05955 - [B1366365] *RELEASED 6/8/78*

Investment Tax Credit: Unresolved Issues. PAD-78-40; B-114802.
May 8, 1978. Released June 8, 1978. 34 pp. + 4 appendices (15
pp.).

Report to Rep. Charles A. Vanik, Chairman, House Committee on
Ways and Means: Trade Subcommittee; by Elmer B. Staats,
Comptroller General.

Issue Area: Tax Policy (1500).
Contact: Program Analysis Div.
Organization Concerned: Department of the Treasury.
Congressional Relevance: House Committee on Ways and Means:
    Trade Subcommittee; House Committee on Ways and Means;
    Senate Committee on Finance. Rep. Charles A. Vanik.
Authority: Tax Reduction Act of 1975.

          In an effort to stimulate economic growth, the
administration proposed that the temporary 10% investment credit
be made permanent and extended. Previous studies of investment
behavior were evaluated to determine the role of the investment
tax credit in promoting stability and growth.
Findings/Conclusions: Since 1962, when the investment tax credit
was enacted, gross private domestic investment as a percentage
of the Nation's economic output has not changed appreciably. Two
areas of concern regarding the level of investment spending are
shortrun economic recovery and future productivity gains.
Studies revealed that: about 2 to 4 years is required for a
significant response in investment expenditures to tax credit
changes; a large portion of the credit goes to reward investment
that would have been made whether or not there was such a
credit; the major thrust of the credit is to provide incentive
to long-term economic growth; and the credit encourages
investment in new, more productive equipment and encourages a
greater proportion of capital investment in equipment. However,
the credit may distort normal market forces and lead to more
intensive use of capital at the expense of labor, affect rates
of return on assets, allow additional tax writeoffs, and bypass
businesses which do not require large capital investments. Two
studies suggested that the method of financing the credit may
lead to changes in capital costs, in redistribution of wealth,
and in consumer behavior. Recommendations: The Congress should
consider the investment tax credit primarily as a tool to
promote capital formation and economic growth in the long run
and consider the following possible changes: applying the credit
to other types of investment such as structures and workforce
training, making the credit available to firms currently making
small profits but growing rapidly, and further research and
analysis on the effectiveness of the credit as an economic
stabilization device. (HTW)

REPORT BY THE

Comptroller General

OF THE UNITED STATES

Investment Tax Credit: Unresolved Issues

At the time of enactment, most proponents of the investment tax credit program thought that this would increase investment in the U.S. economy. Subsequent experience raises questions about this expectation. Since 1962 gross private domestic investment as a percent of the Nation's economic output has not changed appreciably.

How can this apparent failure of incentives to stimulate investment be explained? What alternatives are available to the Government to encourage investment spending?

The investment tax credit is easily administered and gives a tax break to business managers. However, it is difficult to determine how effectively the investment tax credit can encourage business investment.

GAO critically assesses the most important studies that have analyzed the investment tax credit's short-term and long-term economic effects, points out the weaknesses in the analyses, and suggests the direction of future work.

B-114802

The Honorable Charles A. Vanik
Chairman, Subcommittee on Trade
Committee on Ways and Means
House of Representatives

Dear Mr. Chairman:

We are enclosing 30 copies of our report: "Investment
Tax Credit: Unresolved Issues" (PAD-78-40) which is a
survey and evaluation of past studies of the role of the
investment tax credit in promoting stability in the
national economy. We discuss the nature of those studies,
analyze their strengths and weaknesses, and indicate
a need and direction for future research.

Our analysis indicates that about 2 to 4 years is
required for a significant response to the investment
expenditures to changes in the tax credit; thus, the
effectiveness of the tax credit in generating investment
expenditures in the short term must be considered with
much caution. We also found that the major thrust of
the investment tax credit is to provide incentive to
long-term economic growth.

Sincerely yours,

Comptroller General
of the United States

Enclosures - 30

COMPTROLLER GENERAL'S
REPORT TO THE
HONORABLE CHARLES A. VANIK
HOUSE OF REPRESENTATIVES

INVESTMENT TAX CREDIT:
UNRESOLVED ISSUES

D I G E S T

GAO's report is a review and an evaluation
of previous studies of investment behavior
that included the investment tax credit.
Its purpose is to discuss the role of the
investment tax credit in promoting sta-
bility and growth; to identify and evaluate
past studies of the tax credit; and to
set forth any unresolved issues.

The slow rate of investment spending since
the 1974-75 recession regarding the dur-
ability of the current economic recovery
concerns many policymakers. A common
opinion is that recessions are kindled by
a sluggish rate of business investment; when
business spending thrives, the economy is
generally performing well.

In the current situation there are two areas
of concern regarding the level of investment
spending: to keep the recovery going in the
shortrun and to provide for future product-
ivity gains.

Should business investment be manipulated as
part of the Nation's economic stabilization
policy? The debate on this question has led
to considerable reseach as to what are the
determinants of business investment   What
influences the firm's investment decision?
An understanding of this issue is crucial to
the development of an effective policy to help
stimulate investment spending and encourage
economic growth and stability.

GAO reviewed and assessed past studies of
investment behavior that included the
investment tax credit and discusses their
strengths and weaknesses. GAO collected
other suggestive studies and considered
the direction that future research should
take.

Tear Sheet. Upon removal, the report
cover date should be noted hereon.

i

PAD-78-40

FINDINGS

In reviewing past studies, GAO found that:

--About 2 to 4 years is required for a
  significant response in investment ex-
  penditures to tax credit changes. The
  effectiveness of the tax credit for
  investment expenditures in the short-
  term must be considered with substantial
  caution,

--A large portion of the tax credit goes
  to reward investment that would have
  been made whether or not there was a
  tax credit.

--The major thrust of the investment tax
  credit is to provide incentive to long-
  term economic growth.

These studies also indicate that the in-
vestment tax credit:

--Encourages investment in new equipment
  that is more productive than old equip-
  ment and which leads to economic growth.

--Changes the composition of investment
  expenditures in favor of machinery and
  equipment, thereby encouraging economic
  growth to the extent that machinery and
  equipment are more productive than
  investment in other forms of capital.
  The administration's proposal does ex-
  tend the investment tax credit to
  structures.

The investment tax credit may also distort
normal market forces.

--It may lead to the more intensive use
  of capital at the expense of labor. The
  idea behind capital investment is to
  increase labor productivity, thus sup-
  porting economic growth. But it may not
  be beneficial for employment in the shortrun.

--A flat rate (currently 10 percent) applied
  to all assets with lives of 7 years or
  more leads to smaller rates of return for
  assets with longer service lines.

--As currently structured, it is not excluded
  from the depreciable base of an asset so
  that a writeoff is allowed for an expense
  not incurred. The asset is depreciated
  for tax purposes from the original cost,
  not the price adjusted for the tax credit.
  The procedure raises the effective rate
  of the tax credit above the statutory level.

--It tends to bypass those businesses which
  do not require a large capital investment
  since the credit offsets taxes. The
  benefits are reduced or eliminated for
  businesses that lack profits or that
  are operating at a loss. This tends to
  place new or marginal business at a com-
  petitive disadvantage.

Two recent relatively unknown and somewhat
tentative studies explored the implications
of the method of financing the investment
tax credit. These two longrun, full em-
ployment models suggest that the method
of financing the tax credit may lead to
changes in capital costs, in redistribu-
tion of wealth, and in consumer behavior.
Total investment may actually decline if
the Treasury sells bonds to households to
finance the credit. If the credit is fi-
nanced by a reduction in Government ex-
penditures, investment may rise by the full
value of the tax incentive to business
so that:

--The method of financing the investment
  tax credit may be important in determin-
  ing the potential effectiveness of the
  tax credit in stimulating business in-
  vestment spending.

--The potential effectiveness of the credit
  is critically dependent on the form of
  the complete fiscal package.

