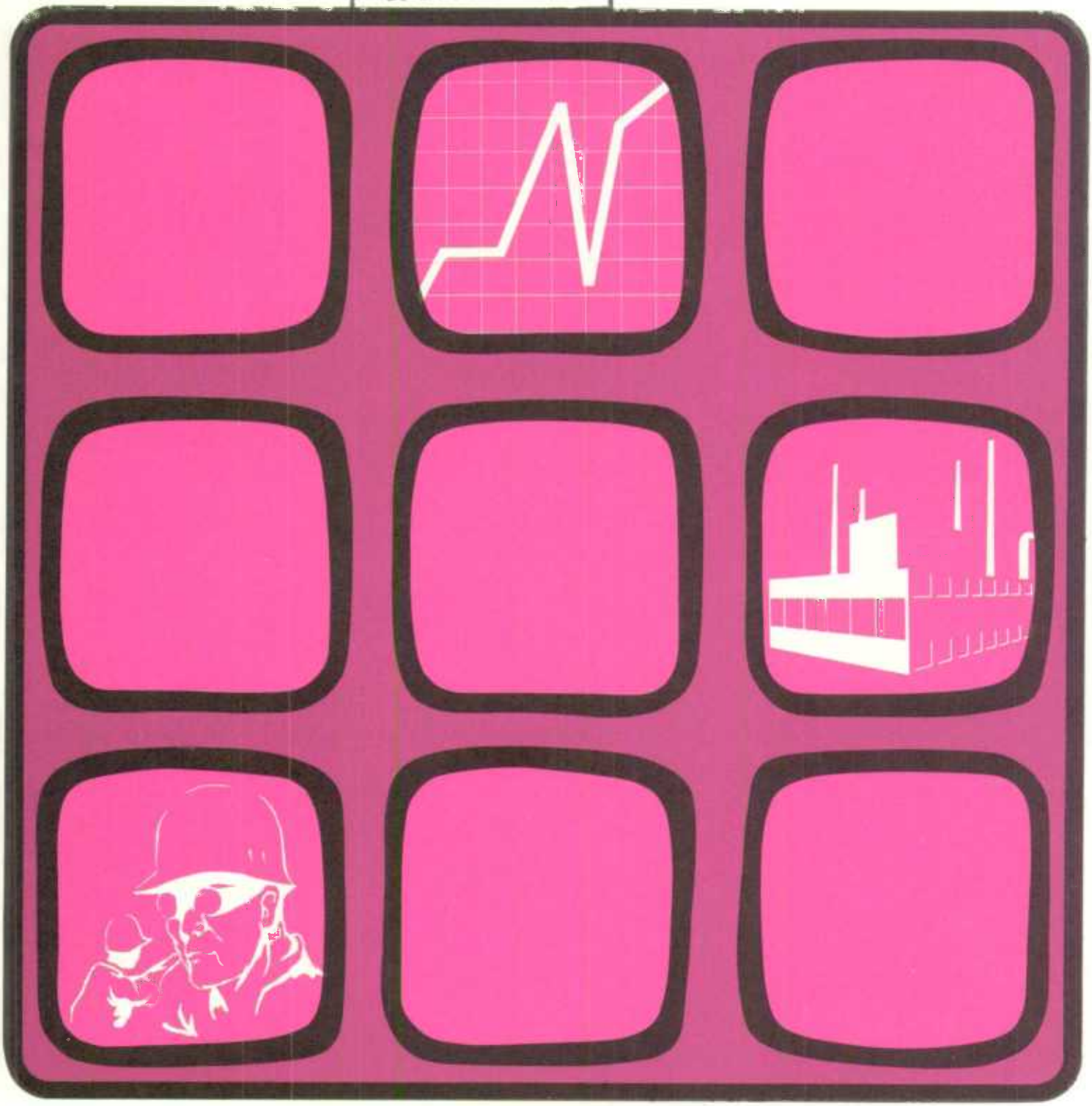
Productivity Trends in Industry

REPORT NO. 2
IRON AND STEEL MILLS



DOMINION BUREAU OF STATISTICS

DOMINION BUREAU OF STATISTICS
National Output and Productivity Division
Productivity Research and Analysis Section

PRODUCTIVITY TRENDS IN INDUSTRY

REPORT No. 2

INDEXES OF OUTPUT PER PERSON EMPLOYED AND PER MAN-HOUR, 1959-68

IRON AND STEEL MILLS

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SYMBOLS

The interpretation of the symbols used in the tables throughout this publication is as follows:

.. figures not available.
... figures not appropriate or not applicable.
– nil or zero.
p preliminary figures.

FOREWORD

This report is the second in a series of studies dealing with productivity change in individual industries, and follows *Productivity Trends in Industry, 1947-61, Report No. 1, Indexes of Output per Person Employed and per Man-hour, Synthetic Textile Mills, Breweries, Pulp and Paper Mills* (DBS Catalogue No. 14-502). Since the present study is essentially an extension of the project to another industry, the detailed explanations of concepts, sources and methodology included in Report No. 1, which are also applicable to this report, are not repeated.

Although data on unit labour costs and capital stocks are introduced into the analysis for the first time, the measures of productivity presented in this report still relate output to a single input only, labour time. It must be emphasized, therefore, that changes in output per unit of labour input cannot be attributed directly and solely to labour. These measures reflect not only changes in the skills and effort of the labour force, but also the contribution of other productive resources with which it works, as well as the effectiveness with which all are combined and organized for production. In other words, changes in technology, capital investment, capacity utilization, work-flow, managerial skills and labour-management relations each have a bearing on movements in what is termed the "labour productivity" series.

This report was prepared by G.P. Heiman of the Industry Productivity Measures Unit, Productivity Research and Analysis Section, under the direct supervision of B. Connolly, Unit Head, and the general direction of D.A. Worton, former Chief of the Section. The advice of various representatives of the Iron and Steel Mills industry is acknowledged together with the assistance given by officers of other government departments and other sections of the Dominion Bureau of Statistics.

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INDUSTRY DEFINITION

The Iron and Steel Mills industry, No. 291 in the 1960 Standard Industrial Classification, is part of the major group, Primary Metal Industries, and is defined as follows:

"Four main types of establishments are classified in this industry:

(1) Establishments primarily engaged in manufacturing pig iron and ferro-alloys.

(2) Steel works primarily engaged in manufacturing ingots, steel castings and in continuous casting of steel.

(3) Rolling mills primarily engaged in hot and cold rolling of steel into primary shapes.

(4) Coke ovens operated in connection with blast furnaces. In some cases the blast furnace, steel mill, rolling mill and coke oven or some combination of two or more of them are carried on as one integrated operation and the manufacturing processes may be carried on beyond the rolling mill stage."[1]

A list of the establishments in this industry may be found in the Dominion Bureau of Statistics publication, *Iron and Steel Mills,* Ottawa, Queen's Printer (DBS Catalogue No. 41-203).

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[1] Dominion Bureau of Statistics, *Standard Industrial Classification Manual,* Ottawa, Queen's Printer, Occasional, December 1960 (DBS Catalogue No. 12-501).

