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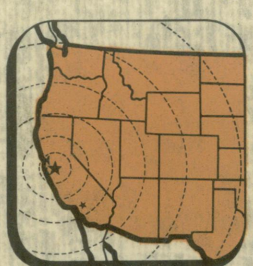
PRODUCTIVITY IN MANUFACTURING IN THE POSTWAR PERIOD IN CANADA, WESTERN EUROPE, AND THE UNITED STATES



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PRODUCTIVITY IN MANUFACTURING IN THE POSTWAR PERIOD IN CANADA, WESTERN EUROPE, AND THE UNITED STATES

by

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FOREWORD

The author wishes to acknowledge his indebtedness to several colleagues at Stanford Research Institute, particularly to Bonnar Brown, William J. Platt, and Robert A. Harker, who have contributed many valuable suggestions during the course of this study and the preparation of the manuscript.

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STATISTICAL DATA

I. Introduction

This article reports the results of a study of the relative productivity of manufacturing labor in eleven Western European countries and Canada as compared with the productivity of manufacturing labor in the United States. The data for the study were collected in connection with research conducted for the Operations Research Office of the Johns Hopkins University by Stanford Research Institute but did not have any direct bearing on the objectives of such research.

Productivity is herein measured by the value added in manufacturing, i.e., the total value of shipments less the cost of materials, supplies and containers, fuel, purchased electric energy, and contract work. Manufacturing labor includes all employees of manufacturing plants, not production workers alone.

Although the productivity of labor has come in for much discussion of late, considerable confusion attends the use of the term. In this paper productivity of labor (or more precisely, average productivity) will refer merely to the ratio of physical output to labor input. This term should not be confused with marginal productivity (the rate of increase of physical output per unit increase in labor input), nor with any notion of intrinsic efficiency of labor. One can also speak of the productivity of capital in either the average or the marginal sense.

The pioneer work of Colin Clark[1/] has shown that for at least 40 years (and perhaps much longer) the productivity of labor has been higher in United States than anywhere else. During most of this period the American advantage has been steadily increasing. It is impossible to appraise accurately the relative importance of the various factors contributing to this development. It is very likely that no single factor is paramount. High American labor productivity is often attributed to the large amount of capital available per worker. That other causes are involved is suggested by the fact that the productivity of American capital seems to be almost as high as that in Western Europe, although this is hard to establish: reliable estimates of total physical capital are very difficult to obtain, even for the United States.

Duane Evans, of the Bureau of Labor Statistics, who has given considerable thought to questions of productivity, has pointed out informally that industrial management abroad is usually under the control of executives with fiscal backgrounds rather than marketing or production viewpoints. Policies are often directed toward high prices, high profit margins, and limited production, which exclude any possibilities of economies of scale. Limited markets, particularly in small countries and under existing restrictions on international trade, have accentuated this effect. Brand differentiation, lack of standardized products, and related factors have greatly reduced the intensity of price competition abroad. Lack of labor mobility and of wage flexibility have made European economies less adaptable and less efficient as operating wholes. The higher standard of living prevalent in labor

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1/ Clark, Colin. The Conditions of Economic Progress. 2nd Ed. London, MacMillan Company, (1951).

shortage countries, such as the United States, must be closely related to the higher productivity found there; but it is not entirely clear which of these factors is the cause and which the effect.

Other factors have undoubtedly contributed to the superior efficiency of the United States labor-management team. Educational advantages of the United States are probably important both with respect to the broad coverage of the well equipped public school system and the extra-curricular training provided by repairs on the omnipresent family car or other electro-mechanical gear around the home or on the farm. A final factor of importance is undoubtedly the American emphasis on applied research and the prompt innovation of technological improvements in industrial processes.

Fortunately, the present paper is concerned only with measurement of relative productivity, and not with explanation of the ratios found. The method followed is similar to that which Rostas[1/] has called the global approach: census type data have been employed to give relative outputs and relative labor inputs. Outputs have been taken initially in value terms and converted to relative real outputs by the use of estimated parity exchange rates. This approach suffers from differences in industrial classification and other incompatibilities in source data; but these defects are not as fatal as they could have been because relative productivities do not vary radically from industry to industry. Incompatibilities between the coverages of employment figures and output figures are more serious. These defects may have accounted for an appreciable portion of the industry-to-industry differences noted. In particular, in this study they have precluded any attempt at comparisons between simple single-product industries other than one for hard coal mining.

Because of the possible inaccuracies of some of the data and the errors introduced by indirect estimating techniques, many of the individual relatives were calculated by more than one method and then reconciled. A discussion of the reliability of the figures is given in Section VI at the close of the paper.

II. Summary

Average productivity of manufacturing labor in Western Europe is about 35 percent of that in the United States. This means that in manufacturing plants about three times as many persons are employed per unit of output in Europe as in the United States.

