%

NOTES: The digit "0" signifies that the figure is included in the above category. The numbers may not add up due to rounding.

SOURCES: 1970: Population Census, 1980-1991: Current Population Survey, Bureau of Labor Statistics (Labor Statistics: Employment and Earnings, various issues).

Table 12: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
JAPAN, 1920-1970

Industry/Year	1920	1930	1940	1950	1960	1970
I. Extractive	56.4%	50.9%	46.3%	50.3%	54.1%	19.6%
Agriculture	54.9%	49.0%	44.0%	46.6%	53.9%	19.4%
Mining	1.5%	1.0%	2.2%	1.7%	1.2%	0.3%
B. Transformative	19.6%	19.8%	24.0%	21.0%	28.5%	34.2%
Construction	2.7%	3.3%	3.0%	4.3%	6.5%	7.6%
Utilities	0.3%	0.4%	0.4%	0.6%	0.6%	0.6%
Manufacturing	16.6%	16.1%	21.6%	16.1%	21.7%	26.0%
Food	2.0%	1.8%	1.4%	2.2%	2.1%	2.1%
Textiles	5.0%	4.8%	3.9%	3.1%	3.2%	2.7%
Metal	1.0%	0.8%	1.4%	1.6%	2.9%	1.5%
Machinery	0.4%	0.7%	2.9%	1.6%	3.1%	4.9%
Chemical	0.4%	0.6%	1.1%	1.2%	1.2%	1.3%
Misc. Mfg.	7.8%	7.4%	10.9%	6.4%	9.2%	13.5%
III. Distributive Services	12.4%	15.6%	15.2%	14.6%	16.6%	22.5%
Transportation	3.5%	3.2%	3.4%	3.5%	4.0%	5.1%
Communication	0.4%	0.7%	0.9%	1.0%	1.1%	1.2%
Wholesale	8.5%	11.6%	10.9%	2.3%	4.7%	6.1%
Retail	^	^	^	7.8%	8.9%	10.2%
IV. Producer Services	0.8%	0.9%	1.2%	1.5%	2.0%	5.1%
Banking	0.4%	0.5%	0.6%	0.7%	1.2%	1.4%
Insurance	0.1%	0.2%	0.3%	0.2%	0.5%	0.7%
Real estate	^	^	^	0.1%	0.2%	0.5%
Engineering	0.0%	^	0.3%	0.3%	1.0%	0.5%
Accounting	^	^	^	^	^	0.2%
Misc. bs. serv.	0.2%	0.2%	^	^	^	1.7%
Legal services	0.1%	0.0%	0.0%	0.2%	0.1%	0.1%
V. Social Services	4.0%	5.5%	6.0%	7.2%	8.3%	10.1%
Medical, health serv.	0.4%	0.3%	0.4%	1.1%	0.3%	0.2%
Hospital	0.3%	0.1%	0.7%	^	1.3%	1.8%
Education	0.0%	1.3%	1.5%	2.4%	2.4%	2.7%
Welfare, relig. serv.	0.6%	0.6%	0.6%	0.3%	0.6%	0.7%
Nonprofit org.	0.1%	^	0.7%	0.2%	0.2%	0.5%
Postal service	2.2%	2.4%	1.9%	3.3%	3.1%	3.3%
Government	^	^	^	^	^	^
Misc. social services	0.3%	0.3%	0.3%	0.1%	0.6%	0.9%
VI. Personal Services	5.7%	7.3%	6.3%	5.3%	7.6%	8.5%
Domestic serv.	2.5%	2.7%	2.2%	0.8%	0.7%	0.3%
Hotel	0.3%	0.5%	0.5%	0.5%	0.8%	0.9%
Eating, drinking places	1.4%	2.4%	1.8%	1.1%	2.2%	3.1%
Repair services	0.0%	0.1%	^	0.9%	0.7%	0.9%
Laundry	0.1%	0.2%	0.2%	0.2%	0.4%	0.5%
Barber, beauty shops	0.5%	0.7%	0.6%	0.6%	1.1%	1.1%
Entertainment	0.4%	0.3%	0.8%	0.5%	0.7%	0.7%
Misc. personal serv.	0.2%	0.3%	0.3%	0.7%	1.0%	1.0%
TOTAL	100%	100%	100%	100%	100%	100%

NOTES: The sign '^' signifies that the figure is included in the category immediately above.
The numbers may not add up due to rounding.
SOURCE: 1920-1970, Siegelman (1978).

Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
JAPAN, 1970-90

Industry/Year	1970	1980	1985	1990
I. Extractive	19.8%	11.2%	9.5%	7.2%
Agriculture	19.4%	11.0%	9.1%	7.1%
Mining	0.4%	0.2%	0.2%	0.1%
B. Transformative	34.1%	33.7%	33.4%	33.7%
Construction	7.6%	9.7%	9.1%	9.6%
Utilities	0.6%	0.6%	0.6%	0.6%
Manufacturing	26.0%	23.4%	23.7%	23.6%
Food	2.1%	2.1%	2.2%	2.3%
Textiles	2.7%	1.7%	1.5%	1.2%
Metal	4.0%	3.6%	3.2%	3.2%
Machinery	5.0%	4.6%	5.9%	5.9%
Chemical	1.3%	1.1%	1.0%	1.1%
Misc. Mfg.	10.9%	10.3%	10.0%	10.0%
III. Distributive Services	22.4%	25.1%	24.8%	24.3%
Transportation	5.1%	5.1%	5.0%	5.0%
Communication	1.1%	1.2%	1.1%	1.0%
Wholesale	6.1%	6.9%	7.2%	7.1%
Retail	10.2%	11.9%	11.5%	11.2%
IV. Producer Services	4.8%	7.5%	8.6%	9.6%
Banking	1.4%	2.8%	3.0%	3.9%
Insurance	0.7%	^	^	1.3%
Real estate	0.5%	0.8%	0.8%	1.1%
Engineering	0.5%	^	^	0.8%
Accounting	0.2%	^	^	0.2%
Misc. bs. serv.	1.4%	3.9%	4.5%	4.0%
Legal services	0.1%	^	^	0.1%
V. Social Services	10.3%	12.0%	13.5%	14.3%
Medical, health serv.	0.4%	2.9%	3.4%	3.5%
Hospital	1.8%	^	^	2.3%
Education	2.9%	3.6%	3.7%	4.2%
Welfare, relig. serv.	0.7%	1.3%	1.3%	1.4%
Nonprofit org.	1.0%	1.1%	1.1%	1.1%
Postal service	^	^	^	^
Government	3.4%	3.6%	3.6%	3.4%
Misc. social services	0.0%	0.5%	0.4%	0.4%
VI. Personal Services	8.5%	9.6%	10.1%	10.2%
Domestic serv.	0.3%	0.1%	0.1%	0.1%
Hotel	0.9%	1.0%	1.1%	1.1%
Eating, drinking places	3.0%	4.1%	4.3%	4.1%
Repair services	0.9%	1.1%	0.9%	1.0%
Laundry	0.3%	1.6%	1.7%	0.6%
Barber, beauty shops	1.1%	^	^	1.1%
Entertainment	0.8%	0.9%	1.0%	1.3%
Misc. personal serv.	1.0%	0.9%	0.9%	0.9%
Unidentified	0.0%	0.0%	0.0%	0.6%
TOTAL	100%	100%	100%	100%

NOTES: The sign '^' signifies that the figure is included in the category immediately above.
The numbers may not add up due to rounding.
SOURCE: Population Census, Bureau of Statistics.

Table 13: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
GERMANY, 1925-1987

Industry/Year	1925	1933	1950	1965	1970
I. Extractive					
Agriculture	38.5%	31.5%	16.1%	9.0%	5.1%
Mining	50.9%	29.1%	12.5%	6.8%	3.8%
	2.6%	2.4%	3.2%	2.2%	1.3%
II. Transformative					
Construction	38.9%	38.3%	47.3%	51.3%	49.6%
Utilities	5.3%	6.1%	9.3%	8.5%	8.2%
Manufacturing	0.6%	0.6%	0.8%	1.2%	0.8%
Food	35.0%	31.8%	37.1%	41.6%	40.2%
Textiles	4.3%	5.1%	4.6%	3.1%	3.8%
Metal	3.7%	3.5%	3.3%	5.1%	2.2%
Machinery	3.7%	4.5%	2.3%	5.7%	3.7%
Chemical	2.9%	3.4%	3.0%	5.0%	4.8%
Misc. Mfg.	1.3%	1.1%	1.7%	2.4%	2.7%
	17.3%	14.0%	22.0%	22.3%	23.0%
III. Distributive Services					
Transportation	11.3%	12.8%	15.7%	16.4%	16.4%
Communication	4.0%	4.2%	5.1%	4.5%	5.9%
Wholesale	---	---	---	0.3%	---
Retail	7.9%	8.6%	10.6%	5.9%	4.4%
	^	^	^	7.5%	8.6%
IV. Producer Services					
Banking	2.1%	2.7%	2.5%	4.2%	5.1%
Insurance	0.7%	0.6%	0.7%	1.2%	1.7%
Real estate	0.6%	0.6%	0.1%	0.3%	0.4%
Engineering	0.2%	0.3%	0.2%	0.4%	0.6%
Accounting	0.5%	0.3%	0.3%	1.0%	0.7%
Misc. bus. serv.	^	^	^	^	^
Legal services	0.3%	0.6%	0.5%	0.6%	0.8%
V. Social Services					
Medical, health serv.	6.0%	6.8%	11.1%	12.5%	17.4%
Hospital	0.4%	1.3%	2.4%	2.5%	3.2%
Education	0.6%	^	^	^	^
Welfare, relig. serv.	1.1%	1.3%	1.5%	2.1%	3.0%
Nonprofit org.	0.5%	0.8%	1.0%	0.9%	0.4%
Postal service	1.1%	1.1%	1.5%	1.7%	1.8%
Government	2.1%	2.3%	4.1%	5.3%	6.6%
Misc. social services	0.1%	0.2%	0.6%	---	---
VI. Personal Services					
Domestic serv.	7.7%	7.8%	6.9%	6.4%	7.4%
Hotel	4.4%	4.0%	3.2%	3.5%	6.5%
Eating, drinking places	2.1%	2.4%	2.2%	2.6%	2.9%
Repair services	^	^	^	^	^
Laundry	0.2%	---	---	---	1.1%
Barber, beauty shops	0.4%	0.7%	0.8%	0.6%	0.5%
Entertainment	0.4%	0.5%	0.1%	---	0.9%
Misc. personal serv.	0.1%	0.2%	0.6%	0.8%	0.4%
TOTAL	100%	100%	100%	100%	100%

NOTES: The sign ^ indicates that the figure is included in the category immediately above. The numbers may not add up due to rounding.

SOURCE: 1925-1970, Stegmann (1978).

Table 13: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
GERMANY, 1970-1987

Industry/Year	1970	1987
I. Extractive		
Agriculture	6.7%	4.1%
Mining	7.5%	3.2%
	1.3%	0.9%
II. Transformative		
Construction	47.1%	40.3%
Utilities	7.7%	7.1%
Manufacturing	0.8%	1.0%
Food	38.6%	32.5%
Textiles	3.6%	2.9%
Metal	2.4%	1.1%
Machinery	4.7%	4.5%
Chemical	5.5%	4.9%
Misc. Mfg.	2.4%	2.7%
	16.0%	16.2%
III. Distributive Services		
Transportation	17.9%	17.7%
Communication	5.4%	5.9%
Wholesale	^	^
Retail	4.2%	3.2%
	8.3%	8.4%
IV. Producer Services		
Banking	4.5%	7.3%
Insurance	1.7%	2.4%
Real estate	0.9%	1.0%
Engineering	0.3%	0.4%
Accounting	0.6%	0.7%
Misc. bus. serv.	---	---
Legal services	0.9%	2.8%
V. Social Services		
Medical, health serv.	15.7%	24.3%
Hospital	3.1%	5.4%
Education	---	---
Welfare, relig. serv.	3.0%	4.9%
Nonprofit org.	0.9%	1.5%
Postal service	0.4%	0.2%
Government	---	---
Misc. social services	7.1%	9.5%
	0.5%	2.8%
VI. Personal Services		
Domestic serv.	6.1%	6.3%
Hotel	0.4%	0.2%
Eating, drinking places	2.8%	2.7%
Repair services	^	^
Laundry	1.0%	1.1%
Barber, beauty shops	0.5%	0.2%
Entertainment	0.9%	1.0%
Misc. personal serv.	0.4%	0.9%
	0.1%	0.1%
TOTAL	100%	100%

NOTES: The sign ^ indicates that the figure is included in the category immediately above. Postal services is included in transportation/communication categories.

SOURCE: 1970-1987, Statistisches Bundesamt, Volkswirtschaft.

Table 14: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group

Industry/Year	1968-1989	1968	1970	1975	1980	1985	1989p
I. Extractive							
Agriculture	15.6%	13.5%	10.3%	8.7%	7.6%	7.6%	6.4%
Mining	14.8%	12.9%	9.9%	8.4%	7.4%	7.4%	6.3%
	0.7%	0.6%	0.4%	0.3%	0.2%	0.2%	0.1%
II. Transformative							
Construction	37.4%	38.0%	37.3%	34.8%	30.9%	30.9%	29.5%
Utilities	9.5%	9.5%	8.9%	8.5%	7.1%	7.1%	7.2%
Manufacturing	27.0%	27.7%	27.6%	25.5%	22.9%	22.9%	21.3%
Food	3.0%	3.0%	2.9%	2.9%	2.9%	2.9%	2.8%
Textiles	3.8%	3.6%	3.1%	2.5%	2.1%	2.1%	1.7%
Metal	3.9%	5.1%	5.0%	4.3%	3.6%	3.6%	3.5%
Machinery	4.9%	5.3%	5.6%	5.2%	4.8%	4.8%	4.3%
Chemical	1.8%	1.9%	1.9%	1.8%	1.7%	1.7%	1.6%
Misc. Mfg.	8.4%	8.8%	9.1%	8.7%	7.7%	7.7%	7.3%
III. Distributive Services							
Transportation	16.8%	18.1%	19.2%	19.9%	20.2%	20.2%	20.5%
Communication	4.2%	4.1%	4.1%	4.1%	4.2%	4.2%	4.3%
Wholesale	1.8%	1.8%	2.0%	2.1%	2.3%	2.3%	2.2%
Retail	3.7%	3.8%	4.0%	4.4%	4.4%	4.4%	4.5%
	9.1%	9.0%	9.2%	9.3%	9.3%	9.3%	9.5%
IV. Producer Services							
Banking	3.0%	3.5%	6.5%	7.8%	8.5%	8.5%	10.0%
Insurance	1.3%	1.4%	1.8%	2.0%	2.1%	2.1%	2.0%
Real estate	0.5%	0.5%	0.6%	0.7%	0.7%	0.7%	0.8%
Engineering	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%
Accounting	---	---	---	---	---	---	---
Misc. bus. serv.	3.1%	3.4%	3.8%	4.9%	5.3%	5.3%	6.9%
Legal services	---	---	---	---	---	---	---
V. Social Services							
Medical, health serv.	15.1%	15.0%	16.4%	17.1%	18.8%	18.8%	19.5%
Hospital	---	---	---	---	---	---	---
Education	---	---	---	---	---	---	---
Welfare, relig. serv.	---	---	---	---	---	---	---
Nonprofit org.	---	---	---	---	---	---	---
Total services	---	---	---	---	---	---	---
Government	---	---	---	---	---	---	---
Misc. social services	---	---	---	---	---	---	---
VI. Personal Services							
Domestic serv.	6.2%	8.7%	10.2%	11.6%	13.3%	13.3%	14.1%
Hotel	2.7%	2.7%	2.7%	2.8%	3.1%	3.1%	3.5%
Eating, drinking places	^	^	^	^	^	^	^
Repair services	---	---	---	---	---	---	---
Laundry	---	---	---	---	---	---	---
Barber, beauty shops	---	---	---	---	---	---	---
Entertainment	---	---	---	---	---	---	---
Misc. personal serv.	5.6%	6.0%	7.4%	8.8%	10.0%	10.0%	10.6%
TOTAL	100%	100%	100%	100%	100%	100%	100%

NOTES: The sign ^ indicates the figure is included in the category immediately above. The numbers may not add up due to rounding. 1989 figures are preliminary. Communications (12) includes postal services. Miscellaneous services includes all non-profit services in 1968-89. SOURCE: 1968-89: INSEE, *Annuaire statistique de la France*.

Table 14: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group

Industry/Year	1921-1968	1921	1931	1946	1954	1962	1968
I. Extractive							
Agriculture	41.6%	36.3%	46.2%	30.9%	23.0%	23.0%	17.0%
Mining	42.4%	36.6%	38.8%	28.6%	20.6%	15.9%	15.9%
	1.2%	1.7%	1.4%	2.3%	2.4%	1.1%	1.1%
II. Transformative							
Construction	29.7%	32.8%	29.6%	35.2%	37.7%	39.3%	39.3%
Utilities	3.0%	4.2%	5.1%	7.4%	8.7%	10.3%	10.3%
Manufacturing	26.4%	26.5%	23.8%	27.2%	28.0%	26.1%	26.1%
Food	2.1%	2.6%	3.2%	3.2%	3.1%	3.0%	3.0%
Textiles	9.4%	4.4%	2.5%	6.0%	4.9%	2.9%	2.9%
Metal	6.6%	2.1%	7.3%	0.9%	1.1%	1.5%	1.5%
Machinery	---	---	^	0.9%	1.2%	1.3%	1.3%
Chemical	0.9%	1.1%	1.1%	1.3%	1.4%	1.5%	1.5%
Misc. Mfg.	12.2%	18.3%	10.7%	14.9%	15.2%	15.5%	15.5%
III. Distributive Services							
Transportation	14.4%	11.6%	15.1%	14.2%	16.4%	15.5%	15.5%
Communication	3.6%	3.1%	6.1%	4.2%	4.3%	4.3%	4.3%
Wholesale	0.7%	^	1.3%	1.7%	0.1%	0.1%	0.1%
Retail	4.1%	5.5%	9.1%	2.3%	3.2%	5.6%	5.6%
	^	^	^	6.5%	7.3%	7.5%	7.5%
IV. Producer Services							
Banking	1.6%	2.1%	1.9%	2.6%	3.2%	3.3%	3.3%
Insurance	0.6%	0.9%	1.2%	0.8%	1.1%	2.0%	2.0%
Real estate	0.2%	0.3%	0.4%	0.5%	0.7%	0.8%	0.8%
Engineering	0.0%	0.0%	0.0%	0.4%	0.2%	0.4%	0.4%
Accounting	0.5%	0.3%	---	0.9%	1.1%	0.3%	0.3%
Misc. bus. serv.	^	^	^	^	^	1.6%	1.6%
Legal services	0.3%	0.3%	0.3%	---	---	0.6%	0.6%
V. Social Services							
Medical, health serv.	5.3%	6.1%	6.8%	9.4%	12.2%	14.3%	14.3%
Hospital	0.9%	1.3%	1.2%	2.2%	2.9%	1.0%	1.0%
Education	1.3%	1.4%	1.5%	2.4%	3.5%	4.4%	4.4%
Welfare, relig. serv.	0.5%	0.5%	0.7%	0.6%	1.1%	1.1%	1.1%
Nonprofit org.	---	---	---	---	1.0%	0.7%	0.7%
Total services	2.3%	2.8%	3.2%	4.0%	3.4%	1.8%	1.8%
Government	^	^	^	^	^	3.3%	3.3%
Misc. social services	0.2%	0.2%	0.1%	0.2%	0.4%	0.0%	0.0%
VI. Personal Services							
Domestic serv.	3.6%	7.2%	6.4%	7.4%	7.4%	7.9%	7.9%
Hotel	1.7%	2.8%	1.3%	3.1%	3.0%	2.7%	2.7%
Eating, drinking places	1.5%	2.8%	1.4%	1.6%	1.6%	0.9%	0.9%
Repair services	---	---	---	1.4%	1.2%	1.8%	1.8%
Laundry	---	---	---	---	0.3%	1.1%	1.1%
Barber, beauty shops	0.3%	---	0.2%	1.0%	1.2%	0.5%	0.5%
Entertainment	0.1%	0.2%	0.3%	0.4%	0.4%	0.2%	0.2%
Misc. personal serv.	0.9%	0.5%	0.5%	---	---	0.0%	0.0%
TOTAL	100%	100%	100%	100%	100%	100%	100%

NOTES: The sign ^ indicates the figure is included in the category immediately above. The numbers may not add up due to rounding. SOURCE: 1921-1968: Stigler (1978).

Table 15: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group

ITALY, 1921-1991	1921	1931	1951	1961	1971	1981	1991*
I. Extractive	51.1%	48.1%	42.9%	39.8%	11.2%	11.7%	9.5%
Agriculture	56.7%	47.7%	42.5%	39.1%	17.2%	11.4%	9.5%
Mining	0.4%	0.4%	0.4%	0.7%	---	0.5%	---
II. Transformative	24.2%	29.0%	31.8%	39.5%	44.2%	40.5%	39.7%
Construction	4.1%	6.0%	7.6%	12.0%	10.8%	9.4%	7.0%
Utilities	0.3%	0.6%	0.6%	0.6%	0.8%	0.8%	0.8%
Manufacturing	19.5%	22.4%	23.7%	27.4%	32.7%	30.2%	31.8%
Food	1.2%	1.5%	2.4%	2.4%	---	1.8%	1.6%
Textiles	3.2%	4.2%	3.7%	3.4%	---	6.3%	5.6%
Metal	3.8%	4.4%	4.2%	---	---	7.9%	4.7%
Machinery	1.5%	---	1.2%	---	---	4.8%	3.3%
Chemical	0.4%	1.0%	1.1%	---	---	1.4%	1.3%
Misc. Mfg.	11.8%	11.5%	13.9%	---	---	8.8%	5.9%
III. Distributive Services	8.6%	10.1%	10.6%	13.0%	16.7%	16.2%	14.8%
Transportation	3.5%	4.2%	3.4%	4.1%	5.3%	4.9%	5.2%
Communication	0.4%	0.5%	0.6%	0.8%	---	---	---
Wholesale	4.3%	5.4%	1.2%	1.4%	10.3%	3.6%	17.3%
Retail	---	---	5.8%	6.7%	---	6.1%	---
IV. Producer Services	1.2%	1.8%	1.9%	2.0%	---	4.6%	---
Banking	0.2%	0.5%	0.8%	0.9%	1.1%	1.2%	1.8%
Insurance	---	---	0.1%	0.2%	---	0.5%	---
Real estate	---	---	---	0.0%	---	0.0%	---
Engineering	0.8%	---	---	0.3%	---	---	---
Accounting	---	---	1.0%	---	---	0.4%	---
Misc. bus. serv.	---	---	---	0.2%	---	0.1%	---
Legal services	0.2%	0.2%	0.5%	0.4%	---	0.4%	---
V. Social Services	4.1%	5.1%	7.9%	9.3%	---	19.1%	---
Medical, health serv.	0.6%	0.8%	1.1%	0.7%	---	1.7%	---
Hospital	---	---	---	0.9%	---	2.6%	---
Education	1.0%	1.1%	2.0%	2.7%	---	7.4%	---
Welfare, relig. serv.	0.6%	0.7%	1.2%	0.2%	---	0.2%	---
Nonprofit org.	---	0.1%	0.1%	---	---	0.3%	---
Postal services	1.3%	2.1%	3.4%	4.8%	---	---	---
Government	---	---	---	---	6.9%	6.5%	15.5%
Misc. social services	0.6%	0.3%	0.1%	---	---	0.4%	---
VI. Personal Services	4.6%	5.6%	4.7%	5.9%	---	7.9%	---
Domestic serv.	2.4%	3.2%	2.2%	2.2%	---	1.2%	---
Hotel	0.2%	0.4%	1.4%	0.7%	---	0.5%	4.1%
Eating, drinking places	0.8%	0.7%	---	1.4%	---	2.0%	---
Repair services	---	---	---	---	---	2.0%	---
Laundry	0.3%	0.3%	0.1%	0.2%	---	0.3%	---
Barber, beauty shops	0.4%	0.7%	0.6%	0.9%	---	1.0%	---
Entertainment	0.0%	0.1%	0.3%	0.3%	---	0.1%	---
Misc. personal serv.	0.4%	0.1%	0.1%	0.2%	---	0.1%	---
TOTAL	100%	100%	100%	100%	100%	100%	100%

NOTE: The sign *** signifies that the figure is included in the category immediately above. The numbers may not add up due to rounding. *1990 figures may not be comparable to figures from earlier years due to the difference in sources. SOURCES: 1921-81: Istituto Centrale di statistiche, Censimento generale della popolazione, 1990: Istituto nazionale di statistiche, Annuario Statistico Italiano, edizione 1991.

NOTE: The sign *** signifies that the figure is included in the category immediately above. The numbers may not add up due to rounding. SOURCE: 1921-61: Sigaluzza (1978).