AGENCY COMMENTS

GAO did not request formal agency comments on this report. GAO did, however, receive informal comments from several agencies and considered these comments in preparing the report. Recognized economic experts in the business and academic communities also reviewed the report.

MATTERS FOR CONSIDERATION BY THE CONGRESS

GAC has reservations about the ability of the investment tax credit to promote short-term economic stability. For this reason, GAO believes that the Congress should consider the investment tax credit primarily as a tool to promote capital formation and economic growth. To improve its effectiveness in achieving these longer term goals, the Congress should consider the following possible changes.

--Applying the investment tax credit to other types of investment such as structures and workforce training. (While the administration proposes extending the tax credit to structures, the Congress may wish to consider other forms of investment.)

--Making the investment tax credit available to those firms that are currently making small profits but are growing rapidly. This would enlargen the base to which the credit is applied and, therefore, aid those industries more likely to invest in machinery and equipment. (The administration's proposal to increase the tax credit limit from 50 to 90 percent goes part of the way, but the Congress may wish to make the credit refundable.)

--GAO believes that further research and analysis should be undertaken concerning the effectiveness of the investment tax credit as an economic stabilization device.

C o n t e n t s

ABBREVIATIONS

FMP   Federal Reserve Board, Massachusetts Institute
         of Technology, Pennsylvania Econometric

GNP   gross national product

CHAPTER 1

INTRODUCTION

PRESIDENT'S INVESTMENT TAX CREDIT PROPOSALS

In an effort to decrease unemployment and encourage growth in the U.S. economy, the administration proposed that the temporary 10-percent investment credit be permanent and be extended to new industrial buildings and to investments made to rehabilitate existing industrial buildings. Furthermore, investment credits are to be allowed to offset up to 90 percent of tax liability in a given year, but they will not be allowed to offset a taxpayer's complete liability. The investment tax credit is designed to reduce business taxes paid by a percentage of the amount spent on machinery, thereby reducing the net-of-tax cost of investment. Unless extended by the Congress, the present 10-percent investment credit expires at the end of 1980.

This proposal to extend the investment tax credit rests upon the belief that the U.S. economy needs a stimulus and that the stimulus should be directed toward business investment because of:

--The slow rate of private investment in the economy.

--The low rate of productivity gains in manufacturing.

--Growing energy requirements.

And the investment tax credit further stimulates investment in capital equipment that results in:

--Improved job opportunities in existing and new businesses.

--Increased productivity that results in alleviation of inflationary pressures.

--Increased Federal revenues from higher levels of economic activity.

PROS AND CONS OF INVESTMENT TAX CREDIT

Proponents argue that the history of the investment tax credit has been effective in stimulating job producing investments throughout the economy. A paper presented to

1

the Ways and Means Committee on February 11, 1977, by the
Ad Hoc Committee for an Effective Investment Tax Credit
stated that:

> "* * * The key to the effectiveness of the
> investment tax credit is the fact that taxpayers
> must earn the benefit through the purchase of
> productive equipment and facilities--purchases
> which result in more jobs in the manufacturer's
> sector and * * * more jobs in the operation
> of the purchaser as well. Thus, employment and
> productive capacity are expanded, inflationary
> pressures are reduced through efficiencies in
> operation and Federal revenues are most likely
> increased far beyond the initial cost to the
> Treasury."

The investment tax credit is, in effect, a subsidy
provided by the Federal Government through the tax system
to encourage investment activity. As such, the investment
tax credit involves the transfer of funds from the
Government to the private sector. The Government does
not send a check to the business firm reimbursing it
for a portion of its capital investment, but the Treasury
Department does forego some of the revenue that it
otherwise would have collected. This foregone revenue
represents the cost of the programs. The benefits are
the investment expenditures required to achieve the
shortrun stability and longrun growth; thus, benefiting
the nation's taxpayers.

Arguments against the investment tax credit say that
it is an inefficient way to stimulate new investment and
create new jobs, and that it distorts the play of market
forces that lead to an inefficient allocation of resources.

This argument emphasizes that the credit does not
sufficiently increase equipment investment to offset its
enormous cost--estimated to be a little over $9 billion
in fiscal year 1977 and $11.8 billion in fiscal year
1978.

The cost, in terms of foregone income, may be greater
than the benefits in terms of investment directly generated
plus the accompanying increase in employment and output,
and revenues to the Treasury. One reason this may be true
is that the price of capital--the variable affected by the
investment tax credit--is only one of the many determi-
nants of investment spending. The price of capital may

affect such spending differently, in terms of timing and magnitude, than other determinants, such as expected and actual sales or new orders, the stock of unfilled orders and inventories, and the capacity utilization of plant and equipment. The empirical evidence measuring the differences in timing and in magnitude of effect will be presented in chapter 3.

And finally, the largest portion of the tax credit goes to reward investment that would have been undertaken in any case. Thus, while a company may increase investment outlays by only 5 percent over what was planned without the credit, they will receive a tax credit benefit on the full 100 percent of their investment. It is not a credit for all investment since it applies only to investment in machinery, not to investment in plant, housing, or durable consumer goods. Furthermore, it does not apply to investment in workforce training or research and development. Finally the credit tends to bypass all businesses not requiring large capital investment and, since it offsets taxes, the credit gives no benefit to new but growing businesses with little or no current profit.

In summary, the argument against the investment tax credit takes two paths. There are those who believe that there are other incentives that can stimulate investment and the economy more effectively than does the credit. Others believe that the credit, or any specific investment incentive, will distort the market mechanism and that policymakers should either leave the market alone or use a general stimulus, such as a cut in the individual income tax or the corporate income tax, or both.

HISTORY AND OPERATION OF INVESTMENT TAX CREDIT

The investment tax credit was enacted in 1962, suspended for 5 months in 1966 and 1967, repealed in 1969, reinstated in 1971 at 7 percent, and raised to 10 percent in 1975. The investment tax credit was considered a major innovation in Federal tax policy. Under it, a business firm may deduct, as a credit against its Federal income tax liability, a specified fraction of its investment expenditures for tangible personal property with a service life of 3 years or more. The 1971-74 credit rates were 7 percent for business and 4 percent for public utilities for services lives of 7 years or more, but in 1975 both rates were increased to 10 percent as an antirecessionary stimulus to investments made in 1975-76. For investments of less than

7 years, a smaller portion of the full credit is allowed.
For assets with lives of 3 to 5 years, one-third of the full
credit is allowed; on assets with lives of 5 to 7 years, the
firm is allowed two-thirds of the full credit. In theory,
this feature adjusts for the tendency of the investment
credit to favor short-lived over long-lived assets. The
full deduction is allowed against the first $25,000 of
tax liability, but prior to 1975, was normally restricted
to 50 percent of the remainder. The Tax Reduction Act of
1975 eliminated the 50-percent restriction for public
utilities from 1975-76, but provided for its gradual
reinstatement over the next 5 years.

Some of the provisions of the law have created special
problems. For example, unused investment tax credits may
be carried back for 3 years and forward for 7. For many
businesses this constraint has created a stock of unused
credits (whose value is difficult to assess because of
uncertainty about when and to what extent they will be
deductable against past and future tax liabilities).
Furthermore, the proper accounting treatment of currently
deducted credits is vague. Should firms be allowed to
reduce current after tax profits by their full amount?
Should they be capitalized and deducted gradually over the
service life of the current asset on whose purchase they
were earned? Accounting for the investment tax credit, in
short, is subject to ambiguities.

Finally, the present version of the investment tax
credit does not reduce the amount of depreciation that
firms may take on their qualified investments. The asset
is depreciated at its cost to the firm, not at its after
investment tax credit cost.

SCOPE OF REVIEW

In our report, we assess the investment tax credit
as a tool to stabilizing the economy in the shortrun
and as a contributor to long-term economic growth. The
analysis of the report is based, in part, on the conceptual
and empirical economic literature relevant to assessing
the policy effects of the investment tax credit. The
analysis performed for this report relies upon currently
available information and data, and no new empirical
analyses are undertaken in the study.