SUMMARY OF FINDINGS

Between 1959 and 1968, the period of primary emphasis in this study, output per person employed in the Iron and Steel Mills industry increased at an average annual rate of 3.8%,[1] accompanied by a growth in output of 7.4% per year and an average annual increase of 3.4% in employment. During the same period, the growth of output per man-hour was quite similar to that of output per person employed due to the relative stability of average hours worked.

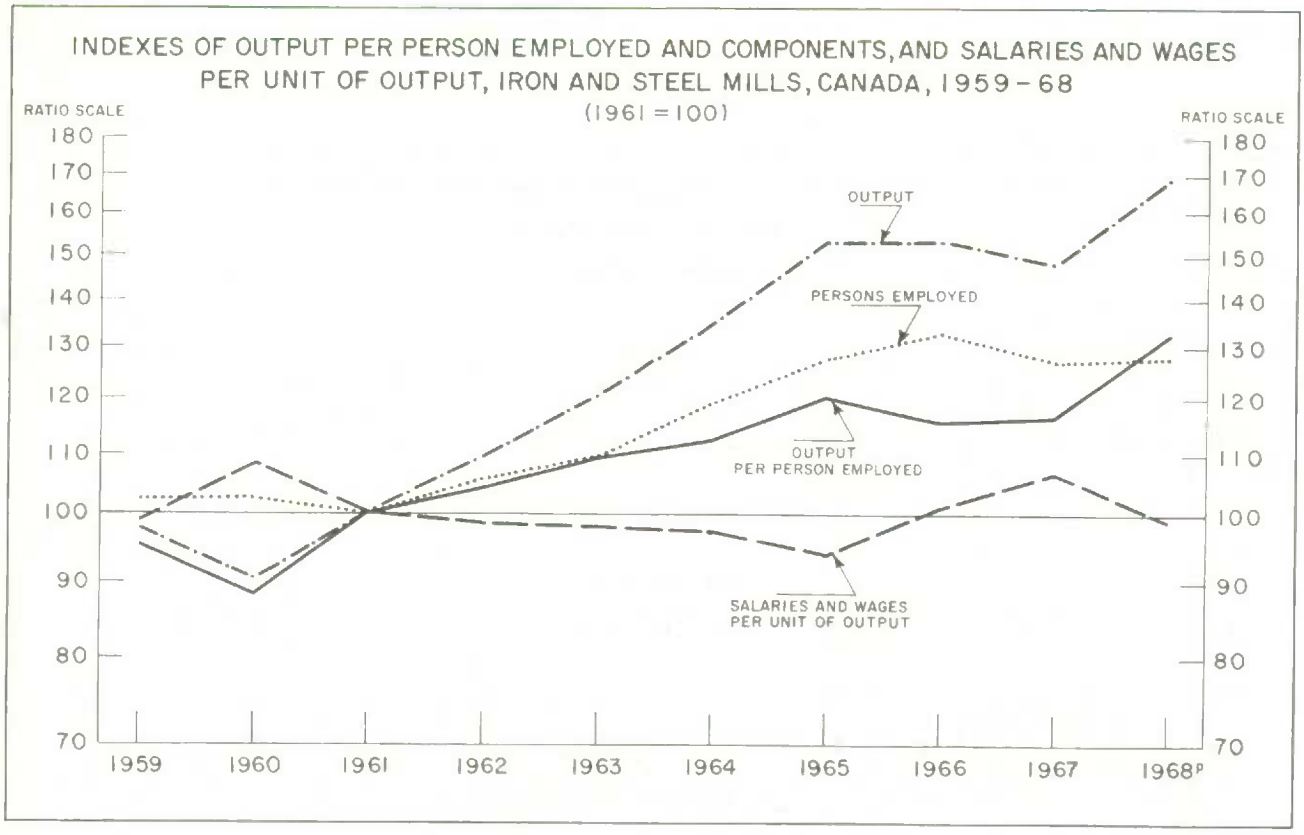
Although the average annual change in salaries and wages per unit of output over the period as a whole was small (–0.1%), this indicator of unit labour cost has tended to fluctuate from year to year. A brief upward swing from 1965 to 1967 was reversed in 1968 after sharp increases in output and productivity in that year.

Output per production worker and per man-hour of production workers[2] showed greater average annual increases in Canada than in the United States between 1947 and 1967, the period selected for this comparison. As the Canadian Iron and Steel Mills industry began to overhaul its United States counterpart in technological development, these ratios grew at 3.8% and 4.0% per annum respectively in the former, while corresponding data for the latter showed average increases of 2.3% and 2.2%.

[1] All growth rates in this publication are calculated by the least squares trend of the logarithms method.

[2] Series based on the labour inputs of production workers are generally regarded as the more reliable measures of productivity change in U.S. studies of individual industries. For further details, *see:* United States Department of Labor, Bureau of Labor Statistics, *BLS Handbook of Methods for Surveys and Studies*, Bulletin 1458, 1966, Chapter 23.

CHART-1



ANALYSIS OF CHANGES IN PRODUCTIVITY AND RELATED DATA

Productivity

Between 1959 and 1968, labour productivity in the Iron and Steel Mills industry rose at about the same rate as in Manufacturing. Average annual increases in the former were 3.9% for output per production worker and per production worker man-hour, 3.8% for output per person employed, and 4.0% for output per man-hour of persons employed. For Manufacturing as a whole, the measures of output per person employed and per man-hour of persons employed increased on average by 3.9% and 4.1% per annum during the same period. A comparison of year-to-year changes over this period, illustrated in Chart 2, indicates a much more volatile picture in the Iron and Steel Mills industry than in Manufacturing, with the peaks and troughs of the two not always coinciding.