Table 16: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
 England and Wales, 1921-1971

Industry/Year	UNIFIED KINGDOM (employment, 1921-50)					Great Britain (employees), 1970-82					Great Britain (Employee), 1971-81					
	1921	1931	1941	1951	1971	1970	1971	1980	1985	1990	1970	1971	1980	1990	1971	1981
I. Extractive																
Agriculture	14.2%	11.8%	8.9%	6.6%	4.3%	3.6%	3.4%	4.8%	4.8%	3.2%	3.6%	3.4%	4.8%	4.3%	3.9%	
Mining	7.1%	4.1%	2.6%	3.2%	2.6%	1.9%	1.6%	1.6%	1.6%	2.0%	1.9%	1.6%	2.0%	1.6%	1.6%	
II. Transformation																
Construction	42.2%	29.3%	43.4%	46.0%	43.8%	46.6%	45.6%	35.3%	29.8%	27.3%	46.6%	45.6%	35.3%	31.3%	36.3%	
Utilities	1.6%	1.5%	1.7%	1.7%	1.6%	1.7%	1.6%	1.6%	1.6%	1.6%	1.7%	1.6%	1.6%	1.6%	1.6%	
Manufacturing	36.8%	32.9%	37.2%	37.8%	34.9%	38.7%	38.1%	33.3%	23.0%	22.5%	38.7%	38.1%	33.3%	31.1%	27.1%	
Food	5.5%	5.4%	3.6%	3.0%	3.0%	5.8%	5.7%	3.2%	2.8%	2.4%	5.8%	5.7%	3.2%	2.3%	3.0%	
Textiles	5.9%	5.9%	4.5%	3.4%	2.4%	5.1%	5.1%	1.3%	1.3%	0.9%	5.1%	5.1%	1.3%	0.8%	1.3%	
Metal	2.8%	3.1%	2.7%	2.7%	2.3%	5.4%	4.6%	6.8%	3.6%	3.1%	5.5%	5.3%	6.8%	2.7%	4.8%	
Machinery	1.6%	1.4%	3.0%	3.2%	3.0%	9.2%	7.7%	3.8%	4.8%	6.1%	9.3%	9.1%	8.0%	5.8%	8.9%	
Chemical	1.9%	1.4%	2.1%	2.3%	2.0%	2.5%	2.1%	1.6%	1.4%	1.4%	2.5%	2.1%	1.6%	2.2%	1.7%	
Misc. Mfg.	22.1%	18.0%	21.9%	22.8%	20.4%	14.8%	13.1%	10.8%	9.2%	8.6%	14.8%	14.8%	10.8%	8.5%	10.6%	
III. Distributive Services																
Transportation	19.2%	21.6%	19.2%	19.7%	17.2%	18.7%	18.9%	19.9%	20.4%	20.6%	18.8%	18.7%	20.2%	20.4%	20.3%	
Communication	7.5%	7.0%	6.4%	5.7%	4.8%	4.9%	4.7%	6.3%	4.2%	4.1%	4.9%	5.0%	6.2%	4.8%	4.8%	
Wholesale	11.0%	11.6%	11.9%	11.0%	8.4%	2.0%	2.0%	2.0%	2.0%	1.9%	2.0%	2.1%	2.0%	1.9%	1.9%	
Retail	^	^	^	^	5.6%	2.3%	2.7%	4.0%	4.5%	4.5%	2.3%	2.4%	4.1%	4.2%	4.5%	
IV. Producer Services																
Banking	2.6%	3.1%	3.2%	4.5%	5.6%	5.0%	5.7%	7.3%	9.7%	12.0%	5.1%	5.2%	7.5%	8.0%	12.1%	
Insurance	0.7%	0.9%	0.9%	1.2%	1.6%	1.3%	1.4%	2.0%	2.4%	2.8%	1.6%	1.7%	2.0%	2.8%	2.1%	
Road estate	^	^	^	^	^	0.3%	0.4%	^	0.6%	0.6%	0.3%	0.3%	^	0.6%	0.4%	
Engineering	0.2%	0.2%	0.2%	0.4%	0.4%	^	^	^	^	^	^	^	^	^	^	
Accounting	0.0%	0.3%	0.3%	0.6%	0.6%	0.4%	0.4%	^	^	^	0.4%	0.4%	^	0.8%	0.4%	
Misc. bus. serv.	0.4%	0.2%	0.1%	1.1%	1.0%	1.0%	1.4%	4.2%	5.6%	7.4%	1.1%	1.1%	4.2%	4.8%	5.6%	
Legal services	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	^	^	^	0.5%	0.5%	^	1.0%	0.5%	
V. Social Services																
Medical, health serv.	1.0%	1.1%	2.9%	3.4%	6.8%	4.3%	5.5%	6.8%	7.8%	8.1%	4.4%	4.6%	6.8%	7.1%	8.7%	
Hospital	^	^	^	^	3.1%	^	^	^	^	^	^	^	^	^	^	
Education	2.1%	2.1%	2.4%	3.9%	5.8%	6.4%	8.5%	7.6%	8.1%	8.3%	6.4%	6.7%	7.3%	7.8%	8.2%	
Welfare, relig. serv.	0.6%	0.4%	0.5%	0.7%	1.0%	0.1%	0.1%	2.3%	3.2%	3.9%	0.1%	0.1%	2.4%	2.6%	3.4%	
Nonprofit org.	0.1%	0.1%	^	^	^	^	^	^	^	^	^	^	^	^	^	
Postal services	1.1%	1.2%	1.4%	1.5%	1.8%	^	^	^	^	^	^	^	^	^	^	
Government	3.8%	4.3%	6.2%	4.0%	6.0%	6.2%	7.5%	7.3%	7.4%	6.8%	6.2%	6.4%	7.1%	7.4%		
Misc. social services	0.2%	0.3%	0.4%	0.4%	0.4%	0.4%	0.6%	^	^	^	0.4%	0.5%	^	0.6%	0.7%	
VI. Personal Services																
Domestic serv.	12.9%	14.3%	11.3%	9.3%	9.3%	8.1%	9.7%	8.1%	9.0%	9.7%	8.1%	8.1%	7.5%	8.1%	8.9%	
Hotel	7.5%	8.2%	3.4%	1.8%	1.0%	0.4%	^	^	^	^	0.4%	0.4%	^	^	0.4%	
Eating, drinking places	2.4%	2.2%	4.2%	2.7%	1.4%	1.2%	1.1%	4.3%	4.9%	5.6%	1.2%	1.2%	4.3%	4.4%	1.3%	
Repair services	0.8%	1.3%	^	^	1.0%	1.5%	2.5%	^	^	^	1.3%	1.3%	^	4.4%	4.0%	
Laundry	^	^	1.4%	1.8%	2.1%	1.8%	1.9%	0.9%	1.0%	1.0%	1.8%	1.3%	0.9%	1.0%	1.1%	
Barber, beauty shops	0.8%	0.8%	0.8%	0.8%	0.4%	0.5%	0.4%	^	^	^	0.5%	0.5%	^	^	0.4%	
Entertainment	0.3%	0.3%	0.4%	0.7%	1.1%	0.4%	0.4%	^	^	^	0.4%	0.4%	^	^	0.6%	
Misc. personal serv.	0.7%	0.9%	1.1%	1.6%	1.1%	1.1%	1.8%	1.9%	2.3%	2.3%	1.1%	1.1%	1.9%	2.0%	1.1%	
Unk./Miss.	0.5%	0.3%	1.2%	0.5%	0.8%	1.2%	2.1%	1.0%	0.9%	0.9%	1.2%	1.4%	0.8%	0.8%	0.9%	
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

NOTES: The sign '^' signifies that the figure is included in the category immediately above. NOTES: The sign '^' signifies that the figure is included in the category immediately above. NOTES: The sign '^' signifies that the figure is included in the category immediately above. The numbers may not add up due to rounding. The data for Great Britain are that of the employed, while the data for United Kingdom are that of employees in employment. Postal services is included in Communications. From 1990 UK figures, statistics included under Mining. Chemical is included in Metal in 1980. SOURCES: 1921-50: Dept. of Employment (Annual Abstract of Statistics, Employment Census); 1971-81: Census, Great Britain (Office of Censuses).

Table 17: Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
CANADA, 1921-1971

Industry Year	1921	1931	1941	1951	1961	1971
I. Extractive						
I.1. Extractive	36.9%	34.4%	31.7%	21.6%	14.7%	9.1%
I.2. Agriculture	35.2%	32.5%	29.5%	19.7%	12.8%	7.4%
I.3. Mining	1.6%	1.9%	2.2%	1.9%	1.9%	1.7%
II. Transformative						
II.1. Transformative	26.1%	24.7%	28.2%	33.7%	31.1%	30.0%
II.2. Construction	9.0%	6.8%	5.5%	6.9%	7.0%	6.9%
II.3. Utilities	---	1.5%	0.6%	1.2%	1.1%	1.1%
II.4. Manufacturing	17.0%	16.4%	22.3%	23.6%	23.0%	22.0%
Food	1.2%	2.2%	3.6%	3.1%	3.7%	3.2%
Textiles	2.7%	2.6%	3.7%	1.6%	1.3%	0.9%
Metal	2.9%	1.9%	2.3%	3.9%	3.2%	1.5%
Machinery	^	0.7%	0.0%	^	0.8%	1.0%
Chemical	0.2%	0.4%	0.8%	1.3%	1.4%	1.0%
Misc. Mfg.	10.0%	8.6%	11.2%	15.7%	12.6%	14.4%
III. Distributive Services						
III.1. Distributive Services	19.2%	18.4%	17.7%	21.8%	23.9%	23.0%
III.2. Transportation	8.5%	7.2%	5.9%	6.8%	6.6%	5.4%
III.3. Communication	---	0.9%	0.7%	1.1%	2.1%	2.1%
III.4. Wholesale	10.7%	1.6%	2.4%	3.8%	4.7%	4.5%
III.5. Retail	^	8.7%	8.8%	10.1%	10.5%	11.0%
IV. Producer Services						
IV.1. Producer Services	3.7%	3.3%	2.7%	3.9%	5.3%	7.3%
IV.2. Building	1.2%	1.2%	0.9%	1.3%	1.8%	2.4%
IV.3. Insurance	^	1.0%	0.9%	1.1%	1.9%	2.2%
IV.4. Real estate	^	0.2%	0.3%	0.4%	^	^
IV.5. Engineering	2.3%	---	---	0.2%	0.4%	0.7%
IV.6. Accounting	^	0.1%	0.1%	0.2%	0.3%	0.4%
IV.7. Misc. bus. serv.	^	0.4%	0.2%	0.4%	0.5%	1.1%
IV.8. Legal services	0.2%	0.4%	0.3%	0.3%	0.4%	0.5%
V. Social Services						
V.1. Social Services	7.5%	8.9%	9.6%	11.3%	15.4%	21.1%
V.2. Medical, health serv.	1.1%	1.6%	2.2%	3.1%	0.9%	1.0%
V.3. Hospital	^	^	^	^	3.7%	4.7%
V.4. Education	2.0%	2.7%	2.7%	2.9%	4.4%	7.3%
V.5. Welfare, relig. serv.	0.9%	1.0%	0.7%	1.1%	1.2%	1.4%
V.6. Nonprofit org.	---	---	---	---	---	0.2%
V.7. Postal service	3.0%	0.5%	0.5%	0.6%	5.1%	5.4%
V.8. Government	^	2.6%	2.6%	3.4%	^	^
V.9. Misc. social services	0.5%	0.3%	0.5%	0.2%	---	---
VI. Personal Services						
VI.1. Personal Services	6.7%	10.2%	10.2%	7.8%	9.4%	9.6%
VI.2. Domestic serv.	---	4.2%	4.5%	1.6%	1.6%	0.7%
VI.3. Hotel	---	2.8%	1.6%	1.5%	3.9%	1.7%
VI.4. Eating, drinking places	---	^	1.2%	1.6%	^	2.6%
VI.5. Repair services	---	0.5%	1.1%	1.1%	1.1%	0.9%
VI.6. Laundry	---	0.5%	0.5%	0.7%	0.6%	0.5%
VI.7. Barber, beauty shops	---	0.6%	0.6%	0.5%	0.7%	0.7%
VI.8. Entertainment	---	0.4%	0.4%	0.5%	0.6%	1.0%
VI.9. Misc. personal serv.	---	1.2%	0.2%	0.3%	1.0%	1.5%
TOTAL	100%	100%	100%	100%	100%	100%

NOTES: The sign "^^" signifies that the figure is included in the category immediately above. The numbers may not add up due to rounding.
SOURCE: 1921-1971: Statistics Canada (1973).

Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group
CANADA, 1971-1992

Industry Year	1971	1981	1992*
I. Extractive			
I.1. Extractive	8.3%	7.1%	5.7%
I.2. Agriculture	6.6%	5.3%	4.4%
I.3. Mining	1.6%	1.8%	1.5%
II. Transformative			
II.1. Transformative	27.1%	26.8%	22.5%
II.2. Construction	6.3%	6.5%	6.5%
II.3. Utilities	1.0%	1.1%	1.2%
II.4. Manufacturing	19.7%	19.2%	14.9%
Food	2.9%	2.7%	---
Textiles	1.0%	0.7%	---
Metal	3.0%	3.4%	---
Machinery	2.3%	2.2%	---
Chemical	1.2%	1.1%	---
Misc. Mfg.	9.1%	9.0%	14.9%
III. Distributive Services			
III.1. Distributive Services	20.8%	22.9%	24.0%
III.2. Transportation	5.0%	4.8%	4.1%
III.3. Communication	1.0%	2.1%	2.1%
III.4. Wholesale	4.1%	4.8%	4.5%
III.5. Retail	9.8%	11.1%	13.2%
IV. Producer Services			
IV.1. Producer Services	6.6%	9.7%	11.2%
IV.2. Building	2.2%	2.7%	3.7%
IV.3. Insurance	2.0%	0.9%	^
IV.4. Real estate	^	1.7%	2.2%
IV.5. Engineering	0.6%	0.9%	---
IV.6. Accounting	0.4%	0.5%	---
IV.7. Misc. bus. serv.	1.0%	2.3%	5.4%
IV.8. Legal services	0.4%	0.6%	---
V. Social Services			
V.1. Social Services	22.0%	24.0%	22.6%
V.2. Medical, health serv.	1.8%	2.0%	9.1%
V.3. Hospital	4.1%	4.0%	^
V.4. Education	6.0%	6.6%	7.0%
V.5. Welfare, relig. serv.	1.2%	1.8%	---
V.6. Nonprofit org.	0.2%	0.2%	---
V.7. Postal service	---	---	---
V.8. Government	7.4%	7.6%	6.5%
V.9. Misc. social services	1.1%	1.6%	---
VI. Personal Services			
VI.1. Personal Services	7.5%	9.5%	13.5%
VI.2. Domestic serv.	0.6%	0.4%	---
VI.3. Hotel	1.2%	5.7%	6.5%
VI.4. Eating, drinking places	2.2%	---	^
VI.5. Repair services	1.0%	1.1%	---
VI.6. Laundry	0.5%	0.5%	---
VI.7. Barber, beauty shops	0.6%	0.5%	---
VI.8. Entertainment	0.9%	1.2%	---
VI.9. Misc. personal serv.	0.3%	0.3%	7.0%
VI.10. Unclassifiable	7.3%	0.7%	0.7%
TOTAL	100%	100%	100%

NOTES: The sign "^^" signifies that the figure is included in the category immediately above. The numbers may not add up due to rounding.
*1992 figures may not be comparable to the earlier years due to the difference in sources.
SOURCES: 1971-81: Population Census, 1992: Statistics Canada (The Labour Force) May.

Table 18: Employment Statistics by Industry

	UNITED STATES, 1920-1970						UNITED STATES, 1970-1991					
	1920	1930	1940	1950	1960	1970	1970	1980	1985	1990	1991	
Industry	48.0%	43.3%	37.9%	39.2%	38.2%	33.6%	Industry	30.5%	27.7%	25.8%	24.9%	
Services	52.0%	56.7%	62.1%	60.8%	61.8%	66.4%	Services	69.5%	72.3%	74.2%	75.1%	
Goods Handling	73.3%	69.0%	67.4%	69.3%	65.8%	61.1%	Goods Handling	57.3%	54.7%	52.6%	51.7%	
Information Handling	26.7%	31.0%	32.5%	30.6%	34.0%	38.9%	Information Handling	42.7%	45.3%	47.4%	48.3%	
Services: Industry	1.1	1.3	1.6	1.6	1.6	2.0	Services: Industry	1.9	2.6	2.9	3.0	
Information: Goods	0.4	0.5	0.5	0.4	0.5	0.6	Information: Goods	0.7	0.8	0.9	0.9	

Notes:

1. Industry = mining, construction, manufacturing.
2. Services = remaining categories.
3. Goods Handling = mining, construction, manufacturing, transportation, wholesale/retail trade.
4. Information Handling = communications; finance, insurance, and real estate (FIRE); services; government.
5. Services: Industry = ratio between services and industry employment.
6. Information: Goods = ratio between information handling and goods handling employment.

Source: see Table 11.

Table 19: Employment Statistics by Industry
JAPAN, 1920-1970

	JAPAN, 1920-1970										JAPAN, 1970-1990				
	1920	1930	1940	1950	1960	1970	1970	1980	1985	1990					
Industry	46.3%	40.7%	47.8%	43.1%	43.4%	42.1%	42.1%	37.4%	36.3%	35.8%					
Services	53.7%	59.3%	52.2%	56.9%	56.6%	57.9%	57.9%	62.6%	63.7%	64.2%					
Goods Handling	76.8%	75.8%	77.3%	72.9%	73.8%	73.2%	73.0%	69.6%	67.9%	65.9%					
Information Handling	23.2%	24.0%	22.5%	27.1%	26.4%	27.0%	26.9%	30.4%	31.9%	33.4%					
Services: Industry	1.2	1.5	1.1	1.3	1.3	1.4	1.4	1.7	1.8	1.8					
Information: Goods	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5					

Notes:

1. Industry = mining, construction, manufacturing.
2. Services = remaining categories.
3. Goods Handling = mining, construction, manufacturing, transportation, wholesale/retail trade.
4. Information Handling = communications; finance, insurance, and real estate (FIRE); services; government.
5. Services: Industry = ratio between services and industry employment.
6. Information: Goods = ratio between information handling and goods handling employment.

SOURCE: see Table 12.

Table 20: Employment Statistics by Industry

GERMANY, 1925-1970

	GERMANY, 1925-1970						GERMANY, 1970-1987			
	1925	1933	1950	1961	1970	1987				
Industry	59.1%	56.6%	57.3%	56.2%	51.2%	41.5%	Industry			
Services	40.9%	43.4%	42.7%	43.8%	48.8%	58.5%	Services			
Goods Handling	78.8%	77.1%	78.1%	76.5%	71.4%	60.8%	Goods Handling			
Information Handling	21.2%	22.9%	21.9%	23.5%	29.1%	39.2%	Information Handling			
Services: Industry	0.7	0.8	0.7	0.8	1.0	1.4	Services: Industry			
Information: Goods	0.3	0.3	0.3	0.3	0.4	0.6	Information: Goods			

Notes:

1. Industry = mining, construction, manufacturing.
2. Services = remaining categories.
3. Goods Handling = mining, construction, manufacturing, transportation, wholesale/retail trade.
4. Information Handling = communications; finance, insurance, and real estate (FIRE); services; government.
5. Services: Industry = ratio between services and industry employment.
6. Information: Goods = ratio between information handling and goods handling employment.

Source: see Table 13.

Table 21: Employment Statistics by Industry
FRANCE, 1921 - 1968

	FRANCE, 1921 - 1968						FRANCE, 1968 - 1989					
	1921	1931	1946	1954	1962	1968	1968	1970	1975	1980	1985	1989
Industry	53.1%	54.3%	49.7%	51.8%	49.5%	47.3%	43.8%	43.4%	41.0%	37.4%	32.5%	30.6%
Services	46.9%	45.7%	50.3%	48.2%	50.5%	52.7%	56.2%	56.6%	59.0%	62.6%	67.5%	69.4%
Goods Handling	79.8%	80.2%	77.8%	73.1%	71.2%	67.7%	67.8%	66.8%	64.1%	60.8%	56.3%	54.9%
Information Handling	20.2%	19.8%	22.4%	27.0%	29.0%	32.3%	32.2%	33.2%	35.9%	39.2%	43.7%	45.1%
Services: Industry	0.9	0.8	1.0	0.9	1.0	1.1	1.3	1.3	1.4	1.7	2.1	2.3
Information: Goods	0.3	0.2	0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.8	0.8

Notes:

1. Industry = mining, construction, manufacturing.
2. Services = remaining categories.
3. Goods Handling = mining, construction, manufacturing, transportation, wholesale/retail trade, hotels/lodging places.
4. Information Handling = communications; finance, insurance, and real estate (FIRE); services; government.
5. Services: Industry = ratio between services and industry employment.
6. Information: Goods = ratio between information handling and goods handling employment.

Source: see Table 14.

Table 22: Employment Statistics by Industry

	ITALY 1921 - 1961					ITALY 1961 - 1990				
	1921	1931	1951	1961	1961	1961	1971	1981	1990*	
Industry	56.5%	55.4%	55.3%	56.6%	Industry	56.4%	52.5%	45.0%	31.9%	
Services	43.5%	44.6%	44.7%	43.4%	Services	43.6%	47.5%	55.0%	68.1%	
Goods Handling	76.6%	76.2%	76.1%	75.6%	Goods Handling	78.8%	76.1%	63.6%	62.2%	
Information Handling	23.4%	23.8%	23.9%	24.4%	Information Handling	21.2%	23.9%	36.4%	37.8%	
Services: Industry	0.8	0.8	0.8	0.8	Services: Industry	0.8	0.9	1.2	2.1	
Information: Goods	0.3	0.3	0.3	0.3	Information: Goods	0.3	0.3	0.6	0.6	

Notes:

1. Industry = mining, construction, manufacturing.
2. Services = remaining categories.
3. Goods Handling = mining, construction, manufacturing, transportation, wholesale/retail trade, hotels/todgin places.
4. Information Handling = communications; finance, insurance, and real estate (FIRE); services; government.
5. Services: Industry = ratio between services and industry employment.
6. Information: Goods = ratio between information handling and goods handling employment.

*1990 figures may not be comparable to figures from earlier years due to the difference in sources.
Source: see Table 15.

Table 23: Employment Statistics by Industry
England and Wales, 1921-1971

	UNITED KINGDOM, 1970-1990									
	1921	1931	1951	1961	1971	1970	1975	1980	1985	1990
Industry	53.0%	47.9%	51.8%	50.9%	46.7%	49.4%	42.6%	39.4%	33.1%	29.6%
Services	47.0%	52.1%	48.2%	49.1%	53.3%	50.6%	57.4%	60.6%	66.9%	70.4%
Goods Handling	76.3%	73.3%	76.4%	74.2%	66.6%	67.6%	61.0%	64.0%	56.7%	54.2%
Information Handling	23.7%	26.7%	23.6%	25.8%	33.3%	32.2%	39.0%	36.0%	43.3%	45.8%
Services: Industry	0.9	1.1	0.9	1.0	1.1	1.0	1.3	1.5	2.0	2.4
Information: Goods	0.3	0.4	0.3	0.3	0.5	0.5	0.6	0.6	0.8	0.8

Notes:

1. Industry = mining, construction, manufacturing.
2. Services = remaining categories.
3. Goods Handling = mining, construction, manufacturing, transportation, wholesale/retail trade, hotels/lodging places.
4. Information Handling = communications; finance, insurance, and real estate (FIRE); services; government.
5. Services: Industry = ratio between services and industry employment.
6. Information: Goods = ratio between information handling and goods handling employment.

Source: see Table 16.

Table 24: Employment Statistics by Industry

CANADA, 1921-1971

	CANADA, 1921-1971						CANADA, 1971-1992			
	1921	1931	1941	1951	1961	1971		1971	1981	1992*
Industry	42.7%	37.2%	42.3%	42.8%	36.6%	33.0%	Industry	29.8%	29.0%	23.5%
Services	57.3%	62.8%	57.7%	57.2%	63.4%	67.0%	Services	70.2%	71.0%	76.5%
Goods Handling	72.3%	69.6%	69.6%	71.9%	67.4%	58.6%	Goods Handling	52.8%	58.1%	54.3%
Information Handling	27.6%	30.4%	30.4%	28.1%	32.6%	41.4%	Information Handling	47.2%	41.9%	45.7%
Services: Industry	1.3	1.7	1.4	1.3	1.7	2.0	Services: Industry	2.4	2.4	3.3
Information: Goods	0.4	0.4	0.4	0.4	0.5	0.7	Information: Goods	0.9	0.7	0.8

Notes:

1. Industry = mining, construction, manufacturing.
2. Services = remaining categories.
3. Goods Handling = mining, construction, manufacturing, transportation, wholesale/retail trade, hotels/lodging places.
4. Information Handling = communications; finance, insurance, and real estate (FIRE); services; government.
5. Services: Industry = ratio between services and industry employment.
6. Information: Goods = ratio between information handling and goods handling employment.

*1992 figures may not be comparable to figures from previous years due to the difference in sources.

Source: see Table 17.

service/industry employment ratios: 1.8 and 1.4 respectively in 1987/1990. This is a fundamental observation that deserves careful discussion later in this text. Yet, as a trend, in the 1990s the majority of the population in all G-7 countries is employed in services.

Is employment also concentrating in information processing? Our ratio of information processing/goods handling employment provides some interesting clues for the analysis:

First, we must put aside Japan for further consideration.

For all other countries there has been a trend toward a higher value of information processing employment. Although Italy and Germany had no increase or slow increase in 1920-70, their share of information employment grew considerably in the last two decades.

The United States holds the highest information employment ratio among the seven countries, but the United Kingdom, Canada, and France are almost at the same level. Thus, the trend toward information processing is clearly not a distinctive feature of the United States: the American employment structure is more clearly set apart from the others as a "service economy" than as an "information economy". Germany and Italy have a significantly lower rate of information employment, but they have doubled it in the last two decades, thus showing the same trend.

The data on Japan are most interesting. They show only a moderate increase of information employment in fifty years (from 0.3 to 0.4), and an even slower increase in the last twenty years, from 0.4 to 0.5. Thus, what is probably the economic structure with the largest diffusion of information technologies, and in which high technology plays a most significant role in productivity and competitiveness appears to have the lowest level of information processing employment, and the lowest rate of progression of such employment. The expansion of information employment and the "informationalization" of work and of society at large do seem to be different, although inter-related, processes. It is indeed interesting, and problematic for some interpretations of the postindustrial society, that Japan and Germany, the two most competitive economies among the major economies in the 1980s (see Appendix) are

those with the strongest manufacturing employment, the lowest service/industry employment ratio, the lowest information/goods employment ratio, and, for Japan (which has experienced the fastest productivity growth) the lowest rate of increase in information employment throughout the century. We could advance the idea that information processing is most effective when it is embedded in material production or in the handling of goods, instead of being disjointed in a stepped up technical division of labor. After all, most of automation refers precisely to the integration of information processing in goods handling.

This hypothesis may also help to interpret another important observation: none of the countries had a ratio of information employment over 1 in 1990, and only the United States was clearly approaching that threshold. Thus, if information is a critical component in the functioning of the economy and in the organization of society, it does not follow that most jobs are and/or will be in information processing. The march towards information employment is proceeding at a significantly slower pace, and reaching much lower levels, than the trend toward service employment. Thus, to understand the actual profile of the transformation of employment in advanced societies we must now turn to the differential evolution of each type of services in the G-7 countries.

To do so, we will first comment on the evolution of each category of services in each country; then, we will compare the relative importance of each type of service vis a vis each other in each country; finally, we will consider the general trends of expansion of those services that have been identified in the literature as characteristic of "postindustrial" societies. In proceeding with this analysis we must remind the reader that the further we go into the fine grain analysis of specific categories of employment, the less solid the data base becomes. The inability to obtain reliable data for some categories, countries, and periods will make it difficult to be systematic in our analysis across the board. Yet, the observation of the tables presented here still suggests that there are some features that merit closer analysis and further elaboration on country-specific data bases.

Let us start with producer services. They are considered in the literature to be the

strategic services of the new economy, the providers of information and support for the increase in the productivity and efficiency of firms. Thus, their expansion should go hand in hand with the increasing sophistication and productivity of the economy. Indeed, we observe throughout the two periods (1920-70, 1970-90) a significant expansion of employment in these activities in all countries. For instance, in the United Kingdom employment in producer services shot up from 5% in 1970 to 12% in 1990; in the United States, for the same period, from 8.2% to 14%; in France, it doubled, from 5% to 10%. It is significant that Japan increased dramatically its producer services employment between 1921 (0.8%) and 1970 (5.1%), most of this increase taking place during the 1960s, the moment when the Japanese economy internationalized in its scope. On the other hand, focusing on the 1970-90 on a different data base, the increase of the Japanese employment in producer services between 1971 and 1990 (from 4.8% to 9.6%) while being substantial still leaves Japan in the lower tier of employment in producer services among the advanced economies. This could suggest that a significant proportion of producer services are internalized in Japan in manufacturing companies, what could appear to be a more efficient formula, if we consider the competitiveness and productivity of the Japanese economy.

This hypothesis receives additional support from the observation of the data concerning Germany. While increasing significantly the share of employment in producer services from 4.5% in 1970 to 7.3% in 1987, Germany still displays the lowest level of producer services employment of the G-7 countries. This could imply a great degree of internalization of service activities in German firms. If these data were confirmed, we must emphasize that the two most dynamic economies (Japan and Germany) have also the lowest rate of employment in producer services, while it is obvious that their firms do use such services in great amount, yet probably with a different organizational structure that links up more closely producer services to the production process.

While it is evident that producer services are strategically crucial in an advanced economy, they still do not represent a substantial proportion of employment in most advanced countries, in spite of their rapid rate of growth in several of them. With the

Table 25: Rates of Change in Share of Employment
 UNITED STATES, 1930-1991

	1930-50	1950-70	1970-80	1980-91
I. Extractive	-0.43	-0.69	-0.01	-0.22
II. Transformative	0.07	-0.02	-0.10	-0.17
Construction	-0.05	-0.06	0.03	-0.03
Utilities	1.33	0.00	0.13	-0.06
Manufacturing	0.07	-0.01	-0.14	-0.21
III. Distributive Services	0.14	0.00	-0.06	-0.02
IV. Producer Services	0.50	0.77	0.28	0.34
V. Social Services	0.35	0.77	0.08	0.08
VI. Personal Services	0.08	-0.17	0.05	0.11

NOTE: The rates of change in share of employment are calculated by dividing the difference in percentage shares of employment between two years by the percentage share of the earlier year.
 Source: See Table 11.