In chapter 2, preliminary matters and some background
materials are presented.

In chapter 3, the literature relevant to the investment tax credit is reviewed. The way in which the investment tax credit is financed is presented, and suggestions for future research on the role of the investment tax credit in the economy are stated.

In chapter 4, the unintended side effects and spillovers that result from the application of the investment tax credit are discussed. In chapter 5, conclusions are drawn and recommendations are made.

CHAPTER 2

ANALYSIS OF INVESTMENT DECISIONS

INTRODUCTION

The investment tax credit began in 1962. Since that time, tax incentives, such as depreciation schemes, investment allowances, and tax exemptions, have been extended and modified in efforts to stimulate investment expenditures. But, there remains the question concerning the extent to which business managers respond to tax incentives in making investment decisions. Under one of the descriptions of firm behavior, the investment tax credit has little or no effect in stimulating new investment spending. In other theories, the investment tax credit is of paramount importance. However, "If capital services cost less as a result of tax incentives, businessmen will employ them." 1/

In fact, the controversy over the extent to which business managers do respond to tax incentives extends to both the theoretical and the empirical levels of analysis. Though the research performed to date has failed to provide policymakers with exact, quantitative answers, definite progress has been made in classifying the basic issues. Although the definitive investment model has not yet and may never be developed, the existing models and empirical studies do provide valuable information for the policymaker.

INVESTMENT AND DEMAND FOR CAPITAL

Effective policies for influencing fixed investment can only be designed if they are specific. This requires a theory of demand for capital goods. It is usually assumed that there is a fixed relation between the stock of capital and the flow of services derived from it. Since the demand for a finite addition to the stock of capital can lead to any rate of investment expenditures, the rate of investment will depend on the behavioral relationship that exists regarding the speed of adjustment to a new and higher level of capital. In other words, if the desired capital stock is different from the actual capital stock, the

----

1/Hall, Robert and Jorgenson, Dale, in G. Fromm (ed.), "Tax Incentive and Capital Spending," p. 9.

shortage is to be made up, but the theory does not tell us at what rate per unit of time this shortage will be eliminated.

An extremely rapid planned investment response to the gap between desired and actual capital might be frustrated because the suppliers of capital goods are unable to meet its demands immediately. Most heavy capital goods are supplied to order and there is a backlog of these orders; to this must be added the time it takes to produce the equipment. Although a firm may plan a particular rate of investment, supply considerations will often change that rate so that the actually realized rate is much different. Furthermore, if all firms plan a fairly rapid rate of investment, then such plans will not be honored in the total, and the economy will be forced along a much slower path, depending on how rapidly the capital goods industry can expand.

The question of which investment path the firm plans to move along and which path is actually realized is one of dynamic adjustment. Thus, to assess the investment tax credit's performance as an investment stimulus, it is necessary to identify the determinants of the demand for capital and how these determinants are translated into the demand for investment. It is then appropriate to address the question: What tax incentives would work best, given alternative theories of investment behavior?

A convenient framework for analyzing and discussing the problem of investment demand is to specify a two-stage process:

1. What determines the desired stock of capital?

2. How does the firm, or economy, adjust from its actual capital stock to the desired capital stock?

In the first stage the following questions should be asked: What elements enter the firm's decision to add to or replace plant and equipment? In the second stage: Once the decision to expand or replace the firm's capital stock has been made, how long will it take for the decision to be implemented and for the capital to be put in place?

Timelags

The need for an explicit recognition of timelags in the formulation of a theory of investment can be illustrated by

considering first the lags which affect a single capital expenditure undertaken by an individual firm. The total lag between the time when the firm is faced with a situation in which it requires further capital expenditure and actual expenditures (investment) consists of the following components:

--The time which elapses between the situations stimulating the purchase of capital goods and the firm's knowledge about the situations. This is the timelag caused by the collection and provision of the relevant statistical information relating to the firm, its industry, and the economy as a whole.

--Time taken by the management of the firm to draft plans for the proposed capital project, to decide on its advisability, and to arrange the necessary financing.

--Time taken by the firm to make its decision effective. This involves either purchase, or for most types of capital goods, the placing of an order.

--For capital goods supplied to order, there may be a further lag before the work on them commences. This lag will exist only if the industries producing the required capital goods are working fairly close to capacity, and its length is likely to depend on the current pressure of demand for capital.

--For capital goods supplied to order, there will also be a lag between the start of work and production. In some cases, the actual capital expenditure will be made by the firm only when the goods are delivered; in other cases, capital expenditures in the form of progress payments will be made by the firm at intervals during the production period.

Summing these components, the total lag between the situation requiring capital expenditure and the actual expenditure is seen to consist of a fixed and, in many cases, a distributed component. A further distributed lag effect is introduced if the firm, instead of responding to a situation existing at a single point in time as assumed above, is more cautious and determines its policy with respect to a range of its recent experiences. The total

8

length of the lag is not easily predicted on a priori grounds. However, for capital goods which are built to order, and for which progress payments are not made, the fixed component of the lag distribution cannot be less than their minimum production period.

When considering the lag distribution relevant to all capital expenditures undertaken by a single firm, the problem becomes more complex. Even for decisions made at the same point in time, different lags are likely to be associated with different capital goods, because of differences in their queueing and production periods. Moreover, the decisionmaking time may vary with the magnitude of the expenditure involved. The consideration of capital expenditure decisions at a more aggregate level (industry or whole economy) introduces additional complications to the lag scheme, since different firms may have different speeds of response to a given situation. Firms are likely to require different assortments of capital goods; the information, decisionmaking, ordering, queueing, and production period components of the lag structure may change over time. Variations in the first three are likely to be determined by such factors as changes in the internal organization and complexity of individual firms, and developments in data collection and provision. Variations in production periods are likely to be caused by both trend and cyclical influences; the trend influence reflecting changes in the production techniques; and the increasing complexity of capital goods, while the cyclical influences are attributable to changes in the pressure of demand on the capital goods industries. This latter influence is also likely to determine both the existence of and the length of the queueing period for actually acquiring the capital goods.

CHAPTER 3

REVIEW OF INVESTMENT STUDIES

In this chapter the main studies of the performance of the investment tax credit over the past 10 years are surveyed and assessed. Although the studies often concern the use of accelerated depreciation and cuts in the corporate tax rate, our emphasis is placed on the conclusions of the studies that relate to the investment tax credit. The studies surveyed include: a Brookings Conference in 1967 and comparative studies undertaken later. Some recent logical extensions of models are made to assess the performance of the investment tax credit as well as other investment incentives, and summary information contained in these studies is presented for policy purposes.

BROOKINGS CONFERENCE

The 1967 Brookings Conference was called in an attempt to evaluate the effect of tax incentives enacted since World War II on capital spending. Each study measured the same phenomenon, but obtained different results. The studies are extremely complex and employ sophisticated conceptual frameworks and empirical analyses. 1/

Although the papers do agree that the investment tax credit is effective in increasing investment spending, questions are raised about the timing of investment expenditures and their effect on short-term economic stability and whether the cost of the tax credit as a program was worth the benefits generated. The studies do go a long way in developing a theoretical framework and methodology for analyzing the effect of various economic factors as investment.

MODELS AND THEIR ESTIMATES

1. Hall and Jorgenson. The investment model formulated by Hall and Jorgenson is based on neoclassical economic theory. Firms maximize profits subject to a production function, taking account of the implicit rental price of capital (the price of capital services). They

----

1/The current major econometric models contain similar types of equations for fixed investment and, hence, are as complex (e.g., Data Resources Incoporated, Wharton, Federal Reserve Board, Chase).

assume a Cobb-Douglas production function and, therefore, that the elasticity of substitution between labor and capital is equal to unity. The parameters of the model are estimated from annual data in 1965 dollars for investment in manufacturing and nonfarm/nonmanufacturing industries in the United States from 1929 to 1965. In each sector, separate investment functions were fitted for equipment and for structures. The Hall-Jorgenson model does not provide a separate lag structure for output and, for the relative prices of labor and capital, both are combined into one variable making it impossible to distinguish the separate effects.

