THE EFFECT OF
PRESENT DEPRECIATION ALLOWANCES
ON THE UNITED STATES STEEL INDUSTRY

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PREFACE

The United States steel industry is currently faced with such problems as rising costs, competition from foreign steel producers, changing sources of ore supply, and the replacement and modernization of its physical plant. If the last of these problems is to be met, large amounts of capital must be available to the industry, and the industry should be able to meet much of this need from tax-free depreciation allowances.

This study of the reasons why these allowances are now inadequate and what should be done about the problem was written by Harleigh F. Fatzinger as his thesis for the master of science degree in mineral economics. The work was done under the supervision of Dr. John J. Schanz, Jr., associate professor of mineral economics.

Much of the information included was supplied by executives and management personnel of the steel industry. Their courtesy and assistance is gratefully acknowledged.

It should be understood, of course, that publication of this work as a Bulletin of the Experiment Station of the College of Mineral Industries of The Pennsylvania State University does not necessarily signify approval by the University of the views expressed by the author.

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SUMMARY

One of the many problems facing the steel industry at the present time is that of modernizing and replacing the obsolete portion of its plant and equipment. This activity requires large amounts of capital—the bulk of which should come from tax-free depreciation allowances. Present allowances, however, provide less than one-half the funds necessary for this modernization.

The depreciation allowances obtained by the steel industry are inadequate for two basic reasons. First, present government policy concerning the tax treatment of depreciation fails to consider the effects of inflation on the purchasing power of the dollar and the cost of replacing depreciable assets. Second, the periods of useful asset life listed by the 1942 edition of Bulletin "F" are too long compared to actual experience within the industry. In addition, the periods of useful life listed by Bulletin "F" fail to consider the increasing rate of technology and its effect on the useful service life of depreciable assets.

During the 1950's these factors were offset, to a great extent, by the additional tax allowances available under the Korean amortization program. However, little certification of facilities has taken place since 1956, and most of the five-year benefits authorized prior to that date have expired. As a result, a major source of funds employed by the industry during the past decade is no longer available.

Published material provides little information of the type necessary for appraising the effect of inadequate depreciation on the steel industry; therefore, the questionnaire method of data collection was employed. The information obtained in this manner indicates that present depreciation allowances contribute significantly to the industry's use of obsolete plant and equipment. Of the total amount of facilities employed by the industry, it is estimated that 20-30 per cent are obsolete. The major factor cited for the continued use of such equipment is that present depreciation allowances fail to provide sufficient funds to cover replacement costs. Depreciation recoveries on assets acquired since December 31, 1953, generally appear to provide, at best, only 80 per cent of replacement costs; recoveries on assets in use prior to that date provide even smaller percentages of replacement costs.

Information obtained from the questionnaire indicates that government depreciation policy causes an understatement of steel industry depreciation and, thereby, causes overstatement of industry profits. As a result, the true profits earned during each year are being taxed at average rates of 60-70 per cent, rather than the 52 per cent authorized by federal legislation.

Inadequate depreciation causes an additional problem; it, in effect, increases the cost of producing steel by necessitating the use of obsolete equipment. In view of rising competition for domestic steel products, this cost increase is particularly significant. Aluminum, plastics, and prestressed concrete are now entering important steel markets, and foreign steel constitutes a major threat to additional markets. Foreign steel producers have expanded rapidly since the end of World War II, and they possess several distinct advantages over producers in this country. Wide labor cost differentials favor foreign producers, and the effective rate of capital expenditures is greater in overseas operations than it is in the United States. In addition, most foreign countries have depreciation policies that are more favorable to industry than are those in the United States. In essence, the foreign producer is able to compete with his U.S. counterpart not only because his employment costs are lower, but also because he is equipped to do so.

This competition has put a premium on cost-cutting in the domestic industry. One of the major opportunities for cutting costs lies in the use of modern, up-to-date equipment
which will enable the production of more steel per unit of labor input. In effect, the industry must substitute capital in the form of depreciable assets for labor.

Significant improvements have been made in this fashion, and the domestic production of steel per manhour has been increasing steadily in recent years. However, these gains have not been sufficient to offset rising employment costs, and steel prices have been forced upward as costs of the labor input rise.

True, the cost of all steel-making inputs have risen. For this reason it is doubtful that the industry, even with the best equipment available, could offset cost increases completely. However, the industry could come closer to doing so if it could reduce the amount of obsolete equipment in use. It can do this only if aided by a government depreciation policy that allows more realistic capital recovery. It is recommended that any such new policy contain a legislative provision allowing compensation for changes in the purchasing power of the dollar and increases in the cost of replacing depreciable assets. This could be accomplished by the application of revaluation factors such as are used in many foreign countries. In addition, any new legislation should be administered in a manner such as to allow the taxpayer more freedom in determining the useful life of his depreciable property based on individual conditions and experience.
CHAPTER I
INTRODUCTION

GENERAL INFORMATION

During the past decade the steel industry of the United States has employed in the production and sale of steel between 515,000 and 650,000 hourly and salaried workers. The depreciable assets of the industry are worth 15 billion dollars. The profits from its operations are distributed to some one million stockholders, and its product is basic to our industrial economy. In short, the well-being of the industry has a significant effect on the prosperity of the nation as a whole.

Many problems face the industry at the present time. One of the most troublesome is that of financing the replacement and modernization of obsolete assets. This financing is directly related to the amount of capital recovered through depreciation allowances.

Ryan describes this concept of capital recovery by the following statement (1): “Material instruments of production are either used up in one productive process or deteriorate over a period of time with the necessity in both cases for replacement. In accounting, the former are a charge against current income, and the latter are a capital expenditure which should be recovered during the productive life.” The tax treatment of this recovery of capital expenditures has been the subject of increasing attention during recent years.

The major cause of this concern is centered on the effect capital recovery has on the modernization activity of U.S. industry. An inequitable tax treatment of capital expenditures tends to reduce the amount of corporate capital available and causes a lag in modernization. The long-range effects of such a lag are described in the 1954 Annual Report of the United States Steel Corporation (2).

The money that industry spends for plant and equipment is important to a high level of employment. Not only does this money result in employment of those who produce the facilities, but once the facilities are installed they provide the continuing jobs of operating them. Stop such capital expenditures and not only is creation of new jobs cut off, but existing jobs are imperiled as existing facilities become obsolete and are not replaced. The factors impairing or encouraging capital expenditures for facilities are of vital importance.

The problems involved in the equitable determination of tax-free depreciation allowances are not unique to the steel industry; they confront all industries to some degree. However, their importance to the steel industry is particularly apparent at the present time. The industry has reached what might be called the “beginning of a new era.” Costs of steel-making are rising and are exerting increasing pressure on the prices of steel products. Even at present price levels, domestic steel is faced with increasing competition from foreign steel and substitute materials. Any further price increases in domestic steel can be expected to result in greater competition in many steel markets.

To meet this threat, the domestic steel industry must cut costs; and to do this, it must make use of modern, up-to-date equipment. Present government depreciation policies, therefore, will have a significant effect on the industry’s ability to remain competitive.

OBJECT AND SCOPE OF THE STUDY

The purpose of this study is to assess the effect of depreciation allowances on modernization in the domestic steel industry. The study consists of three main phases:

1. The background for the study is furnished by a discussion of the historical development of government depreciation policy. This phase points out the important changes in policy and how these changes affect present tax allowances.

2. The second phase examines the adequacy of present depreciation allowances and their effect on modernization in the steel industry.

3. The final phase discusses the importance of steel industry modernization in view
of rising employment costs and increasing competition.

Data used in estimating the amount of obsolete facilities in use were limited to major, integrated or semi-integrated operations which produce significant annual tonnages of ingot steel. Small-scale ingot producers and non-integrated operations were omitted for the following reasons:

1. The large-scale producers are in a position to furnish more complete information. They employ larger staffs for the analysis of financial data and, in general, appear to be in a position to supply more meaningful opinions and data.

2. For the discussions on cost-cutting and productivity, it was necessary to have data that reflect conditions in the entire steel-making cycle. Nonintegrated operations, which do not encompass the complete cycle, do not meet this criterion.

3. Large producers have the facilities to assure that they obtain the maximum possible tax benefits available under present depreciation policy. Many smaller producers, who cannot afford extensive legal and financial counsel, may not obtain these maximum benefits. Therefore, the inclusion of these small producers would tend to distort the assessment of existing depreciation policy.

The study is limited to the extent that it describes the effect of depreciation allowances and government depreciation policy on the domestic steel industry only. It makes no attempt to describe the effects of such policy on the economy as a whole, nor does it attempt to evaluate the general effects of any possible changes in policy.

Certain factors, in the opinion of the author and various steel management personnel, should be considered in planning changes in depreciation policy. These factors are indicated at appropriate places throughout the study, but no attempt is made to arrive at a detailed proposal for depreciation reform.

METHODS OF RESEARCH

The bulk of the general information concerning depreciation legislation and policy was obtained by a literature survey of the materials available on The Pennsylvania State University campus. Because of the increasing interest in depreciation policy, information of this type was quite abundant in published volumes, periodicals, and government documents.

Information dealing more specifically with the steel industry was obtained, in part, from these sources. However, this information was supplemented with additional data available from the American Iron and Steel Institute and various large steel companies. Additional statistical data were obtained from Moody's Industrial Manual and recent annual reports of major steel producers.

The final portion of data, that which was not available in published form, was obtained by means of a questionnaire. The questionnaire was sent to the 34 leading steel producers based on ingot capacity in 1959; it provided coverage of approximately 94 per cent of the ingot capacity of this country. In addition to seeking some statistical data, the questionnaire attempted to secure meaningful estimates and opinions of top management personnel in the industry. The questionnaire, which is described more fully in the text, is included as Appendix B.
CHAPTER II
HISTORICAL DEVELOPMENT OF DEPRECIATION POLICY

Since early in the present century, the Federal government has been applying the concept of depreciation to its taxation of income. The application can be divided into two major types, normal depreciation and accelerated amortization. Each provides for the ultimate tax-free recovery of the initial cost of depreciable assets. The difference between the two lies in the rate at which this capital is recovered. In the first type, normal depreciation, the rate of recovery is based on the useful life of the asset involved. The second type, accelerated amortization, bases the rate of recovery on other factors and permits a more rapid capital recovery than does the normal type.

The historical development of both types was not simultaneous, and each evolved independently. For that reason, each type is developed separately in this chapter.

NORMAL DEPRECIATION

The basic concept of depreciation treats the capital recovery of depreciable assets as an operating cost. This basic concept, although simple in itself, is quite complex when applied to the subject of federal income taxation. Its treatment in taxation has, historically speaking, undergone radical change. The following discussion does not attempt to provide a complete history of depreciation development; rather, the object is to point out the major changes in depreciation policy as they have been applied to the taxation of corporate income.

Development Prior to 1933

George Terboogh, Research Director of the Machinery and Allied Products Institute, describes the early use of depreciation in the following words: “If depreciation policy was generally primitive for accounting and management purposes prior to the present century, it was even more so for tax purposes” (3).

The initial income tax legislation, the acts of 1861 and 1862, the income tax law of the Confederacy, and the income taxes passed shortly after the Civil War completely neglected depreciation in determining taxable income. It was not until the 1894 income tax law that mention was made of depreciation, and this law specifically disallowed depreciation deductions of any type.

The first real provision for depreciation was included in the corporate excise tax law of 1909. The provision, which permitted “a reasonable allowance for depreciation of property, if any,” was interpreted to mean the decrease in value from the exhaustion, wear and tear, or obsolescence arising out of the use of the property (4). This act itemized the deductions allowed in determining taxable income and levied a one per cent tax on the net income of joint stock companies, corporations, and insurance companies if in excess of 5,000 dollars. The depreciation deduction, according to Treasury Department rulings, was to be based on lifetime, cost, value, and use of the property (5).

The ratification of the Sixteenth Amendment removed the legal barriers to modern income taxation, and the first modern tax law was passed in 1913. Like the 1909 law, it provided for a depreciation deduction based on wear and tear, exhaustion, and obsolescence but failed to specify the acceptable causes of obsolescence. In both acts, allowances were made only for property that had been acquired after January 1, 1909.

The Revenue Act of 1916 dropped the use of the word “depreciation” in its description of deductions from gross income; instead, it provided for a deduction based on the wear and tear of property used in business or trade. In this wording, no allowance was made for obsolescence except upon the actual withdrawal of obsolete property from use. In such instances, the difference between cost and selling price of the asset involved was allowed as a subtraction from gross income for the year in which it was sold.

Further change in policy occurred with the
passage of the Revenue Act of 1918. This Act listed the factors that contributed to gross income and the deductions allowed for tax purposes. The depreciation provision was essentially the same as that included in the Act of 1916; however, in contrast with the 1916 law, it recognized obsolescence as a factor in calculating depreciation.

Following the passage of the Revenue Act of 1918, the Bureau of Internal Revenue issued, on August 31, 1920, the first edition of Bulletin "F". This edition, in contrast with later editions which attempted to develop the useful life concept, served only to summarize the current official policy on depreciation. In essence, the 1920 Bulletin "F" stated that depreciation varies quite extensively according to the particular conditions under which it is determined. For that reason, the 1920 edition said it was impossible to set up any generalized methods and formulae for computing depreciation; it left the determination of depreciation deductions strictly to the taxpayer (6).

The almost constant change in depreciation thinking during this early period is obvious from the repeated modification of its treatment in income tax legislation. Grant and Norton summarize the situation in the following words (7):

A study of the laws and regulations prior to 1920 shows that the basic ideas of depreciation were not clearly understood by the Congress and the Bureau...The confused thinking of some members of Congress is evidenced by the specific exclusion of depreciation expense in the 1894 act, by the specific exclusion of obsolescence as an element in the depreciation rate in the 1916 act, and by the difference of opinion as to whether or not to mention depreciation by name in other acts.

By the late 1920's, Bureau policy had become well established in the liberal direction. In general, the rates, methods, and useful lives were left to the discretion of the taxpayer, and the burden of proving the unreasonable nature of any depreciation deduction fell directly on the Bureau. The practice of writing off capital assets over periods considerably shorter than their actual useful lives appears to have been widespread, and the Bureau freely accepted this practice within limits (8). According to Grant and Norton, it was common practice to apply a depreciation rate of 10 per cent over useful lives substantially less than those based on actual experience (9).