Relative productivity per employee for Canada and for each of the eleven European countries is presented in Figure 1, which shows for the year 1950 the estimated value added per employee in each country and the relationship of these values to the comparable figure for the United States. The only significant variations from the average productivity of 35 percent appear in Canada, with a value of 78 or 79 percent; Sweden and United Kingdom, with values of 50 and 45 percent; and in Italy and Spain, with values of 20 and 15 percent, respectively.

1/ Rostas, L., International Comparisons of Productivity. International Labour Review, Vol. LVIII No. 3, September, 1948, Rostas uses prewar data only, but incidentally gives an excellent analysis of factors contributing to high United States productivity.

Table I gives productivity relatives for the twelve countries in each year during the period 1947 to 1951. Except for some lags in recovery of production after World War II, this table indicates a considerable degree of stability in the relatives.

III. Measures of Productivity

While it was ultimately desired to have productivity relatives by industry, the paucity of the data suggested that the first attempt should be to derive productivity relatives for manufacturing as a whole, by countries. For this purpose it was frequently necessary to employ data for all industry instead of data for manufacturing alone. "All industry" includes mining and utilities as well as manufacturing. The results were practically the same, because mining and utilities have only a slight effect on the relatives.

Data on value added by manufacture are reported directly in very few countries, although these figures were sometimes found under other names, such as plus value, or net value of production. Since value added figures were seldom available, consideration was also given to other measures which might vary among countries in approximately the same manner as value added. Gross value of goods produced (sometimes called gross sales) and labor cost are such measures. In addition to these measures, two other sources were available for estimating productivity relatives. One was a United Nations comparison of net value of industrial output in dollars in 1938; these figures were carried forward to 1950 by the production indexes. Another was a set of weights employed by the United Nations in construction indexes of total production and total employment for a group of European countries.

The relation of value added to gross production and labor cost was found to be of the same character in Western European countries as in the United States. Accordingly, the comparison of any one of these types of data for a European country and the United States would give a productivity relative comparable to that derived from value added figures.

Table II shows the relations between these various measures of manufacturing production for each country where more than one measure was available. The correspondence is close enough that productivity relatives derived from such measures can be considered as fair approximations.

In preparing Table II, it was necessary to convert local currencies into dollars. This was done by means of a set of imputed real exchange rates based on prices of industrial goods, which was developed by the United Nations. These exchange rates are given in Table III along the rates used for Canada, which were derived independently. Actual figures on production were not available for all years, and the missing data were estimated from actual data by the use of indexes prepared by the United Nations which give output per man in industry. The indexes are shown in Table IV.

IV. Calculations of Relative Productivity by Country

The methods used and results found in estimating productivity relatives using the several measures are described in the following sections. Subsequently, the various estimates are brought together, showing final estimates for each country. These were selected on the basis of all the data.

Value Added Per Employee. Scattered value added figures are available for six countries: Canada, Denmark, Italy, Norway, The Saar, and the United Kingdom. Additional figures for other years were derived by the use of the

United Nations indexes of output per man, Table IV. These were then compared with value added figures for the United States to arrive at the tentative productivity relatives given in Table V.

Gross Production Per Employee. Gross production data are available for more countries than are data for value added. These figures cover Canada, Denmark, Germany, Netherlands, Norway, The Saar, Spain, Sweden, and the United Kingdom. They are mainly gross sales per employee. Figures for years for which data were not available were derived by the use of the United Nations indexes of output per man, Table IV. The figures were then compared with figures for corporate sales in the United States to arrive at another set of tentative productivity relatives, shown in Table VI.

In the case of Spain, gross production figures are available only for "metals," which apparently include mining, smelting, primary metals manufacture, and possibly some fabrication.

Labor Cost. Economic considerations suggest that in the long run labor cost will adjust to productivity under suitable equilibrium conditions. Labor cost figures are available for Canada and for ten European countries, adding Belgium, France, and Italy to the group covered by gross production figures. Comparisons with labor cost in the United States gave the set of tentative productivity relatives shown in Table VII.

Net Value of Industrial Output in 1938 Dollars. The United Nations reported certain data on the net value of industrial output per employee for Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, and the United Kingdom. All figures are in 1938 dollars and are available for 1938, 1948, and 1949, except for Germany and the United Kingdom. In these countries, instead of 1938, the earliest years are 1936 and 1937, respectively; and in Germany, figures are not available for 1948 and 1949.

Similar data for 1950 in 1938 dollars were derived by means of the United Nations indexes of output per man. The figures were then compared with a 1950 figure for the United States, deflated to 1938 dollars. The tentative productivity relatives thus derived are shown in Table VIII.

Implicit Weights in Western European Index. The United Nations has developed indexes of total production and total employment for European countries as a group. The indexes themselves are not relevant to productivity comparisons, but the relative weights assigned to the individual countries provide information on each country's share of total production and total employment. Further, the deviation of each country's productivity from the average productivity for all the countries could be calculated.