Given the above assumptions and estimated parameters, the model estimates the investment effects of the adoption of accelerated depreciation in 1954, the adoption of new, shorter lifetimes for depreciating investment and the investment tax credit in 1962, and the cut in the corporate profits tax in 1964. The effects of the 1966-67 suspension of tax credit and accelerated depreciation for structures are projected into 1970.

Hall and Jorgenson conclude that tax policy has been highly effective in changing the level and timing as well as the composition of investment expenditures. The investment tax credit, which was limited to certain equipment, shifted investment away from structures and toward equipment. Thus, changes in tax policy are said to have substantially stimulated the level of investment expenditures.

2. Bischoff. Bischoff's model of the investment process is similar in many details to the model presented by Hall and Jorgenson. He is critical of their model, however, because of the restrictive nature of some of their assumptions. He, therefore, develops and applies a less restrictive and more general set of assumptions.

The most important of Bischoff's generalizations is that the proportions between labor and capital may not be freely variable at all times but only before fixed capital goods are put into place. This "putty-clay" hypothesis is used since it implies that measures (tax credits, depreciation rules, etc.) that alter the relative price of capital services should affect capital goods spending more gradually than do changes in output.

11

Bischoff, unlike Hall and Jorgenson, allows for a separate lag distribution for output and relative prices, and the empirical results indicate that this substantially improves the predictive power of the model. Changes in relative prices affect equipment spending more gradually than do changes in output, as predicted by the "putty-clay" hypothesis.

Bischoff relaxes other Hall and Jorgenson restrictions in the following ways: (1) the assumption that the production function underlying the demand for capital of the Cobb-Douglas variety is replaced by the asssumption that the underlying function has a constant but unspecified elasticity of substitution; (2) the assumption that expectations are static is replaced by the assumption that expected output and expected relative prices are generated via distrbuted lag mechanism, and (3) the assumption that the constant before tax cost of capital is replaced by the assumption that the after tax cost of capital may be approximated by a linear function of the corporate bond yield, the corporate dividend-price ratio, the degree of corporate leverage, and the corporate tax rate.

Bischoff concludes that changes in the relative prices of capital goods--including changes resulting from the investment tax credit--appear to have a statistically significant affect on equipment spending. His estimate of the longrun price elasticity of demand for equipment is close to unity. Other things being equal, the stimulus to equipment spending provided by the investment tax credit is estimated to exceed the revenue losses from the credit. For accelerated depreciation the estimated effects are considerably smaller than the revenue loss.

3. Coen. Robert Coen estimates the effect of the various tax incentives for investment--accelerated depreciation, the investment tax credit, and reductions in tax rates on business income--on total plant and equipment expenditures of manufacturing firms. Tax incentives are assumed to influence capital expenditures in two ways: 1) by reducing the implicit rental price of capital, they increase a firm's desired stock of capital; and (2) by increasing the flow of internal funds available for financing purchases of capital goods, they facilitate adjustments of capital stocks to desired levels.

Coen begins the analysis by measuring changes in the rental price of capital and in cash flow brought about by changes in tax policy. He finds, for example, that for

the 1954-61 period, a switch in depreciation methods from straight line to double declining balance reduced the rental price of capital of manufacturing firms by 4 percent on the average. In other words, equal reduction in the rental price of capital would have occurred if the tax rate on business income had been reduced by 4 percentage points. By 1966, the combination of tax incentives had reduced the rental price by 19 percent or the equivalent of a 20-percentage-point reduction in the tax rate. Coen also found that by reducing tax liabilities, accelerated depreciation increased cash flow by $5.1 billion (1954 dollars) during 1954-61 period. This was equivalent to a reduction of approximately 3 perentage points in the tax rate. In 1966 alone, firms enjoyed an increased cash flow of $3.1 billion as a result of all tax incentives--the equivalent of a 9-percent reduction in the tax rate.

Coen then determined the responsiveness of investment to changes in the rental price of capital and in cash flow by statistically fitting an investment relation to quarterly data for 1965-66. Investment is described as the process by which firms adjust actual capital stocks to desired levels. The speed with which investment takes place depends on the adequacy of the cash flow for financing capital expenditures. Firms are assumed to minimize costs of production. Thus, the desired stock of capital depends on expected future output and relative prices of factors production. Expected output is specified as a weighted average of current and past values of new orders, with the weights following an inverted-V pattern. Similarly, expected relative factor prices are specified as a weighted average of current and past prices. Several variants of this basic model are tested. Coen prefers the investment equation which states that if cash flow is small relative to the size of the gap, firms close about 10 percent of the difference between desired and capital stocks each quarter. However, if cash flow is about equal to the gap, the adjustment speed increases to about 28 percent of the gap per quarter. The investment equation also implies that a 1-percent increase in expected output will increase the desired capital stock by 0.9 percent, while a 1-percent decrease in the rental price of capital increases the desired stock by 0.3 percent.

A cost-benefit calculation of the effect of tax policy on the economy shows that accelerated depreciation increased investment expenditures by $2 billion (1954 dollars) from

13

the beginning of 1954 to mid-1962; this compares with tax savings to firms (revenues lost to the Federal Treasury) of $5.1 billion over the same period. From mid-1962 to the third quarter of 1966, all tax incentives increased expenditures by $2.8 billion, compared with tax savings of $8.6 billion. Thus, based on Coen's estimates, the effect of tax incentives has been disappointing in light of their costs.

4. Klein and Taubman. Lawrence Klein and Paul Taubman estimate the effects of the investment tax credit and accelerated depreciation allowances on nonfarm fixed investment. In the process, they compare their methods with those used in the other studies presented at the conference. Unlike other authors, they did not estimate new investment functions with explicit tax credit variables. Instead, these equations (based on quarterly data from 1948 to 1964) were taken from the then current version of the Wharton econometric model. The rate of return was adjusted for tax policy changes and entered as shifts in the interest rate term in the equations for manufacturing, regulated industry, and all other nonfarm investment. For the investment tax credit, the increase in the rate of return was calculated for each of the three industry groups.

The effects differ among groups. Utilities, for example, were granted a lower maximum credit rate and their capital has a longer economic life. Other differences arise from the mix between covered and noncovered capital equipment, and the difference between statutory and the effective tax rate. All effects were evaluated within the Wharton model; hence, feedbacks from the rest of the economy were included, a crucial aspect missing from the other papers.

In contrast to Hall and Jorgenson, Klein and Taubman allowed for the fact that the temporary tax credit suspension (as in 1966-67) should have a greater effect on investment than a permanent suspension. Assuming that it had not been revoked in March 1967, the suspension of the credit and the accelerated depreciation would have reduced investment by an estimated $2.3 billion in 1967. About half this effect occurs because of feedbacks within the model. Without adjustments for the temporary nature of the suspension, the impact was estimated to be $1.6 billion (both amounts in 1958 dollars).

14

This study goes into substantial detail about the problems involved in computing the rental price of capital:

--The failure to include State and local taxes on property and profits.

--The accelerated amortization provisions under the program of the certificates of necessity.

--For structures, the conversion of accelerated depreciation into capital gains.

COMPARATIVE STUDIES

Alternative models of investment behavior have widely different implications for the determinants of investment and for the time structure of the investment process and, therefore, for the effectiveness of tax incentives such as the investment tax credit. Attempts to appraise alternative econometric models of investment behavior on the basis of accepted standards of validity of specification, such as goodness of fit and absence of correlation in the underlying errors, reveals that the information already available is insufficient to provide a basis for comparison.