Two important points must be considered when summarizing the development of depreciation policy prior to 1933. First, as pointed out above, taxpayers possessed a high degree of freedom in determining depreciation write-offs. Under the Bureau's administration of the existing income tax legislation, industry was able to recover its initial investment in depreciable assets rapidly. Second, corporate tax rates were extremely low by modern standards. Except for the years during World War I when an excess profits tax was in effect, corporate income tax rates ranged from 1 to 13⅓% per cent (10). The result was that industry had little incentive to press for clarification of the legislative basis for depreciation allowances. This vague legislative basis for depreciation remained in effect and unchanged, although administered in a liberal manner by the Bureau of Internal Revenue.

**Development from 1933 to 1954**

The depreciation picture changed drastically in 1933. At that time the Roosevelt administration was searching for funds to finance its "New Deal" programs. Since general tax revenue had been sharply reduced by the depression, any additional taxes on income were considered unwise. It was felt that an altogether different approach was necessary.

One solution for this problem was offered by a subcommittee of the House Ways and Means Committee. The subcommittee recommended that the government effect an arbitrary 25 per cent reduction of all depreciation allowances for the years 1934, 1935, and 1936 (11). In defending its recommendation, the Committee stated that depreciation deductions do not represent a current cash outlay and can, therefore, be deferred without injustice (9).

It was at this point that the Treasury Department stepped in. Secretary Morgenthau, in a letter to the Chairman of the House Ways and Means Committee, stated that the changes in depreciation policy could be effected by the administration of existing legislation. He recommended that the additional revenue be obtained by reducing the future depreciation allowances over the remaining useful life of an
asset to the extent that these allowances had been excessive in the past (12).

The proposal was favorably received by Congress, and on February 28, 1934, the Bureau of Internal Revenue issued Treasury Decision 4422. The Decision established three main Bureau policies on depreciation. First, it required taxpayers to submit detailed information such as asset cost and useful life, the portion of the cost already recovered through depreciation allowances, and other such information that might be required by the Bureau. Second, it required that all future deductions be limited to amounts considered necessary to recover the cost over the remaining useful life of the depreciable assets. Third, it placed the burden of proof directly on the taxpayer (13).

Terborgh describes the Treasury Department's application of T. D. 4422 to depreciation allowances as follows: "Having promised Congress to effect drastic reductions in depreciation charges, the Treasury proceeded to pare them down with vigor and persistence" (14). The Treasury began to place stronger and stronger emphasis on the concept of useful life indicated by the 1931 edition of Bulletin "F". Also, although existing legislation allowed the use of any reasonable and consistent system of depreciation, the Treasury began to accept only two write-off methods. The first was the straight line method applied at much lower rates and over much longer periods of asset life than had been the practice prior to the issuance of T. D. 4422.* The second was the unit-production-method of write-off, and this was reserved, almost exclusively, for assets used in the exploitation of mineral resources. The belief, on the part of the Treasury, that straight line write-offs were fundamentally sound and should have been used extensively is indicated in the results of a survey by the National Association of Accountants. Of a total of 55 companies surveyed, only three had been granted the use of methods other than the straight line prior to 1954 (15).

The almost exclusive insistence on the straight line continued until 1945, when the Treasury gave limited approval to a declining balance method of depreciation. This method allowed writing off assets at rates of up to 150 per cent of straight line rates. However, according to Grant and Norton, this maximum rate on the declining balance proved unattractive to most taxpayers (16).

In general, in administering depreciation between 1933 and 1954, the Treasury strictly enforced straight line write-offs over full average service life. This application of average useful life was given added importance in 1942, when the Bureau of Internal Revenue issued its third edition of Bulletin "F". This edition established average asset life on an industry-wide basis and claimed that the average life listed for each asset was listed solely for aid and guidance of taxpayers. However, revenue agents adopted a policy of strictly enforcing the use of Bulletin "F" lives. The effect of this idea of useful life, plus the shift of the burden of proof to the taxpayer, resulted in a decrease in the overall weighted average of rates allowed on fixed assets to approximately 5 per cent per year (17).

During the 20-year period, 1934-1954, opposition to the government's depreciation policy grew steadily. The major argument concerned the continuing strict scrutiny of depreciation claims past 1935. Most opponents of Treasury policy called attention to the fact that depreciation reductions were originated as a temporary measure to increase government revenue during the depression years. Many taxpayers favored a complete return to the pre-1934 practices which allowed taxpayers the freedom to establish their own depreciation rates. Others, more realistically, advocated a liberalization of Treasury policy which would enable a more rapid recovery of capital during the early years of the asset life than was possible under the straight line method.

The opposition to treasury policy was officially recognized on May 12, 1952. On that date the Commissioner of Internal Revenue announced that revenue agents were not to disturb depreciation claims unless there was "clear and convincing evidence for change" (18). This policy, however, has never been fully implemented, and the number of disputes between taxpayers and revenue agents on the field level has continued unabated.

Development Since 1954

By 1954 it had become obvious to the government and the taxpayer alike that changes in depreciation policy were necessary. In that

*Details concerning the computation of depreciation by all methods listed in the text are given in Appendix A.
year Congress provided for the use of two additional methods of depreciation, the declining balance method (with a maximum rate twice that of the straight line method) and the sum of the years-digits method. These new methods, as included in the Internal Revenue Code of 1954, Section 167, represent, at best, a compromise between the strict policies of the 1934-54 period and the liberal applications so widespread prior to 1934. On one hand Congress favored an increase in depreciation allowances, but on the other hand it feared the loss in tax revenue accompanying any substantial liberalization of policy. The new methods, although allowing a significant increase in the rate of capital recovery, had to be applied in conjunction with the useful life concept. This meant that the 1942 edition of Bulletin "F" retained its importance in Treasury policy, and industry continued to be faced with the problems of depreciable assets over periods that it considered to be too long.

An additional restriction incorporated in the 1954 Code was aimed at minimizing the temporary loss of tax revenue that was expected to accompany the use of the new methods. The restriction specifies that the declining balance and sum of the years-digits methods can be applied only to assets which meet the following conditions (19):

1. Their construction, reconstruction, or erection must have been completed after December 31, 1953. In addition, the application was restricted to that portion of the basis which was properly attributable to construction, reconstruction, or erection after December 31, 1953.

2. They must have been acquired after December 31, 1953, and the original use of the property must have commenced with the taxpayer.

In addition, these write-offs could be applied only to assets having a useful life of three or more years.

In spite of these limitations, the new methods have been used extensively since 1954. The previously mentioned study by the National Association of Accountants states that of the 50 companies surveyed, 40 have used the declining balance or the sum of the years-digits method since 1954. Only 14 use the straight line for assets which qualify for depreciation by either of the two new systems (15).

In spite of the widespread application of the more liberal methods authorized by the 1954 Code, industry continues to feel that there are shortcomings in government depreciation policy. It bases this dissatisfaction on several factors.

1. Treasury judgments of useful life are still based on the 1942 edition of Bulletin "F", even though this edition is over 19 years old and has been under revision for several years.

2. The "burden of proof" still remains, in most cases, directly on the taxpayer.

3. None of the depreciation methods consider the effect of inflation on the purchasing power of the dollar.

In spite of these criticisms, government depreciation policy has undergone little change since 1954. One change did occur in 1956 when Congress enacted a provision applying to assets with costs up to 10,000 dollars. This change provided for an accelerated rate of capital recovery by allowing an additional 20 per cent write-off in the first year of the asset life. Although this provision has been helpful in some cases, it remains far short of what industry considers necessary.

At the present time no less than four bills dealing with depreciation are being studied by various Congressional committees. Two of these, the Hartke Bill (S.-720) and the Keogh Bill (H. R.-422), advocate a type of "reinvestment depreciation." Under these proposals, the taxpayer would be granted adjustments for inflation when he replaces depreciable property (20). The other two proposals, the Smathers Bill (S.-580) and the Keogh Bill (H. R.-3886), are aimed at reducing the periods of useful life now applied to depreciable assets (20). A fifth proposal is being formulated by the Executive branch of the government. This proposal, which would grant outright tax credits on new investments in depreciable assets, is apparently aimed more at general expansion than at replacement and modernization of equipment (20). The possibility of any change in government depreciation policy in the near future appears to depend directly on the success of these proposals.

ACCELERATED AMORTIZATION

Like normal depreciation, accelerated amortization functions to provide for the recovery of
investments in depreciable assets. The difference between the two is the rate at which this recovery takes place. Accelerated amortization provides for rates of recovery that are substantially greater than those under normal depreciation. This rapid rate of recovery has long been recognized as an effective stimulus to industrial expansion and modernization. For this reason accelerated amortization has been put into effect during each of the past three military emergencies, World War I, World War II, and the Korean conflict. Thomas, in his study of accelerated amortization, describes its use during the three periods as follows (21):

As an inducement to expand emergency capacity, no other incentive has been as effective as the income tax provision for the accelerated amortization of emergency facilities. And few legislative actions have provoked such widespread controversy. Its history in two World Wars and in the present defense era may be characterized by a course including enactment, intensive utilization, keen scrutiny by the press, and investigation by Congress.

Use During the World War I Period

The initial use of accelerated amortization was brought about as a result of industrial expansion which took place during World War I, and its tax benefits were not available until after the war. The legislation, in the form of the Revenue Acts of 1918 and 1921, attempted to provide a means for the equitable determination and taxation of profits from defense and munitions facilities that were built during the war. It stated that only those facilities used “for the production of articles contributing to the prosecution of the present war” were eligible for amortization (22).

The basic goal of the program was to allow the retrospective depreciation of emergency facilities according to their post-emergency, economic usefulness. This measure of postwar value was subtracted from the original cost of the facilities, and the difference between the two values was allowed as an additional write-off during the postwar years.

The postwar evaluation procedure posed a problem of no small magnitude. In providing for the amortization program, Congress assigned this evaluation activity to the Bureau of Internal Revenue. The appraisal value was to be based on the extent of excess capacity resulting from expansion and was not to be less than the salvage value nor greater than the postwar replacement cost of the facilities (23). In this way it hoped to establish the cost of the facilities that had been absorbed for war purposes.

An additional factor entered the evaluation. The legislation specified that “the excess capacity was to be the difference between the average production for the years 1921, 1922, and 1923, and the capacity (peak wartime production) of the war-built plants plus all other plants (whether built before or after the war).” (23)

The evaluation process encountered several difficulties. The regulations themselves were quite vague, and the Bureau was inexperienced in valuations of this type. Furthermore, the years 1921 and 1922 were marked by a postwar depression which reduced industry operating rates. This reduction caused significant errors in the determination of excess capacity. Also, the Bureau simply did not have sufficient personnel to carry out detailed and meaningful evaluations of all the postwar claims. The magnitude of their job is indicated by Table 1 which itemizes, by industries, the allowances granted through April 30, 1925. The estimated total value ultimately amortized under the program is 650 million dollars (24).

**TABLE 1**

<table>
<thead>
<tr>
<th>Type of Industry or Product</th>
<th>Amortization Allowed on Facilities Discontinued With Reduced Value in Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron and Steel Products</td>
<td>162.6</td>
</tr>
<tr>
<td>Nonferrous Metals and Products</td>
<td>26.2</td>
</tr>
<tr>
<td>Machinery and Electrical Equipment</td>
<td>32.3</td>
</tr>
<tr>
<td>Chemicals and Petroleum</td>
<td>35.3</td>
</tr>
<tr>
<td>Products</td>
<td>14.4</td>
</tr>
<tr>
<td>Ammunition</td>
<td>20.2</td>
</tr>
<tr>
<td>Guns</td>
<td>3.6</td>
</tr>
<tr>
<td>Ships</td>
<td>2.8</td>
</tr>
<tr>
<td>Combat and Motorized Vehicles</td>
<td>1.1</td>
</tr>
<tr>
<td>Miscellaneous Manufacturing</td>
<td>4.6</td>
</tr>
<tr>
<td>Nonmanufacturing</td>
<td>30.1</td>
</tr>
<tr>
<td>TOTAL *</td>
<td>425.9</td>
</tr>
</tbody>
</table>

*Includes only allowances over $500,000 each processed prior to April 30, 1925.

In spite of this large figure, it must be emphasized that little of the expansion was actually stimulated by the program. Some projects were undertaken during the late years of the war when amortization was being discussed by Congress, but this expansion was minimized because enactment of the proposals was not a certainty. In addition, at no time during the war did industry know exactly how much war capacity it would be able to amortize, at what rate it could amortize, and over what period of time it would be allowed to claim tax benefits.

According to the Machinery and Allied Products Institute, "By the mid-twenties it was apparent that a great many of the Bureau's determinations had been gravely in error." (25) A period of Congressional investigation followed; and two major committees, the Couzens Committee and the Nye Committee, were highly critical of both the Bureau's administration of the evaluation provisions and the provisions themselves. By this time general opinion had swung strongly against any future use of "depreciation in retrospect."

Use During World War II

The prospect of a second world war made industrial mobilization again necessary in the early 1940's. Congress, at this time, recognized the need for positive government stimulation of industrial expansion but had serious reservations as to how this stimulation could be accomplished. It was agreed that accelerated depreciation benefits would provide the necessary stimulation. However, the retrospective nature of the World War I amortization, plus the administrative problems accompanying its use, made this approach unsuitable. For positive stimulation, industry needed to be relatively certain of the amount of tax benefits it could claim and the period over which these benefits could be obtained.

The amortization provision included in the Second Revenue Act of 1940 attempted to provide industry with the information it desired. In contrast with the vague provisions for amortization included in the World War I legislation, this Act provided for the determination, in advance, of what facilities could be amortized and over what period of time they could be written off. The Act provided for the granting of tax benefits over a five-year period on facilities that were considered necessary to the national mobilization effort.