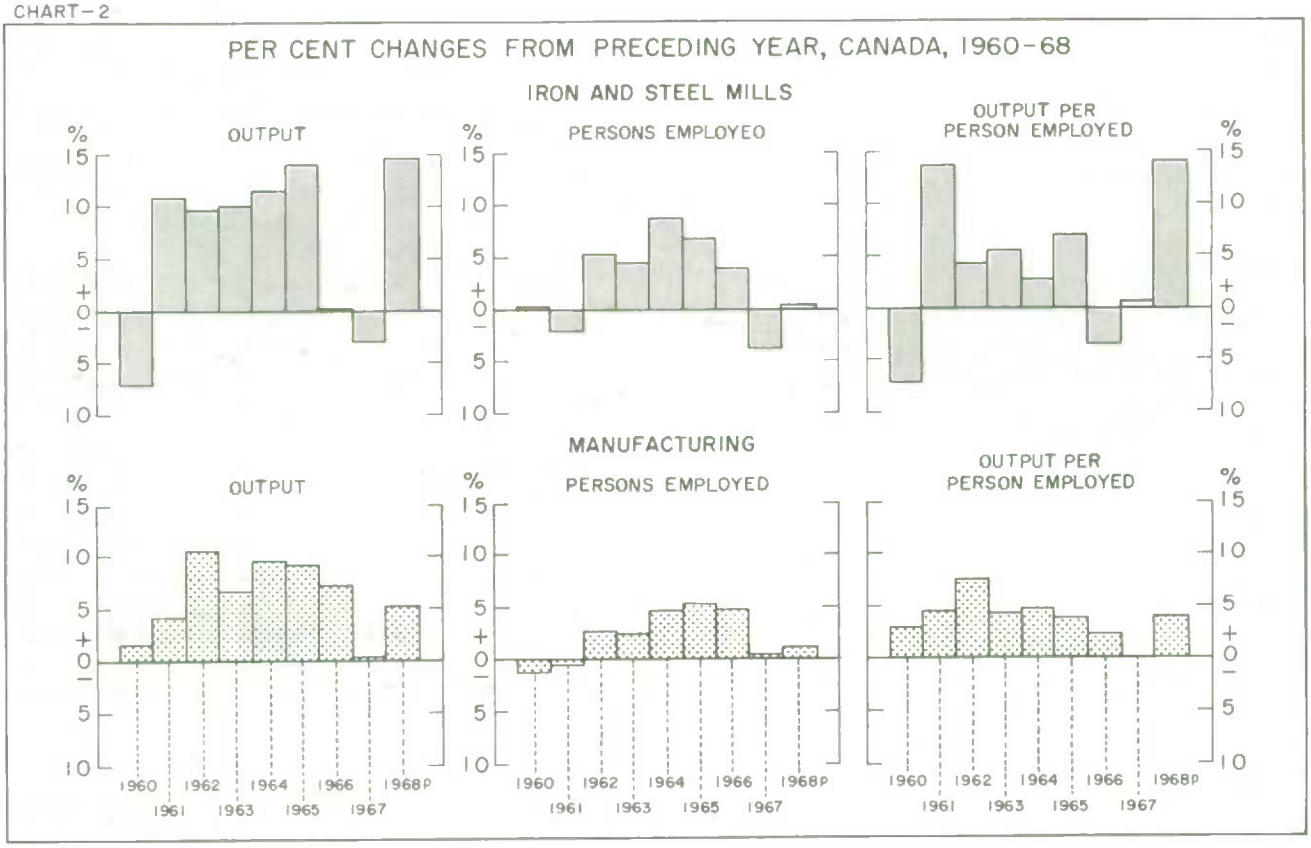
Output

The gain in productivity was associated with a high rate of increase in the volume of output, stimulated by the continued growth in demand for iron and steel products in both the domestic and export markets. This growth in output from 1959 to 1968 followed the expansion in productive capacity which had begun in the early 1950's and which did not moderate significantly until the end of the period under consideration. As a result, the rate of capacity utilization between 1959 and 1968 was relatively steady, with the percentage utilization of steel furnace capacity fluctuating slightly around an average of 86.2%,[3] in contrast to the experience of the 1950's when it varied considerably. Much of the capital build-up was the result of the introduction of new techniques, such as continuous casting, oxygen furnaces, fuel injection and others referred to later in this text.

Over the nine-year period, output increased at an average annual rate of 7.4%, the corresponding increase in Manufacturing being 6.8% per annum. Most of this growth in the Iron and Steel Mills industry took place over a span of six consecutive years, five of which saw year-to-year increases of approximately 10% or more. The years of slow growth or decline were 1960, a year of general economic slackness, and 1966-67, a period affected by strikes in the industry as well as a slight moderation in overall economic activity.

[3] *See:* Chart 3, page 10.

CHART–2



Labour Input

Between 1959 and 1968, the numbers of production workers and persons employed grew at average annual rates of 3.3% and 3.4% respectively, with the corresponding man-hours increasing on average by 3.3%, and 3.2% per annum. In Manufacturing, the increase in labour inputs was more modest, with persons employed and man-hours of persons employed, for instance, growing by 2.7% and 2.6% per annum.

Since average hours paid remained relatively stable in the Iron and Steel industry during the nine-year period (40.6 hours per week in 1959 and 40.3 in 1968), overall changes in labour input were to a large extent attributable to changes in employment alone. Whatever fluctuations did occur in average hours were influenced by the same factors referred to under output, i.e. strikes in 1966-67, or the general economic situation, as in 1960 and 1966-67.

Labour Cost

For the purpose of this study, labour costs cover only current-dollar gross salaries and wages as reported in the Census of Manufactures. Details of supplementary benefits such as employers' contributions to pension funds, employee welfare funds, unemployment insurance and workmen's compensation are not available at the individual industry level.[4]

Total salaries and wages grew appreciably between 1959 and 1968, but the average rate of change of unit labour costs (wages and salaries per unit of output) was negligible due to the parallel growth in output. In those years where unit labour costs did increase, namely 1960 and 1966-67, the measure of output per person employed showed declines or only small increases.

[4] For more details *see*: Concepts and Methods, page 12.

Per Cent Changes from Preceding Year, Iron and Steel Mills, Canada, 1960-68

Year	Output per person employed	Output per man-hour paid of persons employed	Salaries and wages	Salaries and wages per unit of output
1960	−7.2	−5.1	1.8	9.6
1961	13.5	13.3	2.4	−7.6
1962	4.1	3.2	8.0	−1.5
1963	5.4	3.8	9.1	−0.8
1964	2.5	2.1	10.9	−0.4
1965	6.9	8.8	9.5	−3.9
1966	−3.7	−3.3	8.1	8.0
1967	0.6	2.3	1.9	5.4
1968p	14.2	13.9	6.5	−7.1