1. Jorgenson, Hunter, and Nadiri. In one test of the investment theories, Dale W. Jorgenson, Jerrald Hunter, and M. Ishag Nadiri fitted four different models selected to represent the main alternative theories of investment. The models were fitted to the same 1949-64 data for 15 manufacturing industries from the regular investment survey of the Office of Business Economics and the Securities Exchange Commission. The models tested were the Jorgenson-Stephenson Model, which stresses the rental price of capital asset services; the Eisner Model, which minimizes the role of financial factors and stresses the importance of changes in business sales and profits (the so-called flexible accelerator); the Locke Anderson Model, which includes a variety of financial factors such as internal cash flow, interest rates, long-term debt capacity, and accrued tax liabilities; and the Meyer-Glauber Model, which also stresses financial factors by including internal cash flow, interest rates, and the rate of change of common stock prices.

When tested for their ability to explain the behavior of business investment during the time period of the study, the Jorgenson-Stephenson Model ranked first, the Eisner,

15

second; the Meyer and Glauber Model third; and the
Anderson Model, fourth. When tested for the absence of
structural changes between 1949-60 and 1961-64, the Eisner
Model ranked first and the Jorgenson-Stephenson, second;
while the other two held the same position as in the
explanatory test. This test for structural change is
important because the models are built to represent the
underlying structure of the economy, and the empirical
results are specific to that model. If the economy changes
and the model does not pick up (represent) that change,
then the results of the test may not be valid.

2. Bischoff. In another systematic test, Bischoff
fitted five models to quarterly data for 1953-68. He used
the standard neoclassical model of Jorgenson and Stephenson,
Eisner's flexible accelerator model; a straight cash flow
model, a model based on the proposition that corporate
managers invest so as to maximize the market value of their
firm; and the Federal Reserve Board, Massachusetts Institute
of Technology, Pennsylvania Econometric Model (FMP model),
the latter model incorporating Bischoff's "putty-clay"
hypothesis. All five models performed reasonably well
and similarly during the period to which they are fitted,
but when they were used to predict investment in 1969-70,
both the cash flow and the corporate market value equations
showed large errors. Bischoff preferred the FMP model,
with Eisner's flexible accelerator as his second device.

The FMP model had the added advantage of an economy-
wide model in that it incorporated the model's feedback
effects.

SUMMARY AND CONCLUSIONS

In this section of the paper we summarize what we have
learned about the effect of the investment tax credit on
investment and, ultimately, its ability to achieve the
policy objective of short-term economic stabilization and
long-term economic growth.

The Brookings Conference studies started the ball
rolling in the sense that never before had anyone attempted
to evaluate the investment tax credit and other tax
incentives in the context of an econometric model. Previous
attempts had been rather ad hoc representations of the
ratio of investment expenditures to gross national product
(GNP). That is, investment tax incentives were assumed
to increase investment in the U.S. economy in relation

to some measure of the economy's overall scale, such as GNP. But many things were left out of these calculations that had to be accounted for.

These studies were certainly a giant step forward in the attempt to evaluate in a rigorous and sophisticated manner the effect of policy variables such as the investment tax credit, accelerated depreciation, and reductions in the corporate income tax. What information about the performance of the investment tax credit do these studies give us?

Economic stabilization. The purpose of stimulating investment expenditures is to increase aggregate demand at a time when such demand is deficient, that is, when consumption and Government expenditures are not filling the gap so that actual output is less than potential output--with the resulting excess capacity and unemployment problems. Thus, what evidence do the studies give us to indicate that the investment tax credit has increased investment expenditures at the time needed and in the appropriate amount?

In a period of deficit demand, the businessman with lagging sales and excess capacity in plant and equipment will be somewhat unwilling to invest in more plant and equipment. This would, in general, hold true with or without the tax credit. In the downturn and the low point in a business cycle, and very likely in the early stages of the upturn, the likelihood of a significant amount of investment as a result of the investment tax credit is somewhat doubtful. On the other hand, in the middle and later stages of the upturn, the increased demand with the expectation of further increases will encourage investment, and the investment tax credit may likely increase the amount of investment but at what may be an inappropriate time. An investment stimulus is needed in the downturn and the low point of the recession, not in the later stages of the upturn and at the peak of the cycle when in adding to aggregate demand it increases inflation. Thus, it is not a particularly effective countercyclical policy investment.

Evidence from the studies tends to confirm this conjecture. The lag structure on investment is much longer for price changes than for output changes--evidence that output changes are most effective in generating shortrun changes in investment and, therefore, in aggregate demand and employment.

17

The value of the tax credit for stabilization, if the policymaker is going to raise and lower the rate as well as stop the credit altogether, depends on the ability of the policymaker to forecast future trends. The historical choice of the timing of the credit and the choice of the rates appear to have been detrimental to stabilization. In hindsight, a constant rate of x percent would have been preferable to the actual administration of the program. For example, reduction or suspension of the investment tax credit in late 1964--which would have been an appropriate time--would have required accurate anticipation of the course of the Vietnam buildup. In 1964 U.S. fiscal policy was headed in the opposite direction. In that year a major tax cut was instituted, and the effectiveness of the investment tax credit was enhanced by the enactment of the Long Amendment. The implications of the changing defense policy were not apparent to fiscal policymakers until much later.

Economic growth. To the extent that the tax credit affects positively net investment expenditures, it effects long-term economic growth. Economic growth is also affected by replacement investment to the extent that new capital goods replacing old capital goods is more productive, which is usually the case. Furthermore, the investment tax credit may enhance measured economic growth by changing the composition of investment expenditures toward the traditionally more productive plant and equipment investment.

The main criticism of these studies--except for Klein and Taubman--is that they are partial equilibrium studies and have not been undertaken in a macroeconomic framework where the interrelatedness between investment, the interest rate, the money supply, etc., are specified and estimated. Thus, a properly specified macroeconomic model would pick up and trace the feedback relations as investment demand increased, forcing up the interest rate, causing other investment projects to be cancelled, etc. A macroeconomic model would also allow the investigator to stimulate the effects of various possible monetary policies, of other tax and expenditure policies that may be working in the opposite direction, and of various methods of financing the foregone revenues. It would also, if properly designed, note the supply side problems that must be overcome and allow for the researcher to trace through the model the fact that the macroeconomic savings investment identity must be fulfilled, indicating the role of constraint on

18

aggregate investment. We discuss these topics in the following chapter.

While the Klein and Taubman study and the Bischoff FMP study come closest to our ideal in assessing the strength of the investment tax credit as well as other investment tax incentives, there are problems. Those problems are also present in the current macroeconometric models used to evaluate and simulate economic policy programs. Klein and Taubman and the Bischoff FMP studies develop the feedback on the demand side of the model in some detail and tend to pick up the effect of changing capital prices and interest rates on investment demand but does not model supply side effects. That is, Klein and Taubman, as well as the current macroeconomic models, stress the effect of changing tax incentives on disposable income and spending, but the relative price changes that affect the critical choice between work and leisure, consumption and saving, are neglected. In summary, the incentive linkages are either weak or are not modeled. Thus, the use of existing models to simulate the economic effect of tax incentives, may have seriously under (or over) estimated private sector incentives.

In summary, current macroeconometric models are usually constructed so as to simulate the effect of tax incentives on aggregate demand rather than an aggregate supply.

> "Thus, the use of these models may have directed policymakers toward these policies which had visible short-term effects on aggregate demand without considering their likely intermediate or long-term effects on production capacity." 1/

Harberger, in commenting on the Brookings Investment studies pondered the evidence that the investment tax credit (coupled with accelerated depreciation) did increase plant and equipment spending, but did not appear to increase total investment spending relative to gross national product. Instead these tax incentives changed the composition of investment spending. Harberger raised and answered the important question: Why does this very rough data indicate little or no increase in total investment proportional to GNP indicating instead a change in the

---

1/Roberts, Paul Craig, Letter to the Editor, Wall Street Journal (July 25, 1977).

composition of investment from other forms of investment spending toward plant and equipment? Harberger did not find this result surprising. He noted the partial equilibrium nature of the studies evaluating investment incentives and the associated fact that the evaluations did not take into consideration the macroeconomic constraint that aggregate saving must equal aggregate investment. He concluded that stimulating investment through a policy that has little or no effect on saving is doomed to failure.