Administration of the program was concerned mainly with determining what expansion of facilities was considered necessary. This appraisal, which was carried out initially by the Navy and War Departments in conjunction with the Advisory Commission to the Council of National Defense, resulted in the issuance of certificates of necessity. The certificates, which were issued according to wartime need, made no reference to postwar usefulness of the facilities in question; they provided for 100 per cent amortization over a five-year period or over the duration of the war, whichever was shorter.

A policy change occurred in 1944 when the task of issuing the certificates was transferred to the War Production Board. By this time it was felt that the mobilization base had been sufficiently expanded and any further expansion would add little to the war effort. For this reason the Board certified only limited additional expansion, and it reduced the per cent of amortization on any new certificates it did issue. As opposed to the 100 per cent amortization previously granted on certified facilities, the post-1944 certificates averaged only a 35 per cent write-off (26).

In all, approximately 7.3 billion dollars worth of facilities was certified. Of this total, 5.7 billion dollars worth was actually amortized for tax purposes (27). Table 2 lists the industry breakdown of all certified projects in excess of 25,000 dollars.

As can be seen from Table 2, much of the amortization was certified for facilities capable of producing or servicing normal line products as opposed to highly specialized munitions goods. For example, the iron and steel, railroad, aluminum and magnesium, machine tool, and machinery industries received approximately one-half of the total certified expansion. In most cases these facilities retained much of their economic usefulness after the war. On the other hand, facilities that lost much of their usefulness at the end of the war, such as those for the manufacture of ammunition, ships, combat vehicles, and guns, received only about 10 per cent of the total certified expansion.

This expansion of normal facilities was subjected to extreme criticism during the postwar years. Many groups, including Congressional investigating committees, expressed the feeling
TABLE 2
ACCELERATED AMORTIZATION ALLOWANCES GRANTED DURING THE WORLD WAR II PROGRAM
(Breakdown by industry of all certified projects of $25,000 or greater)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Value Certified (millions of dollars)</th>
<th>Per Cent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railroads</td>
<td>4,590</td>
<td>21.3</td>
</tr>
<tr>
<td>Iron and Steel</td>
<td>814</td>
<td>12.1</td>
</tr>
<tr>
<td>Basic</td>
<td>664</td>
<td></td>
</tr>
<tr>
<td>Fabricated</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Coal and Petroleum Products</td>
<td>645</td>
<td>9.6</td>
</tr>
<tr>
<td>Aviation gasoline</td>
<td>492</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>153</td>
<td></td>
</tr>
<tr>
<td>Aircraft engines, parts, and accessories</td>
<td>518</td>
<td>7.7</td>
</tr>
<tr>
<td>Chemicals</td>
<td>399</td>
<td>5.9</td>
</tr>
<tr>
<td>Synthetic rubber</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>357</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>395</td>
<td>5.8</td>
</tr>
<tr>
<td>Nonferrous Metals</td>
<td>584</td>
<td>5.7</td>
</tr>
<tr>
<td>Aluminum and magnesium</td>
<td>316</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Machinery and Electrical Equipment</td>
<td>383</td>
<td>5.7</td>
</tr>
<tr>
<td>Electric Power</td>
<td>277</td>
<td>4.1</td>
</tr>
<tr>
<td>Motor, Water, and Air Transportation</td>
<td>221</td>
<td>3.3</td>
</tr>
<tr>
<td>Ship Construction and Repair</td>
<td>211</td>
<td>3.1</td>
</tr>
<tr>
<td>Machine Tools and Other Metalworking Equipment</td>
<td>194</td>
<td>2.9</td>
</tr>
<tr>
<td>Ammunition, Shells, and Bombs</td>
<td>183</td>
<td>2.7</td>
</tr>
<tr>
<td>Guns</td>
<td>149</td>
<td>2.2</td>
</tr>
<tr>
<td>Combat and Motorized Vehicles</td>
<td>141</td>
<td>1.7</td>
</tr>
<tr>
<td>All Other</td>
<td>418</td>
<td>6.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6,729</td>
<td>100.0</td>
</tr>
</tbody>
</table>


that "legalized profiteering" had resulted from the amortization program (28). To be sure, some corporations had modern, up-to-date facilities that were either totally or in large part amortized by the end of the war. However, it must be re-emphasized that the program was an emergency measure; its primary purpose was to promote industrial expansion in the most expeditious manner possible, regardless of the postwar repercussions. In essence, rapid industrial expansion had been necessary; at the time, the certificate of necessity program appeared to be the best method of stimulating this expansion.

Use During the Korean Emergency

The third and most recent use of accelerated amortization began in 1950, shortly after the beginning of the Korean conflict. Provisions for this amortization were first enacted as part of the Revenue Act of 1950; they were later added as an amendment to the Internal Revenue Code of 1939, Section 124 A.

As was the case with the World War II amortization program, the Korean provisions called for advance certification of the facilities to be amortized. The Korean provisions differed from those of the World War II program in two ways. First, they had no telescope provision relating the duration of the emergency to the length of the write-off period. A straight 60-month write-off period was established, regardless of how long the war lasted. Second, the Korean provisions provided for only partial amortization of the facilities certified. This partial amortization is described by the Revenue Act of 1950 as follows (29):

There shall be included only so much of the adjusted basis (computed without regard to this section) ... as the certifying authority ... has certified as necessary in the interest of national defense during the emergency period, and only such portion of such amount as such authority has certified as attributable to defense purposes.

Some question exists as to what Congress actually intended by this provision. Two different interpretations are possible: First, the fractional amortization should be based on the ratio of defense to nondefense use of the facility during the emergency. Second, the amortization percentage should be based on the difference of the cost of the facility and its estimated value for nondefense uses after the emergency period. Apparently, according to Thomas, most amortization allowances were based on the second interpretation, and the percentage limits were determined through an estimation of the probable economic obsolescence of facilities directly attributable to participation in the defense effort (30). In addition, the final percentages granted were modified by the amount of each type of expansion desired by the government and the amount of assistance deemed necessary to stimulate this expansion. In general, this certification averaged 59 per cent of the initial cost of facilities (31).

To expedite processing the applications for certification, the Defense Production Administration established the practice of setting industry-wide amortization percentages. Under this system, all similar types of facilities in a particular industry were allowed a fixed percentage of amortization, regardless of individual company operations or local conditions (32). This practice was continued by the Office of Defense Mobilization when it assumed the responsibility for issuing certificates in February of 1953.

The amortization provisions were extended
by the Internal Revenue Code of 1954, Section 168, and the issuance of certificates continued at a high level until December 1956. At that time the Office of Defense Mobilization reduced its certification activity. It stated that henceforth tax amortization was to be granted only on applications directly involving procurement by the Department of Defense or the Atomic Energy Commission or where expansion was clearly necessary for defense (33). Finally, even this limited certification ceased on December 31, 1959.

From the start of the program in October 1950 through December 1959 a total of 22,313 certificates of necessity were issued. These certificates covered facilities costing an estimated 39.6 billion dollars, of which 23.3 billion could be amortized over the authorized five-year period (31). Unfortunately, no industry breakdown of these figures is available.

It can be seen that the program provided substantial incentive for industrial expansion and capital expenditure. However, this stimulation ceased with the end of the certification program. In addition, the tax benefits granted as a result of the program have all but expired, and the benefits obtained by most industries contribute little to their present capital formation activity. The domestic steel industry's role in this recent amortization program and the tax benefits received by the industry will be more fully discussed in the following chapter.
CHAPTER III
ADEQUACY OF PRESENT DEPRECIATION ALLOWANCES OF THE STEEL INDUSTRY

The changes in government depreciation policy, the application of these changes, and the latest use of emergency amortization exert a substantial influence on the determination of taxable corporate income. This influence results from the interplay of three major factors: the failure to consider inflation, the application of the useful life concept, and the end of the rapid write-off allowances. Oddly enough, only one of the factors, that concerning the useful life concept, is basically rooted in depreciation development. The other two have been superimposed by economic and political situations, but their effects on depreciation allowances cannot be overlooked.

This chapter will discuss the adequacy of present depreciation allowances as affected by three factors: inflation, useful life, and emergency amortization. These factors affect, to varying degrees, the determination of taxable income in all forms of business. However, because of its high ratio of depreciable assets to net income, its long-lived facilities, and its overall importance to general mobilization, the steel industry has been as greatly affected as any segment of the economy.

In the following discussion each factor will be treated separately; however, their constant interplay can not be overlooked. For example, the depreciation allowances on a facility with a comparatively long useful life will be affected to a greater degree by inflation than will those of a short-lived facility. On the other hand, amortization of a facility will tend to minimize the effects of inflation.

RESULTS OF INFLATION

Terborgh describes the accounting concept of deprecations as follows (34):

An investment in plant or equipment is a prepaid expense from the accounting point of view. This prepayment is then periodically allocated as an operating cost over the time that the asset is used in the business. It should be noted that, in this treatment of depreciation as a current operating cost, inflation acts to cause an overstatement of corporate profits.

While other operating expenses and income figures are reported for tax purposes in current dollars, depreciation is determined and reported in historical dollars. During a period of inflation, the historical dollar will represent a greater amount of purchasing power than will the current dollar, and, for that reason, the computed taxable profit will be overstated.

Exactly how and why this overstatement occurs can be illustrated by a hypothetical situation. Assume that a steel company purchased a blast furnace in 1937 for eight million dollars. Assume also, for the sake of simplicity, that the straight line method of depreciation is used and that there is no salvage value at the end of the 25-year useful life. In this situation the annual
FIGURE 1—BUREAU OF LABOR STATISTICS WHOLESALE PRICE INDEX, ALL COMMODITIES, 1939-1960
depreciation would be $320,000 dollars per year. However, according to the BLS wholesale price index shown in Figure 1, one 1957 dollar has less than one-half the purchasing power of a 1937 dollar. Stated conversely, one 1937 dollar is worth more than two 1957 dollars; and the depreciation expense is, therefore, only one-half as great as it should be in terms of purchasing power. Instead of being reported as a current expense of $640,000 current dollars, the depreciation allowance is reported as $320,000 historical dollars. However, in the computation of taxable income, no differentiation is made between historical and current dollars, and the resultant taxable profit is overstated by $320,000 dollars.

This overstatement of profits results in the creation of several undesirable effects, the most important of which deals directly with taxation. Considering that the steel company in question is well into the surtax bracket, this $320,000-dollar overstatement will be taxed at 52 per cent. The result is that the company will be required to pay $166,400 dollars of tax in excess of the amount it should actually pay. An additional example of this taxation of overstated profits is given in Table 3. The result in both examples is that the government, in actual practice, is taxing true income at a rate in excess of the authorized 52 per cent maximum.

Not only does the creation of “phantom profits” result in overtaxation, but it affects the distribution of earned surplus as well. Overstated and unrealistic profit figures force management to declare dividends in excess of the amount realistically available for distribution. The steel industry, as a whole, has traditionally distributed 40 per cent of its net profit in the form of dividends (35). Present and prospective stockholders expect this, and any reduction of dividends to a level more in keeping with the real profit for the fiscal period would cause dissatisfaction. As a result, steel management bases dividends on distorted profit figures and pays stockholders amounts that do not reflect the profits actually earned.

Further problems are created by the overstatement of profits. Steel management has been forced to report unrealistically high earnings. Labor unions, in turn, use these reported profits as leverage factors in wage disputes. In doing this, they claim that industry earnings are at a high level but that wages are not increasing in relation to the reported profits. For this reason, they say that management is not giving labor its “fair share.”

Finally, the overstatement of profits hinders the determination of real income. Only when the inadequacies of depreciation and the resulting overstatement of profits are clearly understood can management determine the real profit from operations. This determination is necessary for intelligent budgeting, sound management decisions with regard to pricing and financing, and effective and timely equipment replacement.

Increase in Replacement Costs

An additional factor to be considered is the rising cost of replacing depreciable assets. Present depreciation allowances make no provision for increasing costs and provide only for the recovery of initial investments in depreciable assets. As a result, additional funds must be used to supplement depreciation allowances at the time depreciable assets are replaced.

These additional funds are obtained in several ways: long-term borrowing, sale of additional stock, and use of retained earnings. Each, however, has its particular disadvantages.

### TABLE 3

<table>
<thead>
<tr>
<th>EFFECT OF UNDERSTATEMENT OF DEPRECIATION ON THE TAXATION OF PROFITS (A HYPOTHETICAL EXAMPLE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Income</td>
</tr>
<tr>
<td>Cost of Goods Sold:</td>
</tr>
<tr>
<td>Inventory 1/1</td>
</tr>
<tr>
<td>Purchases</td>
</tr>
<tr>
<td>Manufacturing Expense</td>
</tr>
<tr>
<td>Less Inventory 12/31</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Wages and Salaries Expense</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Other Expenses:</td>
</tr>
<tr>
<td>Selling Expense</td>
</tr>
<tr>
<td>Administrative Expense</td>
</tr>
<tr>
<td>Delivery Expense</td>
</tr>
<tr>
<td>Depreciation (understated)</td>
</tr>
<tr>
<td>Income Before Taxes</td>
</tr>
<tr>
<td>Federal Income Taxes</td>
</tr>
<tr>
<td>Net Income</td>
</tr>
<tr>
<td>Effective rate of taxation on overstated income</td>
</tr>
<tr>
<td>If above depreciation expense is understated by</td>
</tr>
<tr>
<td>the following tax rate on true profits is in effect:</td>
</tr>
<tr>
<td>Income Before Taxes (as above)</td>
</tr>
<tr>
<td>Correction for Understatement of Depreciation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>True Income Before Taxes</td>
</tr>
<tr>
<td>Federal Income Taxes (as above)</td>
</tr>
<tr>
<td>True Net Profit</td>
</tr>
<tr>
<td>Effective rate of taxation on true income</td>
</tr>
</tbody>
</table>

FIGURE 2—BUREAU OF LABOR STATISTICS WHOLESALE PRICE INDEX OF MACHINERY AND MOTIVE PRODUCTS AND THE ENGINEERING NEWS-RECORD CONSTRUCTION COST INDEX, 1939-1960

Long-term borrowing, by requiring fixed interest payments, tends to increase the cost of the capital obtained. Also, each interest payment must be made regardless of the profit for each period. During periods of curtailed operations, these mandatory payments can seriously reduce working capital. In spite of this, borrowing can be and is used successfully as a source of funds for some replacement financing. However, its continued and widespread use throughout a planned replacement program is simply too costly and too dangerous.