The relative weights were obtained by expressing each country's production as a percentage of the total production, and each country's employment as a percentage of total employment, and dividing the production percentages by the employment percentages. The results are given in column C of Table IX.

To utilize these relative weights for the purpose of calculating productivity relatives for each country, it was necessary to have the average productivity relative for the group as compared with the United States. An estimate of the group relative was made by the following procedure of successive approximations. A value for the group was assumed for 1950 and compared with each

country's tentative productivity relatives, accumulated from Tables V, VI, and VII. From this comparison, it was possible to tell whether the assumption was too high or too low. A new assumption was made and the process repeated until the derived productivity relatives were reasonably well bracketed by the data from Tables V, VI, and VII. The average productivity relative for the group of European countries was thus estimated at 35 percent. The corresponding relatives for the various countries are given in Table IX.

Final Estimates of Relative Productivity. The various tentative productivity relatives were assembled, as shown in Table X. These data were inspected, taking into account the variations in the basic figures and the methods of calculations; and final estimates of the productivity relatives for 1950 were selected.

While the purpose of the study required only 1950 relatives, a time series of relatives for the period 1947-1950 was also calculated, Table I. The relatives for other years were derived from the 1950 relatives through the use of the indexes of output per man given in Table IV. These resulting figures were adjusted in a few cases to make them more consistent with data for 1948 and 1949 appearing in Tables V, VI, and VII. The time series of relatives thereby derived is given in Table I.

V. Calculation of Relative Productivity by Industry

Data by industry groups are available for value added, gross production, or both, in eight countries--Canada, Denmark, Germany, Italy, Netherlands, Norway, Sweden, and the United Kingdom. These give an incomplete but fairly representative cross section of Canadian and Western European industry. Table XI shows productivity relatives derived by comparing the value added figures with value added per employee in the United States and the gross production figures with gross sales per employee in the United States.

For each country, the relative productivity for a particular industry was divided by the relative productivity for all manufacturing. These ratios, given in Table XII, when averaged over the various countries, gave a measure of the productivity for that industry relative to all manufacturing. Of the industries considered, chiefly in the engineering or hard goods categories, only two show any appreciable departure from the general level; namely, Petroleum and Coal, and Transportation Equipment. Both of these have relatives about 20 percent below average, reflecting in part the exceptional position of the American automobile industry. However, a large amount of service station receipts are included in United States corporate sales figures for the Petroleum and Coal sector as given in the Survey of Current Business; these exaggerate the true difference.

The practice of different countries varied considerably with respect to classification of industries as well as with respect to methods of handling proceeds from contract work (usually excluded) or by-products. Differences also existed with respect to whether allocation of revenues was based on classification by primary products of the individual plant or of the whole firm or on some pro rata basis.

The lack of uniformity of treatment would at first suggest that little significance be attached to the industry-by-industry comparisons. The remarkable consistency of the results, however, is of use in that it helps corroborate the all-industry comparisons by the central tendency of comparisons from virtually a random assortment of economic activities. This is discussed further in subsequent paragraphs.

VI. Reliability of the Estimating Procedure

The estimates of relative productivities were based essentially on the exchange rates. The period from 1947 to 1950, to which the production and employment data pertained, was a period of monetary devaluations and wide price variations between countries and commodities. Under such circumstances, the reliability of the exchange rates was subject to some question because of the difficulty experienced in arriving at appropriate price averages for comparison. As one check on the exchange rates, Table XIII gives a direct comparison of productivities in hard coal mining in six European countries and the United States. Hard coal mining is the only activity in which data were readily available for a comparison in nonmonetary terms.

The nature of the analysis used, as well as qualitative differences between the various factors considered, precluded any possibility of assigning confidence limits or other statistical estimates of margin of error. Since the extreme discrepancies among prices for various industry groupings and for two different countries amounted to as much as 60 percent, an error of 20 to 30 percent in individual productivity estimates is not unlikely. On the other hand, the general consistency of the results and the reasonableness of relative positions of the various countries indicate that errors appreciably above those limits are also unlikely. The individual industry relatives of Table XII follow a normal probability distribution, with a probable error of only about 15 percent, even including the data from the Petroleum and Coal sector. The probable errors in country averages due specifically to random variations in relatives would amount to less than 5 percent.

It should be pointed out that the principal weaknesses in the global approach are associated with difficulties in obtaining comparable aggregative data. For example, the censuses of manufacturers in most countries (where any such census exists) exclude small plants, but the cutoffs are at different levels. United States data for 1950 indicate that relative outputs per man for large plants (more than 250 employees) averaged about 20 percent higher than those for small plants (under 250 employees). Because the census cutoffs in other countries were much lower (usually at 10 or 12 employees), some variations may have resulted from this size of plant effect.