Table 26: Rates of Change in Share of Employment
JAPAN, 1920-1990

	1920-40	1940-60	1970-80	1980-90
I. Extractive	-0.18	-0.26	-0.43	-0.36
II. Transformative	0.27	0.14	-0.01	0.00
Construction	0.11	1.07	0.28	-0.01
Utilities	0.33	0.45	0.12	-0.10
Manufacturing	0.30	0.00	-0.10	0.01
III. Distributive Services	0.23	0.22	0.12	-0.03
IV. Producer Services	0.50	1.42	0.55	0.29
V. Social Services	0.22	0.38	0.26	0.11
VI. Personal Services	0.11	0.21	0.13	0.06

NOTE: The rates of change in share of employment are calculated by dividing the difference in percentage share of employment between two years by the percentage share of the earlier year.
SOURCE: see Table 12.

Table 27: Rates of Change in Share of Employment
GERMANY, 1921 - 1987

	1925-50	1950-70	1980-87
I. Extractive	-0.52	-0.68	-0.53
II. Transformative	0.22	0.04	-0.15
Construction	0.75	-0.14	-0.08
Utilities	0.33	0.00	0.26
Manufacturing	0.12	0.08	-0.17
III. Distributive Services	0.32	0.04	-0.01
IV. Producer Services	0.19	1.04	0.64
V. Social Services	0.85	0.57	0.55
VI. Personal Services	-0.10	0.07	0.03

NOTE: The rates of change in share of employment are calculated by dividing the difference in percentage shares of employment between two years by the percentage share of the earlier year.

SOURCE: see Table 13.

Table 28: Rates of Change in Share of Employment
FRANCE, 1921-1989

	1921-31	1931-54	1954-68	1968-80	1980-89
I. Extractive	-0.12	-0.19	-0.45	-0.44	-0.27
II. Transformative	0.10	0.07	0.12	-0.07	-0.15
Construction	0.40	0.76	0.39	-0.11	-0.15
Utilities	-----	-----	0.14	0.09	0.08
Manufacturing	0.08	-0.05	0.03	-0.06	-0.16
III. Distributive Services	-0.06	0.04	0.09	0.06	0.03
IV. Producer Services	0.31	0.24	1.12	0.56	0.28
V. Social Services	0.15	0.54	0.54	0.13	0.14
VI. Personal Services	0.29	0.03	0.07	0.41	0.22

NOTE: The rates of change in share of employment are calculated by dividing the difference in percentage shares of employment between two years by the percentage share of the earlier year.
Source: see Table 14.

Table 29: Rates of Change in Share of Employment
ITALY, 1921-81

	1921-31	1931-51	1951-61	1961-71	1971-81
I. Extractive	-0.16	-0.11	-0.31	-0.42	-0.32
II. Transformative	0.19	0.10	0.26	0.11	-0.09
Construction	0.46	0.27	0.58	-0.10	-0.13
Utilities	1.00	-0.17	0.20	0.41	0.08
Manufacturing	0.13	0.06	0.16	0.20	-0.08
III. Distributive Services	0.17	0.05	0.23	0.22	-0.13
IV. Producer Services	0.50	0.06	0.05	-----	-----
V. Social Services	0.24	0.55	0.18	-----	-----
VI. Personal Services	0.22	-0.16	0.26	-----	-----

NOTE: The rates of change in share of employment are calculated by dividing the difference in percentage shares of employment between two years by the percentage share of the earlier year.
Source: see Table 15.

Table 30: Rates of Change in Share of Employment
 England and Wales, 1921-71: UNITED KINGDOM, 1971-90.

	England and Wales		United Kingdom	
	1921-51	1951-71	1971-80	1980-90
I. Extractive	-0.37	-0.52	0.38	-0.31
II. Transformative	0.08	-0.04	-0.22	-0.23
Construction	0.48	0.09	-0.11	-0.13
Utilities	0.70	-0.06	-1.00	---
Manufacturing	0.01	-0.06	-0.21	-0.25
III. Distributive Services	-0.01	-0.07	0.07	0.03
IV. Producer Services	0.23	0.75	0.44	0.60
V. Social Services	0.36	0.60	0.31	0.12
VI. Personal Services	-0.12	-0.20	-0.01	0.20

NOTE: The rates of change in share of employment are calculated by dividing the difference in percentage shares of employment between two years by the percentage share of the earlier year.

Source: see Table 16.

Table 31: Rates of Change in Share of Employment
CANADA, 1921-1981

	1921-41	1941-61	1961-71	1971-81
I. Extractive	-0.14	-0.54	-0.38	-0.14
II. Transformative	0.08	0.10	-0.04	-0.01
Construction	-0.41	0.32	-0.01	0.02
Utilities	----	0.83	0.00	0.08
Manufacturing	0.31	0.03	-0.04	-0.03
III. Distributive Services	-0.08	0.35	-0.04	0.10
IV. Producer Services	-0.27	0.96	0.38	0.46
V. Social Services	0.25	0.64	0.37	0.09
VI. Personal Services	0.52	-0.07	0.01	0.26

NOTE: The rates of change in share of employment are calculated by dividing the difference in percentage shares of employment between two years by the percentage share of the earlier year.
Source: see Table 17.

Table 32: Percentage of Employment in Producer and Social Services, G7 Countries
1921-70 and 1970-90*

	1921	1951	1961	1970	1970	1980	1990
Canada (a)	11.2%	15.2%	20.7%	28.4%	Canada	28.6%	33.8%
France (b)	6.9%	12.0%	15.5%	20.0%	France	21.1%	29.5%
Germany (c)	8.1%	13.6%	16.7%	22.5%	Germany	20.2%	31.7%
Italy (d)	5.3%	9.8%	11.3%	---	Italy	---	---
Japan (e)	5.7%	8.7%	11.2%	15.2%	Japan	15.1%	24.0%
United Kingdom (f)	11.5%	15.3%	18.6%	25.0%	United Kingdom	22.8%	39.2%
United States (g)	11.5%	17.2%	22.9%	30.4%	United States	30.2%	39.5%

NOTES: *Or the nearest available years.

(a) 1971, 1981 and 1992 figures are used in place of 1970, 1980 and 1990 figures.

(b) 1954, 1962, 1968, and 1989 figures are used in place of 1951, 1961, 1970 and 1990 figures.

(c) 1925, 1950 and 1987 figures are used in place of 1921, 1951 and 1990 figures.

(d) 1981 figure is used in place of 1980 figure.

(e) 1920, 1950 and 1960 are used in place of 1921, 1951 and 1961 figures.

(f) The figures for 1920-1970 on the left table include only England and Wales. 1971 figures are used in place of 1970 figures.

(g) 1920, 1950, 1960 and 1991 figures are used in place of 1921, 1951, 1961 and 1990 figures.

SOURCE: Singelmann (1978); authors' calculations based on tables 11-18.

unknown of Italy, the proportion of employment varies between 7.3% and 14% in the other countries, of course putting them well ahead of agriculture, but far behind from manufacturing. The battalions of professionals and managers have indeed swelled the ranks of employment in advanced economies, but not always, and not predominantly, in the visible spots of the management of capital and the control of information. It looks more like the expansion of producer services is linked to the process of vertical disintegration that characterizes the informational corporation.

Social services form the second employment category that, according to the postindustrial literature, should characterize the new society. And indeed it does. With, again, the exception of Japan, employment in social services represents between one-fifth and one-quarter of total employment in the G-7 countries. But the interesting observation here is that the major increase in social services took place during the roaring sixties, actually linking their expansion with the impact of social movements rather than with the advent of postindustrialism. Indeed, the United States, Canada, and France, had very moderate rates of growth of employment in social services in the 1970-90 period, while in Germany, Japan, and Britain it grew at a robust rate. Overall, it would seem that the expansion of the Welfare State has been a secular trend since the beginning of the century, with moments of acceleration in periods that vary for each society, and a tendency to slow down in the 1980s. Japan is the exception because it appears to be catching up. It maintained a very low level of employment in social services until 1970, probably linked to a greater decentralization of social support both to the firm and to the family. Then, when Japan became a major industrial power, and when the more traditional forms of support could not be maintained, Japan engaged in the same form of social redistribution as the other advanced economies, providing services and creating jobs in the social services sector. Overall, we can say that although the expansion of social services employment at a very high level is a feature of all advanced societies, the pace of such expansion seems to be directly dependent on the relationship between the State and society, rather than on the stage of development of the economy. Indeed, the expansion of social services employment (except in Japan) is more characteristic of the 1950-70 period than of the

1970-90 period, at the dawn of the informational society. However, given the decisive influence of social mobilization and public policies in the expansion of social services, the 1990s may well characterize a new round of such expansion, in a modified version of a Welfare State better fit to the requirements of informationalism and more responsive to the constraints of public budgets. Distributive services combine transportation and communication, relational activities of all advanced economies, with wholesale and retail trade, the supposedly typical service activities of less industrialized societies. Is employment declining in these low-productivity, labor intensive activities, as the economy progresses toward the automation of work, and toward the modernization of commercial shops? In fact, employment in distributive services remains at a very high level in advanced societies, also oscillating between one-fifth and one-quarter of total employment, with the exception of Germany, that stood at 17.7% in 1987. This level of employment is substantially higher than that of 1920, and has only declined slightly in the last 20 years in the United States (from 22.4% to 20.6%). Thus employment in distributive services roughly doubles in size employment in producer services, considered typical of advanced economies. Japan, Canada, and France have increased the share of such employment in the 1970-90 period. About half of employment in distributive services in the G-7 countries corresponds to retail services, although it is often impossible to differentiate the data between wholesale and retail trade. Overall, retail employment has not significantly declined over a seventy years period. In the United States, for instance, it grew from 11.8% in 1940 to 12.8% in 1970, later declining slightly from 12.9% in 1970 to 11.7% in 1991. Japan has increased retail employment from 8.9% in 1960 to 11.2% in 1990, and Germany, while having a lower level of employment in such activity (8.6% in 1987) has actually increased it over its 1970 figure. Thus, there is a large sector of employment still engaged in distribution, as the movements of the employment structure are in fact very slow in the so-called service activities.

Personal services are viewed, at the same time, as the remnants of a proto-industrial structure, and as the expression (at least for some of them) of the social dualism that, according to observers, characterizes the informational society.

Here also, the observation of the long term evolution in the seven countries invites to introduce a word of caution. They continue to represent a sizable proportion of employment in 1990: with the exception of Germany (6.3% in 1987), they vary in the range between 9.7% and 14.1%, that is roughly equivalent to the quintessential postindustrialist producer services. Overall, they have increased their share since 1970. Focusing on the famous/infamous "eating and drinking places" jobs, a favorite theme of the literature critical of postindustrialism, we do find a significant expansion of such jobs in the last two decades, particularly in the United Kingdom and in Canada, although the data often mix restaurants and bars with hotel employment that could also be considered as characteristic of the "leisure society". In the United States, eating and drinking places employment stood at 4.9% of total employment in 1991 (up from 3.2% in 1970), which is about twice the size of agricultural employment, but still less than it would be made to believe by the essays elaborating on the notion of the "hamburger society". The main remark to be made on employment in personal services is that it is not fading away in the advanced economies, thus providing ground for the argument that the changes in the social/economic structure concerns more the type of services and the type of jobs than the activities themselves.

Let us try now to evaluate some of the traditional theses on postindustrialism in the light of the evolution of employment structure since 1970, more or less at the moment when Touraine, Bell, Richta, and other early theorists of the new, information society, were publishing their analyses. In terms of activity, producer services and social services were considered to be typical of postindustrial economies, both as sources of productivity and as responses to social demands and changing values. If we aggregate employment in producer services and social services, we do observe a substantial increase in what could be labeled the "postindustrial services category" in all countries between 1970 and 1990: from 22.8% to 39.2% in the United Kingdom; from 30.2% to 39.5% in the United States; from 28.6% to 33.8% in Canada; from 15.1% to 24.0% in Japan; from 20.2% to 31.7% in Germany; from 21.1% to 29.5% in France (Italian data in our data base do not allow any serious evaluation of this trend). Thus, the trend is there, but it is uneven since it starts from a very different base in

1970: the Anglo-Saxon countries had already developed a strong basis in advanced services employment, while Japan, Germany, and France kept much higher employment in manufacturing, as well as in agriculture. Thus, we observe two different paths in the expansion of "postindustrial" services' employment: one, the Anglo-Saxon model, that shifts from manufacturing to advanced services, maintaining employment in the traditional services; the other, the Japanese/German model, that both expands advanced services and preserves a manufacturing basis, while internalizing some of the service activities in the industrial sector. France is in-between, although leaning toward the anglo-saxon model.

In sum, the evolution of employment during what we called the "postindustrial" period (1970-90) shows, at the same time a general pattern of shifting away from manufacturing jobs, and two different paths regarding manufacturing activity: one, it amounts to a rapid phasing away of manufacturing, coupled with a strong expansion of employment in producer services (in rate) and in social services (in size), while other service activities are still maintained as sources of employment. A different path more closely links manufacturing and producer services, more cautiously increases social services employment, and maintains distributive services. The variation within this second path is between Japan, with a greater agricultural and retail trade population, and Germany with a significantly higher manufacturing employment.

In the process of transformation of the employment structure there is no disappearance of any major service category with the exception of domestic service as compared to 1920. What happens is an increasing diversity of activities, and the emergence of a set of linkages between different activities that makes the employment categories obsolete. There is indeed a post-manufacturing employment structure emerging in the last quarter of the twentieth century. But there is a great deal of variation in the emerging structures of various countries, and it does not seem that greater productivity, social stability, and international competitiveness are directly associated with the highest degree of service-related or information-processing jobs. On the contrary, those societies in the G-7 group that have been at the forefront of economic progress and social stability in recent years (Japan and Germany), seem to have developed a more efficient linkage system between manufacturing,

producer services, social services, and distributive services than Anglo-Saxon societies, with France and Italy being at the crossroads between the two paths. In all of these societies, informationalization seems to be more decisive than information-processing. They are informational societies, not information economies.

Thus, when societies massively destroy manufacturing jobs in a short period of time, instead of gradually phasing the industrial transformation, is not necessarily because they are more advanced, but because they follow specific policies and strategies that are based in their cultural, social, and political backdrop. And the options taken to conduct the transformation of the national economy and of the labor force have profound consequences in the evolution of the occupational structure that provides the foundations for the new class system of the informational society.

V. THE NEW OCCUPATIONAL STRUCTURE

A major statement of theories on postindustrialism is that people, besides being engaged in different activities, also hold new positions in the occupational structure. By and large, it has been predicted that as we move into what we call the informational society, we will observe an increasing importance of managerial, professional, and technical positions, a decreasing proportion of workers in the craft and operators positions, and a swelling of clerical and sales workers. In addition, the "left-wing" version of postindustrialism points at the growing importance of semi-skilled (often unskilled) service occupations as a counterpart to the growth of professional jobs.

To examine the accuracy of such predictions in the evolution of the G-7 countries over the last 40 years is not an easy task, both because the statistical categories do not always correspond exactly across countries and because dates for the various available statistics do not always coincide. Thus, in spite of our methodological efforts to clean up the data, our analysis on this point remains rather tentative, and should be taken only as a first empirical approach to suggest lines of analysis on the evolution of the social structure.

First, let us start with the diversity of the occupational profiles across societies. The summary Table 33 brings together the distribution of the labor force in the main occupational categories for each country at the time of the latest available statistical information. If we consider that all these countries are indeed proto-informational societies, the first and most important conclusion of our observation is that there are very strong differences between the occupational structures of societies equally entitled to be considered as informational. Thus, if we take the category that groups managers, professionals, and technicians, the epitome of the informational occupations, it is indeed very strong in the United States and in Canada, amounting to almost one-third of the labor force in the early 1990s. But in 1990's Japan it is only 14.9%. And in France and Germany in 1989 was only at about one-quarter of all labor. On the other hand, while crafts and operators have substantially dwindled down in North America, they still represent 31.8% of the labor force of Japan, and they are over 27% in both France and Germany. Similarly, sales workers are not a major category in France (3.8%) but they are still important in the United States (11.9%) and truly significant in Japan

Table 3.3: Occupational Structure of Selected Countries

Country	USA	CANADA	UK	FRANCE	GERMANY	JAPAN
Year	1991	1992	1990	1989	1987	1990
Managers	32.8%	33.0%	11.0%	7.5%	4.1%	3.8%
Professionals	13.7%	17.6%	21.8%	6.0%	13.9%	11.1%
Technicians	3.2%	^	^	12.4%	8.7%	^
Subtotal	29.7%	30.6%	32.8%	25.9%	26.7%	14.9%
Sales	11.9%	9.9%	6.6%	3.8%	7.8%	15.1%
Clerical	15.7%	16.0%	17.3%	24.2%	15.7%	18.6%
Subtotal	27.6%	25.9%	23.9%	28.0%	21.5%	33.7%
Crafts & Operators	21.8%	21.1%	22.4%	28.1%	27.9%	31.8%
Semiskilled Service Workers	13.7%	13.7%	12.8%	7.2%	12.3%	8.6%
Semiskilled Transport Workers	4.2%	3.5%	5.6%	4.2%	5.5%	3.7%
Subtotal	17.9%	17.2%	18.4%	11.4%	17.8%	12.3%
Farm Workers & Managers	3.0%	5.1%	1.6%	6.8%	3.1%	2.2%
Unclassified	---	---	1.0%	---	3.0%	---
TOTAL	100%	100%	100%	100%	100%	100%

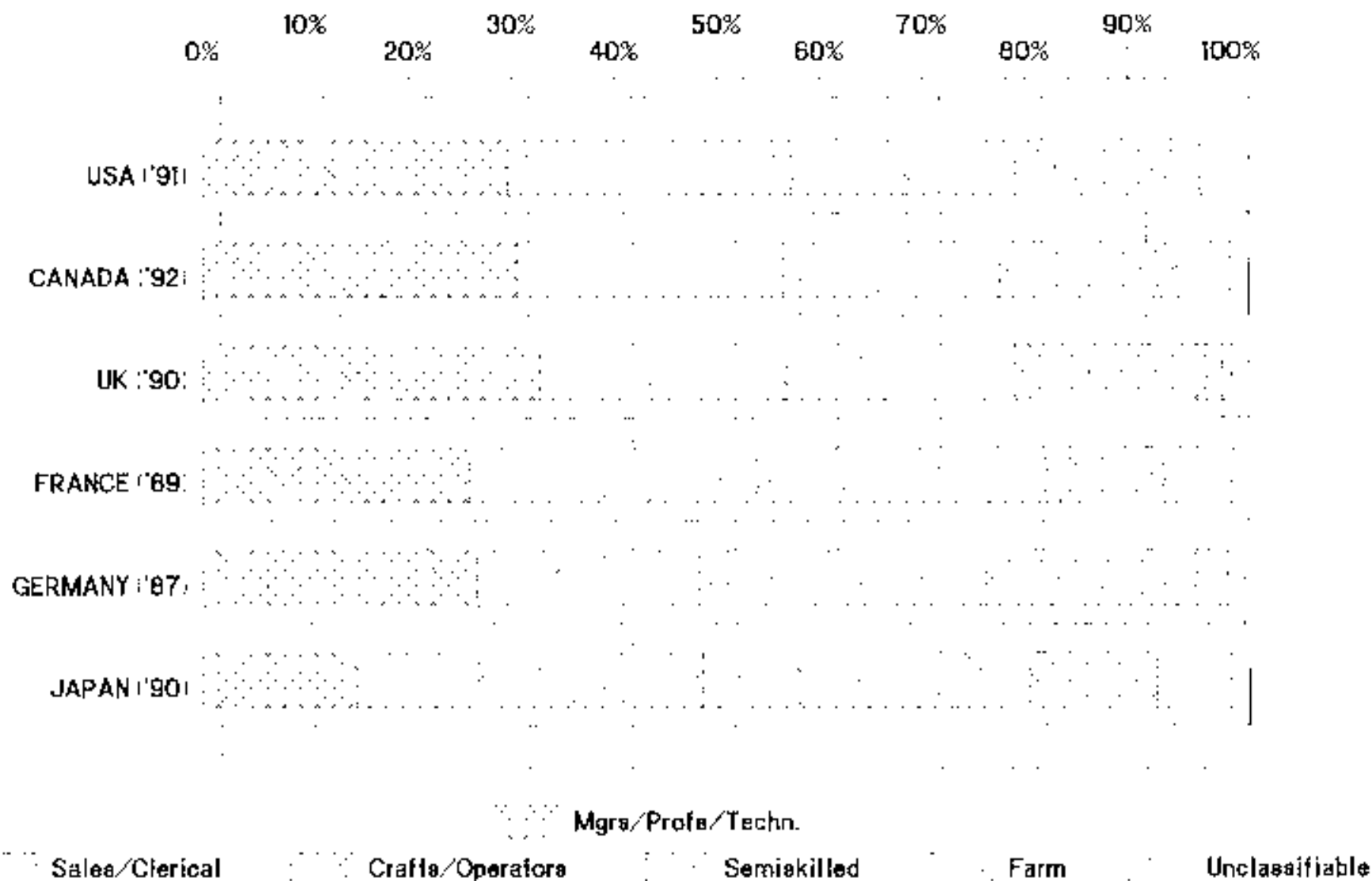
NOTES: The figures may not add up due to rounding.

The ^ signifies that figure is included in the category immediately above.

SOURCE: See Tables 35-40.

Graph 3: Occupational Structures

Latest Available Year



(15.1%). Japan has a very low proportion of managers (only 3.8%) in 1990, compared to 12.8% in the United States, what could be an indicator of a much more hierarchical structure. France's distinctive feature is the strong component of technicians in the higher professional groups (12.4% of all labor force), in contrast to Germany's 8.7%. On the other hand, Germany has many more jobs than France in the "professionals" category: 13.9% against 6.0%.

Another factor of diversity is the variation in the proportion of semi-skilled service workers: it is significant in the United States, Canada, and Germany, much lower in Japan and France, precisely the countries that, together with Italy, have preserved somewhat more sizable traditional agricultural and commercial activities.

Overall, Japan and the United States represent the opposite ends of the comparison, and their contrast emphasizes the need to recast the theory of postindustrialism and informationalism. The data on the United States fit well with the predominant model in the literature, very simply because the "model" was but a theorization of the evolution of the U.S. employment structure. While Japan appears to combine an increase in the professional occupations with the persistence of a strong craft labor force, linked to the industrial era, and with the durability of agricultural labor force and of sales workers that witness the continuity, under new forms, of the occupations characteristic of the pre-industrial era. The U.S. model progresses into informationalism by substituting new occupations for the old ones. The Japanese model does equally progress into informationalism but following a different route: by increasing some of the required new occupations while redefining the content of occupations of a previous era, yet phasing out those positions that become an obstacle to increase productivity (particularly in agriculture). In between these two "models", Germany and France combine elements of both: they are closer to the United States in terms of the professional/managerial occupations, but closer to Japan in the slower decline of craft/operators jobs.

The second major observation refers, in spite of the diversity we have shown, to the existence of a common trend towards the increase of the relative weight of the most clearly informational occupations (managers, professionals, and technicians), as well as of the overall "white collar" occupations (including sales and clerical workers). Having first established our

call for diversity we also want to give empirical credit to the notion that there is indeed a tendency toward a greater informational content in the occupational structure of advanced societies, in spite of their diverse cultural/political system, and in spite also of the different historical moments of their processes of industrialization.

To observe such a common trend, we must concentrate on the growth of each occupation in each country over time. Let us compare for instance (see Table 34) the evolution of four critical groups of occupations: craft/operators; technicians, professionals, and managers; sales and clerical workers; farms workers and managers. Calculating the rates of change in share of each occupation and group of occupations, we observe some general trends and some critical differences. The share of the managerial/professional/technical occupations showed strong growth in all countries except France. Crafts and operators declined substantially in the United States, the United Kingdom and Canada, and moderately in Germany, France and Japan. Sales and clericals increased moderately their share in the United Kingdom and France and strongly in the four other countries. Farms workers and managers declined substantially in all countries. And semi-skilled service and transportation workers presented clearly different trends: they increased their share strongly in the United States and in the United Kingdom; they increased moderately in France; they declined or stabilized in Japan and Germany.

Of all countries considered, Japan was the one that most dramatically upgraded its occupational structure, increasing its share of managers by 46.2% in a twenty years period, and the share of its professional/technical labor force by 91.4%. The United Kingdom also increased the share of its managers by 96.3%, although the increase of its professional/technical workers was much more moderate (5.2%). Thus, we observe a great diversity of rates of change in the share of its occupational group in the overall employment structure. But such diversity mainly reflects the differential starting point of each country. There is diversity in rates because there is some degree of convergence toward a relatively similar occupational structure. At the same time, the differences in management style and in the importance of manufacturing in each country also introduce some variation in the process of change.

Overall, the tendency toward a predominantly white-collar labor force skewed toward its

Table 34: Rates of Change in Share of Occupations in Employment

Categories	USA		CANADA		UK		FRANCE		GERMANY		JAPAN	
	1970-91	1970-92	1970-92	1961-81	1962-82	1976-89	1970-90					
Managers	21.9%	30.0%	96.3%	96.3%	5.6%	7.9%	46.2%					
Professionals	19.0%	29.4%	5.2%	5.2%	7.6%	25.6%	91.4%					
Technicians	^	^	^	^	^	^	^					
Subtotal	20.2%	29.7%	67.5%	67.5%	7.0%	22.5%	77.4%					
Sales	91.9%	39.4%	-9.3%	-9.3%	15.2%	2.0%	16.2%					
Clerical	-9.8%	8.1%	11.2%	11.2%	6.1%	4.6%	25.7%					
Subtotal	16.9%	18.3%	2.6%	2.6%	7.3%	23.6%	21.2%					
Crafts & Operators	-32.3%	-28.7%	-35.3%	-35.3%	-9.1%	-12.3%	-7.0%					
Semiskilled Service Workers	13.5%	11.4%	17.6%	17.6%	16.1%	-1.0%	13.2%					
Semiskilled Transport Workers	31.3%	-34.0%	46.1%	46.1%	-8.7%	-12.7%	-19.6%					
Subtotal	14.7%	-2.3%	25.3%	25.3%	5.6%	-5.3%	0.8%					
Farm Workers & Managers	-25.0%	-31.1%	-40.6%	-40.6%	-17.5%	-48.6%	-58.4%					

NOTES: The ^ signifies that figure is included in the category immediately above.

The rates are calculated by dividing the difference between the percentage share of occupations

between two years by the percentage share of the earlier year. The rates may not be directly

comparable due to the difference in the time periods used for calculations.

SOURCE: See Tables 35-40.

**Table 35: Percentage Distribution of Employment by Occupation
United States, 1960-1991**

Occupational Category	1960	1970	1980	1985	1990	1991
Managerial	11.1%	10.5%	11.2%	11.4%	12.6%	12.8%
Professional	11.8%	14.2%	16.1%	12.7%	13.4%	13.7%
Technicians	^	^	^	3.0%	3.3%	3.2%
Sales	7.3%	6.2%	6.3%	11.8%	12.0%	11.9%
Clerical	14.8%	17.4%	18.6%	16.2%	15.8%	15.7%
Crafts and Operators	30.2%	32.2%	28.1%	23.9%	22.5%	21.8%
Semiskilled Service Workers	13.0%	12.4%	13.3%	13.5%	13.4%	13.7%
Semiskilled Transport Workers	4.9%	3.2%	3.6%	4.2%	4.1%	4.2%
Farm Workers and Managers	7.0%	4.0%	2.8%	3.2%	2.9%	3.0%
Not classifiable						
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

NOTES: ^ signifies that figure is included in the category immediately above.

Figures are seasonally adjusted annual data, except the 1960 data which are that of December.

SOURCE: Labor Statistics: Employment and Earnings, various issues.