Sale of stock has an advantage over borrowing in that periodic payments are not necessary under all conditions. Dividends can be missed if management feels that financial conditions make this necessary. However, the sale of stock does have the undesirable effect of diluting owners’ equity, and the extensive sale of stock for obtaining replacement funds is normally avoided.

The use of retained earnings, generally, is the most acceptable manner of financing replacement activity. Its use has none of the drawbacks of the methods mentioned previously but is not without problems. Corporate gross income is subject to federal and often state taxation (effective combined rate in excess of 52 per cent) which reduces the profit to less than one-half its original amount. Then, as discussed previously, the steel industry dividends reduce the profit-after-tax amount by one-half. The result is that it takes four dollars of gross income to produce one dollar of retained earnings available for replacement financing. (This is in comparison to the depreciation allowance in which each dollar is withheld before any payment of taxes or dividends.)

This problem of financing replacement deficits by the use of retained earnings is described by Roger M. Blough, U.S. Steel’s Board Chairman (36):

Back in 1930 we built an open hearth plant which cost about $10 million. Today, it will cost us about $64 million to replace that plant. Through depreciation we have recovered the $10 million that we spent on this facility. The remaining $54 million will come out of our profits—after taxes.

But in order to earn $54 million in profits after taxes we have to earn $112½ million before taxes. And last year it took the profit on $600 million of the dollars we received from our customers—about one-seventh of our total sales—to pay for the open hearth plant.

The extent to which inflation has affected the price of steel industry facilities is shown by Figure 2. The Bureau of Labor Statistics index of machinery and motive products is used to indicate the price increases in steel making equipment, while the Engineering News-Record index of construction costs is used to indicate the increasing costs of general construction activity. In cases where replacement involves the simple substitution of a new piece of equipment for an old one, the machinery index would be the controlling price factor. However, when replacement proceeds from “the ground floor,” the construction cost index would exert a substantial effect on the price. As a result, no generalized replacement index can be constructed to cover all types of replacement; at best, it can be said that the cost of each replacement activity will be affected to some degree by both increases.

The actual effect of inflation on the prices of various types of steel making equipment is shown by Table 4. The data given were obtained from independent studies by Walker (37) and Reed (38) and show increases actually recorded by major steel companies. In each case the original cost is set at 100 per cent, and the replacement cost is figured as a percentage of the original cost. The effect of inflation is readily apparent on all types of equipment listed. In all cases the difference between the two costs would have to be obtained from a source other than depreciation allowances, and because of this replacement activity would be accompanied by financial problems.

EFFECTS OF THE USEFUL LIFE CONCEPT

Since 1934 the useful life concept has played an important role in government depreciation policy. The development of this concept can be traced by examining the three editions of Bulletin “F”.

Development of the Concept

The 1920 edition of Bulletin “F” expressed the Treasury’s liberal policy of that period. It
stated that, because of the many and varied elements entering into depreciation, no one set of formulae or estimates of useful life could be applied to all cases. It further stated that, for all practical purposes, the Bureau would accept

<table>
<thead>
<tr>
<th>TABLE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFFECT OF INFLATION ON THE REPLACEMENT COSTS OF STEEL INDUSTRY EQUIPMENT</td>
</tr>
<tr>
<td>Asset of Facility</td>
</tr>
<tr>
<td>Blast Furnaces</td>
</tr>
<tr>
<td>Coke Ovens</td>
</tr>
<tr>
<td>Coke Batteries</td>
</tr>
<tr>
<td>Coal Washing Plant</td>
</tr>
<tr>
<td>45° Slabbing Mills</td>
</tr>
<tr>
<td>Billet Mills</td>
</tr>
<tr>
<td>Boring Mills</td>
</tr>
<tr>
<td>80° Hot Strip Mills</td>
</tr>
<tr>
<td>100-Ton Hot Ladle</td>
</tr>
<tr>
<td>100-Ton Mixer Type</td>
</tr>
<tr>
<td>Ladle Cars</td>
</tr>
<tr>
<td>100-Ton Overhead Crane</td>
</tr>
<tr>
<td>80° Hot Strip Mills</td>
</tr>
<tr>
<td>100-Ton Ladle</td>
</tr>
<tr>
<td>100-Ton Mixer Type</td>
</tr>
<tr>
<td>Ladle Cars</td>
</tr>
<tr>
<td>100-Ton Ladle</td>
</tr>
<tr>
<td>100-Ton Mixer Type</td>
</tr>
<tr>
<td>Ladle Cars</td>
</tr>
</tbody>
</table>


A taxpayer’s estimate of useful life and appropriate depreciation rate unless the estimate was considered excessive due to negligence, carelessness, or fraud (39). In such cases, as was the policy for all depreciation controversies at that time, the burden of proof rested with the Bureau.

A distinct change in the Bureau’s attitude toward useful life is apparent in the 1931 edition. In discussing the “probable useful life-rates of depreciation and obsolescence,” the 1931 edition states that past experience coupled with informed opinion as to the present condition of the property in question and the current developments within an industry could furnish reliable guides to the determination of average useful life (40).

The Bureau then carried this idea one step further in January, 1931, when it issued a preliminary report entitled “Depreciation Studies.” This report listed the average life of about 45 major asset groups, according to industry and function. Examples of the grouping and average life assigned to selected steel industry assets are given in Table 5. Similar groups were included for such things as power generation and electrical equipment, mining and quarrying equipment, oil and gas production equipment, and transportation facilities. In all cases the estimates were to be used solely as a guide to taxpayers (40).

This attempt to assign average service life to depreciable assets represents a distinct change in Treasury thinking. Previously, as illustrated by the 1920 edition of Bulletin “F”, the Treasury had made no attempt to estimate average service life on an industry-wide basis.

<table>
<thead>
<tr>
<th>TABLE 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESTIMATED AVERAGE LIFE AND DEPRECIATION RATE OF SELECTED STEEL INDUSTRY ASSETS, 1931</td>
</tr>
<tr>
<td>Depreciable Asset</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Cupolas</td>
</tr>
<tr>
<td>Furnaces:</td>
</tr>
<tr>
<td>Annealing</td>
</tr>
<tr>
<td>Blast</td>
</tr>
<tr>
<td>Electric</td>
</tr>
<tr>
<td>Open Hearth</td>
</tr>
<tr>
<td>Reheating</td>
</tr>
<tr>
<td>Ladles:</td>
</tr>
<tr>
<td>Hot Metal</td>
</tr>
<tr>
<td>Steel</td>
</tr>
<tr>
<td>Mill Machinery</td>
</tr>
<tr>
<td>Billet</td>
</tr>
<tr>
<td>Blooming</td>
</tr>
<tr>
<td>Rod and Wire</td>
</tr>
<tr>
<td>Strip</td>
</tr>
<tr>
<td>Coke Ovens</td>
</tr>
<tr>
<td>Presses:</td>
</tr>
<tr>
<td>Drill</td>
</tr>
<tr>
<td>Hydraulic</td>
</tr>
<tr>
<td>Sintering Plants</td>
</tr>
<tr>
<td>Stampers, billet</td>
</tr>
<tr>
<td>Milling Machines</td>
</tr>
</tbody>
</table>


The real effect of the 1931 edition of Bulletin “F” and its accompanying study was not felt until 1934. After the Treasury’s strict depreciation policy was established, revenue agents began judging reported useful lives by comparing them to those given by the 1931 edition and accompanying study. The result was that the average lives furnished as aids to the taxpayer became, in essence, restrictions on write-offs.

The 1931 useful life estimates apparently were obtained from conferences with industry leaders and persons familiar with the particular types of property involved. Little emphasis seems to have been placed on the statistical evaluation
of retirement data. However, the Treasury engaged in a vigorous campaign of collecting statistical information during the period 1931-1942, and vast quantities of this information were obtained from cases handled under the strict policy of 1934.

The compilation of this information was published in 1942 as the third edition of Bulletin "F". Its asset breakdown is much the same as that of the 1931 edition, being set up on an industry-wide basis. Like the 1931 Bulletin, the 1942 edition states that the indicated useful lives were set up only as guides to taxpayers. However, as was the case with the previous useful lives, the 1942 lives have since been used as industry-wide norms by revenue agents.

The widespread application of useful life as defined by Bulletin "F" has led to several problems. The data used in preparing the 1942 edition were collected during a period when economic conditions tended to discourage equipment replacement. During the early 1930's the depression cut into corporate earnings, and money for replacement activity simply was not available. Even during the late 1930's replacement activity lagged. The whole economic situation was still overshadowed by a basic feeling of uneasiness, and industry was understandably reluctant to invest heavily in new capital assets. By the time that full economic recovery was assured, the country was entering a period of mobilization for World War II, and the aging facilities which had been kept in use during the depression continued in use.

The cumulative effect of this series of events was that the bulk of the data collected by the Bureau applied to assets that were kept in use for periods longer than would be considered economic and practical under normal conditions. Evidence of this fact is supplied by a comparison of the 1931 listed average lives and those listed in 1942. Of a total of 2,700 units of equipment compared, the useful life of 1,038 increased, 1,608 remained unchanged, and only 54 decreased (41). In the iron and steel industry, the increase was even more apparent. Of the 251 units compared, 169 useful lives were increased, 62 remained unchanged, and none were decreased (41).

Table 6 lists the average useful lives of selected iron and steel making facilities as given by the 1942 edition. It can be seen that most major equipment ranges in life from 20 to 30 years, and the average overall life for the industry is listed as 25 years. These figures, as described previously, are based on data collected during a time of abnormal conditions. In addition, the listed lives fail to consider the rapidly increasing rate of obsolescence of facilities.

### TABLE 6

<table>
<thead>
<tr>
<th>Type of Equipment or Facility</th>
<th>Average Useful Life (in years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annealing Furnaces</td>
<td>23</td>
</tr>
<tr>
<td>Blast Furnace Plants</td>
<td>25</td>
</tr>
<tr>
<td>Blooming Mills</td>
<td>25</td>
</tr>
<tr>
<td>By-product Coke Plants, complete</td>
<td>25</td>
</tr>
<tr>
<td>Electric Weld Tube Mill</td>
<td>25</td>
</tr>
<tr>
<td>Heating Furnaces and Equipment</td>
<td>20</td>
</tr>
<tr>
<td>Lap and Butt Weld Pipe Mills</td>
<td>25</td>
</tr>
<tr>
<td>Merchant Bar Mills</td>
<td>25</td>
</tr>
<tr>
<td>Open Hearth Furnace Plants</td>
<td>25</td>
</tr>
<tr>
<td>Electric Furnaces, smelting</td>
<td>20</td>
</tr>
<tr>
<td>Bessemer Converter Plants</td>
<td>20</td>
</tr>
<tr>
<td>Plate Mills</td>
<td>30</td>
</tr>
<tr>
<td>Seamless Tube Mills</td>
<td>20</td>
</tr>
<tr>
<td>Sheet Mills—2 high</td>
<td>20</td>
</tr>
<tr>
<td>cold rolling—2 high</td>
<td>20</td>
</tr>
<tr>
<td>cold rolling—4 high</td>
<td>30</td>
</tr>
<tr>
<td>Strip Mills—4 high—continuous—up to 24 inches wide</td>
<td>20</td>
</tr>
<tr>
<td>Structural Mills</td>
<td>25</td>
</tr>
<tr>
<td>Wire Rod Mills, complete</td>
<td>25</td>
</tr>
<tr>
<td>Overall Average Life for the industry</td>
<td>25</td>
</tr>
</tbody>
</table>


### Obsolescence and Useful Life

The 1942 Bulletin "F" recognizes two types of obsolescence, normal and extraordinary. According to Bulletin "F", "Normal obsolescence is caused by factors which can be anticipated with substantially the same degree of accuracy as other ordinary depreciation factors, such as wear and tear, corrosion, or decay. Accordingly, it is included in estimating the normal useful life of depreciable property—the effect of which is to include the allowance for normal obsolescence in the depreciation deduction." (42) As a result, the lives listed in Bulletin "F" reflect some consideration of this type of obsolescence.

On the other hand, Bulletin "F" makes no provision for extraordinary obsolescence in average useful lives. It states that extraordinary obsolescence can rarely be predicted prior to its occurrence. Although it allows a deduction for extraordinary obsolescence when there is definite
and indisputable proof, it places the burden of this proof on the taxpayer (42). Unfortunately, the definite proof of obsolescence is difficult in most cases, and revenue agents make little allowance for it.

The impact of obsolescence, both normal and extraordinary, has been increasing in recent years. Precise quantitative data are not available, but Barlow estimates that the useful life of a machine built in 1940 was 10 years. He claims that the rapid evolution of technology reduced this figure to eight years for a machine built in 1950 and to five years for one built in 1960 (43).

A different indicator of the increasing rate of obsolescence is used by the Chamber of Commerce of the United States. The Chamber estimates that between 1950 and 1957 industry spent twice as much on research and development as it did in the entire 19th century and the first half of the 20th century (44). With such sums being expended on research and development, modification and improvement of equipment can be expected to occur at a rapid rate. It is, therefore, the opinion of the Chamber that the present useful lives of 20 to 25 years are simply too long for productive equipment (44).

The results of this increased spending on research are quite evident in the steel industry. Equipment and processes, such as oxygen converters of several types, automatic sintering machines, and direct reduction processes, have been developed. Much progress has been made on the complete automation of fabricating operations, and computer-controlled refining operations can be expected in the not too distant future. All of these developments contribute to the obsolescence of existing facilities. However, these factors are not considered in government depreciation policy, and the industry continues to apply the unadjusted useful lives of Bulletin "F" to its depreciable assets. This is done despite the fact that, in many cases, the facilities are obsolete in light of new developments.

Inflation Combined with Useful Life

The general effects of inflation were discussed earlier in this chapter; however, the combined effect of inflation and the long useful life of steel industry equipment is of particular importance. A long useful life will tend to amplify the effects of inflation in that the longer the useful life of a facility the greater will be the difference between initial cost and replacement cost. This situation is illustrated by Table 7, which shows the effect of inflation on the replacement cost of assets having various service lives.