Errors of much greater order of magnitude can be introduced by improper use of output figures having coverage which does not correspond to the employment figures. In cases where strict comparability is not feasible, extreme errors can be avoided either by (a) dividing fully adequate estimates of relative outputs by fully adequate estimates of relative employment (whether or not these relatives are themselves comparable) or by (b) dividing a valid estimate of output per man in one country by a valid but not exactly

comparable estimate of output per man in another country. These alternatives work only because employment distributions are sufficiently similar in most of the countries considered to justify the approximation involved in (a), and because productivities are sufficiently constant from industry to industry to justify the approximation involved in (b).

As a rough check on the sensitivity of results to variations in coverage, Table XIV gives estimates of relative productivity based on national income per capita and on income per available man in the labor force. The results do not differ greatly either from each other or from the relative productivities found in manufacturing.

S T A T I S T I C A L D A T A

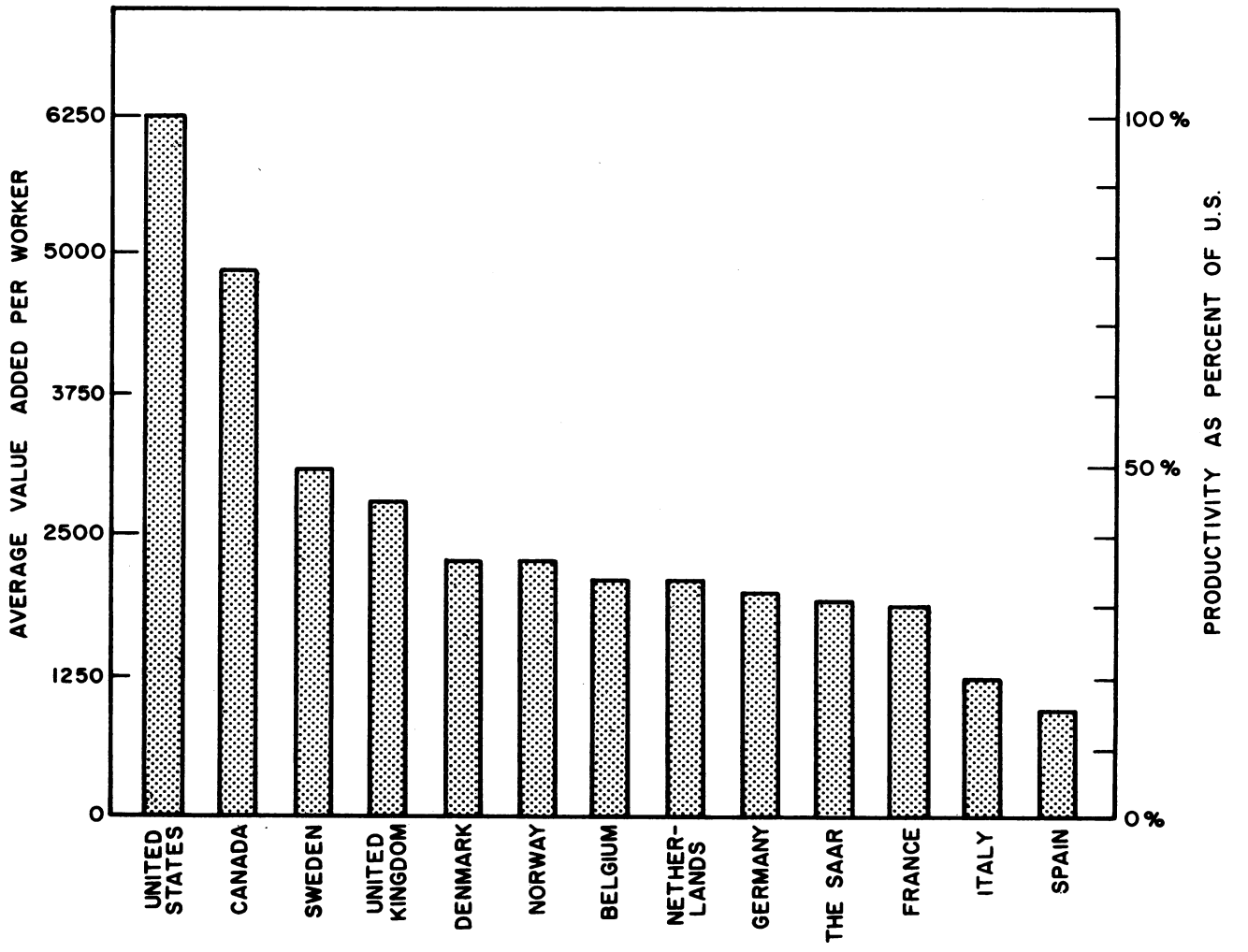

FIG. 1

RELATIVE PRODUCTIVITY AND AVERAGE VALUE ADDED PER WORKER IN MANUFACTURING - 1950

Table I

ESTIMATED RELATIVE PRODUCTIVITY OF LABOR IN MANUFACTURING
(United States = 100)