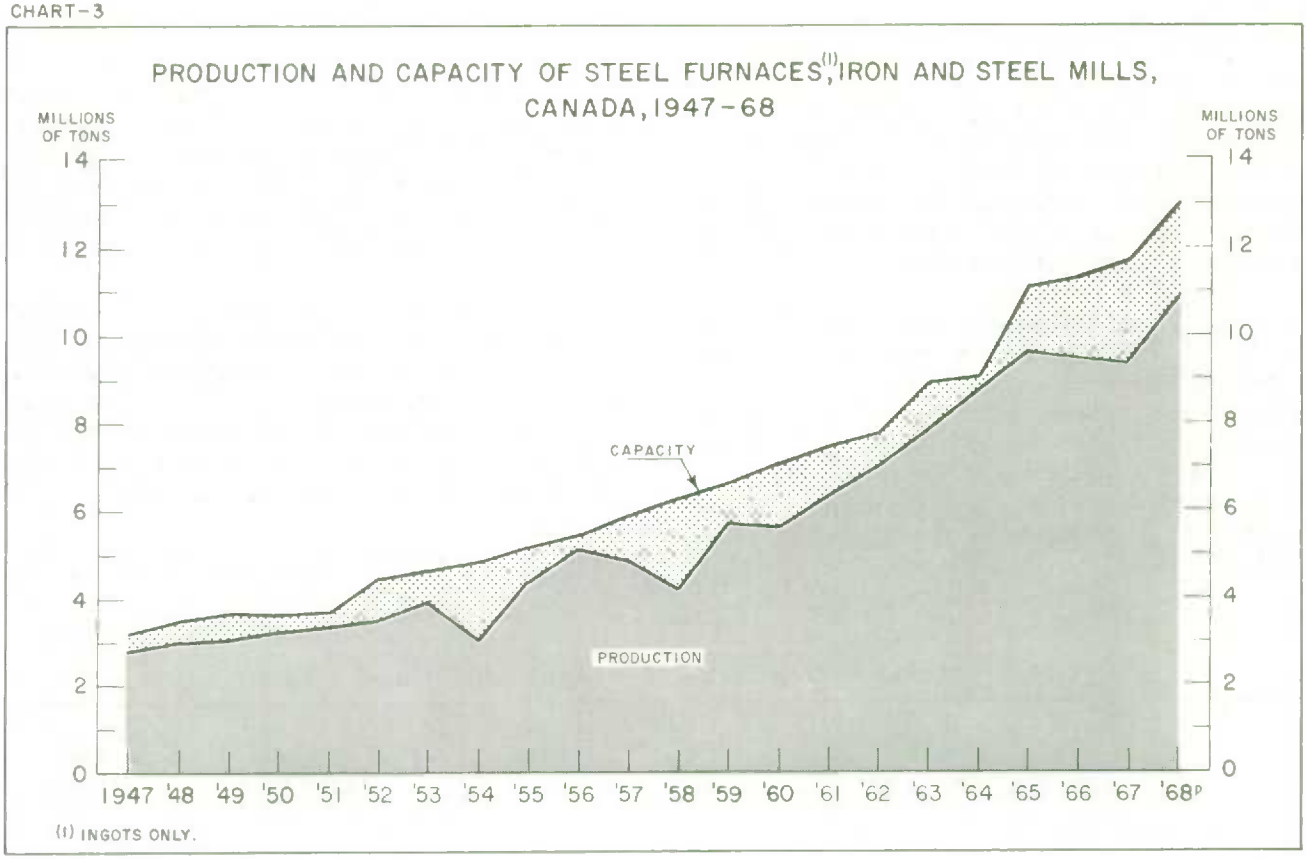
Capital

Although it was implied earlier that capital investment played an important part in the growth of the industry's output over the 1959-68 period, the relationship is not, in general, an easy one to establish statistically. This is particularly so in an industry such as Iron and Steel where technological innovations cannot be introduced nor productive facilities expanded at short notice, and where capacity is generally built up in anticipation of future demand, i.e. before the increases in demand actually materialize. Time lags between capital expenditure and the resultant output growth are thus to be expected. On a short-term basis, increases in output can mainly be achieved by bringing into operation unused capacity. It is probably more appropriate then to look at the importance of capital growth over a longer period than 1959-68, and, at the same time, keep in mind fluctuations in capacity utilization.

As data in Table 6 of Appendix A indicate, although gross capital stock between 1959 and 1968 increased at an annual average rate of 8.7%, this was in effect the continuance of a trend which had been well established for a number of years previously. Thus, investment in the earlier period could be just as important as that which took place concurrently as far as its contribution to productivity between 1959 and 1968 is concerned. Net capital stock data (gross minus capital consumption allowance) show a similar picture regardless of the method of depreciation used. Capacity utilization, however, continued to fluctuate with the business cycle, but, since cyclical swings were less pronounced in the 1960's, remained on average higher during the second period.[5]

[5] Capacity in the Iron and Steel industry is based on the annual production capacity of steel furnaces of establishments classified to this industry according to the criterion of primary activity. *See:* Dominion Bureau of Statistics, *Iron and Steel Mills*, Ottawa, Queen's Printer (DBS Catalogue No. 41-203).

CHART–3



Comparisons with United States Data

Comparisons with the Steel Industry in the United States are based on the period 1947 to 1967, the period for which official U.S. data are published.[6] To provide a comparable Canadian series, it was necessary to link in 1959 Canadian industry data based on the 1948 Standard Industrial Classification with figures reflecting the introduction of the 1960 S.I.C. and the new reporting procedures introduced in 1961. For consistency with the concept of output underlying the U.S. industry studies, an alternative Canadian output indicator had to be utilized which differs from the published index[7] being compiled on a "gross" rather than a "net" basis.[8] Finally, it must be pointed out that the American definition of the industry also covers establishments primarily engaged in steel wire drawing and in the production of steel pipes and tubes, establishments which, in Canada, form separate three digit industries. The value of shipments and value added accounted for by these establishments in the U.S., however, are small relative to the Steel Industry total there.

For the period 1947 to 1967, the Canadian series of output per production worker and per production worker man-hour in the Iron and Steel Mills industry showed significantly greater increases than their U.S. counterparts, with average annual growth rates in Canada being 3.8% and 4.0% as opposed to 2.3% and 2.2% per annum in the United States. This divergence originated most strikingly on the side of output which, in Canada, rose on average at a rate of 5.4% as against 1.4% for the United States. In the U.S., however, there were overall reductions in employment and man-hours of production workers of −0.9% and −0.8% per annum, whereas in Canada, the more rapid growth of output was accompanied by corresponding annual average increases of 1.6% and 1.4%. This is possibly a reflection of the quite different patterns of evolution of the Iron and Steel industry in the two countries during the post-war period. In Canada, the industry was at an immature stage

[6] *See: Indexes of Output per Man-hour, Selected Industries, 1939 and 1947-67*, Washington, United States Department of Labor, Bureau of Labor Statistics, December 1968, BLS Bulletin No. 1612.