Table 36: Percentage Distribution of Employment by Occupation
Canada, 1950-1992

Occupational Category	1950	1970	1980	1985	1992
Managerial	8.4%	10.0%	7.7%	11.4%	13.0%
Professional	7.0%	13.6%	15.6%	17.1%	17.6%
Technicians	1.5%	^	^	^	^
Sales	6.9%	7.1%	10.8%	9.6%	9.9%
Clerical	10.6%	14.8%	17.5%	17.3%	16.0%
Crafts and Operators	28.2%	29.6%	26.0%	22.3%	21.1%
Semiskilled Service Workers	8.8%	12.3%	13.1%	13.7%	13.7%
Semiskilled Transport Workers	6.9%	5.3%	4.1%	3.8%	3.5%
Firm Workers and Managers	21.7%	7.4%	5.3%	4.7%	5.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%

NOTE: ^ signifies that figure is included in the category immediately above.

1950 figures were taken on March 4, 1950, 1980, 1985 and 1985 figures are that of January, 1992 figures are that of July.

SOURCE: Statistics Canada, The Labour Force, various issues.

Table 37: Percentage Distribution of Employment by Occupation
Great Britain, 1961 - 1990

Occupational Category	1961	1971	1981	1990
Managerial	2.7%	3.7%	5.3%	11.0%
Professional	8.7%	8.6%	11.8%	21.8%
Technicians	^	2.4%	2.0%	^
Sales	9.7%	8.9%	8.8%	6.6%
Clerical	13.3%	14.1%	14.8%	17.3%
Crafts and Operators	43.1%	34.2%	27.9%	22.4%
Semiskilled Service Workers	11.9%	12.7%	14.0%	12.8%
Semiskilled Transport Workers	6.5%	10.0%	9.1%	5.6%
Farm Workers and Managers	4.0%	2.9%	2.4%	1.6%
Not Classifiable		2.6%	3.8%	1.0%
TOTAL	100.0%	100.0%	100.0%	100.0%

NOTE: ^ signifies that figure is included in the category immediately above.

SOURCE: Census, 1961, 1971, 1981, 1990; (Spring) Labour Force Survey 1991.

Table 38: Percentage Distribution of Employment by Occupation
France, 1982-1989

Occupational Category	1982	1989
Managerial	7.1%	7.5%
Professional	4.8%	6.0%
Technicians	12.3%	12.4%
Sales	3.3%	3.8%
Clerical	22.8%	24.2%
Crafts and Operators	30.9%	28.1%
Semiskilled Service Workers	6.2%	7.2%
Semiskilled Transport Workers	4.6%	4.2%
Farm Workers and Managers	8.0%	6.6%
Not Classifiable		
TOTAL	100.0%	100.0%

NOTE: ^ signifies that figure is included in the category immediately above.

SOURCE: 1982: Enquete sur l'emploi de mars 1982. 1989: Enquete sur l'emploi de mars 1989.

Table 39: Percentage Distribution of Employment by Occupation
Germany, 1976 – 1989

Occupational Category	1976	1980	1985	1989
Managerial	3.8%	3.2%	3.9%	4.1%
Professional	11.0%	11.1%	12.6%	13.9%
Technicians	7.0%	7.2%	7.8%	8.7%
Sales	7.6%	7.6%	7.5%	7.8%
Clerical	13.1%	14.2%	12.5%	13.7%
Crafts & Operators	31.8%	32.0%	28.3%	27.9%
Semiskilled Service Workers	12.5%	12.5%	15.8%	12.3%
Semiskilled Transport Workers	6.3%	6.1%	5.5%	5.5%
Farm Workers and Managers	5.8%	4.8%	3.9%	3.1%
Not Classifiable	1.1%	1.2%	2.1%	3.0%
TOTAL	100.0%	100.0%	100.0%	100.0%

NOTE: ^ signifies that figure is included in the category immediately above.

SOURCE: 1976 – 89: Statistisches Bundesamt, Statistisches Jahrbuch, various issues.

Table 40: Percentage Distribution of Employment by Occupation
Japan, 1955-1990.

Occupational Category	1955	1960	1965	1970	1975	1980	1985	1990
Managerial	2.2%	2.1%	2.8%	2.6%	4.0%	4.0%	3.6%	3.8%
Professional	4.6%	5.0%	5.0%	5.8%	7.0%	7.9%	9.3%	11.1%
Technicians	^	^	^	^	^	^	^	^
Sales	13.3%	13.4%	13.0%	13.0%	14.2%	14.4%	14.9%	15.1%
Clerical	9.0%	11.2%	13.4%	14.8%	15.7%	16.7%	17.7%	18.6%
Crafts and Operators	27.0%	29.5%	31.4%	34.2%	33.3%	33.1%	33.2%	31.8%
Semiskilled Service Workers	5.4%	6.7%	7.5%	7.6%	8.8%	9.1%	8.7%	8.6%
Semiskilled Transport Workers	1.7%	2.3%	3.7%	4.6%	4.5%	4.5%	3.9%	3.7%
Farm Workers and Managers	36.7%	29.8%	23.1%	17.3%	12.5%	10.3%	8.7%	7.2%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

NOTE: ^ signifies that figure is included in the category immediately above.

Sweepers and garbage collectors are included in Semiskilled service category between 1970 and 1980.

From 1985, they are included in Crafts & Operators category.

SOURCE: Statistical Yearbook of Japan, 1991.

higher tier seems to be the general trend (in the United States in 1991, 57.3% of the labor force was white collar), with the exceptions of Japan and Germany, whose white collar labor force still does not exceed 50% of total employment. However, even in Japan and Germany, the rates of growth of the informational occupations have been the highest among the various occupational positions; thus, as a trend Japan will count increasingly on a substantial professional labor force, although still holding onto a broader craft and commercial basis than in other societies.

Thirdly, the widespread argument concerning the increasing polarization of the occupational structure of informational society does not seem to fit with the data, if by polarization we mean the simultaneous expansion in equivalent terms of the top and of the bottom of the occupational scale. If such were the case the managerial-professional-technical labor force and the semi-skilled service and transport workers would be expanding at similar rates and in similar numbers. Such is clearly not the case. In the United States, semi-skilled service workers have indeed increased their share in the occupational structure but at a lower rate than the managerial/professional labor force, and they only represent 13.7% of the labor force in 1991. By contrast, managers, at the top of the scale, have increased their share between 1950 and 1991 at a rate much higher than that of the semi-skilled service workers, increasing their number to 12.8 % of the labor force in 1991, almost at the same level than that of semiskilled service workers. Even if we add semiskilled transportation workers, we still obtain reach a mere 17.9% of the labor force in 1991, in sharp contrast with the 29.7% of the top managerial/professional/technical category. Of course, many jobs among clerical and sales workers, as well as among operators are also semi-skilled, so that we cannot truly assess the evolution of the occupational structure in terms of skills. Additionally, we know from other sources that there has been a polarization of income distribution in the United States and in other countries in the last two decades. However, here we are objecting to the popular image of the informational economy as providing an increasing number of low-level service jobs disproportionately higher than the upgrading of the professional/technical component of the labor force. According to our data, this is simply not the case. In the United Kingdom there was however a substantial increase of such semi-skilled service jobs between 1961 and 1981, but, even there, the share of the higher occupational level increased faster. In

Canada, semi-skilled service workers also increased their share substantially to reach 13.7% in 1992 but managerial/professional/technical jobs progressed even more, almost doubling their representation to account for 30.6% on the labor force in 1992. A similar pattern can be found in Germany: low-end service jobs remained relatively stable and well below the progression in rate and in size of the upper occupational tier. France, while increasing substantially such service jobs during the 1980s, still counted them only as 7.2% of the labor force in 1989. As for Japan, semi-skilled service jobs experienced a slow growth, from 5.4% in 1955 to a modest 8.6% in 1990.

Thus, while there are certainly signs of social and economic polarization in advanced societies, they do not take the form of divergent paths in the occupational structure, but of different positions of similar occupations across sectors and between firms. Sectoral, territorial, and gender/ethnic/age characteristics are more clear sources of social polarization than occupational differentiation per se. Informational societies are certainly unequal societies, but inequalities stem less from their relatively upgraded occupational structure than from the exclusions and discriminations that take place in and around the labor force.

Finally, a view of the transformation of the labor force in advanced societies must also consider the evolution of its employment status. Again, the data challenge predominant views of postindustrialism, exclusively based on the American experience. Thus, the hypothesis on the fading away of self-employment in mature, informational economies is somewhat supported by the U.S. experience, where the percentage of self-employment on the total labor force declined from 17.6% in 1950 to 8.8% in 1991 (although it has been almost at a stand still for the last 20 years). But other countries present an a diversity of patterns. Germany declined at a slow steady pace, from 13.8% in 1955 to 9.5% in 1975, then to 8.9% in 1989. France has maintained its share of self-employment in the labor force between 1977 and 1987 (12.8% and 12.7% respectively). Italy, while being the fifth largest market economy in the world, above that of the United Kingdom, still retained 24.8% of its labor force in self-employment in 1989. Japan, while experiencing a decline in self-employment from 19.2% in 1970 to 14.1% in 1990, still has a significant level of such autonomous employment position, to which we must add 8.3% of family workers, what places almost one-quarter of the Japanese labor force outside salaried work. As for Canada and the United Kingdom, they

Table 4f: Percentage Distribution of Employment by Employment Status
 United States, 1950-91

Employment Status	1950	1955	1960	1965	1970	1975	1980	1985	1990	1991
Employees	79.7%	82.0%	83.9%	86.4%	89.8%	90.3%	90.6%	90.9%	91.1%	90.9%
Self-Employed	17.6%	15.4%	13.8%	11.8%	8.9%	8.7%	8.7%	8.7%	8.6%	8.8%
Family workers	2.7%	2.6%	2.3%	1.8%	1.3%	1.0%	0.7%	0.4%	0.3%	0.3%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

SOURCE: Dept. of Labor, Labor Force Statistics, various issues.

Table 42: Percentage Distribution of Employment by Employment Status
Japan, 1955 - 1990.

Employment Status	1955	1960	1965	1970	1975	1980	1985	1990
Employees	43.5%	53.4%	60.8%	65.0%	69.9%	71.9%	74.5%	77.6%
Self-Employed	25.1%	22.7%	19.9%	19.2%	18.0%	17.2%	15.8%	14.1%
Family workers	31.4%	23.9%	19.3%	15.8%	12.0%	10.9%	9.7%	8.3%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%

SOURCE: Statistical Yearbook of Japan, 1991.

Table 43: Percentage Distribution of Employment by Employment Status
Germany, 1955-89

Employment Status	1955	1960	1965	1970	1975	1980	1989
Employees	73.9%	77.1%	80.9%	83.4%	85.3%	87.4%	89.1%
Self-Employed	13.8%	12.8%	10.9%	10.1%	9.5%	9.0%	8.9%
Family workers	12.3%	10.1%	8.2%	6.5%	5.2%	3.6%	2.0%
TOTAL	100%	100%	100%	100%	100%	100%	100%

NOTE: 1955 and 1960 figures do not include Berlin.

SOURCE: Statistisches Jahrbuch für die Bundesrepublik Deutschland, various issues.

Table 44: Percentage Distribution of Employment by Employment Status
France, 1977 - 1987

Employment Status	1977	1979	1983	1985	1987
Employees	82.1%	82.9%	82.9%	83.2%	83.7%
Self-employed	12.8%	12.5%	12.8%	12.6%	12.7%
Family workers	5.1%	4.6%	4.3%	4.2%	3.7%
TOTAL	100%	100%	100%	100%	100%

SOURCE: The Labour Force Survey and The Labour Force Sample Survey, Eurostat, various issues.

Table 45. Percentage Distribution of Employment by Employment Status
Italy, 1970 - 1989

Employment Status	1970	1975	1980	1985	1989
Employees	66.7%	70.5%	71.4%	70.3%	70.9%
Self-Employed	33.3%	29.5%	23.3%	24.3%	24.8%
Family workers	---	---	5.4%	5.4%	4.3%
TOTAL	100%	100%	100%	100%	100%

SOURCE: OECD Labour Force Statistics: 1969 - 1989, OECD, 1991.

Table 46: Percentage Distribution of Employment by Employment Status
 United Kingdom, 1969 - 1989.

Employment Status	1969	1970	1975	1985	1989
Employees	92.4%	92.2%	91.9%	88.5%	87.0%
Self-Employed	7.6%	7.8%	8.1%	10.8%	11.7%
Family workers	---	---	---	0.7%	1.3%
TOTAL	100%	100%	100%	100%	100%

SOURCE: OECD Labour Force Statistics: 1969 - 1989, OECD, 1991.

Table 47: Percentage Distribution of Employment by Employment Status
Canada, 1959-1992

Employment Status	1959	1970	1975	1980	1985	1989	1992
Employees	89.4%	88.4%	90.2%	90.1%	89.6%	90.6%	89.8%
Self-Employed	9.6%	11.6%	8.4%	8.7%	9.5%	8.9%	9.7%
Family workers	1.0%	---	1.4%	1.1%	0.9%	0.5%	0.5%
TOTAL	100%	100%	100%	100%	100%	100%	100%

SOURCE: 1959: The Labor Force, annual average. 1970: Statistics Canada, The Labor Force, various issues.

have reversed the supposed secular pattern of corporatization of employment in the last twenty years, as Canada has increased the proportion of self-employed in its population from 8.4% in 1970 to 9.7% in 1992, and the United Kingdom has increased the share of self-employment and family workers in the labor force, from 7.6% in 1969 to 13.0% in 1989.

Granted, the overwhelming majority of the labor force in the advanced economies is now under a salaried condition. But the diversity of the levels, the unevenness of the process, and the reversal of the trend in some cases, calls for a differential view of the patterns of evolution of the occupational structure. We could even formulate the hypothesis that as networking and flexibility become characteristic of the new industrial organization, and as new technologies make possible for small business to find market niches, we could witness a resurgence of self-employment, beyond the patterns of resistance that traditional forms of agricultural production or commercial trade represent in countries like Japan or Italy. Thus, the occupational profile of the informational societies, as they emerge historically, will be far more diverse than that imagined by the quasi-naturalistic vision of postindustrial theories biased by an American ethnocentrism that did not even fully represented the American experience.

VI. THE MATURING OF THE INFORMATIONAL SOCIETY: EMPLOYMENT PROJECTIONS FOR THE UNITED STATES AND JAPAN TO 2005

The informational society, in its historically diverse manifestations, is only taking shape at the twilight of the 20th Century. Thus, an analytical clue for its future direction and mature profile can be provided by employment and occupational projections that forecast the social structure of advanced societies into the early years of the coming century. Such projections are always subjected to a number of economic, technological, and institutional assumptions that are hardly established on solid ground. Thus, the status of the data that we will be using in this section is even more tentative than the analysis of the employment trends up to 1990. Yet, by using reliable technical sources, such as the U.S. Bureau of Labor Statistics and the Japanese Ministry of Labor, and by keeping in mind the approximative nature of the exercise, we may be able to generate some hypotheses on the future path of the informational society.

Our analysis of employment projections will be limited to the United States and Japan. This is, on the one hand, because we can rely on serious statistical sources for these two countries. On the other hand, because we want to keep within limits the empirical complexity of our study to be able to focus on the main argument of our analysis. Thus, by pinpointing at the United States and Japan, that appear to be two different models of informational society, we can better assess our hypotheses on the convergence and/or divergence of the informational society's employment and occupational structure.

For the United States, the U.S. Bureau of Labor Statistics published in 1991 and 1992 a series of studies under the generic title Outlook 1990-2005 (see particularly, Carey and Franklin, 1991; Silvestri and Lukusiewicz, 1992; Braddock, 1992) that together offer a meaningful overview of the evolution of employment and occupational structure between 1990 and 2005. To simplify the analysis, we will refer our data to the "moderate alternative projection" of the three scenarios considered by the Bureau.

In a context of slower job growth than in the preceding period, the American economy is projected to still create almost 25 millions jobs in these fifteen years, that is a total increase of about 20%. The most apparent features in the projection are the continuation of the trend toward the decline of agricultural and manufacturing jobs, that will decline, respectively, at an

average annual rate of -0.4 and -0.2. However, manufacturing output will continue to grow at a slightly higher rate than the economy as a whole, at 2.3% per year. Thus the differential growth rate between employment and output in manufacturing and in services, shows a substantial gap in labor productivity in favor of manufacturing, in spite of the introduction of new technologies in the information processing activities. Higher than average manufacturing productivity continues to be the key to sustained economic growth able to provide jobs for all other sectors in the economy. (See Tables 48 and 49).

An interesting observation comes from the fact that although employment in agriculture will decline, to a low 2.3% of total employment, agricultural related occupations will grow: this is because while farmers are expected to decrease by 224,000, it is expected an increase of 348,000 jobs for gardeners and groundskeepers: the surpassing of farming jobs by urban-oriented agricultural service jobs underlines how far informational societies have come in their post-agricultural status.

As Table 48 shows, with the exception of the construction sector, practically all new job growth in the United States is expected to take place in "service activities". About half of such growth is expected to be contributed by the so-called "services division", whose main components are health services and business services. Business services, that were the fastest growing service sector in 1975-90 will continue to be at the top of the expansion through 2005, although with a slower rate growth of about 2.5% per year. One should be aware though that not all business services are knowledge intensive: an important component of them are computer data processing jobs, but in the 1975-90 period the fastest growing activity was personnel supply services, linked to the increase of temporary work and of putting out services by firms. Other fast growing services in the coming years are expected to be in legal services (particularly, para-legal), engineering and architectural services, and educational services (private schools). In the BLS categories, Finance, Insurance, and Real State, are not included in business services. Thus, to the strong growth in business services we must add the moderate but steady growth projected for this FIRE category, expected to be at about 1.3% per year, to reach 6.1% of total employment by 2005. When comparing this data with our analysis of "producer services" in the preceding sections, both business services and FIRE should be taken into consideration.

Table 48

Employment by major industry division, 1975, 1990, and projected to 2005
 United States
 (Numbers in thousands)

Industry	1975			1990			2005			Change, 1975-90	Change, 1990-2005
	Employment	Wage and salary	Nonwage	Employment	Wage and salary	Nonwage	Employment	Wage and salary	Nonwage		
Nonfarm wage and salary ¹	78,930	109,079	122,775	132,775	139,547	139,531	132,639	13,456	23,326	20,212	
Goods-producing	22,800	24,959	27,877	29,747	26,062	26,062	23,558	-2,081	281	1,404	
Mining	752	711	198	680	680	680	44	-113	-43	52	
Construction	5,525	5,105	5,552	6,050	6,011	6,011	1,071	416	173	1,566	
Manufacturing	18,523	19,111	16,727	18,514	19,109	19,109	798	-2,159	-597	78	
Durable manufacturing	10,552	11,115	8,467	10,517	10,915	10,915	453	-1,648	-598	-700	
Nondurable manufacturing	7,971	7,995	7,260	7,998	8,194	8,194	345	-735	5	779	
Service-producing	54,090	84,163	99,898	107,405	113,169	113,169	30,203	15,535	29,042	28,895	
Transportation, communication, utilities	4,542	5,825	6,203	6,009	7,019	7,019	1,284	277	663	1,193	
Retail trade	4,430	5,705	6,609	7,210	7,965	7,965	1,775	464	1,005	1,380	
Wholesale trade	10,630	19,633	23,006	24,804	25,498	25,498	7,050	3,873	5,711	6,173	
Finance, insurance, and real estate	4,185	6,739	7,509	8,179	9,525	9,525	2,574	860	1,990	1,786	
Services ²	13,027	27,598	36,223	39,058	41,105	41,105	13,961	8,534	11,470	13,521	
Government	14,608	18,302	19,819	21,215	23,074	23,074	3,638	1,577	3,193	4,752	
Agriculture ³	3,479	3,276	2,950	3,080	2,151	2,151	-163	-307	-190	-95	
Private households	1,062	1,014	948	703	736	736	-348	350	-314	-378	
Management, self-employed and unpaid family workers ⁴	4,165	6,951	10,419	10,703	11,095	11,095	2,796	1,434	1,822	2,134	
Total	67,666	22,670	130,807	147,193	154,343	154,343	34,904	14,737	24,020	31,373	
Annual rate of change											
	1975	1990	2005	1975-90	1990-2005	1975-90	1990-2005	High	Moderate	Low	

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Table 49

Output by major industry division (gross duplicated output), 1975, 1990, and projected to 2005														
United States														
(Billions of 1982 dollars)														
Industry	1975	1990	2005			Percent distribution					Annual rate of change			
			Low	Moderate	High	1975	1990	2005			1975-90	1990-2005		
								Low	Moderate	High		Low	Moderate	High
Total	\$5,049.1	\$7,624.1	\$9,159.9	\$10,571.1	\$11,545.0	100.0	100.0	100.0	100.0	100.0	2.8	1.4	2.8	2.8
Goods-producing	2,278.9	3,510.8	3,917.3	4,509.7	4,935.8	45.1	43.4	41.4	42.7	42.5	2.5	1.1	2.1	2.7
Mining	222.5	220.5	190.9	217.9	228.7	4.4	2.9	2.0	2.1	2.3	-1.1	-1.0	.1	.2
Construction	333.0	505.4	566.6	636.7	737.8	6.6	6.4	6.2	6.2	6.4	2.6	1.0	1.8	2.6
Manufacturing	1,722.7	2,584.9	3,159.8	3,634.6	3,939.2	34.1	33.9	33.2	34.4	34.1	2.7	1.3	2.3	2.8
Durable	854.8	1,355.1	1,731.3	2,072.0	2,251.4	16.9	17.0	16.3	16.6	16.5	3.1	1.6	2.9	3.4
Non-durable	867.9	1,229.8	1,428.4	1,561.6	1,561.6	17.2	16.1	14.9	14.8	13.5	2.4	.9	1.6	1.6
Service-producing	2,604.0	4,118.4	5,308.0	5,810.4	6,369.2	51.6	54.0	56.1	55.0	55.1	3.1	1.7	2.3	2.9
Transportation, communications, and utilities	448.1	615.2	779.1	857.3	944.2	8.9	8.1	8.2	8.1	8.2	2.7	1.6	2.2	2.9
Wholesale trade	268.0	405.5	506.4	561.2	620.2	5.3	5.3	5.4	5.3	5.4	2.9	1.5	2.2	2.9
Retail trade	390.8	634.4	838.4	918.5	1,007.9	7.5	8.3	8.9	8.7	8.7	3.5	1.9	2.5	3.1
Finance, insurance, and real estate	571.9	878.3	1,105.1	1,191.6	1,289.7	11.3	11.5	11.7	11.3	11.2	2.0	1.5	2.1	2.6
Services	583.0	1,102.7	1,522.8	1,685.6	1,854.0	11.2	14.5	16.1	15.9	16.2	4.6	2.2	2.9	3.6
Government	376.1	481.3	856.0	586.2	631.5	7.4	6.3	5.8	5.6	5.5	1.7	1.0	1.4	1.9
Agriculture	157.4	165.7	227.4	242.5	263.8	3.1	2.4	2.4	2.3	2.3	1.1	1.4	1.8	2.4
Private households	0.7	9.7	8.5	9.3	10.4	.2	.1	.1	.1	.1	.3	-5	.1	.9

SOURCE: Historical data are from the Bureau of Economic Analysis, U.S. Department of Commerce.

SOURCE: see Table 48.

Health services will be among the fastest growing activities, at a rate twice as fast as its own increase for the 1975-90 period. By 2005, health services are projected to count for 11.5 million jobs, that is 8.7% of all non-farm wage and salary employment. To put this figure into perspective, the comparable number for all manufacturing employment in 2005 is projected to be 14% of the labor force. Home health care services, particularly for the elderly, will be the fastest growing activity.

Retail trade, growing at a healthy 1.6% average annual rate, and starting from a high level in absolute numbers of jobs, represents the third major source of new growth, with 5.1 million new jobs. Within this sector, eating and drinking places will account for 42% of total jobs in retail in 2005.

State and local government jobs will also add to employment in sizable numbers, rising from 15.2 million to 18.3 million by 2005. More than half of such increase is expected to take place in education. Thus, overall, the projected employment structure for the United States closely fits the original blueprint for the informational society:

- * Agricultural jobs are being phased out of advanced economies.
- * Manufacturing employment will continue to decline until being reduced to a hard core of craft and engineering work force, most of its employment impact being transferred to services for manufacturing.
- * Producer services, health, and education lead employment growth in terms of rate, also becoming increasingly important in terms of absolute numbers.
- * Retail jobs and service jobs continue to swell the ranks of low-skilled activities of the new economy.

If we now turn to examine the projected occupational structure, the hypothesis of informationalism also seems to be confirmed (See Table 50): the fastest growing rates among occupational groups are those of professionals (32.3% for the period) and technicians (36.9%). But "service occupations", mostly semi-skilled, are also growing fast (29.2%) and they would still represent 16.9% of the occupational structure in 2005. Altogether, managers, professionals, and technicians would increase their share of total occupational employment from 24.5% in 1990 to 28.9% in 2005. Sales and clerical workers, taken as a group, would remain stable at about 28.8% to total employment. Craft workers would actually increase their

Table 50

Employment by major occupational group, 1990 and projected 2005, moderate alternative projection, and percent change 1975-90 and 1990-2005 United States						
(Numbers in thousands)						
Occupation	1990		2005		Percent change	
	Number	Percent	Number	Percent	1975-90	1990-2005
Total, all occupations	122,570	100.0	147,191	100.0	37.4	20.1
Executive, administrative, and managerial	12,451	10.2	15,816	10.8	30.1	27.4
Professional specialty	15,800	12.9	20,907	14.2	59.9	32.3
Technicians and related support	4,204	3.4	5,754	3.9	75.7	36.9
Marketing and sales	14,088	11.5	17,489	11.9	55.1	24.1
Administrative support occupations, including clerical	21,951	17.9	24,835	16.9	33.9	13.1
Service occupations	19,204	15.7	24,806	16.9	36.1	29.2
Agricultural, forestry, fishing, and related occupations	3,505	2.9	3,065	2.1	-9.0	4.5
Precision production, craft, and repair	14,124	11.5	15,900	10.8	28.8	12.6
Operators, fabricators, and laborers	17,245	14.1	17,951	12.2	6.7	4.2

NOTE: The 1990 and 2005 employment data and the projected change 1990-2005 are derived from the industry-occupation employment matrices for each year. The data on 1975-90 percent change were derived from the Current Population Survey (CPS) because a comparable industry-occupation matrix for 1975 is not available. The CPS data represent estimates of employed persons and exclude the estimates of persons with more than one job that are included in the industry-occupation employment matrices. The CPS exclusion of dual jobholders affects the employment levels and trends of some occupational groups more than others. Therefore, the resulting comparisons of change between 1975-90 and 1990-2005 are only broadly indicative of trends.

SOURCE: see Table 48.

share, confirming the tendency to stabilize a hard core of manual workers around craft skills. Semi-skilled service workers and operators together would decline in terms of their overall share, from 29.8% to 27.8%, thus contradicting the hypothesis on the polarization of the occupational structure.