During the period 1939-1959 the cost of steelmaking equipment increased at a rate of 4.75 per cent, compounded annually (based on the Bureau of Labor Statistics wholesale price index of machinery and motive products). This rate, when combined with the 25-year average life of steel industry assets, produces a replacement cost almost 3.39 times the original cost. However, for much shorter periods of life, the effect is substantially less; i.e., less than 1.28 for a five-year life. Therefore, by enforcing the average lives listed in Bulletin "F", the Treasury is actually contributing to the replacement cost problem.

END OF KOREAN AMORTIZATION BENEFITS

The adequacy of present and future depreciation allowances is affected by a third major factor, the end of Korean amortization benefits. This program was described previously, but a closer look at the steel industry's participation is appropriate.

During the program the steel industry was granted 700 certificates of necessity partially covering 4.8 billion dollars worth of facilities. Of this amount 3.33 billion (approximately 70 per cent) was subject to amortization over the standard 60-month period (31). No data concerning the amount certified in each year since 1950 or the amount remaining unamortized at the present time are available. However, little steel expansion has been certified since 1956 when the Office of Defense Mobilization curtailed the program. For that reason, it is logical to conclude that after 1961 only limited amortization allowances will be available to the industry.

In most cases the amortization benefits are reported as a part of total depreciation allowances; for that reason the total amount of amortization claimed annually by the industry is not available. However, six major companies do itemize their annual amortization allowances.
TABLE 7
COMBINED EFFECT OF INFLATION AND LENGTH OF USEFUL LIFE ON THE REPLACEMENT COST OF DEPRECIABLE ASSETS

<table>
<thead>
<tr>
<th>Compound rate of inflation (per cent per year)</th>
<th>Replacement Cost as a Multiple of Original Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5-yr. life</td>
</tr>
<tr>
<td>2</td>
<td>1.104</td>
</tr>
<tr>
<td>3</td>
<td>1.159</td>
</tr>
<tr>
<td>4</td>
<td>1.217</td>
</tr>
<tr>
<td>5</td>
<td>1.276</td>
</tr>
<tr>
<td>6</td>
<td>1.338</td>
</tr>
<tr>
<td>7</td>
<td>1.403</td>
</tr>
</tbody>
</table>

These data were used in constructing Figure 3 which shows the allowances obtained by the six companies from 1950 through 1959. The trend illustrated can be considered as being similar to that of the total industry.

It can be seen from Figure 3 that accelerated allowances peaked in 1955 and have steadily declined since that time. The decline can be attributed to two causes: (1) the expiration, by 1956, of many of the write-offs granted at the beginning of the program; (2) the curtailment of the program in 1956 which limited any new steel write-offs. The continued decline to 1959 levels naturally follows.

This decline is of major importance to capital formation in the steel industry. As amortization allowances decrease, other sources must be used to supplement depreciation allowances if replacement and modernization is to take place. Figure 4 shows the importance of amortization allowances as a component of plant and equipment expenditures for the six steel companies included in the previous figure. During the period of maximum amortization benefits, 1953-1957, the rapid write-offs provided between one-third and one-half the total capital expenditures. However, by 1959, they provided only about one-eighth of the total.
FIGURE 3—ACCELERATED AMORTIZATION ALLOWANCES OF SIX MAJOR STEEL PRODUCERS, 1950-1959
FIGURE 1: COMPONENTS OF ANNUAL EXPENDITURES OF SIX MAJOR STEEL PRODUCERS, 1954-1959

Source: Steel: America's Industrialman, 1940 and 1953.
CHAPTER IV

EFFECT OF CURRENT DEPRECIATION ALLOWANCES ON THE STEEL INDUSTRY

The previous chapter described the factors contributing to the inadequacy of current depreciation allowances. It is now necessary to consider the effects of these allowances on the domestic steel industry.

Little information necessary for this type of appraisal is available in published form. Therefore, the questionnaire method was employed to provide the necessary data. The aims of the questionnaire were: (1) to secure the basic data necessary for a quantitative assessment of the effects of depreciation allowances, and (2) to obtain estimates and meaningful opinions of steel executives in instances where precise statistical data are not available.

The questionnaire was sent to top management personnel of the 34 largest domestic steel producers. These companies were selected on the basis of 1959 ingot capacity, and they represent over 94 per cent of the total capacity of the United States. The 34 companies are integrated or semi-integrated operations and employ a wide range of depreciable asset types.

The questionnaire, which is included as Appendix B, consisted of 11 major questions which required a total of 17 separate replies. Many of the questions required investigation of company records or careful, informed judgment.

Replies were received from 18 of the 34 companies for a response rate of 53 per cent, which is good in view of the complexity of the questionnaire. Of the 18 returns, 16 contained enough information to be considered usable. This produced a final and usable response rate of approximately 47 per cent.

Information obtained from the questionnaire can be broken down into the following classes: (1) the extent to which steel's depreciation allowances are inadequate in view of inflation and rising replacement costs, (2) the extent to which present allowances contribute to the continued use of obsolete and worn-out facilities, and (3) the extent to which depreciation allowances contribute to the overstatement of profits in the industry.

Of the 16 companies supplying usable returns, 10 use the sum of the years-digits method for depreciating assets acquired after December 31, 1953. An additional company applies this method to all assets over 10,000 dollars in value acquired since December 31, 1954; it uses the straight line method for all assets under 10,000 dollars. Three companies use the declining balance method for all assets acquired after December 31, 1953, and a fourth applies this method to all but small items. Only one reporting company continues predominant use of the straight line method.

It can be seen from this information that the industry has made extensive use of the two "liberal" depreciation methods allowed by the Internal Revenue Code of 1954. Thus, it would appear that the present situation in the steel industry has occurred even though the industry has been progressive in its depreciation policy. It has made use of the best techniques available under present conditions.

CAPITAL RECOVERIES

All 16 reporting companies indicated that the method or methods employed provide total recovery of the initial costs of depreciable assets or provide recovery of all but the estimated salvage values of such assets. However, all but one company stated that present methods fail to provide for adequate recovery in view of rising replacement costs.

Estimates of the amounts by which average replacement costs exceed the sums recovered through depreciation allowances vary widely from company to company. Six companies did not furnish estimates, explaining that they could not give one meaningful figure because their deficits vary so widely on a year-to-year and asset-by-asset basis. Six of the remaining companies indicated that depreciation recoveries on assets installed since December 31, 1953, have provided 61-50 per cent of the current replacement costs. Three other companies estimated a
41-60 per cent recovery of replacement cost, and one company indicated a 20-40 per cent recovery.

None of these percentages includes assets acquired before December 31, 1953, which are not subject to depreciation by the sum of the years-digits or double declining balance methods. These assets, since they have been in use a longer time, will be affected more by inflation. Their replacement costs, therefore, will exceed depreciation allowances by a larger amount than will the costs of assets purchased after December 31, 1953. The result is that average depreciation recovery, as a per cent of replacement cost, is somewhat lower than the above figures indicate.

The problems of supplementing depreciation reserves with funds from other sources were discussed in Chapter III. These problems are of particular importance because replacement normally is a continuous activity. The costs of borrowed capital and the problems of accumulating sufficient retained surplus become acute in such a program. However, modernization and replacement activity is essential to the well-being of the industry, and it must be carried on regardless of the adequacy of depreciation allowances. For this reason all but one of the 16 reporting companies have found it necessary to supplement depreciation reserves with other funds. Fourteen of the companies use retained profits after taxes as the major source of these funds, and 12 of these companies reported the use of long-term borrowing as an additional source. Only minor variations of this practice were reported; one company reported long-term borrowing as its major source, and one company indicated that the sale of stock was normally employed as a third source of funds. Only one company reported that it has not been forced to supplement depreciation reserves with additional funds.

To sum up the replacement cost situation, it can be said that the consensus of respondents strongly indicates an inadequacy of depreciation from the replacement cost standpoint. Industry-wide allowances on assets acquired since December 13, 1954, appear to be furnishing, at best, only 80 per cent of replacement costs. The recovery based on all assets, including those installed prior to December 31, 1953, is significantly lower. For that reason the industry has found it necessary to make extensive use of retained earnings and long-term borrowing in its modernization program.

MODERNIZATION AND OBSOLESCENCE

It may be necessary to replace a depreciable asset for either of two reasons. The asset can be worn out and, therefore, be physically obsolete. In addition, replacement may be necessary because there has been a change in the product or service desired. In this case the asset is functionally obsolete.

Eleven of the 16 reporting companies stated that present depreciation policy tends to encourage their continued use of obsolete equipment. Two of these companies noted, however, that depreciation is not the controlling factor. This is probably the case in additional companies even though it was not noted. Matters of overriding importance in such cases would be the financial condition of the individual company, the existing situation in the industry, and the condition of the economy as a whole. However, the adequacy of depreciation reserves would strongly affect the final decision in all cases.

The amount of equipment which is still in use but is considered to be obsolete for either functional or physical reasons varies widely throughout the industry. Estimates vary from 41-60 per cent in one company to less than 20 per cent in five companies. Three companies reported a 21-40 per cent occurrence of such equipment, and five additional companies stated that they use some inferior equipment but did not supply percentage estimates. There appears to be a correlation between size of company and percentage of inferior equipment. The larger producers reported percentages which were generally lower than those of the small companies. This is probably due to the fact that the larger companies have less difficulty in obtaining funds to supplement their depreciation reserves. For this reason they are more successful in replacing the equipment considered to be inferior.

The wide range in percentage estimates makes it difficult to establish one overall figure for obsolescence in the industry. At best, a limiting percentage can be established. Since the five companies reporting less than 20 per cent obsolescence were all top-ranking producers,
their figures must be weighted heavily. However, much of the remainder of the industry is made up of smaller scale producers whose percentages of obsolescence generally exceed those of the larger ones. Considering these facts, it appears probable that obsolescence in the industry as a whole falls somewhere between 20 and 30 per cent.

All but one company reported a policy of keeping some fully depreciated equipment in use after retirement age. Approximately 60 per cent of these companies cited inadequate depreciation allowances and increasing replacement costs as the major causes for this practice. The remaining companies indicated that this use was governed primarily by the economic usefulness of the asset involved rather than depreciation factors.

In summarizing the situation, it can be said that approximately 70 per cent of the reporting companies cite depreciation policy as contributing to their use of inferior equipment. Data from these companies seem to indicate an industry-wide 20-30 per cent rate of obsolescence; however, this per cent varies widely from company to company. At first glance this percentage appears to be small and unimportant. However, when dealing with this figure, it must be remembered that the efficiency and production of the entire "steel cycle" is affected by this percentage. One unit of inferior equipment tends to make the entire cycle less effective.

In cases where overstatement of profits occurs, federal income taxes are based partially on "paper profits" rather than actual profits. This, in turn, results in an overtaxation of actual profits, and all companies reporting profit overstatement also reported tax rates in excess of 52 per cent of actual profits. The estimated rates range from 55 to 75 per cent of actual profits; two-thirds of the companies indicated rates between 60 and 70 per cent. From this evidence, it appears safe to assume that any single, industry-wide tax rate on actual profits also would lie between 60 and 70 per cent.

In summary, there seems to be convincing evidence of profit overstatement due to present depreciation practices. This overstatement fluctuates widely from company to company throughout the industry. The ultimate effect of this overstatement, the overtaxation of actual profits, does not vary as widely, and an industry-wide tax rate of 60 to 70 per cent on actual profits appears probable.

PROPOSED CHANGES IN DEPRECIATION

Only one of the 16 reporting companies indicated that it was satisfied with the present tax handling of depreciation; it favored no changes, either legislative or administrative, at the present time. The remaining 15 companies expressed dissatisfaction with the present depreciation policy and recommended several basic changes.

The factor found most unsatisfactory in present depreciation for tax purposes was the failure to recognize the effect of rising prices. Returns from 13 of the 16 companies expressed the opinion that increasing replacement costs should be considered in establishing depreciation allowances. Most companies favored a yearly adjustment of depreciation which would compensate for inflation and rising asset costs. Several, however, favored some form of "reinvestment depreciation" which would allow additional tax benefits based on the excess of replacement cost over historical cost. The benefits in this proposed system could be obtained in the year in which such replacement takes place.

In addition, eight companies favored a change in the administration of the useful life concept. The unrealistic useful lives of the 1942 edition of Bulletin "F" and the increasing rate of "in-
novation and automation" were cited as factors necessitating this change. Several companies advocated a return to the pre-1934 policy which allowed companies to establish useful asset lives based on previous experience.

Three companies stated that present methods, the sum of the years-digits and the declining balance, would be adequate if write-off rates were increased. The use of a triple declining balance method, even if applied over Bulletin "F" useful lives, appears to provide rates satisfactory to these companies.

From the preceding discussion it can be seen that the industry voices widespread appeal for depreciation change. However, this appeal is far from unanimous in its specific suggestions for reform. Definite emphasis is placed on the problems of inflation and useful asset life, but no single industry-wide proposal appears acceptable to all companies concerned.
CHAPTER V
MODERNIZATION AND COMPETITION
IN THE STEEL INDUSTRY

The use of physically or functionally obsolete facilities creates problems whenever it occurs. Most significant among these problems is an ultimate increase in the cost of the item or items produced.

Until quite recently the domestic steel industry remained secure in most of its markets regardless of the price of its products. Increases in price due to the use of obsolete equipment had little effect on the overall market picture. Now, however, the picture has changed, and many domestic steel products are accepted or rejected primarily because of their prices. Equipment modernization programs of the present day not only must eliminate the price increases brought about by the use of inferior equipment, but they also must assist in bringing domestic steel prices to a more generally competitive level.

The following statement made by the President's Scientific Research Board summarizes one aspect of the domestic steel industry’s problem of competition (45):

The future is certain to confront us with competition from other national economies of a sort we have not hitherto had to meet. Many of these will be state-directed in the interests of national policies. Many will be supported by new, highly efficient industrial plant and equipment—by the most modern technology. The destruction of the recent war [World War II] makes it inevitable that much of Europe, in rebuilding its facilities, will soon possess an industrial plant more modern than ours.