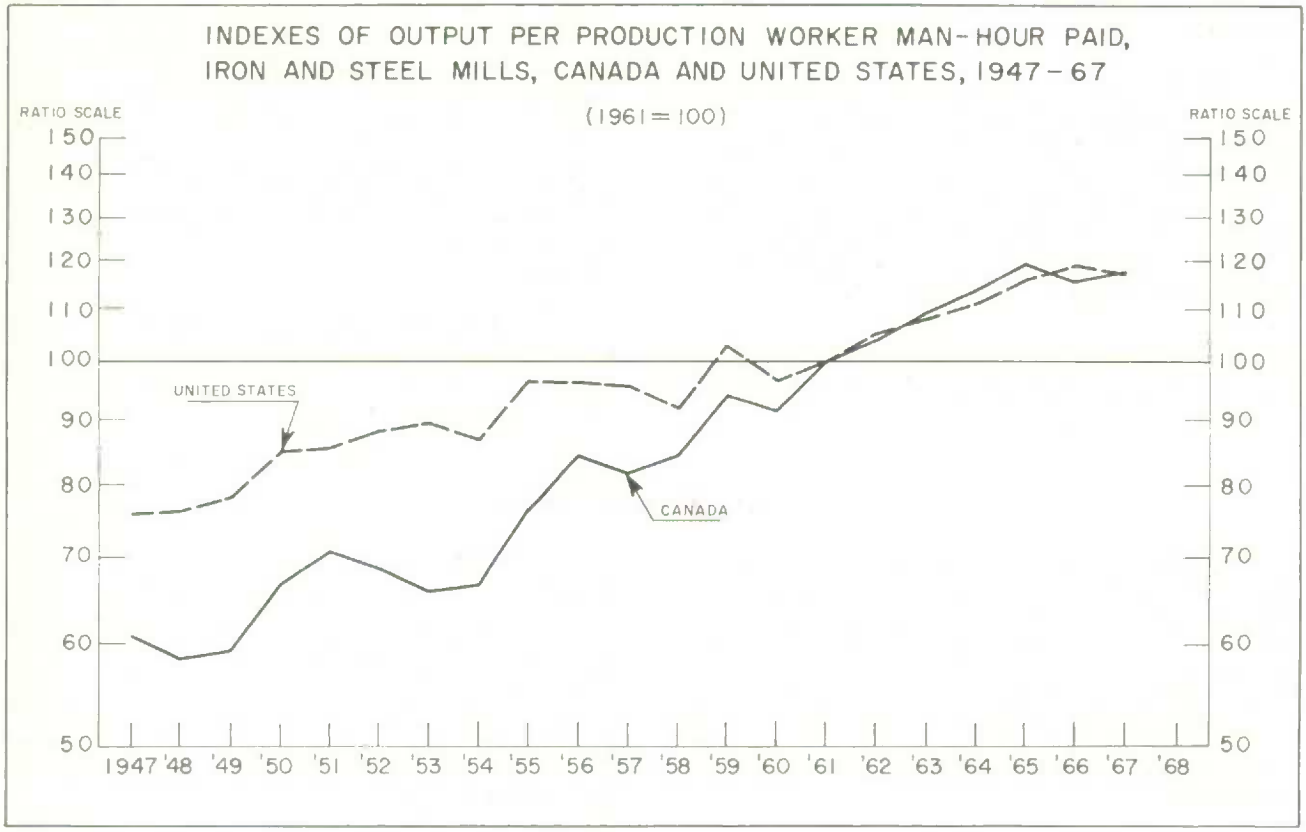
[7] Dominion Bureau of Statistics, *Indexes of Real Domestic Product by Industry (1961 Base)*, Ottawa, Queen's Printer, Occasional, 1968 (DBS Catalogue No. 61-506).

[8] The gross value of an industry's output is the value of sales or shipments adjusted for the value of the physical change in finished goods and goods in process inventories. Net output, as defined here, is approximated by "census value added" which is calculated by subtracting from the gross output the value of certain intermediate inputs, principally materials and fuel and electricity consumed. For further details *see:* Dominion Bureau of Statistics, *Productivity Trends in Industry, Report No. 1*, Ottawa, Queen's Printer, 1966, Part IV (DBS Catalogue No. 14-502).

of development prior to the mid-fifties and the growth of the last decade, under exceptionally favourable circumstances of demand for its products, has contributed importantly towards its "coming of age". The United States industry, on the other hand, had already been mature for many decades, and its post-war growth, while impressive in absolute terms, took place on a much broader basis and under circumstances more appropriate to a developed industry.[9]

[9] For additional comments on Canada – United States steel industry performance comparisons *see: Scale and Specialization in Canadian Manufacturing* by D. J. Daly, B.A. Keys and E.J. Spence, Ottawa, Queen's Printer (Staff Study No. 21), Economic Council of Canada.

CHART – 4



INDUSTRY BACKGROUND

Definition

The definition of the Iron and Steel Mills industry according to the 1960 Standard Industrial Classification appears on page 6 of this report. This definition is changed somewhat from that which prevailed while the 1948 S.I.C. was in force when the industry was called Primary Iron and Steel. The major difference is the inclusion in the 1960 S.I.C. of those coke plants which, although divisions of integrated steel mills, were formerly classified to the Coke and Gas industry. In addition, establishments manufacturing cast steel railway car wheels were transferred to the Railroad Rolling Stock industry.[10]

[10] For further details *see*: Dominion Bureau of Statistics, *Iron and Steel Mills*, 1960, Ottawa, Queen's Printer, Annual (DBS Catalogue No. 41-203).

Size and Structure of Industry

Between 1959 and 1967, the latest year for which data on size and structure are available, the relative importance of the Iron and Steel Mills industry within the Canadian Manufacturing sector did not change dramatically. As Table 4 indicates, the position of the industry relative to the major group of Primary Metal Industries also remained stable both in terms of employment and value in current dollars of factory shipments.

Changes in size and structure during this period appear to be continuations of trends originating in the early 1950's when post-war growth got under way. One such trend was the shift from small to large establishments. The percentage share of establishments employing less than 99 persons, in relation to the universe

comprising all size groups, fell from 29% to 14% between 1961[11] and 1967 while the proportion accounted for by those with 500 and over employees increased from 19% to 25% over the same period. The latter group was responsible for 85% or more of total employment, payroll, gross value of production, cost of materials used and value added in 1967. Ontario still had more establishments than any other province, around 40% in both 1961 and 1967. Its share of employment and shipments remained stable at about 78% and 83% respectively.

The volume of imports and exports showed overall increases between 1959 and 1967, with shifts in the product composition of both. The proportion of imports accounted for by such products as rods increased at the expense of structural shapes and pipe and tubing, while the proportion of exports in such categories as ingots, blooms and billets as well as plates, sheets and strips rose slightly at the expense of pig iron and rails.

[11] The year 1961 was chosen for the comparison, this being the first year in which the new S.I.C. and new Establishment Concept are reflected in the data.

Technology and Quality Improvements

As previously mentioned, the high level of capital expenditures in the 1950's made possible innovations and improvements which almost certainly had an important impact on the productivity performance of the industry. One of the most significant developments was the increased utilization of beneficiated ores. In 1959, only 27.6% of total iron ore materials was accounted for by iron ore agglomerates (pellets, sinter, nodules and briquettes) but, by 1968, this percentage had risen to 61.7%. During the same period, steel production from oxygen furnaces increased by more than 300%. Increasing use was also made of the continuous casting method, the fuel injection technique, heat-treated steel, magnetic particle inspection units and computers. These new developments were important from the point of view of both economy in the use of labour and quality improvement.[12]

[12] For a discussion on the difficulties of allowing for quality change in productivity measurement *see*: Dominion Bureau of Statistics, *Productivity Trends in Industry, Report No. 1*, Ottawa, Queen's Printer, 1966, page 117 (DBS Catalogue No. 14-502).

CONCEPTS AND METHODS

The basic concepts and methods used in developing the statistical data for the Bureau's programme of individual industry studies are described in pages 107 to 188 of *Productivity Trends in Industry, Report No. 1*.[13] Some aspects of their application in this particular study are described below, as well as the concepts and methods underlying the development of new statistical indicators such as measures of unit labour cost and the growth of capital stock.