Country	1947	1948	1949	1950
Belgium	32	33	35	34
Canada	78	78	79	78
Denmark	36	37	38	37
France	27	30	32	30
Germany	15	21	29	32
Italy	17	18	18	20
Netherlands	32	33	35	34
Norway	36	36	38	37
The Saar	-	29	33	31
Spain	14	14	15	15
Sweden	43	45	47	49
United Kingdom	41	43	46	45

Table II

MEASURES OF MANUFACTURING PRODUCTION

Measures
(In Current Dollars per Employee)

Country	A Value Added Per Man[1]			B Gross Production Per Man[1]			C Labor Cost Per Man[2]		
	1948	1949	1950	1948	1949	1950	1948	1949	1950
Canada	4,300	4,400	4,800	10,200	10,300	11,200	2,080[1]	2,150[1]	2,250[1]
Denmark	2,100	2,100	(2,200)[3]	4,600	4,600	(4,800)	(1,125)	1,125	1,030
Germany	-	-	-	(2,600)	(3,700)	4,400	(540)	735	890
Italy	(1,000)	(1,100)	1,200[4]	-	-	-	(490)	548	550
Netherlands	-	-	-	4,900	5,500	5,700	(900)	955	935
Norway	2,500	2,400	(2,500)	5,000	4,900	(5,300)	(1,035)	1,270	1,060
The Saar	(1,400)	1,500	1,500	(3,800)	4,500	4,200	-	-	-
Spain	-	-	-	2,100	2,100	-	-	405	340
Sweden	-	-	-	5,900	6,100	(6,400)	(1,260)	1,250	1,265
United Kingdom	2,100[5]	(2,200)	(2,500)	5,700	(6,000)	(6,400)	(1,160)	1,165	1,200
United States	5,470[5]	5,560	6,250	12,770	12,830	14,230	(2,800)	2,750	2,960

Ratios

Country	A to B			C to A			C to B		
	1948	1949	1950	1948	1949	1950	1948	1949	1950
Canada	42	43	42	48	49	47	20	21	20
Denmark	46	46	(46)	(54)	54	(47)	(25)	24	(21)
Germany	-	-	-	-	-	-	(21)	(20)	20
Italy	-	-	-	(49)	(50)	46	-	-	-
Netherlands	-	-	-	-	-	-	(18)	17	16
Norway	50	49	(47)	(41)	53	(42)	(21)	26	(20)
The Saar	(37)	33	36	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	19	-
Sweden	-	-	-	-	-	-	(21)	21	(20)
United Kingdom	37	(37)	(39)	55	(53)	(48)	(20)	(19)	(19)
United States	43	43	44	51	50	47	(22)	21	21

1/ Derived from United Nations Statistical Yearbook, 1951, and ..., 1952 table entitled "Structure of Manufacturing" except as otherwise noted.
2/ Derived from United Nations Economic Survey of Europe in 1950.
3/ Figures in parentheses were derived from figures for other years by use of the indexes of production per man, given by the United Nations or as otherwise indicated in Table IV.
4/ Derived from official government statistics of the country.
5/ Estimated as 43.0 percent of corporate sales; 43 percent is the average of 1947, 1949, and 1950 percentages, which were 41.8, 43.4, and 43.9 respectively.

Table III

ESTIMATED PARITY EXCHANGE RATES BASED ON PRICES OF INDUSTRIAL GOODS
(Foreign Monies Valued in United States Cents)

Year	Belgium	Canada[1]	Denmark	France	Germany	Italy
1947	1.863	116	17.6	0.6583	-	0.195
1948	1.753	106	16.5	0.3834	-	0.172
1949	1.715	97	15.9	0.3391	23.7	0.178
1950	1.647	95	15.2	0.3161	26.16	0.177

	Netherlands	Norway	The Saar[2]	Spain[3]	Sweden	United Kingdom
1947	36.7	19.0	0.658	4.3	24.9	396.4
1948	35.2	16.8	0.383	4.0	23.4	368.4
1949	35.4	15.7	0.339	3.7	23.1	364.3
1950	32.2	15.1	0.316	3.06	22.4	358.0

1/ Canadian rates based on free exchange rate of 1950 carried back through 1947 by use of Canadian and United States index of wholesale prices for finished goods.
2/ The French rates are used for The Saar.
3/ The 1950 rate for Spain is derived from National Income estimates by the Office of Intelligence Research, U. S. Department of State in Indicators of the Economic Potential of Western Europe, Canada, the U. S., and the Soviet Bloc, in 1950. OIR Unclassified Report No. 5549. Values for 1947, 1948, and 1949 are derived from the 1950 value by use of general index of wholesale prices.

Source: United Nations, Economic Surveys of Europe, 1950 and 1951.