This statement is particularly applicable to the steel industry. There has been extensive building in foreign steel industries within the last 10 years, and the United States no longer holds its once pronounced superiority in equipment. In fact, many foreign operations are now employing facilities and equipment that are competitive with those used in this country. Coupled with low foreign labor costs, this equipment enables foreign producers to exert an increasing influence on markets for domestic steel.

The domestic steel industry is faced with competition from still another source. Substitute materials such as aluminum, plastics, and prestressed concrete are finding increased application in traditional steel uses. In many cases these materials possess little mechanical, physical, and/or chemical superiority over the steel products; but they do possess the all-important advantage of lower cost.

Since both types of competition to domestic steel result from the price situation, the domestic industry must place increased emphasis on reducing its costs. Modernization and replacement activity in the industry, therefore, assumes added importance. The effect of competition of both types cannot be overlooked when considering depreciation policy and its effect on industry modernization.

COMPETITION FROM FOREIGN STEEL

U.S. Steel Trade Balance

Since the end of World War II, steel production in the United States, when expressed as a percentage of world steel production, has steadily declined. According to Figure 5, the U.S. produced 54.2 per cent of the world's steel in 1946; by 1954, this figure had dropped to 33.8 per cent. The U.S. accounted for only 27.8 per cent of the world's total in 1959. This percentage drop has been sustained despite the fact that domestic steel production in 1959 exceeded 1946 production by some 26.0 million tons (46).

The cause of this apparently contradictory situation has been the accelerated growth of foreign steel production, particularly in western Europe and Japan. This rapid growth is illustrated by Figure 6, which shows that Belgium-Luxembourg and West Germany have almost doubled their steel production in the last 10 years, Japan has increased its steel production
FIGURE 5—UNITED STATES STEEL PRODUCTION EXPRESSED AS A PERCENTAGE OF TOTAL WORLD PRODUCTION, 1946-1959

FIGURE 6—PRODUCTION OF STEEL INGOTS AND CASTINGS IN SELECTED FOREIGN COUNTRIES, 1946-1959

FIGURE 7—DEFLATED VALUE OF U.S. STEEL IMPORTS AND EXPORTS, 1939-1960
approximately 300 per cent, and French steel production has increased 60 per cent.

The effect that these increases have had on the domestic steel industry is illustrated by Figure 7, which compares the value of U.S. steel imports and exports since 1939. The decrease in the favorable balance of steel trade is readily apparent. In 1939 exports exceeded import values by approximately 19 million dollars (1947-1949 constant dollars), and by 1947 this favorable balance had increased to approximately one billion dollars. Since 1947 imports have begun to increase steadily while exports have fallen. In 1950 exports exceeded imports by only one-third of the 1947 figure, and by 1959 they exceeded imports only by 6.8 million dollars.

It must be noted that the values of both imports and exports have been distorted during the years since 1957. In the recession year of 1958 there was a significant cutback in domestic steel operations and demand for steel. As a result, both imports and exports are somewhat lower than would have been expected. The prolonged steel strike which occurred in 1959 decreased exports far below expected levels and increased imports to an even greater degree. Even in 1960 the true picture is not presented, for sharp inventory cutting caused a reduction in U.S. demand during the year. However, the downward trend of exports and an upward surge of imports probably would have taken place even without these abnormal conditions.

It must also be noted that exports were abnormally high during and immediately following World War II. Increased world steel demand during the war, coupled with the extensive destruction of many foreign facilities, caused widespread demand for U.S. steel. This is apparent from the export values shown in Figure 7.

The excess wartime demand no longer exists; in addition, most foreign operations are now able to supply many of their domestic steel needs. As a result, U.S. exports have declined significantly since World War II and are rapidly approaching the prewar level. It is doubtful that future exports will greatly exceed this level.

Imports, on the other hand, show a definite and steady trend upward. The value of imports, about 20 million dollars in 1939, was 145 million dollars in 1958 (1947-1949 dollars). By 1958 U.S. producers had lost much of their domestic market for wire and wire products, pipe and tubing, and tool steel and bars (47). This trend appears likely to continue in the future.

When compared to the 66.5 million tons of steel mill products produced and shipped by the total U.S. industry in 1959, the 5.52 million tons imported in that year seem relatively unimportant (48). However, the ability of foreign producers to furnish even this amount of low-priced steel to the American market is a major threat to the domestic industry. It is evidence of the foreign cost advantage which, in the face of continually increasing employment costs in this country, probably will widen in the future. Any significant rise in domestic steel costs and prices will be accompanied by additional loss of markets at home and abroad.

**Foreign Cost Advantage**

Average raw material costs of U.S. producers are less than those of foreign competitors. In western Europe raw materials costs range from 7 to 22 dollars higher per ton than in the United States (49). In Japan, because of the lack of high-grade domestic sources of iron ore and coal, the case is much the same.

This initial cost advantage is nullified by the wide labor cost differentials that exist between the U.S. and foreign producers. In some cases higher transportation costs and higher U.S. productivity offset this labor cost advantage. However, in many cases the labor cost differential is so great that the ultimate cost advantage shifts in favor of the foreign producers. As direct labor involved in producing the steel product increases, this cost advantage widens. The result of this widening differential is that the more advanced steel mill products, such as barbed wire, reinforcing bars, and nails, have become increasingly attractive import items for U.S. consumers.

The differentials existing between the 1959 employment costs in the U.S. and those of other selected countries, all of which are major competitors to the U.S., are shown in Table 8. The average hourly earnings listed are based on actual 1959 data for all countries but Japan; only total employment costs were available for this country. The hourly earnings data given in local currency were then converted to U.S. dollars to obtain a common monetary unit. An additional factor, as used by the American Iron
and Steel Institute calculations based on comparable data for 1957, was then applied to obtain the estimated employment costs per hour for each country. This factor is a correction applied to cover fringe benefits not included in the basic hourly cost data.

The results of these calculations indicate the magnitude of each foreign employment cost advantage. U.S. costs vary from about 2.9 to 6.8 times those of overseas operations.

Lister indicates that the output-per-manhour of foreign steel operations remains lower than that of U.S. producers (50). This can be attributed mainly to an inefficient use of labor.

**TABLE 8**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>West Germany</td>
<td>3.22 DM</td>
<td>.766</td>
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</tr>
<tr>
<td>Luxembourg</td>
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<td>.859</td>
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<td>Japan</td>
<td>1188.50 yen</td>
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<td>.468</td>
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<td>United States</td>
<td>8.749</td>
<td>3.594</td>
<td>4.030</td>
</tr>
</tbody>
</table>

*Factor for converting hourly earnings to employment costs is based on an American Iron and Steel Institute study of similar data for 1957.

1Total reported employment cost.

The earnings figures used for the United States are those relating to hourly and salaried employees combined. It would be more accurate to list the earnings and hourly employment costs for hourly employees alone. These are $3.42 for average hourly earnings and $3.80 for estimated hourly employment costs. This, however, would make very little difference in the relationship of costs between the United States and foreign steel producers.


input rather than the lack of highly productive, up-to-date facilities. As stated previously, almost all of the plant and equipment employed by the west European and Japanese producers is less than 10 years old. This is less than one-half the average useful life of steel industry equipment listed by Bulletin "F". If foreign producers make better use of their manpower and their available equipment, they will be able to widen their cost advantage.

An additional factor must be included in any consideration of foreign cost advantages. This factor deals with the cost of modernization and replacement activity in foreign operations. Although no such data are available for Japan, Lister provides the following comparison of steel facility costs in the United States and the European Coal and Steel Community (51):

The cost of a completely new steel plant in Europe, from coke ovens to rolling mills and finishing facilities, averaged $225-$250 per metric ton of crude steel at 1956 prices. It was about $320 per metric ton in the United States, where the industry is more capital intensive per ton of capacity ... An existing plant can be enlarged and modernized for about 70 per cent of the cost of a new one.

Table 9 lists the capital expenditures of the steel industries of the European Coal and Steel Community and the United States for the period 1954-1959. The annual expenditures are then divided by the average number of workers for each year to obtain the average capital expenditure per worker for each year. The figures indicate a favorable position for the U.S. industry, insofar as capital expenditures are concerned. However, these figures must be corrected for the cost differential between the industries as cited by Lister ($235 per metric ton for ESCS operations and $320 per metric ton for U.S. operations produces a 1:1.36 cost ratio). Only after this factor is applied is the true effective rate of capital expenditure per worker obtained.

As can be seen from Table 9, the effective rate of capital expenditure per E.S.C.S. worker has exceeded that for the U.S. worker in each of the years since 1957. In effect, each E.S.C.S. worker is being supplied with a larger amount of modern, up-to-date equipment than is his U.S. counterpart. Under such circumstances it will become increasingly difficult for U.S. producers to remain competitive from an equipment standpoint. It will be even more difficult for them to offset the employment cost advantage enjoyed by foreign producers.

**Foreign Depreciation Advantages**

In addition to lower employment costs and comparatively high effective rates of capital expenditure, foreign producers have a third advantage. Without exception, the major steel-producing countries throughout the world have depreciation allowances that are more favora-
TABLE 9
COMPARISON OF THE EFFECTIVE RATES OF CAPITAL EXPENDITURE PER WORKER IN THE EUROPEAN COAL AND STEEL COMMUNITY AND THE UNITED STATES STEEL INDUSTRIES, 1954-1959
(In millions of dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Capital Expenditures E.C.S.C.</th>
<th>Average No. of Workers E.C.S.C.</th>
<th>Capital Expenditure per Worker E.C.S.C.</th>
<th>Effective Capital Expenditure per Worker E.C.S.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S.</td>
<td></td>
<td>U.S.</td>
<td>U.S.</td>
</tr>
<tr>
<td>1954</td>
<td>454</td>
<td>699</td>
<td>480,073</td>
<td>761,951</td>
</tr>
<tr>
<td>1955</td>
<td>524</td>
<td>714</td>
<td>500,294</td>
<td>810,377</td>
</tr>
<tr>
<td>1956</td>
<td>570</td>
<td>1311</td>
<td>522,366</td>
<td>825,241</td>
</tr>
<tr>
<td>1957</td>
<td>708</td>
<td>1724</td>
<td>528,210</td>
<td>841,774</td>
</tr>
<tr>
<td>1958</td>
<td>629</td>
<td>1136</td>
<td>501,957</td>
<td>720,955</td>
</tr>
<tr>
<td>1959</td>
<td>500</td>
<td>917</td>
<td>514,479</td>
<td>721,599</td>
</tr>
</tbody>
</table>

European Coal and Steel Community, *Investment in the Coalmining and Iron and Steel Industries*, Luxembourg: September 1960, p. 17.

Table 10 lists the generalized depreciation provisions of selected foreign countries; it also indicates how the provisions compare with those of the U.S. These advantages can be summarized as follows:

1. The application of revaluation factors is the use of selected coefficients to revalue assets, thereby permitting depreciation to be calculated on a current value basis. This practice avoids the situation that occurs in the U.S. in which depreciation is measured in historical dollars while income and other expenses are reported in current dollars. (Depreciation above cost also is used to compensate for inflation in some countries.)

2. The additional write-off, above normal depreciation in the first year or early years, enables capital recovery at an accelerated rate. This, in effect, reduces the time element in considering the risk involved in any investment. It also allows the recovered capital to be put to work again in the particular business.

3. The accelerated rates, above the normal U.S. rates, throughout the life of the asset provide essentially the same advantages as listed above.

TABLE 10
SUMMARY OF DEPRECIATION PROVISIONS IN SELECTED FOREIGN COUNTRIES

<table>
<thead>
<tr>
<th>Country</th>
<th>Revaluation Factors Used</th>
<th>Depr. Above Cost (without reval.)</th>
<th>Added Write-off in Early Years</th>
<th>Accel. Rates (above U.S.)</th>
<th>Shorter Useful Lives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colombia</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Germany</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Britain</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holland</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. The shorter useful life allows complete write-off and recovery of asset value in a shorter period of time than in the U.S. This is of particular advantage during times of increasing equipment development and innovation.

All countries that export significant quantities of steel to the United States appear in Table 10. Japan allows only revaluation factors, while West Germany, Belgium, and France provide one or more additional advantages. The steel producers in these countries not only have the advantage of being able to buy more equipment for their depreciation dollar than can U.S. producers, but they receive more depreciation benefits per dollar of investment.

COMPETITION FROM SUBSTITUTES

The second type of competition now facing the domestic steel industry arises from the increasing use of substitute materials. Unfortunately, a quantitative analysis of the impact of substitutes on domestic steel markets is extremely difficult. Virtually no statistical data are available on the subject. However, it is important at this point to examine this form of competition from a qualitative standpoint.

The rapidly climbing prices of steel mill products have been accompanied by increasing pressure from substitutes. For each incremental price increase of steel, the competitive position of substitutes has become stronger, and now three major substitute materials—aluminum, plastics, and prestressed concrete—compete vigorously with steel for certain markets.

At the present time competition from substitutes is restricted to certain specialized markets, and the materials do not compete directly with steel in most of its "bulk" markets. However, the continuing application of substitutes to various steel uses is clearly evident.

For the past several years aluminum products have been moving rapidly into the steel sheet and strip market. Also, increasing use has been made of aluminum in the manufacture of specialty products, such as home and office furniture and ornamentation. The automobile market, once served almost exclusively by steel and cast iron, has found it increasingly advantageous to use aluminum. Automobile trim and engine blocks are now commercial realities.

The most recent adaptation of aluminum has been in the container market, particularly for tin cans. One of the major aluminum companies has developed an aluminum tin can designed to undersell its steel counterpart. As a result, several of the major steel companies are actively engaged in the development of a "thin tin" plate to be used in producing a lower cost container.

In the construction field steel is faced with rising competition from prestressed and reinforced concrete. The highway-bridge construction market, once almost completely controlled by steel, now is using increasing amounts of concrete in place of steel. Prestressed concrete has also invaded steel's market in the construction of buildings.