General

As noted earlier, the period of main emphasis for this study is 1959-68, and the underlying data therefore reflect the new reporting procedures which have characterized the Census of Manufactures since 1961. This now covers the total activity of reporting establishments so that "persons employed", in addition to production workers and office and administrative employees, also includes sales and distribution workers as well as employees in new construction and other ancillary activities. Such an all-inclusive measure of employment properly relates only to the corresponding "total activity" output. On the other hand, the measures of real output used here are, for the time being, still restricted to manufacturing activity, a concept to which the comprehensive measures of "persons employed" cannot be satisfactorily adjusted. However, the use of a total activity index of employment in conjunction with an output index based only on manufacturing activity has not resulted in any significant distortion of the derived productivity measure in the Iron and Steel industry, since non-manufacturing labour inputs account for only a small portion of the total and appear for the most part to have changed in roughly the same proportion. Moreover, the total activity output measure, which should be available in the near future, is not expected to differ significantly in terms of year-to-year change from the present index.[14]

[13] *Ibid.*

Output

The output index used for the definitive productivity measures of this report originates for the years 1959 to 1967 inclusive from the "Indexes of Real Domestic Product by Industry"[15] and for 1968 from the "Index of Industrial Production".[16] Both measure "net" output in real terms, i.e. "census value added" in 1961 dollars. For the purpose of the Canada-United States comparison only, consistency with the official U.S. data necessitated the use of an alternative measure based on the concept of "gross" output, i.e. the value of production before the subtraction of intermediate inputs.[17] However, complete consistency is not possible

[14] Dominion Bureau of Statistics, *Indexes of Real Domestic Product by Industry, (1961 Base)*, Ottawa, Queen's Printer, 1968, page 11 (DBS Catalogue No. 61-506).

[15] Dominion Bureau of Statistics, *Indexes of Real Domestic Product by Industry, (1961 Base)*, Ottawa, Queen's Printer, 1968 (DBS Catalogue No. 61-506).

[16] Dominion Bureau of Statistics, *Index of Industrial Production (1961 = 100)*, Ottawa, Queen's Printer (DBS Catalogue No. 61-005).

[17] See footnote 8, page 10.

since the U.S. output data are expressed in real terms on the basis of 1957-59 dollars.

Labour Input

Census of Manufactures data were available up to and including 1967 for the calculation of labour input data. Since Employment Survey data exist for 1968, estimates for that year are based on projections of the relationship between the Census of Manufactures and Employment Survey series prevailing from 1959 to 1967.

Labour Cost

Total labour cost should include direct payment for the services of all production and non-production labour within the industry plus the cost of supplementary benefits. Labour costs for the Iron and Steel industry, as noted earlier, are restricted in this study to salaries and wages paid for production and non-production workers since data on supplementary benefits prior to 1967 are not available at the individual industry level. Salaries and wages are as defined in the Census of Manufactures reporting instructions, i.e. "Gross earnings before deductions from employees for income tax and social services such as sickness, accident, pensions, insurance, etc. They include all bonuses, profits shared with employees, the value of room and board where provided, as well as any other allowance forming part of the employee's earnings, (including payment for overtime)".

The relative importance of supplementary benefits in 1968 for the major group of which the Iron and Steel industry forms a preponderant part can be seen from the following table.

Estimates of Selected Labour Costs as Per Cent of Total Specified Labour Costs in Manufacturing and Primary Metal Industries, Canada, 1968

Type of labour cost	Manufacturing	Primary metal industries
Components of gross payroll:		
Basic pay, "in-plant time"	81.5	77.6
Premium pay	2.3	2.9
Paid absences	7.4	8.2
Miscellaneous direct payments	1.2	1.2
Totals	**92.4**	**89.9**
Supplementary labour costs:		
Unemployment insurance	0.7	0.6
Canada or Quebec pension plan	1.1	1.0
Private benefit plans	4.9	7.3
Workmen's comprensation	0.9	1.2
Totals	**7.6**	**10.1**
Total labour costs	**100.0**	**100.0**

Source: Joint Dominion Bureau of Statistics and Canada Department of Labour publication, *Labour Costs in Manufacturing 1968*, Ottawa, Queen's Printer, Occasional, 1969 (DBS Catalogue No. 72-510).

Capital

In earlier studies of this series, the contribution of capital to changes in productivity was considered only indirectly by a scrutiny of new capital and repair expenditures. More recently, however, tentative capital stock estimates at the individual industry level have been developed for this study consistent with the methodology underlying published estimates for major groups within Manufacturing.[18] These estimates comprise both gross and net capital stock series in constant dollars derived by the "perpetual inventory" method from historical data on gross fixed capital formation which, for certain components of the assets used by the Iron

[18] Dominion Bureau of Statistics, *Fixed Capital Flows and Stocks, Manufacturing, Canada, 1926-60*, Ottawa, Queen's Printer, 1967 (DBS Catalogue No. 13-522).

and Steel Mills industry, must predate the reference period by as much as thirty years. The gross series is calculated by cumulating the annual investment for a number of years equal to the assumed average economic life of the assets; the net stock estimates are derived after making allowances for capital consumption.[19]

In the study of Iron and Steel Mills, two methods of estimating capital consumption allowances have been employed, one based on the "straight line" method and the other employing the "sum of the years digits" technique. The former assumes that the economic services of the assets are used-up in equal installments over the life of the asset, while the latter is a variation of the "reducing balance" method which is based on the premise that an asset yields greater services in the early years of its operation and a declining amount over the remaining years of its economic life.

The average life expectancies of assets adopted for the Iron and Steel Mills industry were 25 years for building construction, 30 years for engineering construction and 15 years for machinery and equipment. These figures were based on information provided by the industry and are very similar to estimates which were used in the United States for accounting purposes.[20] However, it must be emphasized that they are arbitrary in nature and, as has been pointed out in a more general discussion of this problem in the reference paper cited above, particular historical circumstances in the component establishments of the Iron and Steel Mills industry may frequently have given rise to significantly different patterns of asset use and retirement.

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[19] Dominion Bureau of Statistics, *Fixed Capital Flows and Stocks, Manufacturing, Canada, 1926-60*, Ottawa, Queen's Printer, 1967 (DBS Catalogue No. 13-522), p. 43 for detailed explanation.

[20] United States Treasury Department, *Bulletin 'F', Tables of Useful Lives of Depreciable Property*, Washington, D.C., 1942.

APPENDICES

APPENDIX A

TABLE 1. Indexes of Output per Unit of Labour Input, Iron and Steel Mills, Canada, 1959 - 68
(1961 = 100)

Item and year	Output per				
	Person employed[1]	Production worker	Man-hour paid of persons employed[1]	Man-hour paid of production workers	Man-hour worked of production workers
1959	95.0	93.5	93.0	91.4	91.0
1960	88.1	88.2	88.3	87.6	87.8
1961	100.0	100.0	100.0	100.0	100.0
1962	104.1	103.4	103.2	102.7	102.6
1963	109.7	110.1	107.1	106.9	106.8
1964	112.4	112.5	109.4	108.6	108.2
1965	120.2	119.4	119.1	117.7	117.5
1966	115.7	114.6	115.2	113.3	113.1
1967	116.4	116.6	117.9	116.3	116.7
1968P	132.9	133.9	134.2	132.4	132.9
1968 as % of 1959	140.0	143.3	144.4	145.0	146.1
Annual trend rate of change (%)	3.8	3.9	4.0	3.9	4.0

[1] From 1961 forward, the persons employed and man-hours paid of persons employed components of the productivity ratios were compiled on a total activity basis.