Table IV

OUTPUT PER MAN IN INDUSTRY[1]
(1935-38 = 100)

Country	1947	1948	1949	1950	1951
Belgium	81	85	90	93	102
Canada[2]	95	96	97	102	-
Denmark	92	96	98	102	100
France	81	92	99	98	108
Germany	38	52	72	84	95
Italy	81	86	91	104	-
Netherlands	73	77	82	84	83
Norway	88	90	95	99	102
The Saar[3]	-	56	64	65	77
Sweden	111	116	121	126	128
United Kingdom	105	112	118	125	128
United States[4]	127	129	127	137	140

1/ United Nations, Economic Survey of Europe in 1950, and... in 1951, except as otherwise noted.
2/ Canadian figures derived by dividing official index of industrial production by index of nonagricultural employment as given in the United Nations Statistical Yearbook, 1952.
3/ 1938 = 100. Series obtained by dividing index numbers of production by index numbers of employment.
4/ U. S. figures derived by dividing FRB index of industrial production by employment index derived from actual series on full-time equivalent employees in industry as given in Survey of Current Business.

Table V

PRODUCTIVITY RELATIVES DERIVED FROM
FIGURES FOR VALUE ADDED IN MANUFACTURING

Country	Value Added Per Employee[1] In Current Dollars			Productivity Relatives (USA = 100)		
	1948	1949	1950	1948	1949	1950
Canada	4,300	4,400	4,800	79	79	77
Denmark	2,100	2,100	(2,200)[2]	38	38	35
Italy	(1,000)	(1,100)	1,200[3]	18	20	19
Norway	2,500	2,400	(2,500)	46	43	40
The Saar	(1,400)	1,500	1,500	26	27	24
United Kingdom	2,100	(2,200)	(2,500)	38	40	40
United States	5,480[4]	5,560	6,250			

1/ Derived from the United Nations Statistical Yearbook, 1951, table entitled "Structure of Manufacturing," with the aid of the parity exchange rates of Table III.

2/ Figures in parentheses were estimated from actual figures for other years by means of indexes of output per man in Table IV.

3/ Derived from Annuario Statistico Italiano, 1951, with the aid of the parity exchange rates.

4/ Estimated as 43 percent of corporate sales, since 43 percent is the average of 1947, 1949, and 1950 percentages which were 41.8, 43.4, and 43.9, respectively.

Table VI

PRODUCTIVITY RELATIVES DERIVED FROM
GROSS PRODUCTION FIGURES (MANUFACTURING)

Country	Gross Production Per Employee In Current Dollars 1/			Productivity Relatives (USA = 100)		
	1948	1949	1950	1948	1949	1950
Canada	10,200	10,300	11,200	80	80	79
Denmark	4,600 2/	4,600	(4,800) 3/	36	36	34
Germany	(2,600)	(3,700)	4,400 4/	20	29	31
Netherlands	4,900	5,500	5,700	38	43	40
Norway	5,000	4,900	(5,300)	39	38	37
The Saar	(3,800)	4,500	4,200	30	35	30
Spain	2,100 5/	2,100 5/	-	16 5/	16 5/	-
Sweden	5,900	6,100	(6,400)	46	48	45
United Kingdom	5,700	(6,000)	(6,400) 6/	45	47	45
United States 7/	12,770	12,830	14,230			

1/ Derived from the United Nations Statistical Yearbook, 1951, and ...,1952, table entitled "Structure of Manufacturing," with the aid of the parity exchange rates of Table III, except where otherwise noted.

2/ An alternative figure of 4,500 was derived from Statistisk Årbog For Danmark, 1951, with the aid of the parity exchange rates of Table III.

3/ Figures in parentheses were estimated from actual figures for other years by means of indexes of output per man in Table IV.

4/ Derived from Die Industrie der Bundesrepublik Deutschland, December, 1951, with the aid of the parity exchange rates.

5/ Derived from Annuario Estudistico de España, 1950, with the aid of the parity exchange rates. Figures relate to metals industry only. Relatives were obtained by comparison with comparable metals industry figures for the United States as given in the Survey of Current Business, 1951 Income Supplement.

6/ An alternative figure of 6,300 was derived from the United Kingdom Annual Abstract of Statistics, 1951-52.

7/ The United States figures are based on corporate sales per person engaged as derived from the Survey of Current Business, 1951 Income Supplement.

Table VII

PRODUCTIVITY RELATIVES DERIVED FROM LABOR COST IN INDUSTRY

Country	Labor Cost Per Employee In Current Dollars		Productivity Relatives (U.S. = 100)	
	1949	1950	1949	1950
Belgium	930	930	34	31
Canada	2,150	2,250	78	76
Denmark	1,125	1,030	41	35
France	855	890	31	30
Germany	735	890	27	30
Italy	548	550	20	19
Netherlands	955	935	35	32
Norway	1,270	1,060	46	36
Spain	405	340	15	11
Sweden	1,250	1,265	45	43
United Kingdom	1,165	1,200	42	41
United States	2,750	2,960		

Source: United Nations, Economic Survey of Europe in 1950, except for Canadian figures which were taken from the United Nations Statistical Yearbook, 1952. See table entitled "Structure of Manufacturing."