Let us examine more closely this argument: is the future informational society characterized by an increasing polarization of the occupational structure? In the case of the United States, the Bureau of Labor Statistics has included in its projections an analysis of the educational level required for the 30 occupations that are expected to grow most rapidly and for the 30 occupations that are expected to decline faster in the next fifteen years (See tables in Appendix). The analysis considers both the rate of growth or decline of the occupations and their variation in absolute numbers (Silvestri and Lukasiwicz, 1992). The conclusion of the authors of the study is that "in general, a majority of the [growing] occupations require education or training beyond high school. In fact, more than 2 out of 3 other the 30 fastest growing occupations, and nearly half of the 30 with the largest number of jobs added had a majority of workers with education or training beyond high school in 1990." (p.82). The largest job declines, on the other hand, are expected in manufacturing industries, and in some clerical jobs that will be swept by office automation, generally in the lower tier of skills. Thus, the overall trend points at an upgrading of the occupational structure, in line with the predictions of postindustrial theory. However, the fact that the occupational structure does not seem to be polarized, and that the high-skill occupations tend to grow faster and in larger numbers, does not mean that society at large avoids polarization and dualism. This is because if the high-skill content of the new occupational structure does not fit with the educational characteristics of some segments of the labor force, a substantial proportion of the labor force could be left out of the job market, since the number of available low-skill jobs seems to be dwindling as a share of total jobs. Thus, the Bureau of Labor Statistics points to the fact that ethnic minorities in the United States are particularly concentrated in those manufacturing and low-skill service occupational categories that are projected to decline in the near future. Advanced education as a gateway to skilled employment seems to be at the same time the characteristic of the informational economy and the nightmare of those groups who cannot play by the rules of the informational society.

Let us now turn to examine the projections on the Japanese employment and occupational structure. We have two projections, both from the Ministry of Labor. One of them, published in 1991, projects (on the basis of the 1980/85 data) to 1989, 1995, and 2000. The other, published in 1987, projects to 1990, 1995, 2000, and 2005. Both project the employment structure by industry and the occupational structure. We present both sources in Tables 51A, 51B, 52A, and 52B. However, we have chosen to elaborate on the basis of the 1987 projection because, while being equally reliable, is more detailed in its breakdown by industries and reaches out to 2005.

The most significant feature to these projections is the slow decline of manufacturing employment in Japan in spite of the acceleration of the transformation of Japan into an informational society. In the 1987 statistical projection manufacturing employment stood at 25.9% in 1985 and was projected to remain at 23.9% of total employment in 2005. As a reminder, in the U.S. projection, manufacturing employment was expected to decline from 17.5% in 1990 to 14% in 2005, a much sharper decline from a substantially lower base. Japan achieves this relative stability of manufacturing jobs by compensating declines in the traditional sectors with actual increases in the newest sectors. Thus, while employment in textiles would decline from 1.6% in 1985 to 1.1% in 2005, in the same period employment in electrical machinery would increase from 4.1% to 4.9%. Metal workers will decline substantially, but jobs in the food processing industry will jump from 2.4% to 3.5%.

Overall, the most spectacular increase in employment in Japan is projected to be in business services (from 3.3% in 1985 to 8.1% in 2005), thus showing the increasing role of information intensive activities in the Japanese economy. However, the employment share of activities in financial, insurance, and real estate is projected to remain stable for the twenty years period of the projection. Coupled with the preceding observation, this seems to imply that these rapidly growing business services are, in their majority, services to manufacturing and to other services, that is services that input knowledge and information into production. Health services are projected to grow slightly, and education employment is expected to remain at the same share as in 1985.

On the other hand, agricultural employment is expected to decline sharply, from 9.1% in 1985 to 3.9% in 2005, as if Japan had finally assumed its transition to the post-agricultural

Table 51A: Employment by Industry Division, 1980-2000 (projected)
JAPAN

(in 10 thousands)	----->					<-----				
	1980	1985	1989	1995	2000	1980	1985	1989	1995	2000
Industry										
Primary Sector	557	509	463	365	305	10.1%	8.8%	7.6%	5.7%	4.6%
Agriculture, forestry, fishery	557	509	463	365	305	10.1%	8.8%	7.6%	5.7%	4.6%
Secondary Sector	1,915	1,983	2,062	2,172	2,193	34.9%	34.3%	33.9%	33.7%	33.2%
Construction	548	530	575	607	628	10.0%	9.2%	9.3%	9.4%	9.5%
Manufacturing	1,367	1,453	1,484	1,565	1,565	24.9%	25.2%	24.4%	24.3%	23.7%
Machinery	538	619	644	716	715	9.8%	10.7%	10.6%	11.1%	10.8%
Other manufacturing	829	834	840	849	850	15.1%	14.4%	13.8%	13.2%	12.9%
Tertiary Sector	3,019	3,283	3,566	3,906	4,102	55.0%	56.8%	58.5%	60.6%	62.2%
Utilities	30	33	30	31	31	0.5%	0.6%	0.5%	0.5%	0.5%
Wholesale, retail, eating/drinking places	1,248	1,318	1,400	1,533	1,560	22.7%	22.8%	23.0%	23.8%	23.6%
Financial insurance, real estate	191	217	243	245	259	3.5%	3.8%	4.0%	3.8%	3.9%
Transportation, communication	350	343	368	376	386	6.4%	5.9%	6.0%	5.8%	5.8%
Services	4,200	1,372	1,525	1,723	1,866	21.9%	23.8%	25.0%	26.7%	26.5%
TOTAL	5,491	5,775	6,091	6,445	6,800	100.0%	100.0%	100.0%	100.0%	100.0%

SOURCE: Ministry of Labor (Rodoryokubosekijūshū no taishū, 1991: p.54, Table 9).

SOURCE: Ministry of Labor (Rodoryokubosekijūshū no taishū, 1991: p.54, Table 9).

Industry	--- Projections ---					--- Projections ---				
	1980	1985	1990	1995	2000	1985	1990	1995	2000	2005
Agiculture	547,831	464,000	4,003,330	3,157,378	2,931,632	2,444,377				
Forestry	150,620	130,000	314,910	91,100	80,127	65,308				
Fishing	462,471	414,000	512,286	332,394	158,286	119,134				
Mining	119,311	28,000	39,000	39,000	39,000	39,000				
Construction	5,413,256	5,590,000	6,062,900	6,314,000	6,942,000	6,233,100				
Manufacturing	10,791,855	10,806,000	14,781,900	14,828,000	14,920,000	15,120,100				
Food	1,147,118	1,279,000	1,336,500	1,764,900	1,973,000	2,212,546				
Textile	972,424	843,000	841,000	794,312	742,000	708,000				
Chemical and other chem.	860,170	914,000	1,005,196	1,406,136	1,707,795	1,990,421				
Wood	421,626	311,000	313,944	304,286	193,741	193,935				
Furniture	346,849	328,000	318,814	299,707	290,519	290,519				
Paper, pulp	345,891	328,000	378,303	413,950	443,626	475,912				
Printing, publishing	695,255	711,000	807,991	848,670	855,463	856,572				
Chemical	554,473	559,000	538,000	528,691	493,000	466,825				
Plastics, rubber, glass	55,721	48,000	58,262	70,220	83,000	97,629				
Rubber	1,967,715	212,000	225,692	211,254	212,985	214,839				
Leather, fur	147,278	144,000	146,531	150,711	131,451	123,922				
Stone, clay	614,873	566,000	664,155	600,282	594,034	584,236				
Steel, iron - ferroalumin	275,910	1,278,000	1,172,770	949,876	653,077	566,749				
Metals	1,203,910	1,146,000	1,213,924	1,113,947	1,003,710	1,003,710				
Machinery, weapons	1,250,525	2,199,000	2,250,525	2,201,206	2,094,749	1,990,159				
Electric machinery	368,284	1,648,000	1,667,922	1,493,145	1,713,196	1,713,245				
Transportation equipment	344,117	760,000	476,848	454,193	343,311	195,246				
Business instruments	777,587	193,000	455,063	317,284	271,115	123,596				
Other manufacturing	31,085,098	33,487,000	56,286,739	39,154,000	46,536,484	41,588,735				
Services	3,842,678	4,344,000	4,530,224	4,938,227	4,991,240	5,075,163				
Wholesale	801,913	5,584,200	7,023,668	7,516,043	7,522,582	7,544,156				
Retail	2,538,045	2,371,500	2,669,833	5,127,790	2,349,628	2,498,631				
Financial, insurance	1,277,907	1,742,200	1,613,400	2,172,019	2,153,507	2,064,729				
Real Estate	475,906	445,000	370,320	387,193	364,468	411,204				
Transportation	2,976,076	2,878,000	2,865,361	2,731,131	2,445,803	2,015,691				
Communication	632,074	632,000	773,769	694,663	943,717	954,503				
Utilities	343,517	311,000	342,200	370,000	373,700	373,000				
Personal services	1,953,296	1,971,000	2,117,500	2,177,613	2,351,642	2,574,413				
Health services	468,469	504,000	607,628	760,542	823,992	878,438				
Recreation	510,221	661,000	81,861	112,544	141,782	151,036				
Repair	593,596	593,000	593,456	593,945	572,625	541,636				
Business services	1,292,252	1,278,000	2,279,700	3,186,690	4,094,494	5,111,274				
Health, medical	1,692,677	1,958,000	2,133,223	2,213,640	2,403,115	2,493,180				
Education	1,891,659	1,958,000	2,173,768	2,253,018	2,353,422	2,393,125				
Other services	2,532,494	9,621,000	3,258,071	3,937,376	3,681,595	3,776,119				
Public administration	2,013,416	2,014,000	2,076,593	2,121,940	2,176,146	2,246,596				
Not defined	91,274	105,000	61,261	89,250	79,526	61,616				
TOTAL	86,382,405	83,846,000	97,666,480	60,199,653	62,528,337	63,166,643				

Source: Ministry of Labour, Bureau of Japanese Statistics, 1980-2011, Table D-3-13.

Table 52A. Employment by Major Occupational Group, 1990-2000 (projected)

JAPAN

Occupation	← - - Projections - - →					(Percentage Distribution) Occupation	← - - Projections - - →				
	1990	1985	1989	1995	2000		1980	1985	1989	1995	2000
Managerial	220	211	235	259	271	4.0%	3.7%	3.9%	4.0%	4.1%	
Professional, Technical	438	513	605	781	893	7.9%	9.2%	10.9%	12.1%	13.5%	
Sales	797	861	957	997	1,005	14.4%	14.0%	15.4%	15.5%	15.2%	
Clerical	924	1,021	1,101	1,228	1,311	16.7%	17.7%	18.1%	19.0%	19.8%	
Crafts, Operators, Laborers	1,821	1,919	1,950	2,019	2,091	33.8%	33.2%	32.0%	31.3%	30.3%	
Mining	5	4	3	2	2	0.1%	0.1%	0.0%	0.0%	0.0%	
Services, Protective Services	501	501	510	567	582	9.1%	8.7%	8.5%	8.8%	8.8%	
Transportation, Communication	248	227	230	232	239	4.5%	3.9%	3.8%	3.0%	3.0%	
Farm Workers and Managers	570	502	459	364	304	10.3%	8.7%	7.5%	5.6%	4.6%	
TOTAL	5,524	5,779	6,099	6,449	6,697	100.0%	100.0%	100.0%	100.0%	100.0%	

SOL RCE, Ministry of Labor (Rodoryokuhuseikijudai e no taisho, 1991, p.56, Table 10)

Table 52B: Employment by Major Occupational Group, 1980-2005 (projected)
JAPAN

(In thousands)	Projections					(Percentage Distribution)				
	1985	1990	1995	2000	2005	1985	1990	1995	2000	2005
Occupation										
----->										
Managerial	2,304	3,117	3,373	3,406	3,816	4.0%	5.1%	5.2%	5.3%	5.8%
Professional, Technical	6,095	6,833	8,344	9,952	11,133	10.5%	11.1%	13.0%	15.2%	17.0%
Sales	8,109	8,328	8,382	8,522	8,531	13.9%	13.5%	13.4%	13.0%	13.0%
Clerical	10740	12051	13159	13784	14231	18.4%	19.5%	20.5%	21.1%	21.7%
Crafts, Operators	18,127	18,530	18,438	18,317	17,162	31.1%	30.9%	28.7%	28.0%	26.2%
Mining	61	45	33	23	16	0.1%	0.1%	0.1%	0.0%	0.0%
Services	4136	4996	5301	5322	5500	7.1%	8.1%	8.2%	8.1%	8.4%
Protective Services	392	748	765	748	697	1.4%	1.2%	1.2%	1.1%	1.1%
Transportation, Communication	2,376	2,046	2,589	2,403	2,291	4.1%	4.3%	4.0%	3.7%	3.5%
Farm Workers and Managers	5,373	4,342	3,601	2,817	2,158	9.2%	7.0%	5.6%	4.3%	3.3%
Not Classifiable	104	94	86	75	64	0.2%	0.2%	0.1%	0.1%	0.1%
TOTAL	58,217	61,750	64,271	65,459	65,999	100.0%	100.0%	100.0%	100.0%	100.0%

SOURCE: Ministry of Labor (Roudogyaku jiyun no ehonkyo soshoku, 1987, p.215, Table 11-3-13).

(not postindustrial) age.

In general terms, with the exception of business services and agriculture, the Japanese employment structure is projected to remain remarkably stable, verifying again this gradual transition into the informational paradigm, reworking the content of existing jobs into the new paradigm without necessarily phasing out such jobs.

As for the occupational structure, the most substantial change is the increase in the share of professional and technical occupations, that will grow from 10.5% in 1985 to a staggering 17% in 2005. On the other hand, managers, while growing significantly in their share, will grow at a slower rate, and they still would represent less than 6% of total employment in 2005. This would confirm the tendency toward the reproduction of the lean hierarchical structure of Japanese organizations with power concentrated in the hands of a few managers. The data also seem to indicate the increase in the professionalization of middle-level workers and the specialization of tasks in information processing and knowledge generation. Crafts and operators are expected to decline, but will still represent over one-quarter of the labor force in 2005, about 3 percentage points ahead than the corresponding occupational categories for the United States in the same date. Clerical workers are also expected to increase at a moderate rate, while farming occupations would be reduced by about two thirds in relationship to their 1985 level.

Thus, the projections of the employment structure in the United States and Japan seem to continue the trends that we have observed for the 1970-1990 period. These are clearly two different employment and occupational structures corresponding to two societies that can be equally labeled informational in terms of their socio-technical paradigm of production, yet with clearly distinct performances in productivity growth, economic competitiveness, and social cohesion. While the United States appears to be emphasizing its tendency to move away from manufacturing activity (and not just manufacturing jobs), and to concentrate in both producer and social services, Japan is maintaining a more balanced structure, with a strong manufacturing sector, and a wide cushion of retail service activities. Japanese emphasis in business services is significantly less concentrated in finance and real estate, and the expansion of employment in social services is also more limited. The projections on the occupational structure confirm different styles of management, with Japanese organizations

establishing cooperative structures at the shop floor and office level while at the same time continuing to concentrate decision making into a leaner managerial rank. Overall, the general hypothesis of diverse paths to the informational paradigm within a common pattern of employment structure seems to be confirmed by the limited test offered by the projections presented here.

VII. ELEMENTS FOR A COMPARATIVE THEORY OF THE EMPLOYMENT STRUCTURE OF INFORMATIONAL SOCIETY

The historical evolution of employment structure, at the roots of social structure, has been dominated by the secular trend toward the increasing productivity of human labor. As technological and organizational innovations have allowed men and women to put out more and better product with less effort and resources, work and workers have shifted from direct production to indirect production, from cultivation, extraction, and fabrication to consumption and management work, and from a narrow range of economic activities to an increasingly diverse occupational universe.

But the tale of human creativity and economic progress throughout history has been often told in simplistic terms, thus obscuring the understanding not only of our past but of our future. The usual version of this process of historical transition as a shift from agriculture, to industry, then to services, as an explanatory framework for the current transformation of our societies presents three fundamental flaws:

- (1) It assumes homogeneity between the transition from agriculture to industry and that from industry to services, overlooking the ambiguity and internal diversity of the activities included under the label of "services".
- (2) It does not pay enough attention to the truly revolutionary nature of new information technologies, that by allowing a direct, on-line linkage between different types of activity in the same process of production, management, and distribution, establish a close, structural connection between spheres of work and employment artificially separated by obsolete statistical categories.
- (3) It forgets the cultural, historical, and institutional diversity of advanced societies, as well as the fact that they are interdependent in a global economy. Thus, the shift to the socio-technical paradigm of informational production takes place along different lines, determined by the trajectory of each society and by the interaction between these various trajectories. It follows a diversity of employment/occupational structures within the common paradigm of the informational society.

Our empirical observation of the evolution of employment in the G-7 countries shows some fundamental common features that seem indeed to be characteristic of informational societies:

- * The phasing out of agricultural employment.
- * The steady decline of manufacturing employment.
- * The rise of both producer services and social services, with the emphasis in business services in the first category, and in health services in the second group.
- * The increasing diversification of service activities as sources of jobs.
- * The rapid rise of managerial, professional, and technical jobs.
- * The formation of a "white collar" proletariat, made up of clericals and sales workers.
- * The relative stability of a substantial share of employment in retail trade.
- * The overall upgrading of the occupational structure over time, with an increasing share of those occupations that require higher skills and advanced education. It does not follow that societies at large are upgraded in their skills, education, or income status, nor in their stratification system. The impact of an upgraded employment structure into the social structure will depend on the ability of the institutions to incorporate the labor demand into the labor force and to reward workers proportionally to their skills.

On the other hand, the analysis of the differential evolution of the G-7 countries clearly shows some variation in their employment and occupational structures. At the risk of oversimplifying, we can propose the hypothesis of two different informational models:

- * The "Service Economy Model", represented by the United States, the United Kingdom, and Canada. It is characterized by a rapid phasing out of manufacturing employment after 1970, as the pace towards informationalism accelerated. Having already eliminated almost all agricultural employment, this model emphasizes an entirely new employment structure where the differentiation among various service activities becomes the key element to analyze their social structure. This model emphasizes also capital management services over business services, and keeps expanding the social service sector because of a dramatic rise in health, and to a lesser extent, education employment. It is also characterized by the expansion of the managerial category that includes a considerable number of middle managers.

* The "Info-Industrial Model", clearly represented by Japan, and to a considerable extent by Germany, that while reducing also the share of their manufacturing employment, continue to keep it at a relative high level (around one quarter of the labor force) in a much more gradual movement that allows for the restructuring of manufacturing activities into the new socio-technical paradigm. Indeed, this model reduces manufacturing jobs while reinforcing manufacturing activity. Partly as a reflection of this orientation, business services are much more important than financial services, and they seem to be more directly linked to production firms. This is not to say that financial activities are not important in Japan and Germany: after all, eight of the world's ten largest banks are Japanese. Yet, while financial services are indeed important and have increased their share in both countries, the bulk of service growth is in services to services and in social services. However, Japan is also specific in showing a significantly lower level of employment in social services than other informational societies. This is probably linked to the structure of the Japanese family and to the internalization of some social services into the structure of the firms: a cultural and institutional analysis of the variations of employment structure seems to be a necessity to account for the diversity of informational societies.

In-between, France seems to be leaning toward the service economy model, but maintaining a relatively strong manufacturing basis and emphasizing both producer and social services. The close linkage between the French and the German economies in the European Community is probably creating a division of labor between management and manufacturing activities that could ultimately benefit the German component of the emerging European economy. Italy characterizes itself for keeping almost one-quarter of employment in self-employed status, maybe introducing a third model that would emphasize a different organizational arrangement, based on networks of small and medium businesses, adapted to the changing conditions of the global economy, thus laying the ground for an interesting transition from proto-industrialism to proto-informationalism.

The different expressions of such models in each one of the G-7 countries are dependent upon their position in the global economy. In other words, for a country to be focused on the "service economy" model it means that other countries are exercising their role as

info-industrial economies. The implicit assumption of postindustrial theory that the advanced countries would be service economies and the less advanced countries would specialize in agriculture and manufacturing have been rejected by historical experience. Throughout the world, many economies are quasi-subsistence economies, while agricultural and industrial activities that thrive outside of the informational core do so on the basis of their close connection to the global economy, dominated by the G-7 countries, with the exception of the ex-Soviet Union that is now moving fast toward such integration. Thus, the employment structure of the United States and of Japan reflect their different forms of articulation to the global economy, and not just their degree of advancement in the informational scale. The fact that there is a lower proportion of manufacturing jobs or a higher proportion of managers in the United States is partly due to the offshoring of manufacturing jobs by U.S. firms, and to the concentration of information processing activities in the United States at the expense of production activities generated in other countries by U.S. consumption of these countries' products.

Furthermore, such different modes of articulation to the global economy are not only due to different institutional environments and economic trajectories, but to different government policies and firms' strategies. Thus, the observed trends can be reversed (although the United Kingdom is probably too much down the de-industrialization path to come back to an info-industrial model). If policies and strategies can modify the service and industrial mix of a given economy it means that the variations of the informational paradigm are as important as its basic structure, and that therefore it is a socially open, politically determined paradigm, whose main common feature is technological (including in it organizational technology).

As economies rapidly evolve towards their integration and interpenetration, the resulting employment structure will largely reflect the position of each country and region in the interdependent structure of production, distribution, and management. Thus, the artificiality of the separation of social structures along the institutional boundaries of different nations (the United States, Japan, Germany etc.) reduces the interest of analyzing the occupational structure of the informational society in a given country in isolation of what happens in another country whose economy is closely inter-related. If Japanese manufacturers produce

the cars and the chips consumed by the American market, we are not witnessing the demise of manufacturing, but the impact on the employment structure of each country of the division of labor among different types of informational societies.

The implications of such observation for the theory of informationalism are far reaching: the unit of analysis to comprehend the new society will necessarily have to change. The focus of the theory must shift to a comparative paradigm able to explain at the same time the sharing of technology, the interdependence of the economy, and the variations of history in the determination of an interdependent employment structure spread across national boundaries.

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**Appendix A: Methodological Note and
Statistical References**

APPENDIX A: METHODOLOGICAL NOTE AND STATISTICAL REFERENCES

Methodological Note

Three sets of statistics have been compiled to illustrate the development of service and information sector. Data have been collected for seven countries (Canada, France, Germany, Italy, Japan, United Kingdom and the United States) beginning 1920s up to the most recently available date. The following describes each set of statistics compiled for this exercise.

1. Percentage Distribution of Employment by Industrial Sector and Intermediate Industry Group

Employment statistics by industry have been compiled for seven countries. Industries are classified into 6 industrial sectors and 37 intermediate industry groups, according to the classification developed and used by Singelmann, in *From Agriculture to Services* (1978).

The six industrial sectors are:

- I. Extractive
- II. Transformative
- III. Distributive services
- IV. Producer services
- V. Social Services
- VI. Personal services

Within each sector, two to eight intermediate industry groups are included, as shown in Table

1. Employment statistics with detailed industrial breakdown, from national census or statistical abstracts, have been aggregated and reclassified into these categories.

Instead of reconstructing the database from the 1920s, we chose to build upon Singelmann's work by extending his database beyond 1970. We put the best possible effort in making our

classification of industries identical to that used by Singelmann, so that the database would be comparable in time series.

For the purpose of clarification, Table 2 shows the industrial breakdown we used in updating the employment distribution by industry. The table lists all detailed industrial categories included in each intermediate industrial group for seven countries. Any major variations from other countries concerning the classification is noted in each statistical table produced. For all countries, figures that represent annual averages of the number of employed persons (including self-employed, non-salaried employees) by industry have been used for this analysis.

Table 1
Classification of Industrial Sectors and Intermediate Industry Groups

<p>I. Extractive Agriculture Mining</p>	<p>V. Social Services Medical, health services Hospital Education Welfare, religious services Nonprofit organizations Postal service Government Miscellaneous social services</p>
<p>II. Transformative Construction Utilities Manufacturing Food Textile Metal Machinery Chemical Miscellaneous Manufacturing</p>	<p>VI. Personal Services Domestic services Hotel Eating, drinking places Repair services Laundry Barber, beauty shops Entertainment Miscellaneous personal services</p>
<p>III. Distributive Services Transportation Communication Wholesale Retail</p>	
<p>IV. Producer Services Banking Insurance Real Estate Engineering Accounting Miscellaneous business services Legal services</p>	

Source: Singelmann (1978).

Table 2: Classification of Industries by Countries

	CANADA	FRANCE	GERMANY	ITALY	JAPAN	UNITED KINGDOM	UNITED STATES
Agriculture	agriculture, forestry, fishing/trapping	agriculture, forestry, fisheries	agriculture, forestry, fisheries, gardening	agriculture, forestry, fisheries	agriculture, forestry, fisheries	agriculture/forestry/fishing	agriculture, forestry, fisheries
Mining	mining, quarries, oil wells	solid mineral extraction/cooling	coal mining, iron mining, petroleum/gas extraction	extraction of combustible solids, liquids	mining	coal extraction/solid fuels/electricity/gas	metal, coal mining, crude petroleum and natural gas extract.
Construction	construction	building/civil engineering/agricole	construction	construction	construction	construction	construction
Food	food/beverage, tobacco	food, meat/milk	food, beverage, tobacco	food, beverages, tobacco	food, beverage, tobacco, feed	food/drink/tobacco	food/kindred prods., tobacco manufactures
Textile	textile, knitting mills	textile/clothing	textile	textile	textile	textiles	textile mill prods.,
Metal	primary metal, metal fabricating	ferrous metals, steel, construction materials, foundry	foundry, metal, steel	non-ferrous metal, fabricated metal, foundry	non-ferrous metal, fabricated metal, iron/steel	metal, non-metallic mineral prods.,	primary metal, fabricated metal
Machinery	machinery, electrical products	machinery, electric/electronic prods., household appliances	machinery, electric, office equipment	machinery, electric/electronics machinery	machinery, electric/electronic products	mechanical engineering, data-processing equip., electrical/electronic engineering	machinery, electrical machinery
Chemical	chemical, petroleum/coal products	basic chemical/artificial fibers, pharmaceutical	chemical/fibers	chemical	basic chemical, petroleum/coal prods.	chemical/man-made fibers	chemical/allied prods., petroleum/coal prods.