However, savings can increase from other sources; they are generated not only by households and business but by Federal, State, and local government. Furthermore, the position taken by monetary authorities is crucial to the success or failure of any fiscal policy, particularly one as generally applicable as the investment tax credit.

SAVING, INVESTMENT, AND GENERAL EQUILIBRIUM

Since the investment tax credit is applicable to many firms, it will, if it is to be a successful policy, have a significant effect on the economy as a whole. Tests of the effectiveness of the investment tax credit should be put in a context that takes into account the interrelatedness among investment spending of all types, the demand for capital, interest rates, and the price of capital, and the price of output and savings, among other things. And, in a general equilibrium framework, investment and saving are completely bound together. Thus, the method of financing a tax incentive--in truth a whole tax package --will be an important determinant of how effective the incentive will be.

The tax credit and the attendant increase in investment have three major stimulative effects. First, the tax credit increases investment in equipment and machinery that increases income and employment in the capital goods producing sector. Second, through the multiplier effect, the tax credit increases disposable income. Third, if the deficit is increased there is an increase in net private sector financial assets. This can be shown by using the following identity:

$$G-T = S-I$$

Where G-T is the Government deficit (Government spending minus tax revenues), it is identical to private sector savings (aggregate private savings less investment). If a tax credit reduces T, tax revenues, it increases the deficit, and thus, there must be an increase net private savings, S-I. This increase in net savings may be accomplished by increasing S, decreasing I, or some combination of both. This must result in an increase in private sector financial assets corresponding to the public sector increase in liabilities due to the deficit.

The stimulative effect of the tax credit and the accompanying deficit increase will depend on what happens to monetary policy (to the money supply), and that depends on how the deficit is to be financed. If the financing does not increase commercial bank reserves, it will not increase the money supply, and interest rates will rise to choke off some of the new investment demand stimulated by the tax credit. Just how much investment is choked off will depend on how responsive investment demand is to interest rate changes, how responsive saving is to interest rate changes, and how responsive the demand for money to hold is to those same interest rate changes. These topics to be discussed at the end of this section. If additional reserves are created, the money supply increases interest rates do not rise at all adding to the expansionary effect of the investment tax credit.

Taubman and Wales. Two recent studies of the economic effects of the manner of financing investment incentives, such as the investment tax credit, have found that under certain circumstances, the tax credit, when analyzed in a macroeconomic framework which takes account of monetary policy and the method of financing the deficit, has a much smaller economic effect than partial equilibrium studies suggest. Taubman and Wales used a budget balancing package replacing revenue lost through investment incentives by a proportional increase in personal income taxes. The assumptions underlying the study were rather restrictive, though not unrealistic. They concluded that investment stimuli were effective but less than a similar partial equilbrium analysis would indicate. They also conclude that as long as savings depend on interest rates or the distribution of income, then changes in Government expenditures, income taxes, or investment subsidies will alter the capital-labor ratio and change consumption and, therefore, saving.

21

Christensen. In a second study, Christensen explored the implications of the various methods of financing foregone revenues by expanding the usual macroeconomic model and carrying the analysis further. This expanded model not only specified the production sector, but incorporated fairly well specified household and Government sectors, which have been vague in the past. The focus of his study is that since saving and investment must be equal, it is important to specify the determination of savings as well as investment. This allows Christensen to specify and analyze household portfolio decisions and the consequent effect of increases in wealth due to the purchase of Government debt on savings, thus, enabling him to investigate the financing effects of investment incentives in a general equilibrium setting. The effectiveness of tax policy in stimulating private investment is found to depend critically on the form of the complete fiscal package. At one extreme--Treasury selling bonds to the household sector--investment incentives have no immediate impact and actually have a lagged effect causing investment to decline. This occurs if the resulting increases in savings is entirely "invested" in Government debt. Consumption increases due to higher wealth, and investment suffers. At the other extreme, investment incentives initially increase private investment dollar for dollar. This occurs if the Government revenue foregone via investment incentives is matched by a concurrent reduction in Government purchase of investment goods from the production sector.

Thus, judging the effectiveness of tax policy requires much more attention to the development of an appropriate macroeconomic context and the consideration of complete fiscal packages than has been evidenced in previous studies. Each of these studies is based on a set of assumptions about the structure of the economy, people's reactions to changing economic incentives, and the formulation of economic and technological constraints that have to be met. These assumptions are realistic though other equally realistic assumptions will change the details of the answers, but the policies discussed give rise to questions of what is the effect of the investment tax credit, under what circumstances is it valid, and what is evidence and nature of that evidence on those circumstances. We have raised questions about what we know and what we should know and about the earlier empirical studies.

22

These Christensen and Taubman/Wales studies suggest that more work needs to be done in identifying and quantifying the linkages between fiscal policy and aggregate supply. Ultimately, of course, they must be incorporated into an overall macroeconomic model.

CHAPTER 4

ALLOCATIONAL AND DISTRIBUTIONAL EFFECTS OF

INVESTMENT TAX CREDIT

In the earlier chapters we noted that a higher rate
of investment is desirable for two reasons: to help sustain
the shortrun economic expansion and to help provide the
new capacity required in the longer run to insure labor
force employment. In this chapter we discuss the investment
tax credits allocational and distributional side effects
and the possible distortion in market behavior. We start
our analysis of the investment tax credits side effects with
a general discussion of the allocation and distribution
functions of a market.

ALLOCATION AND DISTRIBUTION

Economic policy's primary objective is to insure the
full use of scarce resources, otherwise, people would
not be fully satisfied. However, when scarce resources
are used fully, we have the problem of their proper
allocation among competing uses for the satisfaction of
different wants--an increase in the satisfaction of an
alternative want or wants. Another economic policy
objective is the proper distribution among consumers
of the goods and services produced with their aid.

INVESTMENT TAX CREDIT AND MARKET DISTORTIONS

The imposition of a tax or a subsidy on an efficiently
operating market will, in most circumstances, cause market
distortions or less than desirable allocation of resources.
Taxes and subsidies not only create distortions, but they
may be used to offset distortions in a market or an economy.
Some proponents of the investment tax credit argue that it
alleviates distortions in the capital market generated
by the corporate income tax and accelerated depreciation.
In fact, that appears to have been one of the intents of the
Congress in enacting the investment tax credit. The credit
was restricted to equipment purchases because of what was
thought to be favorable tax treatment already accorded to
structures under the rules for accelerated depreciation and
the expensing of interest and taxes incurred during the
construction period. It was further argued that the most
rapid gains in productivity could be achieved by encouraging
investment in new equipment. In addition, there was the
fear that a credit on structures might become a tax loophole

for real estate speculation and the purchase of private residences.

If the investment tax credit has created side effects that have a significant effect on the economy, what are they and are the effects costly? The investment tax credit lowered the price of a piece of capital equipment, thereby increasing the profitability of investment. Many of the side effects are created by the restrictions in its use. Those restrictions, as noted in the introduction, deal with what investments qualify, what amount of the investment that can be deducted which is related to the life of the asset, and when the reduction can be taken. Qualified investments are generally new depreciable assets used in production, excluding structures, with service lives of 3 years or more. The amount of the tax credit claimed in any year may not exceed the company's total tax liability for that year. The maximum credit that may be taken is $25,000 plus 50 percent of the tax liability in excess of $25,000. Also the current year's unusable credits may be deducted against tax liabilities 3 years back and 7 years ahead. This deduction must be on a first-in, first-out basis; the oldest credits must be used first.

Each of the above restrictions in the application of the credit has, in one manner or another, generated economic inefficiencies or inequities, or both. In most cases, not enough information exists to determine just how extensive and how costly such distortions are. However, in the remainder of this chapter, we will discuss each distortion and its probable consequence, presenting such evidence if available.