Table VIII

PRODUCTIVITY RELATIVES DERIVED FROM
NET VALUE OF INDUSTRIAL OUTPUT IN 1938 DOLLARS

Country	Net Value per Person Engaged				Index of Output per Man (1950/1938)	Productivity Relative U. S. A.			
	1938	1948	1949	1950 1/		1938	1948	1949	1950
Denmark	900	-	-	900	100	52	-	-	38
France	580	590	640	626	108	33	30	29	27
Germany	790 2/	-	-	664	84	47	-	-	28
Italy	450	420	440	509	113	26	21	20	21
Netherlands	790	620	650	695	88	46	31	30	29
Norway	890	780	810	881	99	51	39	37	37
Sweden	990	1,080	1,090	1,220	123	57	54	50	52
United Kingdom	910 3/	920	980	1,174	129	53	46	45	50
United States	1,730 4/	2,000	2,180 5/	2,365	137	100	100	100	100

1/ Values for 1950 were estimated as product of 1938 net value per man, multiplied by index of output per man (1950/1938).
2/ For 1936 instead of 1938.
3/ For 1937 instead of 1938.
4/ Reported to be for 1937 instead of 1938, but 1937 and 1938 values are essentially the same.
5/ Interpolated between 1948 and 1950 values.

Sources: United Nations, Economic Survey of Europe, 1948, for 1938 values.
United Nations, Economic Survey of Europe, 1949, for 1948 and 1949 values.

Table IX

PRODUCTIVITY RELATIVES DERIVED FROM
IMPLICIT WEIGHTS IN WESTERN EUROPE PRODUCTION INDEX
1950

Country	A Production as Percentage of Total for Group	B Employment as Percentage of Total for Group	C Index of Productivity (Group = 100)	D Productivity Relative (U.S. = 100)
Belgium	3.6	3.8	95	33
Denmark	2.1	1.6	131	46
France	14.5	17.3	84	29
Germany	19.8	21.9	90	31
Italy	7.5	9.5	79	28
Netherlands	3.6	3.8	95	33
Norway	1.3	1.5	87	30
The Saar	0.4	.5	80	28
Spain	4.2	6.3	67	23
Sweden	4.7	3.2	147	51
United Kingdom	38.2	30.5	125	44

Source: Columns A and B, United Nations Economic Survey of Europe in 1950. Column C is quotient of (A) divided by (B). Column D is 35 percent of (C), based on estimate that average productivity is 35 percent of United States level.

Table X

SUMMATION OF PRODUCTIVITY RELATIVES AND FINAL ESTIMATES FOR 1950

Country	Value Added '48	'49	'50	Gross Production '48	'49	'50	Labor Cost '48	'49	'50	Net Value in 1938 Dollars '48	'49	'50	Production Index '50	Final Relative Productivity Estimates for 1950
	(Table V)			(Table VI)			(Table VII)			(Table VIII)			(Table IX)	
Belgium	-	-	-	-	-	-	-	34	31	-	-	-	33	34
Canada	79	79	77	80	80	79	74	78	76	-	-	-	-	78
Denmark	38	38	35	36	36	34	40	41	35	-	-	38	46	37
France	-	-	-	-	-	-	-	31	30	30	29	27	29	30
Germany	-	-	-	20	29	31	19	27	30	-	-	28	31	32
Italy	18	20	19	-	-	-	18	20	19	21	20	21	28	20
Netherlands	-	-	-	38	43	40	32	35	32	31	30	29	33	34
Norway	46	43	40	39	38	37	37	46	36	39	37	37	30	37
The Saar	26	27	24	30	35	30	-	-	-	-	-	-	28	31
Spain	-	-	-	16	16	-	-	15	11	-	-	-	23	15
Sweden	-	-	-	46	48	45	45	45	43	54	50	52	51	49
United Kingdom	38	40	40	45	47	45	41	42	41	46	45	50	44	45

Table XI

RELATIVE PRODUCTIVITY BY INDUSTRY

Tentative Relatives Based On	Chemicals	Petroleum & Coal[1]	Rubber	Stone, Clay & Glass	Primary Metals	Fabricated Metals	Machinery	Electrical Machinery	Transportation Equipment	All Manufacturing
Value Added										
Canada, 1947	82	69	93	87	--	--	82	78	71	73
Denmark, 1948[2]	37	27	25	31	48	33	31	33	27	38
Italy, 1950	(. . 21 . .)		28	13	(. .	29	. .)	17	--	19
Norway, 1949	32	23	45	29	36	33	31	31	22	43
United Kingdom, 1948[4]	30	32	40	37	(. . 40 . .)		36	35	37	38
Gross Production										
Canada, 1947	67	44[1]	66	--	--	--	--	--	67	77
Denmark, 1948[2]	38	5[1]	27	31	(. . 26 . .)		32	32	28	36
Germany, 1950	27	15[1,3]	29	29	(. . 31 . .)		27	24	21	31
Netherlands, 1948	44	--	40	26	(. .	27	. .)	35	25	38
Norway, 1949	48	10[1]	38	37	(. . 41 . .)		32	37	17	38
Sweden, 1948	46	--	38	46	(. . 46 . .)		45	45	--	46
United Kingdom, 1948[4]	36	18[1]	42	44	(. . 59 . .)		39	34	32	45

[1] Gross production figures for Petroleum & Coal are doubtful since figures on corporate sales from Survey of Current Business appear to include some service station receipts.