	CAMBODIA	FRANCE	GERMANY	ITALY	JAPAN	UNITED KINGDOM	UNITED STATES
Misc. Mfg.	rubber/plastic, leather, clothing, wood, furniture/fixture, paper, printing/publishing, transp. equipment, non-metallic mineral products, misc. manufacturing	automobile, ship/aerospace/military, equip., apparel, misc. Mfg., food, plastic, glass, printing/publishing, paper, equipment, non-metallic mineral products, misc. manufacturing	stone/clay, rubber, transport equip., aircraft/shipbuilding, wood, plastic, glass, paper, printing/publishing, leather, misc. Mfg., cloth, clothing	leather, transport equip., clothing/footwear, paper/printing/publishing, rubber/plastic, misc. Mfg.	apparel/other fabric prods., transp. equip., precision instr., misc. Mfg., lumber/wood/furniture, plastic, rubber, pulp/paper, printing/publishing, leather/fur, ceramic/stone/clay prods.	motor vehicle/parts, other transp. equip., instrument engineering, footwear/clothing, timber/wood furniture/cabinets, stone/crystal/glass, paper, publishing/printing, rubber/plastic, leather, misc. Mfg.	transportation equip., apparel, prof./photo-graphic equipment/watches, toys/sporting goods, lumber/wood, furniture/cabinets, stone/crystal/glass, paper, publishing/printing, rubber/plastic, leather, misc. Mfg.
Utilities	electric power, gas, water utilities	electricity, gas, propulsion/distrib., gas/water distrib.	electricity, gas, water supply	electricity, gas, water	electricity distr., water/gas/heat supply	gas/electricity/water	utilities/sanitary serv.
Transportation	transportation, storage	transport	railways, water transport	railways, air transport	railways, road passenger/freight, water/air, other rel. serv. auto. parking	railways, other inland transport, sea, air transport, supporting serv.	railroads, bus/urban transit, taxicab, trucking, water/air, transp., warehousing
Communication	communication	telecommunication/postal services	communication, postal services	communication	communication	communication/postal services	communication, broadcasting
Wholesale	wholesale trade	food wholesale, non-food wholesale	wholesale	wholesale	wholesale, warehousing	wholesale	wholesale trade
Retail	retail trade	food retail, non-food retail, auto repair/sales	retail	retail	retail	retail	retail trade
Banking	banks, credit agencies, security brokers/dealers	financial organizations	financial institutions	financial institutions, securities	financing/insurance	banking/finance	banking, S&L, credit agencies, security brokerage

	CANADA	FRANCE	GERMANY	ITALY	JAPAN	UNITED KINGDOM	UNITED STATES
Insurance	insurance carriers/agencies/real estate	insurance	insurance	insurance	insurance	insurance except social security	insurance
Real Estate	n.a.	real estate rental/finance	real estate, rental	real estate	real estate	owning/dealing real estate	real estate, real estate insurance law offices
Engineering	engineering/scientific services	n.a.	technical consulting	technical services	civil engineering, architecture	n.a.	engineering/architectural/survey
Accounting	accountants	n.a.	n.a.	accounting	accounting	accounting	accounting/auditing
Misc. business serv.	services to business management	services to enterprises	legal/accounting/other business services	other business services, renting	goods rental/leasing, info serv./research/advertising, professional serv.	business services, renting of movables	advertising, commercial R&D, personnel supply serv., bus. mgmt consulting, computer serv. detective serv., bus. serv.
Legal services	office of lawyers/notaries	n.a.	n.a.	legal	legal services	legal	legal serv.
Medical, health serv.	office of physicians/surgeons, paramedical, dentists, etc.	n.a.	health/veterinary	health services, veterinary	medical/health serv., public health serv.	medical/other health serv., sanitary serv.	health serv. except hospitals
Hospital	hospitals	n.a.	n.a.	hospitals	hospitals	n.a.	hospitals
Education	education and related services	n.a.	education, science/research institutions	education, research, museums, botanical/toological gardens	education, science research institutions	education, research and development	schools, libraries, vocational schools, educational serv.
Welfare, relig. serv.	welfare, religious organizations	n.a.	social serv./employment offices	religious organizations	welfare/social insurance, religion	other serv. incl. social welfare	religious organizations

	CANADA	FRANCE	GERMANY	ITALY	JAPAN	UNITED KINGDOM	UNITED STATES
Nonprofit organizations	labor organizations, trade associations	n.a.	non-profit organizations	economic org., professional associations	clubs, cultural organizations	n.a.	membership organizations
Postal service	n.a.	n.a.	n.a.	postal services	n.a.	n.a.	postal serv.
Government	public administration, defense	n.a.	public administration	public administration, armed forces, international organizations	national gov't serv., local gov't serv., foreign gov'ts/int'l org.	public administration and defense	public administration, defense, justice, public order
Misc. social services	miscellaneous services	n.a.	waste removal, residential institutions	other social services	waste treatment, other services	other professional/scientific services	misc. prof. and related serv.
Domestic services	private households	n.a.	private households	domestic services	domestic services	n.a.	private households
Hotel	hotels/motels, lodging houses/residential clubs, camping grounds	hotels/cafes/restaurants	hotels/restaurants	hotels (with or without restaurants)	hotels/lodging places	hotels/catering (restaurants/cafes/labs/canteens)	hotels/motels, lodging places
Eating, drinking places	restaurants/cafes/taverns	n.a.	n.a.	restaurants, catering	eating/drinking places	restaurants/cafes/cock bars	eating/drinking pl.
Repair services	repair of shoe, auto, jewelry, electrical appliances	n.a.	automobile repair	repair	repair services	repair of consumer goods/vehicles	auto, electrical, misc. repair
Laundry	laundries/laundress/presort, self-services laundries	n.a.	laundry/cleaning	laundry	laundry	laundry/dry cleaning	laundry/cleaning
Barber, beauty shops	barber/beauty shops	n.a.	barber/body care businesses	barber/beauty shops	barber/beauty shops	hairdressing/salons	beauty shops, barber shops

Entertainment	CANADA	FRANCE	GERMANY	ITALY	JAPAN	UNITED KINGDOM	UNITED STATES
	amusement/recreational services	n.b.	culture/sports/entertainment	entertainment, cinema, broadcasting, sports	motion pictures, recreation, broadcasting, amusement	recreation/cultural services	entertainment, theaters/services, bowling alleys/billiard/pool places
Misc. personal services	funeral services, misc. personal services	all for-profit personal services	other personal services	various administrative	misc. personal services	personal services	funeral services/crematorie

Note that the sectoral categories [categories I. through VI.] does not take into account detailed industries which may be included in another sector. For instance, when a country's statistics include eating and drinking places in retail services, but cannot be disaggregated due to the lack of detailed breakdown, the percentage for distributive service (III) becomes over-estimated and personal services (VI) becomes underestimated than the actual proportions. As a result, proportions for certain industrial sectors may be inflated or deflated.

Also, priority was given to comparability across countries rather than strict breakdown of detailed industry by our classification. This was done to avoid industries assigned to different categories in each country, which would have disturbed the comparability of the shares of employment of large categories (I. through VI.). This was due to the fact that data from some countries combined various sectors and we were unable to disaggregate them. For instance, many countries regarded paper, printing and publishing as one sector, and we have allocated it to miscellaneous manufacturing, although it was theoretically favorable to consider publishing as business services. As a result, we have allocated publishing statistics from all countries under miscellaneous manufacturing, even those countries which provide disaggregated data on publishing, in order to maintain cross-national comparability.

For the same reasons, the following industries are allotted to the following detailed categories.

- Products that are made from textile or fabrics, including apparel, shoes and clothing are classified as "miscellaneous manufacturing."

- Transport equipment (including automobile, shipbuilding and aerospace industry products) are classified under "miscellaneous manufacturing."

- Scientific equipment, including optical, photography, and precision instruments are classified under "miscellaneous manufacturing."

- Printing and publishing is classified under miscellaneous manufacturing.

-Depending on the breakdown available in each country, broadcasting (radio and TV) may be classified under "communication" or "entertainment."

-Miscellaneous professional and related services may be classified in any miscellaneous services, depending on the country. After a careful analysis of the data and finding some further disaggregated data, "other professional services" was classified as "business services" for Japan. For the United States, it is classified as "miscellaneous social services."

In addition, following specificities should be noted for the countries studied:

Canada:

The 1971 figures are based on the census data on persons 15 years and over who worked in 1970. The 1981 figures are based on the 20% sample data from the 1981 census on labor force 15 years and over. Due to the unavailability of the breakdown of the labor force in detailed industry from the results of the 1991 census as of November 1992, we have used the latest statistics available (May 1992) from Statistics Canada, published in monthly report, *The Labour Force*. The figures are derived from the sample of about 62,000 representative households across the country (excluding the Yukon and Northwest Territories). The survey has been designed to represent all persons in the population 15 years of age and over residing in the provinces of Canada, with the exception of the following; persons living on Indian reserves, full-time members of the armed forces and people living in institutions (i.e., inmates of penal institutions and patients in hospitals or nursing homes who have resided in the institution for more than 6 months). The 1992 figures reflect the labor force in May, 1992, and have been based on the 1980 Standard Industrial Classification since 1984 (Statistics Canada, 1992).

France:

Figures are based on the employed population on December 31st of every year, published in the annual statistical abstract. 1989 figures are preliminary. Problems has been encountered

due to general lack of detailed breakdown of statistics on the service sector employment. Whenever a detailed breakdown of service industries are unavailable, the category "not-for-profit services" is classified as miscellaneous social services, and "for-profit services" is classified as miscellaneous personal services. However, the data from the annual statistical abstract was used instead of the census data since the most recent results currently available to us from the census are that of 1982.

Germany:

In this analysis we used former Federal Republic of Germany prior to unification as a unit of analysis. The figures are based on the census data on the employed for 1970 and 1987. No census was conducted in Germany between these years.

Italy:

Figures are based on the census data on labor force in 1971 and 1981. 1990 figures may not be directly comparable to the data in earlier years due to the difference in sources. Since the 1991 census figures are not available at the time of this writing, the 1990 figures have been used as a rough indicator of recent trends.

Japan:

Figures are based on the census data from October 1st, 1970, 1980 and 1990 on employed persons 15 years of age and over. The 1970 and 1980 figures are that of 20% sample tabulation, and the 1990 figures are that of 1% sample tabulation.

United Kingdom:

Figures for the England and Wales were used for the years between 1921 and 1971. From 1971 onwards, figures on employees in employment for the entire United Kingdom in June every year are used. These figures are chosen over the census data on the employed persons due to the unavailability of 1991 census results at the time of this writing, and the 1971 and 1981 figures available to us do not include the entire United Kingdom. In addition, careful comparisons of the census data on the employed and the Dept. of Employment data on

employees in employment for Great Britain revealed that differences are minor in terms of employment distribution¹. Thus we have decided that the employees in employment figures would serve as a rough estimate of the trends in United Kingdom between 1970 and 1990. These figures exclude private domestic servants, a small number of employees of agricultural machinery contractors but include seasonal and temporary workers. Family workers are included in the figures for Great Britain but not for Northern Ireland. The figures on the employees in employment also excludes the self-employed. The figures are from censuses of employment conducted in Great Britain by the Department of Employment, and for the United Kingdom include information from similar censuses conducted in Northern Ireland by the Department of Manpower Services.

United States:

The detailed breakdown of employment from the current population survey for 1970 was not published in the Employment and Earnings issues. Thus we have substituted the 1970 data with that of the census, since the intercensal statistics provided by the current population survey are, in general, designed to be comparable with the decennial statistics (see p. VII of 1970 census, volume 2: 7B, Subject Reports: Industrial Characteristics). The U.S. figures are based on all civilians who, during the survey week, did any work at all as paid employees, in their own business, profession, or on their own farm, or who worked 15 hours or more as unpaid workers in an enterprise operated by a member of a family, and all those who were not working but who had jobs or businesses from which they were temporarily absent because of illness, bad weather, vacation, labor-management disputes, or personal reasons, whether they were paid for the time off or were working other jobs. Members of the Armed Forces stationed in the United States are also included in the employed total. Each employed person is counted only once. Those who held more than one job are counted in the job at which they worked the greatest number of hours during the survey week. Included in the total are employed citizens of foreign countries who are temporarily in the United States but not living

¹ There is a tendency, however, that share of agricultural employment is estimated to be lower than that of the entire employed population, as shown in Table 16 in the text.

on the premises of an embassy. Excluded are persons whose only activity consisted of work around the house (painting, repairing, or own home housework) or volunteer work for religious, charitable, and similar organizations (Dept of Labor Statistics, 1992). Due to the reclassification of the SIC codes for the 1980 census, figures before and after that date may not be strictly comparable.

2. Employment Statistics by Industry

Hall proposes two ways of dividing employment sectors; industry versus services, and goods handling versus information handling (Hall, 1988). "Industry" includes all mining, construction and manufacturing sectors, and "services" includes all remaining categories. "Goods handling" sector includes mining, construction, manufacturing, transportation, wholesale/retail trade, and "Information handling" sector includes communications, finance, insurance and real estate (FIRE), all remaining services and government.

In our analysis, employment statistics with Singelmann's classification has been aggregated and reorganized to fit into Hall's classification². Further, ratio between services and industry employment, as well as the ratio between information handling and good handling employment have been derived from the data used in Tables 10 through 17.

3. Employment by Occupations

Standard occupational classifications of most countries habitually confuse sectoral activities with skill levels, and thus are unfavorable for our use. However, after careful considerations based on the available data from the countries, it became clear that a reconfiguration of occupational classifications would be a major project by itself. Since our primary purpose of this paper excludes such analysis, we decided to use existing classification as a rough

² In order to comply with the standard classification of services, eating and drinking places are included in retail trade.

indicator for the occupational breakdown of these countries. As a result, the following rough breakdown of occupations have been determined as follows:

- Managerial
- Professional
- Technicians
- Sales
- Clerical
- Crafts & Operators
- Semiskilled Service Workers
- Semiskilled Transport Workers
- Farm Workers and Managers

For most countries, it was impossible to separate professional and technician categories. Also, in some countries, craft workers and operators are mixed, thus we have collapsed these categories into one in order to avoid misleading conclusions from the data. The same applies to the collapse of farm workers and farm managers into one category. Crafts and Operators also include laborers, handlers and miners. Those categorized as service workers have been included in Semiskilled Service Workers.

The specificity for each country is described as follows:

Canada:

Figures are based on the occupational classification of the employed. Professional and Technicians categories also included those whose professions are in natural science, social science, teaching, medicine/health and artistic/recreational. Crafts and Operators category also included mining/quarrying, machining, processing, construction trades, materials handling, and other crafts/equipment operating. Farm Workers and Managers also included agriculture, fishing/hunting/trapping and forestry/lodging.

France:

Figures are based on the occupational classification of the population aged 15 years and over, excluding unemployed, retired, students, and others who never worked, according to

employment surveys, the results of which are included in the statistical abstract. Managerial category also included high level public officials and high level administrative/commercial workers in business enterprises. Professional category included professors/scientific occupations, information/art and engineers/technical workers. Technicians included intermediate professions, workers in religion, and social/health mid-level workers. Clerical category included civil servants and administrative workers. Crafts and Operators category include qualified and unqualified workers in industries.

Germany:

Figures are based on the occupational classification of the employed persons, according to the statistical abstract. Managerial category also included accountants, public officials and entrepreneurs. Professional category also included engineers, scientists, artists, and health service workers. Crafts and Operators include most industrial workers. Technicians also include social workers. Farm Workers and Managers category also includes workers in forestry and fisheries.

Japan:

Figures are based on the occupational classification of employed persons, according to Labour Force Survey, the results of which are included in the statistical abstract. Farm workers and managers also include workers in forestry and fisheries. Semiskilled Service Workers category also includes protective service workers. Semiskilled Transport Workers also include communications occupations.

United Kingdom:

Figures are based on the 10% sample of Great Britain, derived from the censuses. Professional category also includes judges, economists, environmental health officers, etc. Technicians included estimators, welfare occupations, medical technicians, draughtsmen, foremen, tracers, supervisors of tracers, and technician engineers. Crafts and Operators include most industrial workers. Semiskilled Transport Workers include warehousemen/storekeepers/packers/hottlers. Semiskilled Service Workers include

sport/recreation workers and protective service. The 1990 figures are based on the Labour Force Survey (1990 and 1991) conducted by the Office of Censuses and Surveys. The 1990 figures are not directly comparable to previous years due to the difference survey methodology and categories employed. However, since the 1991 census data are not available at the time of this writing, these 1990 figures provide a rough estimate of current employment structure in Great Britain.

United States:

Figures are based on the annual averages of the employed persons according to the household survey, conducted as part of the Current Population Survey by the Bureau of the Census for the Department of Labor. Managerial category also included executive and administrative occupations. Clerical category also included administrative support. Semiskilled Service Worker category also included private household and protective service. Crafts and Operators category also included precision production, repair, machine operators/assemblers/inspectors, handlers, equipment cleaners, helpers and laborers. Semiskilled Transport Workers also included material moving occupations. Farm Workers and Managers also included forestry and fishing.

4. Distribution of Employment Status

The status of the employed persons are broadly categorized as employees, self-employed and family workers. When figures for family workers are not available, they may be included within the self-employed categories. Self-employed generally include employers, unless otherwise noted.

The following lists the specificity for each country.

Canada:

Those employers who are paid workers (rather than the self-employed) are included in the employees category.

France:

Figures are based on the civilian employment, indicated in OECD Labour Force Statistics.

Germany:

Figures are based on the annual statistical abstract.

Italy:

Figures are based on the civilian employment, indicated in OECD Labour Force Statistics.

Japan:

Figures are based on the Labour Force Survey on employed persons, included in the annual statistical abstract.

United Kingdom:

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Appendix B: Statistical Tables

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Appendix Table J: Productivity in the Business Sector
Average Annual Percentage Change by Period

Country	Total factor productivity*			Labor productivity**			Capital productivity		
	1960-73	1973-79	1979-90	1960-73	1973-79	1979-90	1960-73	1973-79	1979-90
Canada	2.0%	0.8%	0.0%	2.8%	1.5%	1.2%	0.6%	-0.5%	-2.1%
France	4.0%	1.7%	1.8%	5.4%	3.0%	2.7%	0.9%	-1.0%	-0.2%
Germany	2.6%	1.8%	0.8%	4.5%	3.1%	1.6%	-1.4%	-1.0%	-0.7%
Italy	4.4%	2.1%	1.4%	6.3%	3.0%	2.0%	0.4%	0.4%	0.0%
Japan	5.8%	1.4%	2.0%	8.6%	2.9%	3.0%	-2.5%	-3.4%	-1.3%
United Kingdom	2.3%	0.6%	1.6%	3.6%	1.6%	2.1%	-0.6%	-1.5%	0.4%
United States	1.6%	-0.4%	0.2%	2.2%	0.0%	0.5%	0.1%	-1.3%	-0.7%

NOTE: *Total factor productivity growth is equal to a weighted average of the growth in labour and capital productivity.

The sample-period averages for capital and labour shares are used as weights.

**Output per employed person.

SOURCE: OECD Economic Outlook 51 (OECD, June, 1992, Table 48).

Appendix Table 2: Value Added by Sector as a Percentage of GDP

Country	Agriculture					Manufacturing				
	1960-67	1968-73	1973-79	1979-90	1990-90	1960-67	1968-73	1973-79	1979-90	1990-90
Canada*	5.4%	4.0%	4.1%	3.1%	4.0%	22.3%	20.4%	18.5%	17.1%	19.4%
France	8.8%	6.6%	5.0%	3.9%	5.9%	29.0%	28.4%	26.7%	22.2%	26.0%
Germany	4.8%	3.4%	2.6%	1.9%	3.1%	39.9%	37.5%	34.5%	31.4%	35.3%
Italy	11.6%	7.9%	6.6%	4.5%	7.4%	27.9%	27.1%	28.5%	24.5%	26.7%
Japan	10.8%	6.3%	5.1%	3.1%	6.1%	34.5%	35.2%	30.5%	29.0%	31.9%
United Kingdom	3.9%	2.5%	2.2%	1.6%	2.3%	30.0%	27.9%	25.9%	21.0%	25.4%
United States**	3.4%	3.0%	3.1%	2.3%	2.8%	28.0%	25.5%	23.3%	20.6%	23.9%

Country	Industry					Services				
	1960-67	1968-73	1973-79	1979-90	1990-90	1960-67	1968-73	1973-79	1979-90	1990-90
Canada*	34.7%	32.4%	32.3%	30.9%	32.4%	59.9%	63.6%	63.7%	65.9%	63.6%
France	39.4%	38.5%	36.3%	36.7%	35.5%	51.8%	55.0%	58.7%	65.5%	58.6%
Germany	52.7%	48.1%	44.3%	40.5%	45.8%	42.5%	48.6%	53.1%	57.7%	51.1%
Italy	41.1%	40.8%	40.7%	35.4%	38.9%	47.3%	51.2%	52.7%	60.1%	53.7%
Japan	44.4%	45.8%	42.4%	41.3%	43.2%	44.8%	47.9%	52.6%	55.0%	50.7%
United Kingdom	40.8%	38.1%	36.6%	33.2%	36.8%	56.2%	59.4%	60.9%	65.2%	60.8%
United States**	37.6%	34.9%	33.6%	31.7%	34.0%	59.0%	62.1%	63.2%	66.0%	63.2%

NOTES: * Average figure for '80-'88 is used instead of that for '80-'90.

** Average figure for '60-'87 is used instead of that for '80-'90.

SOURCE: OECD Economic Outlook Historical Statistics: 1960-1990 (OECD, 1992, Table 5.1, 5.2, 5.3, 5.4).

Appendix Table 3-A: Real Gross Domestic Product (GDP)
Average Annual Percentage Change by Period

Country	1960-68	1968-73	1973-79	1979-90	1960-90
Canada	5.5%	5.4%	4.2%	2.8%	4.2%
France	5.4%	5.4%	2.8%	2.1%	3.7%
Germany	4.0%	4.9%	2.3%	2.0%	3.1%
Italy	5.7%	4.5%	3.7%	2.4%	3.9%
Japan	10.2%	8.6%	3.6%	4.1%	6.3%
United Kingdom	3.0%	3.4%	1.5%	2.1%	2.4%
United States	4.5%	3.2%	2.4%	2.6%	3.2%

SOURCE: OECD Economic Outlook Historical Statistics: 1960-1990 (OECD, 1992, Table 3.1).

Appendix Table 3-B: Real Gross Domestic Product (GDP) per Capita
Average Annual Percentage Change by Period

Country	1960-68	1968-73	1973-79	1979-90	1960-90
Canada	3.6%	4.1%	2.0%	1.8%	2.9%
France	4.2%	4.5%	2.3%	1.7%	2.9%
Germany	3.1%	4.1%	2.5%	1.7%	2.6%
Italy	5.0%	3.9%	3.2%	2.2%	3.4%
Japan	9.1%	7.1%	2.5%	3.5%	5.3%
United Kingdom	2.4%	3.0%	1.5%	1.9%	2.1%
United States	3.1%	2.6%	1.4%	1.6%	2.0%

SOURCE: OECD Economic Outlook Historical Statistics: 1960-1990 (OECD, 1992, Table 3.2).

Appendix Table 3-C: Share of Gross Domestic Product (GDP)

Country	Industrialized Countries	World
Canada	3.6%	2.7%
France	6.8%	5.2%
Germany	8.6%	6.6%
Italy	6.0%	4.6%
Japan	20.0%	15.3%
United Kingdom	5.7%	4.4%
United States	35.5%	27.1%
Other Industrialized Countries	13.8%	10.5%
All Industrialized Countries	100.0%	76.4%
World Total		100.0%

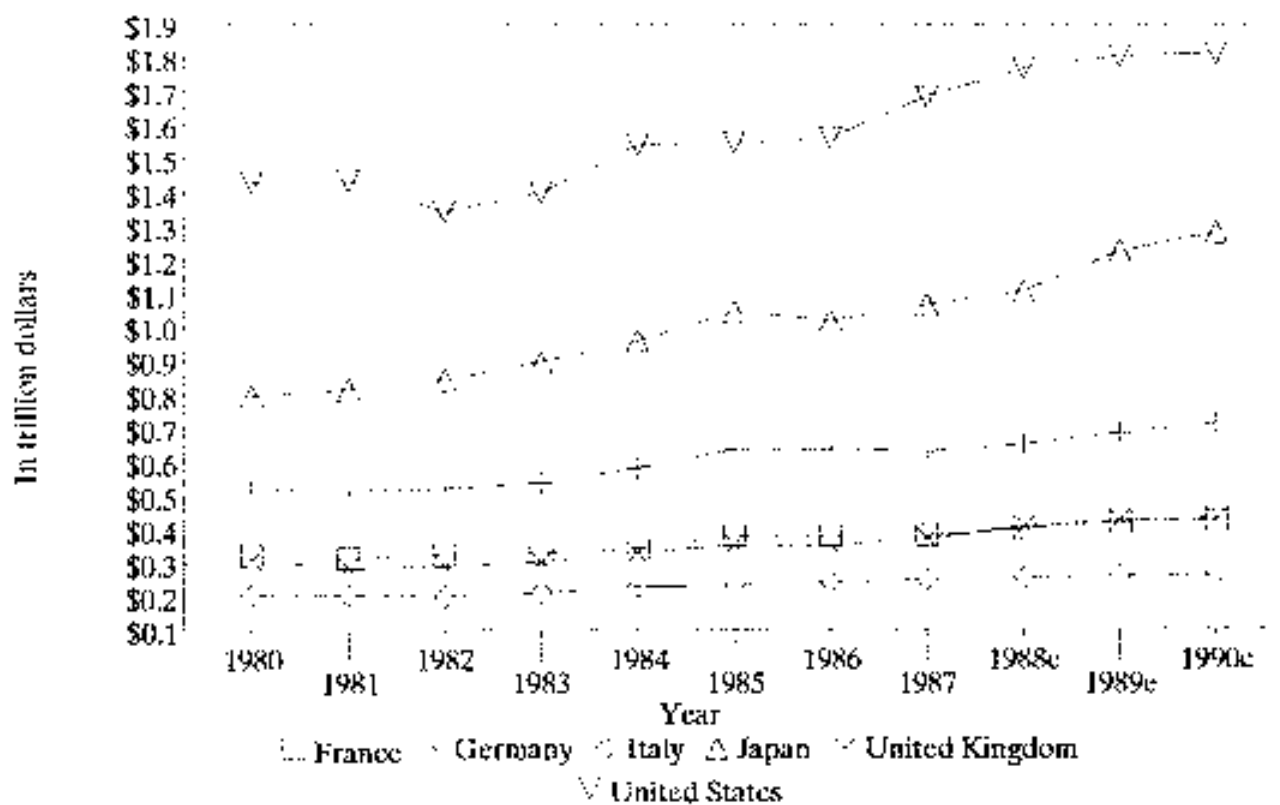
SOURCE: World Economic Outlook (World Bank, 1991).

Appendix Table 4: Output per Worker-hour in Manufacturing, 1960–1989
(1982 = 100)

Country	1960	1965	1970	1975	1980	1982	1985	1989
France	36.7	49.0	67.7	78.0	95.9	100	107.7	124.5
Germany	45.8	57.4	73.4	85.3	99.2	100	110.2	114.2
Italy	34.1	62.1	79.4	91.0	95.3	100	121.0	143.0
Japan	20.2	28.2	50.9	62.3	91.7	100	120.9	146.1
United Kingdom	57.5	66.0	77.4	86.4	90.4	100	119.7	145.9
United States	59.8	76.1	77.9	88.9	97.3	100	121.1	137.8

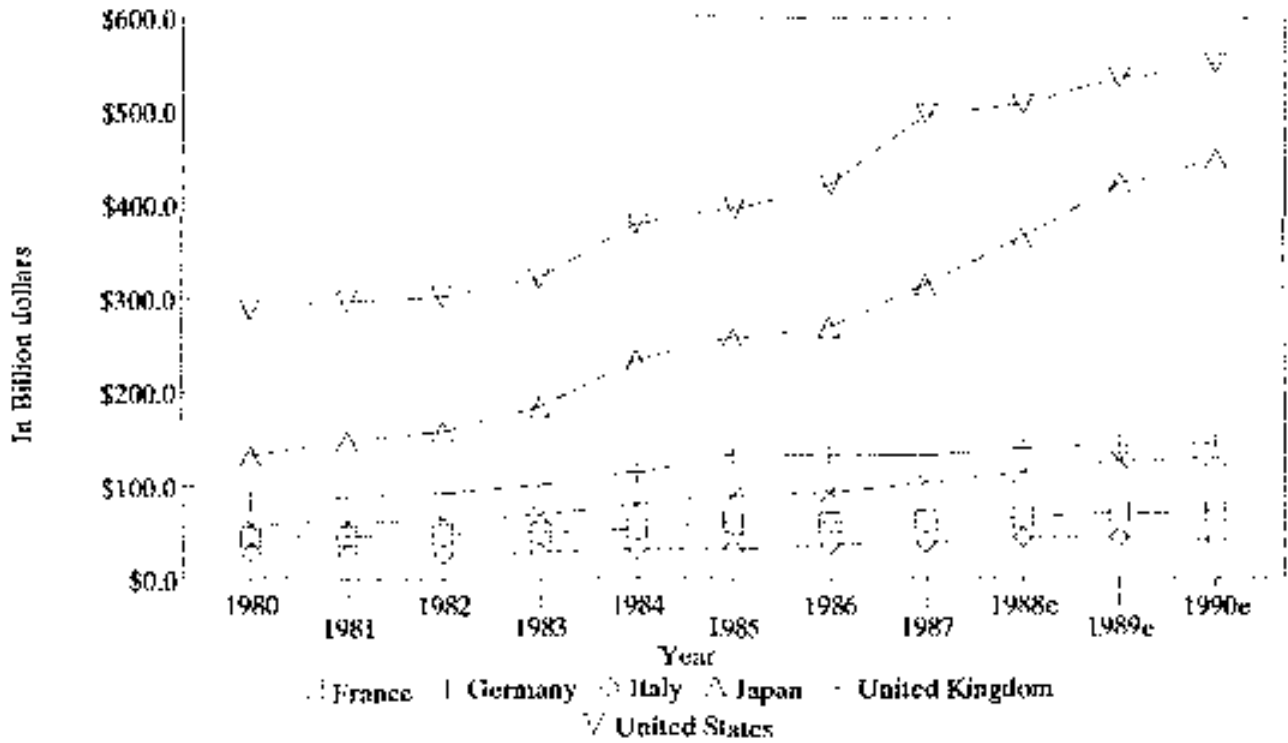
SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 6–33.)