To date, plastics have had somewhat less success in competing with steel than have aluminum and concrete. However, increasing use of plastics has been made in the production of specialized pipe and tubing. Also, some use of plastics has been made in the production of automobile bodies, but the limited strength of plastics available in the past has tended to minimize their widespread use. However, the recent development of products such as DuPont's high strength "Delrin" suggests increasing application to steel uses in the future.

Not only have steel consumers tended to substitute other materials for steel; they also have been active in reducing the amount of steel that is necessary in their particular products. An outstanding example of this trend is furnished by the compact car. According to Silberman, compact cars require, on the average, 2700 pounds of steel. The conventional models, on the other hand, average 4000 pounds of steel (52).

Another example of this reduction in the amount of steel necessary for a given product is the use of "thin tin" in making tin cans. United States Steel's "thin tin" product, "Ferolite," is 40 per cent thinner than conventional tin plate. It contains 25 per cent less steel per base box of 218 square feet than does the conventional product (52). The overall result is a decrease in the amount of steel necessary for each can and an ultimate reduction in the total market for steel.
EFFECT OF COMPETITION TO DATE

The real importance of competition to date does not lie in its quantitative effect on present markets for domestic steel. The use of substitute materials and foreign steel appears limited to a relatively small percentage of the market for domestic steel. However, the qualitative effect of the competition is quite significant. At present, this competition exerts strong pressure on domestic steel prices. If its prices continue to rise, the domestic steel industry can be expected to lose additional portions of its market.

To remain competitive, the domestic industry, therefore, must keep its prices down. This must be done at a time when employment costs continue to rise rapidly. It must be done at a time when an important percentage of steel-making equipment is either physically or functionally obsolete. Modernization, therefore, is necessary not only to eliminate the use of these obsolete facilities but also to compensate, in some manner, for increasing employment costs.
CHAPTER VI

MODERNIZATION AND PRODUCTIVITY IN THE STEEL INDUSTRY

As pointed out in the last chapter, competition has put a premium on cost-cutting in the domestic steel industry. Several methods of obtaining this cost reduction can be employed. This chapter deals with but one of these methods. However, it is felt that this method must be employed in all cases, either separately or in conjunction with other measures, if any significant cost reductions are to be obtained.

Equipment modernization and replacement activity in the steel industry, like that in any other profit-making operation, has a reduction in the ultimate cost per unit of output as its goal. This cost reduction is accomplished in four major ways:

1. New, modern equipment normally requires less extensive maintenance and repair than does older equipment. The result is a reduction in the overhead cost of the particular operation.

2. New, modern equipment normally will produce a higher number of output units over a given period. This allows distribution of overhead costs over a larger number of output units, thereby reducing the overhead cost per unit of production.

3. The higher output will also allow the distribution of employment costs over a greater number of output units. The employment cost per unit is thereby reduced.

4. New, modern equipment often makes more efficient use of raw materials, thereby reducing raw material costs per unit of output.

According to the Bureau of Labor Statistics, employment costs in the steel industry have averaged 35 per cent of total revenues since World War II; this is second only to raw material costs (53). During the period, raw material costs actually declined as a per cent of total revenues, while employment costs have increased (53). For this reason, any savings on employment costs through modernization appear to be the most significant both now and in the future. Certainly, the other cost savings will be necessary, but the labor cost saving will be of prime importance.

This reduction of employment costs in the face of competition is directly affected by the amount of steel produced per manhour in the industry. As labor per unit of output is reduced, the employment cost factor in the ultimate price of the product is reduced. The manner by which the industry has attempted to do this can be seen by examining the productivity of the domestic steel industry.

PRODUCTIVITY IN STEEL

In measuring productivity, one commonly considers only the relationship of labor input to physical output, and productivity is expressed in terms of units of output per manhour. This measure fails to consider the capital input factor and, as a result, overstates the actual increase or decrease of productivity in terms of total input.

A better measure of productivity should include more than labor on the input side. For example, the American Iron and Steel Institute, in its background memo entitled Economic Trends in the Iron and Steel Industry, defines productivity as follows (54): "Productivity is the quantity of goods and services produced (output) compared to the contributions (inputs) of men, machines, materials, money, and taxes required for production. An increase in the ratio of output to input is an increase in productivity."

Recent work in the area of productivity has been completed by John Kendrick (55). Kendrick's study and calculations, which are based on the U.S. economy as a whole, express productivity in terms of output versus labor and capital input. Although Kendrick's method cannot be applied directly to a single industry, it is possible to apply his general concept of productivity to any industry or segment of the economy.

The following sections will discuss productivity in the domestic steel industry in terms of labor input and capital input. The input and effective use of raw materials is assumed to be constant. Although there may be considerable
FIGURE 8—COMPARISON OF STEEL PRICE AND HOURLY EMPLOYMENT COST INDEXES, 1946-1959

variation in this input factor, no effective means of measuring this variation is available on an industry-wide basis.

LABOR INPUT IN STEEL

As indicated previously, labor costs represent 35 per cent of total steel revenues and constitute the most rapidly rising cost element in steel making. This rise has put increasing pressure on the selling price of steel products as shown by Figure 8. Employment costs have more than doubled since 1947, increasing from 1.63 in that year to 4.03 dollars per hour in 1959 (56). *

The average price, although reflecting the rise in employment costs, has not kept pace with these increases. One significant reason is that the industry has been able to increase its output per unit of labor input. This increase is shown by Figure 9, which illustrates the trend in manhours per ton of steel shipped. The production of one ton of steel, which took 26 manhours in 1947, now takes approximately 20 hours.†

The overall result is that the industry is now able to produce more steel from a given labor input. Certainly some of this increase is due to improved operating techniques; however, much must be attributed to an increase in the other major input, capital. In the face of the present “wage-cost spiral,” the industry has substituted capital input for labor input in hopes of keeping prices down. It has been successful to the degree that prices, as shown by Figure 8, have increased only about two-thirds as much as have employment costs during the years since World War II.

CAPITAL INPUT IN STEEL

Capital input can be defined as the amount of capital consumed by an industry in producing its product. However, the precise measurement of capital input in the domestic steel industry is extremely difficult. Problems arise as to just what factors must be included in the construction of such a measure. Certainly, the amount of assets must be considered, but other factors also can be classified as capital input factors. For example, many of the normal periodic expenditures included as operating expenses could be included as capital input. In addition, other random expenditures on nondepreciable assets might be considered. Theoretically, money spent on research and development should also enter the capital input picture. However, the purpose here is to examine the capital input in the form of depreciable assets. For this reason all other capital inputs are disregarded, and the capital input factors employed in the following discussions are based exclusively on depreciable assets.

This measure of capital input must represent the amount of capital in the form of depreciable assets that is actually consumed during any one period. Therefore, the factor must reflect the depreciation of assets rather than merely the total value of the assets.

The Annual Statistical Report of the American Iron and Steel Institute provides annual data on the total book value of depreciable assets used throughout the industry. However, these data indicate only the original cost of the assets, and no information is given as to their purchase date or value in current dollars. For that reason, it is exceedingly difficult to assign a true value to the assets in use during any particular year, and it is also difficult to obtain the true depreciation for any year in terms of constant 1947-1949 dollars.

However, it is possible to derive a reasonable estimate of the capital input in terms of depreciation for any one year. The first step in such a process is to deflate the gross value of assets available at the beginning of the year, and then deflate the value of the assets purchased during the year. This will provide a constant dollar value of all assets employed throughout the year. The annual depreciation can then be obtained by taking 1/25 of the total asset value. This factor is based on the estimated 25 years average useful life of steel industry equipment as listed in Bulletin “F”. The result will be a depreciation figure which closely approximates the value of assets consumed during the year—capital input.

This process was used to determine the capital input in terms of depreciation for each year since the end of World War II. It was first necessary to express the value of assets availa-
ble at the beginning of 1946 in terms of constant 1947-1949 dollars. Since this entire group of assets was not purchased in any one year, a simple deflation could not be employed. To accomplish the deflation it was necessary to assume, based on the average 25-year life of steel assets, that most of the assets had been purchased in the 25-year period prior to 1946. The asset groups should then reflect the average price of the 25-year period.

Based on this assumption, it was possible to deflate the total asset value by use of the geometric mean of the BLS wholesale price index (all commodities except farm products) for the 25-year period prior to 1946. This process converted the asset value to constant 1947-1949 dollars.

The next step was to deflate the value of assets purchased during each year, 1947-1959. This was accomplished by dividing the asset expenditures of each year by the BLS index for that year. By this process it was possible to convert the value of all assets purchased since 1946 to constant dollar values. These annual amounts were then added to the value of assets brought forward from the preceding year to obtain the asset value for each year. For example, the adjusted asset value as of December 31, 1945, was combined with the adjusted value of assets purchased in 1946. This amount represents the value of assets in use and subject to depreciation during 1946. This figure was combined with the adjusted value for assets purchased in 1947 to produce the total value of assets subject to depreciation in 1947. This procedure was carried on throughout the entire time series.

The final step was to calculate the estimated value of depreciation in each year. This was done, as described above, by taking 1/25 of the total value of assets in use during the year. These figures represent the capital input in the form of depreciation assets expended by the industry in each year.

The rising importance of this form of capital input in the domestic steel industry can be seen from Figure 10. The figure shows the labor and capital inputs as related to the physical output for each year 1947-1959. The estimated value of capital input in the form of assets was divided by the total tons of steel shipped to obtain the capital input in terms of output. The labor input factor was obtained by dividing the total manhours of both salaried and wage-earning employees by the tons of steel shipped in each year; the result is the average manhours per ton of steel produced.

It can be seen from Figure 10 that the labor input per unit of output has been decreasing steadily since 1947, with only minor fluctuations upward during the recession years of 1954 and 1958. The overall decrease has been approximately 20 per cent since 1947.

On the other hand, the capital input factor has increased substantially since 1947. This increase is marked by fluctuations that are more severe than those of the labor input trend. These fluctuations are due to the fact that capital input in the form of assets remains unchanged regardless of operating rates. For this reason the capital inputs shown for the strike years of 1952 and 1959 plus the recession years of 1954 and 1958 are abnormally high. Nevertheless, the upward trend is apparent.

The diverging trends of labor and capital input are readily apparent upon examining two years in which the industry operated at comparably high rates. For this purpose the years 1948 and 1956 appear satisfactory. The industry operated at 94.1 per cent of capacity in 1948 and at 89.9 in 1956 (57).

In 1948 each ton of steel shipped required 25.7 manhours of labor; each ton shipped in 1956 required only 20.1 hours. This represents a 28.3 per cent decrease in the labor input per ton. On the other hand, capital input per ton of output has increased. In 1948 the value of assets consumed per ton of steel shipped was 6.7 dollars; by 1956 this figure had increased 19.4 per cent to 8.0 dollars per ton (in constant 1947-1949 dollars).

It is now important to examine the trend of the value of both inputs in relation to the trend of the output value for the period since World War II. This comparison illustrates the basic productivity consideration of the industry; the value of the labor input, as based on employment costs per manhour, must be minimized if "steel" is to avoid further price increases. To do this, the industry must substitute capital for labor.

Figure 11 shows the indexes of the annual value of labor and capital inputs from 1946-1959. The index of the value of industry output is also shown. The value of labor input was obtained by calculating the average em-
FIGURE 10—COMPARISON OF LABOR INPUT AND CAPITAL INPUT PER TON OF STEEL SHIPPED, 1946-1959

Source of Data: American Iron and Steel Institute, Annual Statistical Report, various years.
FIGURE 11—COMPARISON OF THE VALUE OF LABOR INPUT, CAPITAL INPUT, AND OUTPUT, 1946-1959

Source of Data: American Iron and Steel Institute, Annual Statistical Report, various years.
ployment cost per hour during the 1947-1949 base period. This figure was then multiplied by the total manhours worked for each year, 1946-1959, to obtain the value of the labor input in each year (in constant 1947-1949 dollars). The annual value of each input was then expressed as a per cent of the base period value. *

The value of the output was obtained by deflating the value of products shipped and miscellaneous services reported for each year. These constant dollar values were then converted to percentages of the value for the 1947-1949 period.

The steady increase in annual capital input is apparent from Figure 11. It can also be seen that the deflated value of output has risen less rapidly while the value of the labor input has remained essentially constant. Since operating rates will tend to cause fluctuations in these trends, it is necessary, once again, to compare the years 1948 and 1956. The following facts can be noted from this comparison:

1. The value of labor input increased only 67 per cent from 1948 to 1956.
2. The value of capital input in the form of asset depreciation increased 34.9 per cent from 1948 to 1956.
3. The value of output increased a total of 31.9 per cent between 1948 and 1956.

From this comparison it is apparent that the industry has been able to increase significantly the value of its output without substantially increasing its labor input. This has been possible mainly by the use of increasing amounts of capital in the form of depreciable assets. In essence, the industry has substituted capital for labor in the production of steel.

As indicated previously in this chapter, the substitution of capital for labor has been necessitated by rising employment costs. To offset these increases, the industry has attempted to produce more steel with each unit of labor input; it has been successful to the extent that steel output per manhour has been increasing steadily. However, this capital for labor substitution has not been sufficient to offset employment costs completely, and steel prices have been forced upward. Each price increase, in turn, has been accompanied by increasing competition from foreign steel and substitute materials.

It is doubtful that the industry, even with the best available equipment, would be able to offset rising costs totally. However, the situation could certainly be improved if the obsolete equipment now in use were replaced by modern, up-to-date facilities. Rapidly evolving technology has made such equipment available, but the industry simply has not had sufficient funds to complete its modernization job.

As pointed out in this study, the inadequacy of present depreciation recoveries has been a major handicap to the industry's modernization program. W. T. Hogan points out that during recent years depreciation allowances have contributed less than 50 per cent of the funds spent on depreciable assets throughout the industry (58). This percentage would have been even lower had the industry replaced all the assets it now considers obsolete. In view of this situation, it appears that a change in government depreciation policy is necessary if the steel industry is to modernize successfully and remain competitive.