Source: For 1959-67, the indexes of output were obtained from the Dominion Bureau of Statistics publication, *Indexes of Real Domestic Product by Industry, (1961 Base)*, Ottawa, Queen's Printer, 1968 (DBS Catalogue No. 61-506). They were developed on a net basis. The labour inputs were derived from the Annual Census of Manufactures. For 1968, the index of output was obtained from the Dominion Bureau of Statistics publication, *Index of Industrial Production (1961= 100)*, Ottawa, Queen's Printer, Monthly (DBS Catalogue No. 61-005). The labour input figures for that year were projections of the Census of Manufactures series using the most recent Employment Survey Data.

TABLE 2. Indexes of Output, Labour Input, and Labour Costs, Iron and Steel Mills, Canada, 1959 - 68
(1961 = 100)

Item and year	Output	Persons employed[1]		Production workers			Labour costs[1]	
		Number	Man-hours paid	Number	Man-hours paid	Man-hours worked	Salaries and wages	Salaries and wages per unit of output
1959	97.1	102.2	104.4	103.9	106.3	106.7	95.9	98.8
1960	90.2	102.4	102.2	102.3	102.9	102.7	97.7	108.3
1961	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1962	109.6	105.3	106.2	106.0	106.7	106.8	108.0	98.5
1963	120.6	109.9	112.6	109.5	112.8	112.9	117.8	97.7
1964	134.3	119.4	122.7	119.4	123.7	124.1	130.6	97.3
1965	153.1	127.4	128.6	128.3	130.1	130.3	143.1	93.4
1966	153.2	132.4	133.0	133.7	135.2	135.4	154.6	100.9
1967	148.1	127.2	125.7	127.0	127.4	126.9	157.6	106.4
1968P	169.7	127.7	126.4	126.7	128.1	127.6	167.8	98.9
1968 as % of 1959	174.8	124.9	121.0	122.0	120.6	119.6	174.9	100.1
Annual trend rate of change(%)	7.4	3.4	3.2	3.3	3.3	3.3	7.2	-0.1

[1] From 1961 forward, figures represent total activity.

TABLE 3. Indexes of Output per Production Worker, and per Production Worker Man-hour, Iron and Steel Mills, Canada and United States, 1947 - 67

(1961 = 100)

Year	Canada		United States	
	Output[1] per production worker	Output[1] per production worker man-hour paid	Output per production worker	Output per production worker man-hour paid
1947	63.3	60.8	76.0	75.9
1948	63.7	58.3	77.5	76.3
1949	63.7	59.1	76.7	78.2
1950	69.1	66.5	87.0	84.9
1951	71.9	70.6	89.6	85.3
1952	68.7	68.8	90.4	88.0
1953	64.6	65.9	92.6	89.1
1954	64.7	66.5	84.3	86.8
1955	80.3	76.5	100.5	96.6
1956	86.9	84.1	100.3	96.5
1957	83.5	81.8	96.0	95.6
1958	82.9	84.1	88.6	92.0
1959	96.0	93.9	105.9	102.8
1960	92.4	91.8	94.5	96.4
1961	100.0	100.0	100.0	100.0
1962	104.6	103.8	105.7	104.9
1963	112.9	109.6	111.4	107.9
1964	117.3	113.2	117.6	111.0
1965	121.3	119.5	122.4	115.8
1966	116.8	115.5	124.9	118.8
1967	117.9	117.5	121.2	117.2
1967 as % of 1947	186.3	193.3	159.5	154.4
Annual trend rate of change (%)	3.8	4.0	2.3	2.2

[1] The indexes of output for Canada were specially constructed to reflect the gross value of production. For a more detailed explanation *see: Comparisons with United States data*, page 10 of this report.

TABLE 4. Value of Factory Shipments and Persons Employed, Iron and Steel Mills, and Primary Metal Industries, Canada, 1959 - 68

Year	Value of factory shipments			Persons employed[1]		
	Iron and steel mills	Primary metal industries	Iron and steel mills as per cent of primary metal industries	Iron and steel mills	Primary metal industries	Iron and steel mills as per cent of primary metal industries
	millions of dollars		per cent	number		per cent
1959	790	...	...	35,320	88,385	40.0
1960	734	...	...	35,364	89,258	39.6
1961	775	1,937	40.0	34,749	89,956	38.6
1962	861	2,070	41.6	36,593	91,713	39.9
1963	963	2,221	43.4	38,196	94,107	40.6
1964	1,108	2,547	43.5	41,505	100,407	41.3
1965	1,232	2,854	43.2	44,274	104,632	42.3
1966	1,255	3,085	40.7	45,999	113,645	40.5
1967	1,229	3,053	40.3	44,203	112,945	39.1
1968[p]	1,334	3,278	40.7	44,361	112,506	39.4
1968 as % of 1959	168.9	...	...	125.0	127.3	...

[1] From 1961 forward, figures represent total activity.

Source: Dominion Bureau of Statistics, *Manufacturing Industries of Canada*, Ottawa, Queen's Printer, Annual (DBS Catalogue No. 31-203). For 1968 the data for shipments originate from the publication, *Inventories, Shipments and Orders in Manufacturing Industries*, December 1968, Ottawa, Queen's Printer, Monthly (DBS Catalogue No. 31-001). 1968 persons employed figures for Iron and Steel Mills and Primary Metal Industries are projections of Census of Manufactures series using the most recent Employment Survey data.

TABLE 5. Per Cent Distribution of the Value of Production between Principal Components, Iron and Steel Mills, Canada, 1959 - 67

Year	Production	Materials	Fuel and electricity	Salaries and wages	Other[1]
	per cent				
1959	100.0	45.8	3.3	23.5	27.4
1960	100.0	47.1	3.9	25.7	23.3
1961	100.0	45.3	3.8	25.0	25.9
1962	100.0	45.5	3.7	24.3	26.5
1963	100.0	45.3	3.6	23.7	27.4
1964	100.0	46.2	3.7	22.8	27.3
1965	100.0	45.9	3.9	22.5	27.7
1966	100.0	45.3	3.9	23.9	26.9
1967	100.0	46.0	4.1	24.8	25.1

[1] This is basically a residual category which includes profits, depreciation, advertising, insurance, etc.

Source: Dominion Bureau of Statistics, *Iron and Steel Mills*, Ottawa, Queen's Printer, Annual (DBS Catalogue No. 41-203).