Appendix Graph 1: Global Production of Manufactured Products
(In Trillions of constant 1980 dollars)



SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 6-7).

Appendix Graph 2: Global Production of High-tech Manufactured Products.
 (In Billions of constant 1980 dollars)



SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 6-7).

Appendix Table 3: World Export Shares of Selected Technology Intensive Products: 1977, 1980 and 1987.

Country	1977	1980	1987	% Growth 1977-87
Communications equipment and electronics components				
France	7.5%	8.3%	8.8%	17.3%
Germany	13.6%	14.4%	12.8%	-5.9%
Japan	19.4%	24.7%	28.8%	100.0%
United Kingdom	7.7%	8.1%	7.9%	2.0%
United States	23.8%	19.0%	13.9%	-41.6%
Aircraft and parts				
France	10.7%	6.3%	10.4%	3.0%
Germany	9.1%	10.2%	11.2%	23.1%
Japan	0.2%	0.3%	0.7%	250.0%
United Kingdom	12.9%	21.7%	11.8%	-8.5%
United States	54.3%	50.2%	51.7%	-4.8%
Office, computing and accounting machines				
France	8.9%	7.8%	6.8%	-23.6%
Germany	16.4%	12.9%	10.8%	-34.1%
Japan	10.2%	9.9%	21.6%	111.8%
United Kingdom	9.9%	11.0%	10.4%	5.1%
United States	23.8%	34.3%	28.2%	18.5%

SOURCE: National Science Foundation (Databook, 1990; Figure 38).

Appendix Table 6: Students in Higher Education

Country	1970	1980	1988	% Growth			
				1970-80	1980-88	1970-88	
Canada*	Total No. of students per 100,000 inhabitants	642,013 3,011	888,444 3,711	1,308,533 5,025	38.4%	47.3%	103.8%
France	Total No. of students per 100,000 inhabitants	801,156 1,578	1,076,717 1,998	1,477,094 2,655	34.4%	37.2%	84.4%
Germany	Total No. of students per 100,000 inhabitants	503,819 631	1,233,221 1,987	1,686,725 2,779	26.6%	32.9%	68.3%
Italy	Total No. of students per 100,000 inhabitants	687,242 1,227	1,117,742 1,981	1,296,298 2,263	142.8%	37.9%	234.8%
Japan	Total No. of students per 100,000 inhabitants	1,819,323 1,744	2,412,117 2,065	2,588,470 2,117	62.6%	16.0%	88.6%
United Kingdom**	Total No. of students per 100,000 inhabitants	601,300 1,081	827,146 1,468	1,086,092 1,913	32.6%	7.3%	42.3%
United States***	Total No. of students per 100,000 inhabitants	8,498,117 4,144	12,096,895 5,311	12,398,000 5,142	18.4%	31.3%	80.6%
					35.8%	30.3%	77.0%
					42.3%	2.5%	45.9%
					28.2%	-3.2%	24.1%

NOTES: *Not including part-time students at non-university institutions.

**Data for 1988 refer to that of 1987.

***Data for 1988 refer to that of 1986.

SOURCE: UNRSCO (Statistical Digest, 1991).

Appendix Table 7: Scientists and Engineers per 10,000 Labor Force, 1987

Country	Nonacademic scientists & engineers	Scientists & engineers engaged in R&D
Canada	-----	44.2
France	197	44.9
Germany*	223	53.7
Italy**	61	28.5
Japan***	251	72.9
United Kingdom:****	219	35.9
United States:*****	328	76.9

NOTES: *1985 figure used for nonacademics. **1981 and 1986 figures.

***1985 and 1988 figures used.

****Great Britain figure in 1981 is used for nonacademics.

*****1986 and 1988 figures used.

SOURCE: National Science Foundation (International Science and Technology Data Update: 1991, p.35, p.45).

Appendix Table 8. Scientists and Engineers per 10,000 Labor Force, 1965-1988.

Country	% Growth									
	1965	1970	1980	1987	1965-70	1970-80	1980-87	1965-87		
France	21.0	27.3	32.1	44.9	30.0%	17.6%	39.9%	64.5%		
Germany*	22.6	30.8	44.3	53.7	36.3%	43.6%	21.2%	74.4%		
Italy	---	13.2	20.8	29.4	---	57.6%	41.3%	122.7%		
Japan	24.6	33.4	53.6	68.8	35.8%	60.5%	28.4%	106.0%		
United Kingdom**	19.6	20.8	35.8	35.9	6.1%	72.1%	0.3%	72.6%		
United States	64.7	64.1	60.0	75.9	-0.9%	-6.4%	26.5%	18.4%		

NOTES: *NSF estimates.

**1968 and 1981 figures are used in place of 1970 and 1980 figures.

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 3-19).

Appendix Table 5: Import Share of Domestic Market, by Industry: 1980-90

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988*	1989*	1990*
High-tech manufacturers											
France	33.2%	33.3%	34.1%	36.6%	38.7%	40.3%	45.1%	50.6%	53.9%	53.5%	55.2%
Germany	25.1%	26.7%	28.1%	27.9%	28.4%	28.8%	31.2%	33.9%	35.2%	37.6%	41.2%
Italy	29.3%	30.8%	34.7%	36.9%	37.1%	44.0%	44.5%	46.3%	47.5%	40.5%	43.6%
Japan	6.0%	6.1%	6.3%	6.9%	6.5%	6.5%	8.4%	8.3%	8.8%	8.6%	9.2%
United Kingdom	22.1%	25.1%	27.5%	29.4%	32.2%	33.6%	38.8%	37.0%	39.2%	38.5%	42.1%
United States	8.0%	8.2%	8.0%	8.9%	10.4%	10.8%	12.1%	13.2%	15.1%	13.8%	13.8%
Industrial Chemicals											
Japan	8.6%	9.8%	11.4%	14.3%	16.4%	17.6%	25.7%	25.0%	26.4%	24.5%	22.1%
United States	8.0%	7.6%	8.6%	9.4%	11.2%	12.3%	11.7%	9.8%	9.9%	10.8%	10.6%
Drugs and Medicines											
Japan	7.8%	7.8%	8.1%	8.3%	8.8%	9.2%	12.9%	13.9%	14.7%	13.6%	12.0%
United States	4.8%	4.9%	4.2%	4.9%	5.8%	6.2%	6.9%	7.2%	8.2%	4.9%	5.5%
Office and Computing Machinery											
Japan	1.9%	2.0%	2.0%	1.6%	1.8%	2.0%	2.3%	3.0%	3.9%	5.3%	6.2%
United States	3.8%	4.4%	5.2%	8.0%	9.8%	10.4%	13.6%	16.8%	20.3%	15.5%	16.4%
Radios, TV, & Comm. Equipment											
Japan	1.4%	1.3%	1.2%	1.4%	1.6%	1.3%	1.9%	1.9%	2.3%	2.4%	2.7%
United States	5.0%	5.0%	5.2%	5.7%	7.1%	5.3%	5.5%	6.5%	8.2%	9.1%	8.8%
Aircraft											
Japan	34.4%	39.7%	39.8%	47.1%	34.2%	40.8%	49.9%	43.7%	41.4%	32.1%	42.2%
United States	5.6%	6.6%	5.6%	4.6%	5.3%	6.1%	6.7%	6.4%	6.7%	7.1%	7.7%
Scientific Instruments											
Japan	19.9%	18.1%	19.8%	23.1%	27.0%	27.0%	36.9%	44.0%	62.4%	69.0%	73.8%
United States	13.1%	13.6%	12.0%	13.0%	14.9%	15.9%	18.4%	18.6%	19.0%	18.7%	17.5%

* NOTE: Figures for 1988, 1989 and 1990 are estimates.

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 6-5).

Appendix Table 20: First University Degrees, by Field of Study, 1988*

Country	All Fields	Total	Natural sciences	Engineering	Agriculture
France**	degrees %	26,606 47.8%	12.0%	14,576 26.2%	-----
Germany	degrees %	26,081 35.0%	13,303 18.0%	10,444 14.0%	2,244 3.0%
Italy	degrees %	23,423 30.9%	10,312 13.3%	10,295 13.5%	3,016 4.0%
Japan	degrees %	102,911 26.9%	13,388 3.5%	76,362 19.9%	13,161 3.4%
United Kingdom	degrees %	25,990 37.0%	15,658 22.6%	8,839 12.5%	1,293 1.8%
United States	degrees %	196,984 19.2%	108,784 14.8%	70,406 7.0%	14,531 1.4%

NOTES: * 1987 figures are used for France and Italy.

**Data are based on matricule degrees and engineering degrees. Agriculture is included under natural sciences.

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 3-23).

Appendix Table 11: Export Market Shares, by Industry and Country: 1980-88

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
ALL MANUFACTURING INDUSTRIES									
France	10.2%	10.2%	10.1%	10.2%	10.0%	9.8%	9.3%	9.3%	9.4%
Germany	17.3%	17.8%	18.5%	17.9%	17.9%	18.4%	17.8%	17.2%	16.8%
Italy	7.0%	7.3%	7.0%	7.6%	7.4%	7.7%	7.6%	7.5%	7.6%
Japan	10.8%	11.7%	11.4%	12.1%	13.1%	12.9%	12.7%	12.4%	12.5%
United Kingdom	8.7%	7.5%	7.9%	7.7%	7.8%	8.1%	9.0%	9.2%	8.8%
United States	16.2%	15.7%	13.6%	12.2%	11.6%	10.6%	10.2%	11.2%	13.1%
High-tech manufacturers									
France	9.3%	9.6%	9.9%	9.8%	10.2%	10.3%	9.3%	9.6%	9.2%
Germany	16.1%	17.0%	18.1%	17.3%	17.5%	17.1%	15.5%	14.4%	13.5%
Italy	3.6%	4.3%	4.6%	5.0%	4.6%	4.7%	4.4%	4.4%	4.2%
Japan	9.7%	10.1%	9.9%	11.0%	12.1%	11.6%	12.5%	13.7%	15.2%
United Kingdom	12.0%	10.9%	11.7%	11.4%	12.0%	13.3%	14.6%	13.5%	12.0%
United States	26.9%	25.9%	23.3%	22.0%	20.9%	20.1%	20.1%	21.8%	23.4%
Industrial Chemicals									
France	11.9%	12.0%	9.8%	12.0%	12.3%	13.4%	13.0%	13.3%	12.3%
Germany	19.1%	20.1%	20.9%	20.6%	21.4%	21.1%	19.3%	18.7%	17.5%
Italy	3.6%	4.5%	5.6%	6.5%	5.6%	5.6%	4.2%	4.6%	5.0%
Japan	6.7%	6.0%	6.2%	6.0%	5.7%	5.9%	6.3%	7.2%	6.8%
United Kingdom	10.2%	9.6%	10.6%	10.3%	10.6%	11.3%	13.0%	13.0%	12.0%
United States	18.0%	16.9%	15.4%	13.1%	13.1%	11.8%	12.0%	13.1%	13.4%
Drugs and Medicines									
France	11.6%	11.5%	19.8%	11.8%	11.6%	11.6%	11.0%	10.9%	10.8%
Germany	17.5%	18.0%	16.2%	17.4%	18.1%	18.3%	17.4%	17.2%	17.0%
Italy	5.3%	5.6%	5.1%	5.6%	5.9%	6.2%	5.6%	5.3%	5.5%
Japan	2.3%	2.3%	2.0%	2.3%	2.3%	2.3%	2.3%	2.3%	2.4%
United Kingdom	13.4%	12.9%	12.6%	13.2%	13.4%	13.7%	14.9%	14.5%	13.8%
United States	15.6%	14.9%	12.9%	14.0%	13.4%	12.3%	12.6%	12.2%	13.5%
Engines and Turbines									
France	8.5%	8.6%	8.4%	8.7%	8.8%	9.3%	9.0%	9.3%	9.4%
Germany	16.6%	15.8%	17.3%	17.6%	17.7%	17.9%	17.6%	17.3%	16.2%
Italy	4.6%	4.9%	4.9%	5.8%	5.0%	4.2%	5.0%	5.0%	4.2%
Japan	10.9%	12.2%	11.3%	12.3%	14.2%	13.5%	13.9%	14.2%	13.7%
United Kingdom	18.3%	15.9%	16.0%	13.4%	12.8%	13.5%	15.2%	14.0%	14.9%
United States	26.7%	25.2%	23.3%	21.0%	19.9%	19.0%	17.6%	18.2%	20.1%

Appendix Table 11: Export Market Shares, by Industry and Country, 1980-88

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Office and Computing Machinery									
France	9.9%	10.6%	8.2%	8.4%	9.2%	9.0%	7.9%	8.0%	7.2%
Germany	12.1%	13.4%	13.4%	12.3%	11.3%	11.5%	11.1%	9.0%	7.6%
Italy	2.8%	3.0%	3.6%	3.4%	3.2%	4.5%	4.6%	4.0%	4.0%
Japan	6.3%	7.8%	9.2%	10.7%	10.8%	11.2%	13.5%	15.8%	20.0%
United Kingdom	12.9%	10.0%	11.8%	12.9%	15.6%	18.2%	17.5%	16.9%	12.0%
United States	42.3%	41.4%	38.1%	35.7%	33.6%	28.8%	27.1%	28.5%	31.8%
Radio, TV & Comm. Equipment									
France	8.7%	9.4%	7.2%	6.8%	6.6%	8.0%	7.5%	8.1%	7.7%
Germany	14.1%	14.2%	11.5%	11.2%	11.2%	11.9%	10.3%	9.6%	10.8%
Italy	3.8%	4.1%	3.7%	3.6%	3.4%	4.1%	3.8%	4.3%	3.2%
Japan	26.8%	29.6%	25.8%	30.0%	33.4%	29.9%	31.0%	32.0%	34.4%
United Kingdom	7.9%	6.7%	7.3%	6.8%	7.7%	10.2%	10.1%	9.0%	8.8%
United States	24.3%	22.5%	33.3%	30.5%	25.6%	21.7%	23.1%	23.7%	23.6%
Aircraft									
France	6.7%	8.7%	12.0%	11.7%	15.0%	11.9%	9.2%	11.0%	12.0%
Germany	10.7%	15.0%	21.1%	17.3%	20.5%	16.8%	11.0%	11.8%	13.2%
Italy	1.8%	4.5%	4.7%	4.7%	5.4%	5.0%	4.1%	4.0%	4.3%
Japan	0.4%	0.4%	0.6%	0.6%	0.5%	0.5%	0.5%	0.7%	0.7%
United Kingdom	18.3%	10.5%	12.8%	14.7%	15.0%	15.1%	19.7%	9.7%	10.7%
United States	53.0%	51.0%	38.7%	41.1%	34.6%	40.8%	43.3%	50.0%	44.8%
Scientific Instruments									
France	7.6%	7.4%	7.5%	7.7%	7.9%	8.0%	7.0%	7.3%	7.4%
Germany	16.4%	16.9%	17.7%	17.1%	17.6%	18.6%	18.1%	17.7%	17.6%
Italy	3.3%	3.3%	3.3%	3.5%	3.6%	3.8%	3.9%	4.0%	3.9%
Japan	17.7%	18.5%	17.8%	19.3%	20.0%	19.9%	20.0%	19.8%	20.0%
United Kingdom	9.3%	8.8%	9.7%	9.8%	10.1%	10.7%	11.8%	11.7%	11.6%
United States	21.4%	20.6%	19.3%	17.0%	15.8%	13.9%	13.5%	13.8%	14.9%
Other manufacturers									
France	10.4%	10.3%	10.2%	10.2%	9.9%	9.7%	9.3%	9.2%	9.4%
Germany	17.5%	17.9%	18.6%	18.0%	17.9%	18.8%	18.4%	18.0%	17.8%
Italy	7.7%	8.0%	8.2%	8.2%	8.1%	8.4%	8.4%	8.3%	8.6%
Japan	11.0%	12.0%	11.7%	12.3%	13.3%	13.2%	12.7%	12.1%	11.7%
United Kingdom	7.9%	6.8%	7.0%	6.9%	6.8%	6.8%	7.5%	8.0%	7.9%
United States	14.1%	13.6%	13.5%	10.0%	9.4%	8.3%	7.6%	8.3%	10.0%

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 6-7.)

Appendix Table 12: Trade Balances for High-tech Industries, by Country: 1980-88

By High-tech and Other Manufacturers

(Millions of constant 1980 U.S. dollars)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
High-tech manufacturers									
France	1,213	2,690	3,191	2,893	5,817	5,862	563	357	-1,298
Germany	7,941	8,914	10,663	9,462	12,670	11,244	6,002	3,151	1,807
Italy	-3,059	-1,422	-1,018	-389	-1,418	-2,398	-5,695	-7,088	-2,369
Japan	8,022	9,267	8,943	10,378	14,193	15,127	15,622	20,144	26,627
United Kingdom	6,092	5,377	5,949	4,328	4,093	8,078	11,692	9,371	588
United States	23,698	23,643	20,640	17,512	10,881	12,210	9,187	10,392	11,855
Industrial Chemicals									
France	-456	454	-380	1,210	1,495	2,018	1,024	1,073	944
Germany	2,933	3,243	3,468	4,129	5,072	4,617	3,219	2,812	2,976
Italy	-1,460	-883	-583	-232	-624	-1,046	-2,856	-2,710	-3,122
Japan	267	-90	-557	-1,141	-2,092	-1,921	-3,303	-3,516	-4,205
United Kingdom	1,372	1,022	1,204	1,218	1,224	1,788	2,379	2,223	2,108
United States	3,073	2,926	2,420	1,459	1,080	485	1,005	2,041	2,572
Drugs and Medicines									
France	796	821	2,257	857	886	895	816	739	575
Germany	981	1,188	1,180	1,161	1,265	1,289	1,170	1,115	1,165
Italy	36	92	82	-16	-15	-75	-450	-513	746
Japan	-779	-803	-914	-929	-986	-1,002	-1,730	-1,954	-2,240
United Kingdom	1,217	1,123	1,185	1,065	1,125	1,247	1,550	1,410	1,304
United States	1,217	1,217	1,221	1,110	914	740	806	570	567
Engines and Turbines									
France	475	456	-2	71	358	378	-126	-355	548
Germany	3,391	3,256	3,722	3,418	3,769	3,680	3,266	3,151	2,917
Italy	153	356	399	737	461	126	301	318	234
Japan	2,824	3,463	3,086	3,268	3,923	3,880	4,084	4,318	4,533
United Kingdom	2,959	2,613	2,517	1,567	1,547	1,754	2,015	1,436	1,614
United States	4,566	4,256	4,102	2,717	1,401	288	-557	-590	94
Office and Computing Machinery									
France	139	172	-315	-470	422	300	-988	-996	-2,559
Germany	-78	9	0	-382	-470	-1,137	-1,954	-3,631	-5,402
Italy	-263	-211	-223	-217	-202	-121	-249	-908	-1,458
Japan	279	487	742	1,675	2,722	4,233	7,012	10,697	10,263
United Kingdom	138	-85	-121	-206	104	2,864	3,056	3,669	-4,105
United States	2,517	2,864	2,701	2,847	2,867	4,084	1,952	935	819

Appendix Table 12: Trade Balances for High-tech Industries, by Country: 1980-88
 By High-tech and Other Manufacturers
 (Millions of constant 1980 U.S. dollars)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Radio, TV & Comm. Equipment									
France	-192	-36	-122	-93	-145	-104	-204	-224	-603
Germany	-596	-468	-406	-450	-612	-880	-1,225	-1,147	-947
Italy	-405	-216	-273	-245	-512	-532	-801	-1,058	-509
Japan	1,594	1,843	2,084	3,058	4,973	4,170	4,459	5,522	7,599
United Kingdom	-277	-321	-346	-603	-864	-699	-938	-925	-1,163
United States	-1,554	-1,835	-386	-646	-2,240	-1,411	-1,004	-1,383	-2,420
Aircraft									
France	763	1,042	2,067	1,664	2,817	2,365	1,248	1,634	1,424
Germany	-476	-777	-69	-1,040	439	-156	-1,467	-1,586	-1,501
Italy	-224	237	452	394	273	148	-96	-97	9
Japan	-913	-1,204	-662	-1,402	-874	-1,582	-2,214	-1,987	-2,144
United Kingdom	422	1,218	1,609	1,664	1,430	1,236	3,083	1,471	843
United States	10,518	10,943	7,463	7,892	5,925	7,887	7,841	9,785	10,570
Scientific Instruments									
France	-333	-218	-416	-348	-14	9	-1,205	-1,516	-1,628
Germany	1,785	2,465	2,770	2,626	3,208	3,831	2,992	2,437	2,600
Italy	-891	-796	-871	-809	-801	-895	-1,544	-2,119	-625
Japan	4,750	5,572	5,163	5,848	6,523	7,348	7,313	7,035	6,824
United Kingdom	162	-195	-100	-379	-473	-112	147	87	-19
United States	3,362	3,272	3,119	2,135	933	138	-857	-966	-347
Other manufacturers									
France	10,343	16,749	7,916	8,629	12,069	7,008	14,145	23,823	25,183
Germany	53,511	49,165	53,673	40,922	48,348	56,764	37,002	30,691	33,553
Italy	13,830	25,277	24,776	25,140	24,194	24,969	16,802	7,299	9401
Japan	53,923	65,121	60,801	66,550	79,944	84,706	65,097	45,136	25,811
United Kingdom	-4,667	-12,189	-16,247	-25,911	-31,699	-32,064	-34,316	-36,171	-47,151
United States	-12,734	-14,989	-26,275	-50,788	-90,043	-113,885	-138,294	-140,655	-125,126

SOURCE: National Science Board (Science & Engineering Indicators, 1991, Appendix Table 6-8.)

Appendix Table 13. Distribution of Employment by Industrial Sector and Intermediate Industry Group
 UNITED STATES, 1970-1991 (in Thousands)

Industry/Year	1970	1980	1985	1990	1991
I. Extractive	3,504	4,410	4,277	4,085	4,123
Agriculture	2,866	3,470	3,338	3,355	3,390
Mining	636	940	939	730	733
II. Transformative	25,310	28,791	29,109	30,172	28,824
Construction	4,634	6,065	6,987	7,690	7,087
Utilities	811	1,156	1,243	1,292	1,303
Manufacturing	19,864	21,570	20,879	21,184	20,434
Food	1,456	1,820	1,783	1,877	1,784
Textiles	968	782	731	692	688
Metal	2,391	2,646	2,114	2,121	1,902
Machinery	3,921	5,084	4,858	4,517	4,349
Chemical	1,189	1,511	1,257	1,490	1,525
Misc. Mfg.	9,940	9,727	10,036	10,187	10,096
III. Distributive Services	17,150	20,464	22,386	24,290	24,079
Transportation	3,013	3,596	3,731	4,167	4,170
Communication	1,132	1,420	1,603	1,517	1,598
Wholesale	3,100	3,827	4,341	4,651	4,640
Retail	9,946	11,621	12,711	13,955	13,671
IV. Producer Services	6,298	10,188	13,617	16,495	16,350
Banking	1,658	2,504	3,135	3,434	3,286
Insurance	1,006	1,817	2,079	2,450	2,419
Real estate	789	1,538	1,791	2,137	2,081
Engineering	333	581	734	884	833
Accounting	303	464	549	638	660
Misc. bus. serv.	1,401	2,525	4,334	5,735	5,797
Legal services	409	759	995	1,217	1,274
V. Social Services	16,888	23,086	25,251	29,364	29,839
Medical, health serv.	1,846	2,275	3,884	5,049	5,259
Hospital	2,836	5,132	4,260	4,690	4,839
Education	6,546	8,032	8,134	9,345	9,366
Welfare, relig. serv.	908	1,560	2,410	3,049	3,154
Nonprofit org.	330	452	414	491	468
Postal service	732	688	728	868	852
Governmental	3,484	4,552	4,995	5,608	5,639
Misc. social services	206	395	217	260	262
VI. Personal Services	7,696	10,243	12,509	13,507	13,659
Domestic serv.	1,272	1,229	1,254	1,023	1,000
Hotel	731	1,106	1,451	1,780	1,813
Eating, drinking places	2,479	4,279	5,244	5,663	5,744
Repair services	1,056	1,231	1,635	1,674	1,670
Laundry	587	432	415	517	470
Barber, beauty shops	728	685	805	858	876
Entertainment	632	1,017	1,278	1,503	1,570
Misc. personal serv.	211	264	427	459	536
TOTAL	76,805	97,270	107,150	117,914	116,877

NOTES: The sign "*" signifies that the figure is included in the above category.

SOURCES: 1970: Population Census (5% sample); 1980-1991: Current Population Survey, Bureau of Labor Statistics (Labor Statistics: Employment and Earnings, various issues).

Appendix Table 14: Distribution of Employment by Industrial Sector and Intermediate Industry Group
 JAPAN, 1970-90 (in Thousands)

Industry/Year	1970	1980	1985	1990
I. Extractive	10,309	6,243	5,524	4,448
Agriculture	10,087	6,130	5,426	4,383
Mining	222	113	98	66
II. Transformative	17,772	18,798	19,466	20,795
Construction	3,943	5,413	5,295	5,806
Utilities	288	344	334	345
Manufacturing	13,541	13,041	13,837	14,544
Food	1,086	1,147	1,262	1,391
Textiles	1,427	972	853	714
Metal	2,103	1,983	1,883	1,985
Machinery	2,596	2,584	3,418	3,620
Chemical	666	610	586	679
Misc. Mfg.	5,664	5,745	5,833	6,155
III. Distributive Services	11,689	14,902	14,452	14,987
Transportation	2,636	2,867	2,930	3,097
Communication	577	677	617	598
Wholesale	3,159	3,843	4,193	4,577
Retail	5,316	6,615	6,712	6,916
IV. Producer Services	2,522	4,171	5,046	5,945
Banking	729	1,578	1,742	1,181
Insurance	376	^	^	783
Real estate	274	436	491	707
Engineering	268	-----	-----	500
Accounting	93	-----	-----	188
Misc. bus. serv.	741	2,157	2,413	2,493
Legal services	42	-----	-----	85
V. Social Services	5,359	7,213	7,872	8,855
Medical, health serv.	211	1,604	1,968	943
Hospital	923	^	^	1,328
Education	1,537	1,999	2,157	2,757
Welfare, relig. serv.	381	708	784	847
Nonprofit org.	524	610	659	656
Postal service	-----	-----	-----	-----
Government	1,750	2,032	2,084	2,092
Misc. social services	23	260	220	232
VI. Personal Services	4,441	5,348	5,875	6,296
Domestic serv.	153	77	79	80
Hotel	463	548	619	677
Eating, drinking places	1,585	2,296	2,523	2,536
Repair services	430	593	554	614
Laundry	239	676	974	349
Barber, beauty shops	565	^	^	650
Entertainment	425	478	601	822
Misc. personal serv.	532	478	525	567
Unclassifiable	19			366
TOTAL	52,110	55,778	58,336	61,734

NOTE: The sign ^ signifies that the figure is included in the category immediately above.

SOURCE: Population Census, Bureau of Statistics.