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*There would probably be some slight changes if consideration were limited to manhours used in steel producing alone. However, this probably would not affect the trend indicated.
CHAPTER VII
CONCLUSIONS

The 1934 change from liberal to strict government depreciation policy has caused problems of increasing importance to U.S. industry as a whole and the steel industry in particular. Although passage of the Internal Revenue Code of 1954 marked the return to a more liberal policy, the methods administered under this law still do not provide for an equitable tax treatment of depreciation.

Because of existing government policy, depreciation allowances received by the steel industry are inadequate for asset modernization and replacement. This inadequacy can be attributed to the following:

1. The current tax treatment of depreciation fails to consider variations in the purchasing power of the dollar. During the present inflationary period, this treatment contributes to the overstatement of steel industry profits and, thereby, causes overtaxation of actual earnings. Conversely, in a period of deflation, this treatment would cause understatement of profits and undertaxation of true earnings.

2. Present depreciation fails to consider the effects of inflation on the costs of replacing depreciable assets. Steel industry depreciation recoveries, therefore, are not sufficient to cover rising replacement costs and must be supplemented with funds from other sources.

3. The periods of useful life now applied to steel industry assets are too long for productive equipment. These lives are based on average service lives listed in the 1942 edition of Bulletin "F" and fail to consider the accelerating rate of technological development and extraordinary obsolescence.

As a result of present depreciation policy, the steel industry's true earnings have been taxed at rates in excess of the 52 per cent authorized by federal legislation. The tax rate on true profits throughout the industry as a whole appears to lie between 60 and 70 per cent. Present depreciation policy also appears to have led to the use of significant amounts of obsolete equipment. Of the total amount of equipment in use by the industry, approximately 20 to 30 per cent is obsolete.

The continued use of this obsolete equipment is particularly significant at the present time. The domestic steel industry, faced with rising employment costs and increasing competition from foreign steel and substitute materials, must cut costs. To do this successfully, it must maximize production from each unit of labor input by use of the most modern, up-to-date facilities available. In short, it must substitute capital in the form of depreciable assets, for labor in the production of steel. The industry can do this only if aided by a government depreciation policy that allows realistic and equitable depreciation recoveries.

In view of the situation presently existing in the domestic steel industry, this study recommends the following modifications in the government's tax treatment of depreciation:

1. Legislative — Modification of existing depreciation legislation to allow compensation for changes in the purchasing power of the dollar and the cost of replacing depreciable assets. This could be accomplished by the annual application of revaluation factors such as are used in many foreign countries.

2. Administrative — Modification of the concept of average useful life. Taxpayers should be given more freedom to choose useful service lives that are consistent with actual experience.
REFERENCES CITED


19. Internal Revenue Code of 1954, Section 167 (e).


25. Ibid., page 23.

26. Ibid., page 32.

27. Ibid., page 29.


29. Revenue Act of 1950, Section 124 A (e) (1).


50. Ibid., page 68.

51. Ibid., pages 80-81.


57. Ibid., page 9.

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———, Investment in the Community Coal-mining and Iron and Steel Industries, Luxembourg: September 1960, 84 pages.


———, “Increased Costs of Production in Steel: the problem and possible solution,” Iron and Steel Engineer, Volume 36, Number 4, April 1959, pages 83-88.


U.S. Treasury Department, Bureau of Internal Revenue, Treasury Decision 4422, February 28, 1934.

APPENDICES

APPENDIX A

METHODS OF COMPUTING DEPRECIATION FOR TAX PURPOSES

Section 167 (b) of the Internal Revenue Code of 1954 lists the methods by which depreciation can be calculated for tax purposes. This section follows in its entirety:

Use of certain methods and rates.—For the taxable years ending after December 31, 1953, for term “reasonable allowance” as used in subsection (a) shall include (but shall not be limited to) an allowance computed in accordance with regulations prescribed by the Secretary or his delegate, under any of the following methods:

1. the straight line method,
2. the declining balance method, using a rate not exceeding twice the rate which would have been used had the annual allowances been computed under the method described in paragraph (1).
3. the sum of the years’-digits method,
4. any other consistent method productive of an annual allowance which, when added to all allowances for the period commencing with the taxpayer’s use of the property and including the taxable year, does not, during the first two-thirds of the useful life of the property, exceed the total of such allowances which would have been used had such allowances been computed under the method described in paragraph (2).

Nothing in this subsection shall be construed to limit or reduce an allowance otherwise available under subsection (a).

The following discussions are designed to illustrate the calculation of annual depreciation as permitted by Section 167 (b). No one method can be selected as being representative of the entire fourth group; however, the most common methods of this group, the unit-of-production method and the machine-hour method, are discussed.

STRAIGHT LINE METHOD

The straight line method is the most simple and widely known computation of depreciation. In this computation, the annual allowance is based on original cost (purchase price plus installation charges), estimated salvage value, and probable useful life of the property. The allowance is calculated by dividing the original cost less salvage value by the years of useful life. This produces an annual deduction which is constant throughout the useful life of the asset involved.

The following example illustrates the computation of straight line depreciation:

1. Basic Data:
   - original cost \( (0) \) $10,000.00
   - salvage value \( (S) \) $1,000.00
   - useful life \( (U) \) 10 years

2. Computation of Depreciation
   - annual depreciation \( = (0-S)/L \)
   - \( = (10,000-1,000)/10 \)
   - \( = $900.00 \)

<table>
<thead>
<tr>
<th>Year</th>
<th>Book Value (end of year)</th>
<th>Annual Depreciation</th>
<th>Accumulated Depreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$9100.00</td>
<td>900.00</td>
<td>$ 900.00</td>
</tr>
<tr>
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<td>8200.00</td>
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<td>1800.00</td>
</tr>
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<td>7300.00</td>
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<td>2700.00</td>
</tr>
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<tr>
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<td>1000.00</td>
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<td>9000.00</td>
</tr>
</tbody>
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This method of depreciation can be applied to all depreciable property, tangible or intangible, regardless of the date of acquisition or original use. During the early years of useful life, the allowances obtained by the straight line method are lower than those obtained by the use of other methods. Since this causes a comparatively slow rate of capital recovery, many companies have shifted to other methods specified in Section 167 (b).

DECLINING BALANCE METHOD

The declining balance method, in contrast with the straight line calculation, produces non-uniform annual allowances; the allowances decrease throughout the useful life of the property.
involved. During the early years declining balance allowances exceed straight line deductions, but during the later years of asset life the reverse is true.

The calculation of depreciation by the declining balance method disregards salvage value, and the annual allowance is computed by taking the same unchanging percentage of the book value of the asset during each year. This fixed percentage, as indicated by Section 167 (b), must not produce an annual allowance which exceeds twice the straight line allowance had that method been employed.

Annual allowances less than 200 per cent of the straight line amounts are not prohibited by Section 167 (b); in fact, many companies continue use of the 150 per cent declining balance method authorized prior to the passage of the 1954 Code. In this method, maximum annual depreciation cannot exceed one and one-half the straight line allowances.

The first step in each of the declining balance methods is to calculate the fixed percentage which, when applied to the book value for each year, will produce the maximum allowable depreciation. This calculation for the 150 and 200 per cent methods based on a 10-year useful life is as follows:

1. 150 per cent maximum rate:
   Fixed percentage = 150/10 = 15%

2. 200 per cent maximum rate:
   Fixed percentage = 200/10 = 20%

The percentage obtained in this manner is then applied to the book value for each year to determine the depreciation deduction for the year. This computation is illustrated by the following example which employs the 200 per cent declining balance method:

1. Basic Data:
   - original cost (0) $10,000.00
   - useful life (L) 10 years
   - maximum rate 200%

2. Computation of Depreciation

<table>
<thead>
<tr>
<th>Year</th>
<th>Book Value (end of year)</th>
<th>Annual Depreciation</th>
<th>Accumulated Depreciation</th>
</tr>
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<td>10</td>
<td>1073.74</td>
<td>268.43</td>
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</table>

It can be seen from the above figures that the declining balance method can not depreciate an asset to zero value at the end of useful life. For this reason the method omits salvage value in the calculations. In addition, Section 167 (c) allows the taxpayer to switch to the straight line method at any time during the useful life of the property (provided that the taxpayer has made no agreement or commitment to the contrary).

**SUM OF THE YEARS-DIGITS METHOD**

This method produces annual allowances similar to those of the declining balance computation. The allowances exceed those of the straight line during the early years of the useful life but are smaller than those of the straight line during the later years.

Computation of annual depreciation by the sum of the years-digits method involves the application of an annually decreasing fraction to the original cost of the property less salvage value. The denominator of this fraction is the sum of the years representing the useful life of the property. For example, the denominator for a three-year useful life is six (1 + 2 + 3). The numerator to be used for each particular year is the number of the year counted from the end of the service life. For instance, the numerator for the first year of a three-year useful life is three; for the second year, the numerator is two.

The following example illustrates the computation of depreciation by the sum of the years-digits method:

1. Basic Data:
   - original cost (0) $10,000.00
   - salvage value (S) $1,000.00
   - useful life (L) 10 years
   - denominator of fraction 55

   \[ L \times (L+1)/2 = 55 \]

2. Computation of Depreciation

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<th>Annual Depreciation</th>
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OTHER METHODS

Paragraph (4) of Section 167 (b) allows the use of any consistent method of calculating depreciation so long as the method used produces reasonable annual allowances. No specific methods are mentioned in paragraph (4), but it is stated that any such method must not produce annual allowances which, during the first two-thirds of the useful life, exceed those of the straight line calculation.

Of the many different methods employed under paragraph (4), the two most common are the unit-of-production and the machine-hour methods. In the unit-of-production method, the annual depreciation is based on the number of units of output during each year. In the machine-hour method, the annual deduction is based on the number of machine-hours actually worked during each year.

The first step in calculating depreciation by either method is to determine the amount of depreciation per base unit; i.e., depreciation per unit of output or machine-hour. This is accomplished by dividing the original cost less salvage value by the estimated useful life expressed in units of production or machine-hours.

Annual depreciation is then obtained by multiplying the depreciation per base unit by the number of base units for each year. The example below illustrates the computation of depreciation by the unit-of-production method; computation by the machine-hour method would follow a similar procedure.

1. Basic Data:
   - original cost (0) $10,000.00
   - salvage value ($) $1,000.00
   - useful life (in units of production) 90,000

2. Calculation of Depreciation per Unit of Production:
   \[
   (0-S)/90,000 = (10,000 - 1000)/90,000 \\
   = 0.10
   \]

3. Computation of Depreciation

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<tr>
<th>Year</th>
<th>Units Produced</th>
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<td>$1000.00</td>
<td>$ 9000.00</td>
</tr>
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</table>
APPENDIX B

QUESTIONNAIRE SENT TO MAJOR STEEL PRODUCERS

QUESTIONNAIRE

Survey of the Effect of Present Depreciation Allowances on the Steel Industry of the United States

Company ................................................................. No. .................................................................
Address ...................................................................................................................... City .................................................................

1. What method of depreciation for tax purposes is used by your company for capital equipment acquired after December 31, 1953?
   a. Straight Line
   b. Declining Balance
   c. Sum of the Years-Digits
   d. Other (please specify)

2. Does this method allow recovery of total historical cost?
   Yes................................................................. No.................................................................

3. Does this method allow recovery of total replacement cost?
   Yes................................................................. No.................................................................
   A. If answer to previous question was NO, what per cent of replacement cost is recovered?
      1. Less than 20
      2. 20-40
      3. 41-60
      4. 61-80
      5. More than 80
   B. If answer to previous question was NO, how is the excess of replacement cost over depreciation allowances obtained? (If more than one source is used, please rank in order of importance).
      a. Retained earnings
      b. Long-term borrowing
      c. Sale of additional stock
      d. Other (please specify)

The following definitions apply to capital equipment in need of replacement and pertain to Questions 4-6.
   a. physically inferior—replacement is considered necessary by reason of age and use (increasing maintenance costs, deterioration of product quality and quantity).
   b. functionally inferior—replacement is considered necessary because of the availability of improved equipment for doing the same job or a change in the type and amount of service desired.
   c. obsolete—all equipment considered in need of replacement for either physical or functional reasons or a combination of both.

4. Do you consider that depreciation methods presently authorized by the Internal Revenue Code of 1954 tend to encourage the use of physically inferior equipment by your company?
   Yes................................................................. No.................................................................
5. Do you consider that depreciation methods presently authorized under the Internal Revenue Code of 1954 tend to encourage the use of functionally inferior equipment by your company?
   Yes ........................................ No ............................

6. a. If either Question 5 or 6 was answered YES, what per cent of the capital equipment now in use is considered to be obsolete?
   a. Less than 20 ........................................
   b. 20-40 ........................................
   c. 41-60 ........................................
   d. 61-80 ........................................
   e. More than 80 ........................................
   b. Of this per cent, is the majority considered physically inferior?
      Yes ........................................ No ............................

7. a. Is it company policy to keep fully depreciated capital equipment in operation past retirement age?
      Yes ........................................ No ............................
      b. If YES, for what reason ........................................

8. It is often company policy to keep two sets of books, one for internal use and one for tax purposes. Does your company have this policy?
   Yes ........................................ No ............................

9. a. Do you feel that presently employed methods of depreciation for tax purposes contribute to the overstatement of profits?
      Yes ........................................ No ............................
      b. If you feel that overstatement of profits due to depreciation policies occurs, by what per cent would you estimate this overstatement?
         Estimate ........................................
      c. If you feel that overstatement occurs, by what rate would you estimate that the company's "actual" income is being taxed? (Federal income taxes only)
         Estimate ........................................

10. What changes in Government depreciation policies (both legislative and administrative in nature) do you feel are necessary?
    ...................................................................................................................
    ...................................................................................................................
    ...................................................................................................................
    ...................................................................................................................
    ...................................................................................................................
    ...................................................................................................................
    ...................................................................................................................
    ...................................................................................................................

11. For the purposes of this Question, consider that the changes proposed in Question 10 had been incorporated in the Internal Revenue Code of 1954. — By what per cent might average annual capital equipment expenditures have exceeded the average annual sums actually spent over the last three years?
    Estimate ........................................

Thank you.

Please return to:
Harleigh F. Fatzinger
Mineral Sciences Bldg.
The Pennsylvania State University
University Park, Pa.