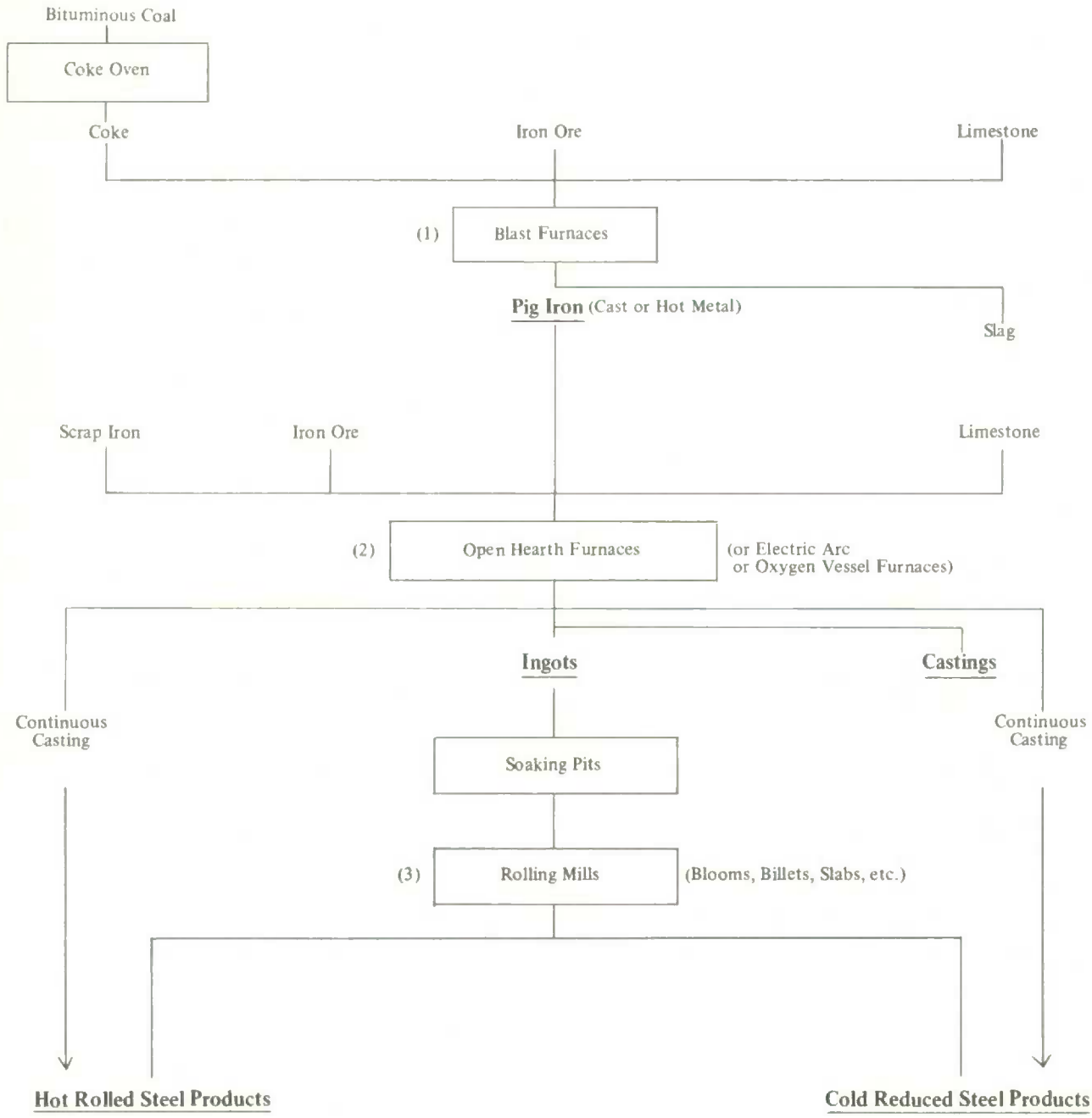
TABLE 6. Rates of Growth of Mid-year Fixed Capital Stock, Iron and Steel Mills, Canada, 1947 - 68

Period	Gross stock[1]	Net stock[1]	
		Straight line method	Sum of the years' digits method
1947-68	8.9	7.7	9.0
1947-59	9.4	8.1	10.6
1959-68	8.7	7.2	7.8

[1] For a detailed explanation of the terms *see: Fixed Capital Flows and Stocks, Manufacturing, Canada, 1926-60*, Ottawa, Queen's Printer, Occasional,1967 (DBS Catalogue No. 13-522).

APPENDIX B

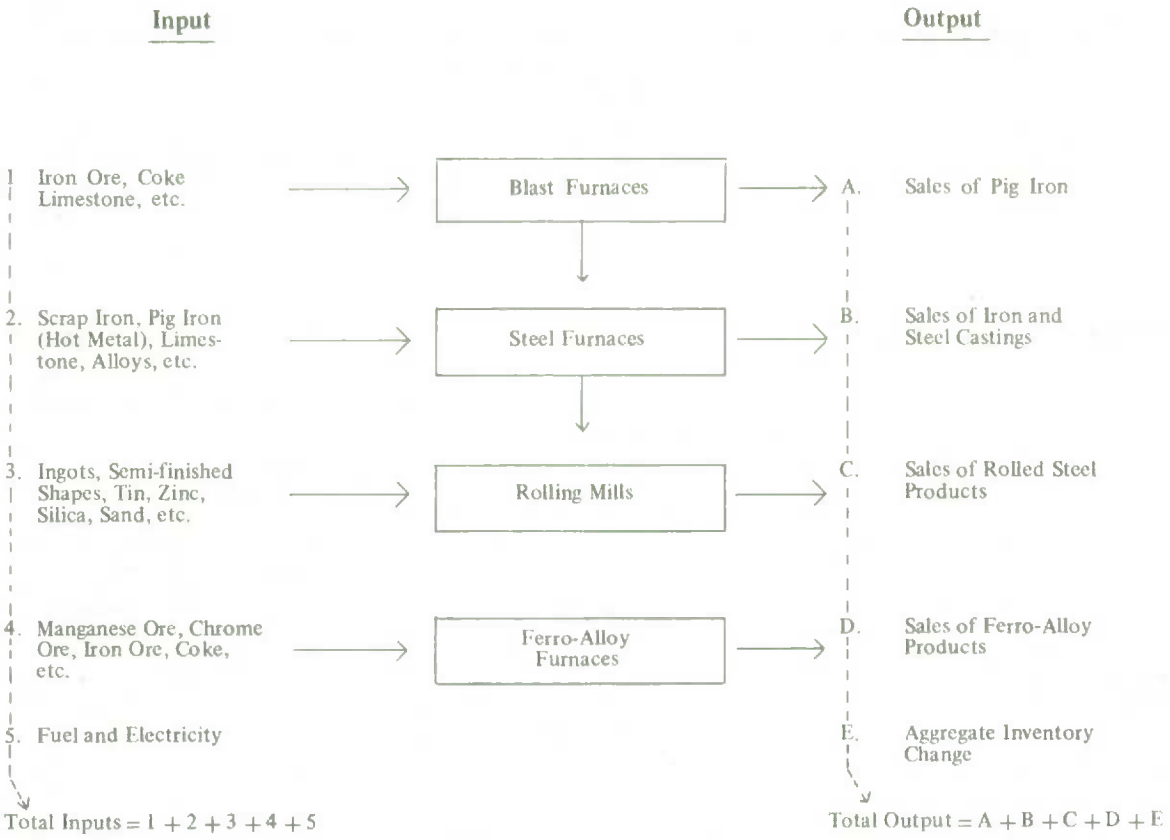
Flow Diagram of Materials and Work in the Iron and Steel Mills Industry



APPENDIX C

Simplified Input-Output Diagram for the

Iron and Steel Mills Industry



Real gross output = Current dollar output revalued using 1961 prices.

Real net output = The above measure less total current dollar inputs which are also revalued using 1961 prices.