Substitution of capital for labor. The investment tax credit lowers the price of new productive assets, altering the terms of substitution between labor and capital. Depending on the responsiveness of the demand for new assets to changes in the prices of those assets and to the relative degree of substitution between capital and labor (elasticity of substitution), firms will tend to substitute capital for labor over time. Offsetting this tendency, at least in part, is the increase in demand for labor as the tax credit succeeds in generating new investment and in generating employment in capital goods producing industries. Even if the demand for new assets rises, it is impossible to predict a priori whether the demand for labor will rise or fall due to the investment tax credit. Whether it rises, falls, or remains the

same will depend on business inventory policies and other fiscal and monetary policies that are pursued at the same time. Thus, while the investment tax credit will probably increase the productivity of labor by increasing the capital-labor ratio, it may cause unemployment to fall in the shortrun. If the investment tax credit encourages the purchase and installation of labor-saving machinery and equipment, then the general tendency will be to increase labor's productivity but at the expense of the short-term demand for labor.

Full employment. To the extent that the tax credit depresses the demand for labor, it has the unfortunate effect of making it more difficult for policymakers to approach their full employment goal. In principle, of course, other fiscal and monetary instruments are available to promote full employment; but, for a multitude of reasons, we may be unwilling to use them for fear of sacrificing other goals that are considered to be more important (i.e., price stability).

Reallocation effects among firms. The investment tax credit is limited in amount to 50 percent of a taxpayer's income tax liability. Accordingly, despite generous carryback and carryforward provisions, the credit is of less value to some classes of firms than others and, therefore, has reallocation effects among them.

For example, firms that are growing rapidly and investing heavily in new assets relative to their current income may be unable to claim a full credit against their current tax liability. And even if they can carry the unused credit forward, the delay is to slightly discourage investment in such firms vis-a-vis investment in older, established firms.

Furthermore, even firms that are stable or growing slowly but highly capital intensive may be unable to take full advantage of the credit. If so, the investment tax credit lowers the price of capital to these firms less than it lowers the price of capital to less intensive firms.

In the case of both kinds of firms, techniques are available for "selling" the credit to other who can use it by engaging in leaseback transactions (e.g., mergers). Still, these sales normally require the credit to be

26

shared, and so reduce its value to the investing firms. The President's proposed changes regarding the investment tax credit are directed toward reducing this bias.

Bias against short-lived and long-lived assets. Many economists believe that the investment tax credit discriminates against short-lived assets (those with service lives of fewer than 3 years) and against long-lived assets (those with service lives of more than 7 years). Though there may be some justification for denying the credit to inventory assets, there are many other types of productive short-lived assets which could, on efficiency grounds, benefit from the tax credit.

Furthermore, it is often stated that the flat 10-percent rate applied to all assets with lives of 7 years or more results in a progressively smaller increase in the rate of return on these longer lived productive assets. Thus, the implied rate of return falls the longer the service life of the asset.

If this bias exists it could be overcome using a variable rate of return with a larger credit applied to longer lived assets. Then those industries, such as primary processing industries, that traditionally invest in very long-lived assets would benefit. Such industries are critical to the economy's long-term growth potential.

Inclusion of tax credit in depreciable base

Under IRS rules the depreciable base of an asset is the price paid for that asset--not excluding the tax credit. Thus, a writeoff is allowed for an expense not incurred. The effective rate of the tax credit is greater than the statutory rate--the shorter the asset's life, the larger the increase. This accentuates any existing bias against longer lived assets. If the Congress wishes to give firms the same benefits, a more appropriate procedure would be to adjust the depreciable tax base or change the size of the credit.

EQUITY CONSIDERATIONS

Perhaps it would be worthwhile pointing out that the reallocation aims of the investment tax credit are to some extent inconsistent with widely accepted norms concerning the proper distribution of tax burdens. The degree of inconsistency may depend on how well the credit succeeds

in accomplishing those a ns--the chief one being to
stimulate investment. The credit decreases the taxes paid
by the recipient of income from capital in proportion to
their rate of investment in new productive assets. Some
analysts may decide that this feature offends against
two equity criteria.

Equal treatment of persons equally circumstanced.
There is a body of opinion that holds that one's rate of
new investment should not affect the size of one's current
tax burden. The answer that this objection invites,
however, is that the Congress (or the community) has
decided that one's rate of investment is a relevant
circumstance in determining whether two persons are equally
circumstanced for purposes of determining their tax
liability. Whether we like it or not, we are obliged
to abide by that decision.

Progressive distribution of tax burdens. Because
income from capital is highly concentrated in upper income
brackets, the benefits from the investment tax credit--the
reduction in tax--presumably have the effect of making the
income tax less progressive. The Congress may attempt to
offset the reduction in progressivity by increasing tax
rates in higher brackets. However, since the bulk of
all income that is subject to tax in those brackets is
income from capital, a substantial increase in tax rates
would probably undo most of the incentive effect of the
investment tax credit.

To the extent that the credit succeeds in stimulating
new investment, rates of return on capital should fall and
the adverse equity effects will be mitigated. On the
other hand, if the credit promotes the displacement of
labor by capital, returns to labor may decline as if a tax
had been imposed on labor income--a regressive tax at
that.

The only other equity issues have to do with the 50-
percent limitation on the credit, together with the operation
of the carryback and carryforward provision, and the
graduation of the credit by the length of life of the
qualifying asset. If the 50-percent limitation denies
credits to persons who are otherwise fully entitled to
receive them and those persons cannot realize them in another
way (as by carrying them back to previous years or by
"selling" them on favorable terms to others), the denial
may be deemed to be inequitable. And the reduction of the

credit on short-lived assets may be too arbitrary to pass
muster as a definable feature of a just tax system.

Composition of investment by sector. The investment
tax credit is not available for the purchase of all
productive assets but only for those assets that meet the
tests in the Internal Revenue Code. However, most classes
of productive assets are eligible for the tax credit. The
principal exclusion is of buildings and structural
components, presumably because these are eligible for more
rapid depreciation than other investment property and it
was thought to be unnecessary, or perhaps unfair, to
grant them the tax credit as well. To the extent that
the advantage of accelerated depreciation does not offset
the loss of the credit, however, the investment tax credit
does tend t promote some substitution of investment
in eligible machinery and equipment for investment in
buildings and structural components.

Purchases of used productive assets are also
discouraged by the $100,000 limitation on the value of
used assets on which a credit may be claimed in any year.

CHAPTER 5

SUMMARY AND CONCLUSIONS

The road from the implementation of the investment
tax credit, through investment spending, to its effect
on output, employment, and ultimately economic stability
and growth, is uncertain. The timing and magnitude of
the tax credit's effect on stability and growth are
highly variable. There is a diversity of relationships
that must be accounted for in determining when, to be
most effective, the tax credit should be implemented.
These uncertainties present difficulties not only to
the policymaker but to the economist attempting to evaluate
the effectiveness of the investment credit as a policy
instrument. In this paper we critically assess the most
important studies that have analyzed the investment tax
credit's short-term and long-term economic effects, point
out the weaknesses in the analyses, and suggest the
direction of future work.

At the time of enactment, most proponents of the
investment tax credit thought that such a program would
increase investment in the U.S. economy. The subsequent
experience with the investment tax credit raises questions
about this expectation. From 1950 to 1961 gross private
domestic investment had an average relationship to GNP
of 15.3 percent. The corresponding average from 1962
to 1967 was 15.0 percent.

How can this apparent failure of the incentives to
actually stimulate investment be explained? A partial
answer is contained in the fact that, for the national
economy, total savings must equal total investment. That
is, in national income accounting terms, gross private
domestic investment plus net foreign investment must
equal gross private savings plus the Government surplus.
However, the implementation of tax credit entailed a
reduction in the revenues the Government might expect
from a given level of GNP, and at the same time, a
corresponding rise in private disposable income. But
some increments to disposable income are not necessarily
saved. It is possible that the net effect of the investment
tax credit stimuli is a reduction in total savings (private
plus Government) as a fraction of GNP.