Appendix Table 15: Distribution of Employment by Industrial Sector and Intermediate Industry Group
 GERMANY, 1970-1987 (in Thousands)

Industry/Year	1970	1987
I. Extractive	2,313	1,103
Agriculture	1,991	866
Mining	323	237
II. Transformative	12,481	10,835
Construction	2,033	1,908
Utilities	215	274
Manufacturing	10,234	8,654
Food	964	778
Textiles	635	307
Metal	1,243	1,168
Machinery	2,517	1,311
Chemical	634	736
Misc. Mfg.	4,240	4,353
III. Distributive Services	4,748	4,765
Transportation	1,413	1,574
Communication	^	^
Wholesale	1,125	873
Retail	2,179	2,319
IV. Producer Services	1,187	1,977
Banking	438	658
Insurance	244	257
Real estate	92	109
Engineering	163	198
Accounting	-----	-----
Misc. bus. serv.	250	754
Legal services	-----	-----
V. Social Services	4,155	6,550
Medical, health serv.	815	1,465
Hospital	-----	-----
Education	802	1,314
Welfare, relig. serv.	245	410
Nonprofit org.	112	56
Postal service	.	.
Government	2,053	2,543
Misc. social services	128	760
VI. Personal Services	1,610	1,687
Domestic serv.	116	56
Hotel	730	731
Eating, drinking places	^	^
Repair services	271	297
Laundry	120	62
Barber, beauty shops	234	258
Entertainment	119	248
Misc. personal serv.	19	35
TOTAL	26,494	26,908

NOTES: The sign '^' signifies that the figure is included in the category immediately above.

Postal service is included in transportation/communication categories.

SOURCE: 1970-1987, Statistisches Bundesamt, Volkszählung.

Appendix Table 16: Distribution of Employment by Industrial Sector and Intermediate Industry Group

FRANCE, 1968-1989 (in Thousands)

Industry/Year	1968	1970	1975	1980	1985	1989 ^a
I. Extractive						
Agriculture	3,121	2,781	2,169	1,881	1,607	1,390
Mining	2,976	2,660	2,075	1,821	1,561	1,365
	146	121	85	61	47	27
II. Transformative						
Construction	7,495	7,826	7,820	7,513	6,562	6,437
Utilities	1,913	1,938	1,860	1,829	1,499	1,577
Manufacturing	162	163	172	191	211	209
Food	5,420	5,705	5,788	5,493	4,852	4,652
Textiles	611	609	602	627	626	611
Metals	760	744	655	548	449	379
Machinery	1,069	1,059	1,048	936	771	769
Chemical	987	1,093	1,172	1,119	1,016	976
Misc. Mfg.	960	982	949	883	858	841
	1,695	1,821	1,911	1,880	1,635	1,585
III. Distributive Services						
Transportation	3,762	3,855	4,027	4,294	4,285	4,475
Communication	841	834	857	878	891	932
Wholesale	358	374	409	456	486	473
Retail	743	785	843	956	934	991
	1,820	1,862	1,919	2,024	1,974	2,080
IV. Producer Services						
Banking	1,009	1,179	1,368	1,688	1,804	2,181
Insurance	253	289	366	421	446	440
Real estate	97	106	131	145	159	164
Engineering	30	35	56	68	71	74
Accounting	---	---	---	---	---	---
Misc. bus. serv.	630	707	795	1,054	1,129	1,305
Legal services	---	---	---	---	---	---
V. Social Services						
Medical, health serv.	3,023	3,202	3,436	3,686	4,193	4,259
Hospital	---	---	---	---	---	---
Education	---	---	---	---	---	---
Welfare, relig. serv.	---	---	---	---	---	---
Nonprofit org.	---	---	---	---	---	---
Postal service	---	---	---	---	---	---
Government	---	---	---	---	---	---
Misc. social services	---	---	---	---	---	---
VI. Personal Services						
Domestic serv.	1,648	1,782	2,129	2,203	2,777	3,082
Hotel	534	551	570	597	659	766
Eating, drinking places	---	---	---	---	---	---
Repair services	---	---	---	---	---	---
Laundry	---	---	---	---	---	---
Barber, beauty shops	---	---	---	---	---	---
Entertainment	---	---	---	---	---	---
Misc. personal serv.	1,114	1,251	1,559	1,906	2,119	2,316
All Other Services						
TOTAL	20,058	20,584	20,939	21,564	21,229	21,810

NOTES: The sign --- signifies the figure is included in the category immediately above.

1989 figures are preliminary. Communication includes postal services.

Miscellaneous services includes all non-profit services in 1968-89.

SOURCE: 1968-89: INSEE, *Annuaire statistique de la France*.

Appendix Table 17: Distribution of Employment by Industrial Sector and Intermediate Industry Group
 ITALY, 1961-1990 (in Thousands)

Industry/Year	1961	1971	1981	1990*
I. Extractive	5,838	3,243	2,301	2,231
Agriculture	5,693	3,243	2,240	2,231
Mining	145	-----	61	-----
II. Transformative	7,818	8,350	7,942	6,941
Construction	2,345	2,026	1,845	1,643
Utilities	118	160	181	196
Manufacturing	5,355	6,164	5,916	5,102
Food	-----	-----	353	385
Textiles	-----	-----	1,238	1,162
Metal	-----	-----	1,379	1,094
Machinery	-----	-----	935	783
Chemical	-----	-----	284	306
Misc. Mfg.	-----	-----	1,726	1,372
III. Distributive Services	2,989	3,516	3,171	5,550
Transportation	967	992	961	1,304
Communication	^	^	294	310
Wholesale	2,023	2,524	714	4,036
Retail	^	^	1,201	^
IV. Producer Services	-----	-----	911	-----
Banking	213	286	333	421
Insurance	^	^	96	^
Real estate	-----	-----	10	-----
Engineering	-----	-----	278	-----
Accounting	-----	-----	84	-----
Misc. bus. serv.	-----	-----	28	-----
Legal services	-----	-----	81	-----
V. Social Services	-----	-----	3,741	-----
Medical, health serv.	-----	-----	334	-----
Hospital	-----	-----	507	-----
Education	-----	-----	1,442	-----
Welfare, relig. serv.	-----	-----	40	-----
Nonprofit org.	-----	-----	62	-----
Postal service	-----	-----	-----	-----
Government	1,352	1,216	1,270	3,624
Misc. social services	-----	-----	85	-----
VI. Personal Services	-----	-----	1,556	-----
Domestic serv.	-----	-----	226	-----
Hotel	-----	-----	174	959
Eating, drinking places	-----	-----	358	^
Repair services	-----	-----	390	-----
Laundry	-----	-----	54	-----
Barber, beauty shops	-----	-----	200	-----
Entertainment	-----	-----	99	-----
Misc. personal serv.	-----	-----	25	-----
All Other Services	1,376	2,221	-----	3,642
TOTAL	19,792	18,831	19,621	24,367

NOTE: The sign "^" signifies that the figure is included in the category immediately above.

*1990 figures may not be comparable to figures from earlier years due to the difference in sources.

SOURCES: 1961-81: Istituto Centrale di statistica, Censimento generale della popolazione.
 1990: Istituto nazionale di statistica, Annuario Statistico Italiano, edizione 1991.

Appendix Table 18: Distribution of Employment by Industrial Sector and Intermediate Industry Group

Great Britain, 1971-81 (in Thousands -- 10%)

UNITED KINGDOM (employees), 1970-92 (in Thousands)

Industry/Year	1971	1981	1970	1975	1980	1985	1990	1992
I. Extractive	103	88	836	753	1,087	932	749	380
Agriculture	63	51	793	401	361	341	298	265
Mining	39	37	443	352	726	591	451	114
II. Transformative	1,016	814	10,942	9,153	8,193	6,383	6,237	5,595
Construction	167	161	1,469	1,313	1,252	1,021	1,087	843
Utilities	36	31	388	353	---	---	---	260
Manufacturing	812	619	9,075	7,487	6,941	5,362	5,150	4,492
Food	74	69	910	726	730	596	540	496
Textiles	59	29	731	529	345	245	202	175
Metal	114	94	1,257	1,047	1,560	766	719	579
Machinery	197	162	2,161	1,741	1,814	1,447	1,396	1,229
Chemical	52	38	548	469	---	342	330	303
Misc. Mfg.	317	229	3,468	2,975	2,492	1,966	1,963	1,710
III. Distributive Services	458	464	4,386	4,281	4,573	4,362	4,706	4,398
Transportation	115	105	1,147	1,070	1,183	990	940	925
Communication	42	44	478	448	---	477	434	397
Wholesale	49	80	544	851	915	955	1,035	957
Retail	253	225	2,217	1,912	3,175	2,080	2,299	2,119
IV. Producer Services	172	180	1,178	1,296	1,734	2,068	2,734	2,615
Banking	38	48	367	424	464	521	634	586
Insurance	28	25	298	265	218	227	264	253
Real estate	8	9	64	85	---	119	145	140
Engineering	11	---	---	---	---	---	---	---
Accounting	16	---	95	86	---	---	---	170
Misc. bs. serv.	26	98	215	326	1,932	1,201	1,094	1,264
Legal services	12	---	107	109	---	---	---	204
V. Social Services	447	522	4,158	5,015	5,553	5,742	6,215	6,146
Medical, health serv.	23	145	1,045	1,255	1,557	1,683	1,860	1,847
Hospital	76	---	---	---	---	---	---	---
Education	147	153	1,506	1,936	1,749	1,730	1,897	1,858
Welfare, relig. serv.	27	---	20	29	578	744	904	718
Nonprofit org.	3	---	---	---	---	---	---	---
Postal service	---	---	---	---	---	---	---	---
Government	161	164	1,457	1,654	1,669	1,567	1,557	1,570
Misc. social services	10	60	130	141	---	---	---	152
VI. Personal Services	198	204	1,895	2,203	1,850	1,936	2,214	2,074
Domestic serv.	24	5	104	---	---	---	---	---
Hotel	23	93	287	258	979	1,042	1,272	282
Eating, drinking places	46	---	310	568	---	---	---	852
Repair services	50	33	421	433	211	218	230	243
Laundry	11	---	115	86	---	---	---	---
Barber, beauty shops	15	---	89	91	---	---	---	---
Entertainment	26	44	254	286	435	490	522	494
Misc. personal serv.	4	25	715	481	225	186	300	202
Unclassifiable	17	14	50	6	2	---	---	64
TOTAL	3,373	2,286	21,446	22,707	22,972	21,423	22,856	21,271

NOTES: The sign "—" signifies that the figure is included in the category immediately above.

The data for Great Britain are that of the employed, while the data for United Kingdom

are that of employees in employment. Postal service is included in Communication.

From 1980 UK figures, utilities is included under Mining. Chemical is included in Metal in 1980.

SOURCES: 1971, 1981: Census: Great Britain (Office of Censuses). 1970-92: Dept. of Employment

(Annual Abstract of Statistics, Employment Gazette).

Appendix Table 19: Distribution of Employment by Industrial Sector and Intermediate Industry Group
CANADA, 1971-1992 (in Thousands)

Industry/Year	1971	1981	1992*
I. Extractive	691	844	791
Agriculture	554	628	608
Mining	138	216	183
II. Transformative	2,265	3,160	3,093
Construction	530	767	867
Utilities	87	133	166
Manufacturing	1,648	2,279	2,060
Food	246	322	-----
Textiles	85	83	-----
Metal	250	409	-----
Machinery	193	261	-----
Chemical	97	130	-----
Misc. Mfg.	778	1,074	2,060
III. Distributive Services	1,739	2,722	3,323
Transportation	415	573	564
Communication	161	254	298
Wholesale	343	573	627
Retail	820	1,322	1,831
IV. Producer Services	555	1,152	1,561
Banking	162	326	510
Insurance	169	105	^
Real estate	^	206	304
Engineering	49	105	-----
Accounting	31	59	-----
Misc. bs. serv.	87	277	747
Legal services	37	74	-----
V. Social Services	1,835	2,853	3,132
Medical, health serv.	153	241	1,260
Hospital	345	477	^
Education	501	785	966
Welfare, relig. serv.	107	225	-----
Nonprofit org.	18	26	-----
Postal service	-----	-----	-----
Government	622	908	906
Misc. social services	88	189	-----
VI. Personal Services	628	1,126	1,873
Domestic serv.	51	46	-----
Hotel	124	676	898
Eating, drinking places	187	-----	^
Repair services	80	126	-----
Laundry	39	40	-----
Barber, beauty shops	53	64	-----
Entertainment	72	137	-----
Misc. personal serv.	22	38	975
Unclassifiable	613	-----	93
TOTAL	8,356	11,877	13,866

NOTES: The sign '^' signifies that the figure is included in the category immediately above.

*1992 figures may not be comparable to the earlier years due to the difference in sources.

SOURCES: 1971-81: Population Census. 1992: Statistics Canada (The Labour Force) May.

Appendix Table 20: Distribution of Employment by Occupation
United States, 1960–1991 (in Thousands)

Occupational Category	1960	1970	1980	1985	1990	1991
Managerial	7,308	8,289	10,919	12,221	14,839	14,954
Professional	7,790	11,140	15,613	13,630	15,818	16,058
Technicians	^	^	^	3,255	3,842	3,794
Sales	4,801	4,854	6,172	12,667	14,191	13,958
Clerical	9,786	13,714	18,105	17,309	18,641	18,334
Crafts and Operators	19,909	25,281	27,331	25,621	26,567	25,456
Semiskilled Service Workers	8,562	9,712	12,958	14,441	15,759	15,986
Semiskilled Transport Workers	3,214	2,510	3,468	4,535	4,849	4,878
Farm Workers and Managers	4,620	3,126	2,704	3,470	3,408	3,459
Not classifiable						
TOTAL	66,010	78,627	97,270	107,149	117,914	116,877

NOTES: ^ signifies that figure is included in the category immediately above.

Figures are seasonally adjusted annual data, except the 1960 data which are that of December.

SOURCE: Labor Statistics: Employment and Earnings, various issues.

Appendix Table 21: Distribution of Employment by Occupation
Canada, 1950-1992 (in Thousands)

Occupational Category	1950	1970	1980	1985	1992
Managerial	405	786	781	1,222	1,649
Professional	336	1,070	1,591	1,826	2,231
Technicians	71	^	^	^	^
Sales	329	558	1,098	1,022	1,255
Clerical	509	1,168	1,782	1,845	2,027
Crafts and Operators	1,351	2,331	2,651	2,386	2,675
Semiskilled Service Workers	421	967	1,338	1,466	1,729
Semiskilled Transport Workers	331	418	414	408	447
Farm Workers and Managers	1,043	580	538	507	645
TOTAL	4,796	7,879	10,193	10,682	12,658

NOTE: ^ signifies that figure is included in the category immediately above.

1950 figures were taken on March 4, 1950. 1980 and 1985 figures are that of January-1992 figures are that of July.

SOURCE: Statistics Canada, The Labour Force, various issues.

Appendix Table 2: Distribution of Employment by Occupation
Great Britain, 1961–1981 (in Thousands)

Occupational Category	1961	1971	1981	1990
Managerial	617	92	134	2,855
Professional	1,994	216	301	5,662
Technicians	^	59	52	^
Sales	2,216	225	225	1,720
Clerical	3,032	356	375	4,501
Crafts and Operators	9,849	862	710	5,837
Semiskilled Service Workers	2,727	320	355	3,322
Semiskilled Transport Workers	1,473	253	231	1,463
Farm Workers and Managers	920	74	61	417
Not Classifiable		65	96	253
TOTAL	22,827	2,522	2,540	26,030

NOTE: ^ signifies that figure is included in the category immediately above.

SOURCE: Census, 1961, 1971, 1981, 1990; Labour Force Survey.

Appendix Table 23: Distribution of Employment by Occupation
 France, 1982-1989 (in Thousands)

Occupational Category	1982	1989
Managerial	1,639	1,795
Professional	1,111	1,427
Technicians	2,847	2,966
Sales	760	904
Clerical	5,273	5,778
Crafts and Operators	7,151	6,688
Semiskilled Service Workers	1,433	1,717
Semiskilled Transport Workers	1,070	990
Farm Workers and Managers	1,863	1,562
TOTAL	23,146	23,826

NOTE: ^ signifies that figure is included in the category immediately above.

SOURCE: 1982: Enquete sur l'emploi de mars 1982, 1989: Enquete sur l'emploi de mars 1989.

Appendix Table 24: Distribution of Employment by Occupation
Germany, 1976 – 1989 (in Thousands)

Occupational Category	1976	1980	1985	1989
Managerial	978	865	1,067	1,147
Professional	2,842	2,973	3,487	3,841
Technicians	1,800	1,940	2,145	2,408
Sales	1,964	2,043	2,083	2,147
Clerical	3,380	3,804	3,462	3,805
Crafts & Operators	8,183	8,557	7,801	7,725
Semiskilled Service Workers	3,214	3,344	4,374	3,421
Semiskilled Transport Workers	1,632	1,638	1,512	1,522
Farm Workers and Managers	3,482	1,288	1,088	856
Not Classifiable	279	323	569	829
TOTAL	25,754	26,775	27,608	27,701

NOTE: ^ signifies that figure is included in the category immediately above.

SOURCE: 1976 – 89: Statistisches Bundesamt, Statistisches Jahrbuch, various issues.

Appendix Table 25: Distribution of Employment by Occupation
Japan, 1955 - 1990 (in Thousands)

Occupational Category	1955	1960	1965	1970	1975	1980	1985	1990
Managerial	900	910	1,310	1,340	2,060	2,200	2,110	2,390
Professional	1,900	2,200	2,380	2,950	3,640	4,380	5,380	6,900
Technicians	^	^	^	^	^	^	^	^
Sales	5,430	5,960	6,150	6,620	7,380	7,970	8,610	9,400
Clerical	3,700	4,990	6,360	7,550	8,200	9,240	10,210	11,570
Crafts and Operators	11,040	13,110	14,840	17,400	17,370	18,260	19,230	19,790
Semiskilled Service Workers	2,190	2,980	3,540	3,870	4,570	5,010	5,010	5,350
Semiskilled Transport Workers	710	1,000	1,770	2,320	2,370	2,480	2,270	2,330
Farm Workers and Managers	15,030	13,220	10,940	8,800	6,540	5,700	5,020	4,480
TOTAL	40,900	44,370	47,290	50,850	52,130	55,240	57,840	62,210

NOTE: ^ signifies that figure is included in the category immediately above.

Sweepers and garbage collectors are included in Semiskilled service category between 1970 and 1980.

From 1985, they are included in Crafts & Operators category.

SOURCE: Statistical Yearbook of Japan, 1991.

Appendix Table 26: Distribution of Employment by Employment Status
 United States, 1950-91 (in Thousands)

Employment Status	1950	1955	1960	1965	1970	1975	1980	1985	1987	1990	1991
Employees	46,985	50,962	55,180	61,418	70,645	77,550	89,950	97,406	102,403	107,394	106,193
Self-Employed	10,359	9,577	9,098	8,394	7,031	7,427	8,642	9,269	9,624	10,160	10,341
Family workers	1,573	1,634	1,499	1,278	1,001	869	710	474	513	359	343
TOTAL	58,917	62,173	65,777	71,090	78,677	85,846	99,302	107,149	112,540	117,913	116,877

SOURCE: Dept. of Labor, Labor Force Statistics, various issues.

Appendix Table 27: Distribution of Employment by Employment Status
Japan, 1955-1990 (in Thousands)

Employment Status	1955	1960	1965	1970	1975	1980	1985	1990
Employees	17,780	23,700	28,760	33,060	36,460	39,710	43,130	48,350
Self-Employed	10,280	10,060	9,390	9,770	9,390	9,510	9,160	8,780
Family workers	12,840	10,610	9,150	8,050	6,280	6,030	5,590	5,170
TOTAL	40,900	44,370	47,300	50,880	52,130	55,250	57,880	62,300

SOURCE: Statistical Yearbook of Japan, 1991.

Appendix Table 28: Distribution of Employment by Employment Status
Germany, 1955-89 (in Thousands)

Employment Status	1955	1960	1965	1970	1975	1980	1989
Employees	17,160	19,530	21,758	22,246	22,014	23,009	24,718
Self-Employed	3,215	3,240	2,923	2,690	2,445	2,360	2,463
Family workers	2,855	2,560	2,206	1,732	1,351	959	561
TOTAL	23,230	25,330	26,887	26,668	25,810	26,328	27,742

NOTE: 1955 and 1960 figures do not include Berlin.

SOURCE: Statistisches Jahrbuch für die Bundesrepublik Deutschland, various issues.

Appendix Table 29: Distribution of Employment by Employment Status
 France, 1977-1987 (in Thousands)

Employment Status	1977	1979	1983	1985	1987
Employees	17,232	17,598	17,707	17,713	17,904
Self-Employed	2,692	2,649	2,739	2,692	2,709
Family workers	1,072	984	915	892	782
TOTAL	20,996	21,231	21,361	21,297	21,395

SOURCE: The Labour Force Survey and The Labour Force Sample Survey, Eurostat, various issues.

Appendix Table 30: Distribution of Employment by Employment Status
Italy, 1970-1989 (in Thousands)

Employment Status	1970	1975	1980	1985	1989
Employees	12,811	13,735	14,499	14,418	14,765
Self-Employed	6,407	5,756	4,724	4,986	5,163
Family workers	-	-	1,090	1,104	904
TOTAL	19,218	19,491	20,313	20,508	20,832

SOURCE: OECD Labour Force Statistics: 1969-1989, OECD, 1991.

Appendix Table 31: Distribution of Employment by Employment Status
 United Kingdom, 1969 - 1989 (in Thousands)

Employment Status	1969	1970	1975	1985	1989
Employees	22,625	22,479	22,723	21,423	22,276
Self-Employed	1,853	1,902	1,996	2,610	2,986
Family workers	---	---	---	176	343
TOTAL	24,478	24,381	24,719	24,209	25,605

SOURCE: OECD Labour Force Statistics: 1969 - 1989, OECD, 1991.

Appendix Table 32: Distribution of Employment by Employment Status
 Canada, 1959 - 1992 (in Thousands)

Employment Status	1959	1970	1971	1975	1980	1985	1989	1992
Employees	4,615	7,004	7,675	8,375	9,651	10,051	11,309	11,367
Self-Employed	496	915	675	777	935	1,067	1,111	1,227
Family workers	52	---	284	132	122	102	66	64
TOTAL	5,163	7,919	8,633	9,284	10,708	11,220	12,486	12,658

SOURCE: Statistics Canada, The Labour Force, various issues.

Appendix Table 33

Occupations with the largest job growth, 1990-2005, moderate alternative projection United States				
(Numbers in thousands)				
Occupation	Employment		Numerical change	Percent change
	1990	2005		
Salespersons, retail	3,619	4,506	887	24.5
Registered nurses	1,727	2,494	767	44.4
Cashiers	2,633	3,318	685	26.0
General office clerks	2,737	3,407	670	24.5
Truckdrivers, light and heavy	2,362	2,979	617	26.1
General managers and top executives	3,086	3,681	595	19.4
Janitors and cleaners, including maids and housekeeping cleaners	3,007	3,567	560	18.5
Nursing aides, orderlies, and attendants	1,274	1,826	552	43.4
Food counter, fountain, and related workers	1,607	2,158	550	34.2
Waiters and waitresses	1,747	2,196	449	25.7
Teachers, secondary school	1,200	1,717	437	34.2
Receptionists and information clerks	900	1,322	422	46.9
Systems analysts and computer scientists	463	829	366	78.9
Food preparator workers	1,150	1,521	365	31.6
Child care workers	726	1,078	353	48.8
Gardeners and groundskeepers, except farm	674	1,027	348	39.6
Accountants and auditors	985	1,325	340	34.5
Computer programmers	565	862	317	56.1
Teachers, elementary	1,567	1,875	313	20.0
Guards	683	1,161	296	39.7
Teacher aides and educational assistants	800	1,086	276	34.4
Licensed practical nurses	644	913	269	41.9
Clinical supervisors and managers	1,218	1,461	263	21.6
Home health aides	287	550	263	91.7
Cooks, restaurant	615	872	257	41.6
Maintenance repairers, general utility	1,128	1,379	251	22.2
Secretaries, except legal and medical	3,064	3,312	248	8.1
Cooks, short order and fast food	743	969	246	33.0
Stock clerks, sales floor	1,747	1,451	209	16.8
Lawyers	587	793	206	35.1

SOURCE: Silvestri, G & Lukaszewicz, J. "Outlook 1990-2005: Industry Output and Employment," *Monthly Labor Review* (November, 1991).

Appendix Table 34

Projected growth occupations, by level of education required United States	
Group I: <i>Occupations generally requiring a bachelor's degree or more education</i>	Teacher aides and educational assistants
System analysts and computer scientists	Registered nurses
Physical therapists	Legal secretaries
Operations research analysts	Medical secretaries
Psychologists	
Computer programmers	Group III: <i>Occupations generally requiring high school graduation or less education</i>
Occupational therapists	Home health aides
Management analysts	Human services workers
Marketing, advertising, and public relations managers	Personal and home care aides
General managers and top executives	Correction officers
Teachers, secondary school	Travel agents
Teachers, elementary school	Flight attendants
Accountants and auditors	Salespersons, retail
Lawyers	General office clerks
	Cashiers
Group II: <i>Occupations generally requiring some post-secondary training or extensive employer training</i>	Food counter, fountain, and related workers
Paralegals	Truckdrivers, light and heavy
Radiologic technologists and technicians	Nursing aides, orderlies, and attendants
Medical assistants	Janitors and cleaners, including maids and housekeeping cleaners
Physical and corrective therapy assistants and aides	Waiters and waitresses
Data processing equipment repairers	Food preparation workers
Medical records technicians	Receptionists and information clerks
Surgical technicians	Gardeners and groundskeepers, except farm
Cooks, restaurant	Guards
Respiratory therapists	Child care workers
Licensed practical nurses	Secretaries, except legal and medical
Maintenance repairers, general utility	Cooks, short order and fast food
	Clerical supervisors and managers
	Stock clerks, sales floor

Source: see Appendix Table 33

Appendix Table 35

Occupations with the largest job declines, 1990-2005, moderate alternative projection				
United States				
(Numbers in thousands)				
Occupation	Employment		Numerical change	Percent change
	1990	2005		
Farmers	1,074	850	-224	-20.9
Bookkeeping, accounting, and auditing clerks	2,276	2,143	-133	-5.8
Child care workers, private household	314	190	-124	-39.5
Sewing machine operators, garment	585	408	-176	-29.8
Electrical and electronic assemblers	732	120	-612	-83.6
Typists and word processors	977	600	-377	-38.6
Cleaners and servants, private household	411	310	-101	-24.5
Farm workers	837	745	-92	-11.0
Electrical and electronic equipment assemblers, precision	171	90	-81	-47.5
Textile draw-out and winding machine operators and tenders	199	139	-61	-30.6
Switchboard operators	246	189	-57	-23.2
Machine forming operators and tenders, metal and plastic	174	131	-43	-24.5
Machine tool cutting operators and tenders, metal and plastic	145	104	-41	-28.3
Telephone and cable tv line installers and repairers	130	92	-38	-29.4
Central office and fax installers and repairers	90	46	-44	-48.5
Central office operators	53	22	-31	-58.2
Statistical clerks	85	54	-31	-36.1
Packaging and filling machine operators and tenders	324	297	-27	-8.3
Station installers and repairers, telephone	47	21	-26	-57.0
Bank tellers	517	492	-25	-4.8
Lathe and turning machine tool setters and set-up operators, metal and plastic	80	61	-19	-24.4
Grinders and polishers, hand	84	65	-19	-22.5
Electromechanical equipment assemblers, precision	49	31	-18	-36.5
Grinding machine setters and set-up operators, metal and plastic	72	54	-18	-25.1
Service station attendants	246	229	-17	-7.1
Directory assistance operators	26	11	-15	-57.4
Butchers and meatcutters	204	190	-14	-6.9
Chemical equipment controllers, operators, and tenders	75	61	-14	-19.1
Drilling and boring machine tool setters and set-up operators, metal and plastic	52	39	-13	-25.0
Meter readers, utilities	50	37	-13	-24.6

Source: see Appendix Table 33