[2] Based on production workers only.

[3] Data for last four months of 1950 only.

[4] British data gave only partial coverage of industry groups. Available British data were compared with U. S. data for comparable industry sectors and averaged.

Source: Derived from the statistical yearbooks of the countries concerned.

Table XII

RELATIVE PRODUCTIVITY BY INDUSTRY AS A PERCENTAGE OF RELATIVE PRODUCTIVITY IN ALL MANUFACTURING

	Chemicals	Petroleum[1] & Coal	Rubber	Stone, Clay & Glass	Primary Metals	Fabricated Metals	Machinery	Electrical Machinery	Transportation Equipment
From Value Added									
Canada, 1947	113	95	128	119	--	--	112	107	97
Denmark, 1948	97	71	66	82	126	87	82	87	71
Italy, 1949	(. .	111 . .)[2]	148	69	(. .	153	. .)	90	--
Norway, 1949	74	53	105	68	84	77	72	72	51
United Kingdom, 1948	79	84	105	97	(. .	105 . .)	95	92	97
From Gross Production									
Canada, 1947	87	(57)[1]	85	--	--	--	--	--	87
Denmark, 1948	105	(14)[1]	75	86	(. .	72 . .)	89	89	78
Germany, 1950	87	(48)[1]	94	94	(. .	100 . .)	87	78	68
Netherlands, 1948	116	--	105	69	(. .	71	. .)	92	66
Norway, 1949	126	(26)[1]	100	97	(. .	108 . .)	84	97	45
Sweden, 1948	100	--	83	100	(. .	100 . .)	98	98	--
United Kingdom, 1948	80	(40)[1]	93	98	(. .	131 . .)	87	76	71

[1] Gross production figures for Petroleum & Coal are doubtful since figures on corporate sales from the Survey of Current Business appear to include some service station receipts.

[2] Figures in wide parentheses are averages over the columns indicated.

Source: All data derived directly from Table XI.

Table XIII

OUTPUT PER MAN-SHIFT IN HARD COAL MINING (OVER-ALL)
AND AS PERCENT OF UNITED STATES

Country	Output in Kilograms Per Man-Shift						As Percentage of United States		
	1937	1947	1948	1949	1950	1951	1947	1948	1949
Belgium	782	584	603	641	693	743	23.1	23.6	24.6
France	833	591	-	702	770	849	23.4	-	26.9
Germany	1587	928	958	1048	1067	1103	36.6	37.5	40.2
Netherlands	1774	1297	1362	1407	1425	1427	51.3	53.4	54.0
The Saar	1054	-	763	844	961	1043	-	29.9	32.4
United Kingdom	1186	1091	1124	1179	1213	1228	43.2	44.0	45.2
United States	-	2530	2550	2612	-	-			

Source: United Nations, Economic Survey of Europe in 1951. United States figures were obtained by converting to metric units, data from Statistical Abstract for the United States, 1951.

Table XIV

PER CAPITA INCOME AND INCOME PER AVAILABLE MAN

Country	Per Capita Income[1]				Income per Available Man[2]			
	Dollars		As Percent of United States		Dollars		As Percent of United States	
	1949	1950	1949	1950	1949	1950	1949	1950
Belgium	582	587	40	38	1420	1430	39	37
Canada	870	935	60	60	2140	2300	59	59
Denmark	689	714	47	46	1440	1490	40	38
France	482	544	33	35	935	1050	26	27
Germany	320	358	22	23	725	810	20	21
Italy	235	249	16	16	533	567	15	15
Netherlands	502	531	34	34	1250	1320	35	34
Norway	587	594	40	38	1340	1360	37	35
The Saar	-	550	-	35	-	1490	-	38
Spain	-	168	-	11	-	470	-	12
Sweden	780	858	54	55	1740	1910	48	49
United Kingdom	773	831	53	54	1650	1770	46	46
United States	1453	1552	100	100	3610	3880	100	100

1/ Income per capita for 1949 was taken from National and Per Capita Incomes, Seventy Countries - 1949, statistical paper No. 1 of Series E of the Statistical Office of the United Nations.
Values for 1950 were taken from estimates by the Office of Intelligence Research, U. S. Department of State, given in Indicators of the Economic Potential of Western Europe, Canada, the United States, and the Soviet Bloc, 1950, OIR unclassified report No. 5549.

2/ Income per available man was estimated by dividing per capita income by the latest available value of the ratio of labor force to population, as given in the Yearbook of Labor Statistics, 1949-50, International Labor Office.

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