Once the issue of the savings rate is brought into
the picture, it becomes obvious that those who expected
the tax stimuli to substantially increase overall investment

(and, therefore, saving) in relation to GNP would likely be disappointed. The ultimate effect of the savings constraint was to shift the composition of total investment. A change occurred in residential construction where it moved from an average 4.8 percent of GNP in the 1955-61 period to 3.9 percent in the 1962-67 period. Counterbalancing this, other private domestic nonresidential investment (primarily plant and equipment spending) rose from 9.8 percent of GNP in the earlier period to 10.2 percent in the late period. Both plant and equipment investments were, of course, the principal beneficiaries of the accelerated depreciation and investment tax credit.

It seems apparent, then, that taxing some sources of income at rates lower than others serves largely to divert investment into areas where the tax rates are lower. This tax treatment affects total investment spending only on the basis that insofar as it reduces the overall rate of taxation and increases the relative return from savings.

FINDINGS

Based on our review of past studies, we found that:

--The significant response of investment expenditures to tax credit changes occurs over a period of from 2 to 4 years; thus, the effectiveness of the credit for short-term stabilization should be interpreted with substantial caution.

--A further reason for interpreting the results with caution is the restrictive nature of some of the assumptions and the conceptual limitation of the methodology.

--A large portion of the tax credit goes to reward investment that would have been otherwise under- taken. For example, a company may increase investment outlays by 5 percent over what would have occurred without the credit, but it receives the benefit of the tax credit on the total amount it invests.

--The major role of the tax credit lies in helping to generate long-term economic growth.

These studies also indicate that the investment tax credit:

--Encourages replacement investment which, in turn, generates economic growth to the extent that new equipment is more productive than old equipment.

--Changes the composition of investment expenditures in favor of machinery and equipment. (Economic growth is enhanced to the extent that machinery and equipment are more productive than investment in other forms of capital. However, to the extent that other forms of capital are more productive, economic growth would be diminished by the investment tax credit.) The administration's proposal does extend the investment tax credit to structures.

The investment tax credit may distort normal market forces. Our study indicates that:

--The investment tax credit leads to the more intensive use of capital at the expense of labor. (This, of course, is the idea behind capital investment's raising of labor productivity, thus, enhancing economic growth, but it should be noted that the tax credit may not be as beneficial for employment in the shortrun.)

--A flat rate (currently 10 percent) applied to all assets with lives of 7 years or more lead to smaller rates of return for assets with longer service lives. (This rule tends to disadvantage primary processing industries, for example, that invest in long-lived assets and whose economic prospects are critical to the economy's long-term growth potential.)

--As currently structured, the tax credit is not excluded from the depreciable base of an asset so that a writeoff is allowed for an expense not incurred. The asset is depreciated for tax purposes from the original fine, not the price adjusted for the tax credit. The procedure raises the effective rate of the tax credit above the statutory level.

--The credit tends to bypass those businesses which do not require a large capital investment

since the credit offsets taxes. The benefits are reduced or eliminated for businesses that lack profits or that are operating at a loss. This tends to place new or marginal business at a competitive disadvantage. (The administration's proposal raises the limit from 50 percent to 90 percent, which will go a long way toward alleviating many of these problems for those making more than $25,000 profit.)

Two recent relatively unknown and somewhat tentative studies explored the implications of the method of financing the investment tax credit. These two longrun, full employment models suggest that the method of financing the tax credit may lead to changes in capital costs, in distribution of wealth, and in consumer behavior. Total investment may actually decline if the Treasury sells bonds to households to finance the credit. If the credit is financed by a reduction in Government expenditures, investment may rise by the full value of the tax incentive to business.

These studies suggest that:

--The method of financing the investment tax credit may be important in determining the potential effectiveness of the tax credit in stimulating business investment spending.

--The potential effectiveness of the credit is critically dependent on the form of the complete fiscal package.

MATTERS FOR CONSIDERATION BY THE CONGRESS

We have reservations about the ability of the investment tax credit to promote short-term economic stability. For this reason, we believe that the Congress should consider the investment tax credit primarily as a tool to promote capital formation and economic growth. To improve its effectiveness in achieving these longer term goals, the Congress should consider the following possible changes:

--Applying the investment tax credit to other types of investment such as structures and workforce training. (While the administration proposes extending the tax credit to structures the Congress may wish to consider other forms of investment.)

--Making the investment tax credit available to those
  firms that are currently making small profits but
  are growing rapidly. This would enlargen the base
  to which the credit is applied and, therefore, aid
  those industries more likely to invest in machinery
  and equipment. (The administration's proposal to
  increase the tax credit limit from .0 to 90 percent
  goes part of the way, but the Congress may wish to
  make the credit refundable.)

OPERATION OF THE INVESTMENT TAX CREDIT (note a)

Qualified investment property

In general the investment tax credit is available only on property that, with certain exceptions, includes depreciable or amortizable property having a useful life of 3 years or more and includes:

1. Tangible personal property.

2. Other tangible property (not including a building or its components) used as an integral part of (a) manufacturing, (b) extraction, (c) production, or (d) furnishing transportation, communications, electrical energy, gas, water or sewage disposal services.

3. Elevators and escalators.

4. Research facilities or bulk storage facilities for tangible commodities (including liquids and gases) used in connection with the activities (2)(a)-(d) Code sec. 48(a)(1).

Application of credit

A credit against the Federal income tax is allowed in general for 10 percent of the qualified investment in the above property acquired and placed in service or constructed during the period beginning January 22, 1975, and ended December 31, 1980. An 11-percent rate may be used for property qualifying for the 10-percent rate if the extra 1 percent is contributed to an employee stock ownership plan. An extra 0.5 percent is also available beginning in 1977 and continuing through 1980 if there are contributions by employees matching the 0.5 percent.

The credit is allowed for the year the property is placed in service. The liability for tax against which the credit may be applied is the income tax as reduced by the foreign tax credit and the credit for the elderly.

---

a/1978 U.S. Master Tax Guide, pp. 445-449.

Amount of credit. The investment tax credit may not exceed tax liability. If tax liability exceeds $25,000, the tax credit may not exceed $25,000 plus 50 percent of the tax liability over the amount. For example, a corporation's tax liability is $40,000. Its qualified investment for 1976 is $500,000. Ten percent of the qualified investment is $50,000. The credit, however, is limited to $32,500 ($25,000 plus 50 percent of $15,000, the tax liability over $25,000).

Unused credits. Any part of the investment credit which is not applied as a credit against the tax because of the above limitations may be carried back 3 years and forward 7 years.

ALTERNATIVE THEORIES OF INVESTMENT BEHAVIOR

As noted in chapter 2, effective policies to influence
fixed investment can only be designed if the factors
influencing business investment decisions can be identified
and their strengths measured. This requires a theory
of the demand for capital goods. But it is only in the
past decade or so that empirical investigators have
been able to obtain even barely reasonable empirical
explanations of investment demand.

These theories of investment behavior start with the
knowledge that since the demand for a finite addition to
a firm's capital stock can lead to any rate of investment
expenditure, then the rate of investment will depend
on the behavioral relationship that exists regarding
the speed of adjustment of the capital stock to a newer
and higher level. That is, if the desired capital stock
is different from the actual capital stock, then the
shortage will be eliminated, but the theory does not
tell us at what rate per unit of time this shortage will
be removed.

Therefore, a convenient framework for analyzing and
discussing the problem of investment demand is to specify
a two-stage process:

1. What determines the desired stock of capital?

2. How does the firm or economy adjust from its
    actual capital stock to the desired capital
    stock?

That is, in developing a theory of investment behavior the
investigator should ask: What elements enter the firm's
decision to add to or replace plant and equipment? And,
once the decision to expand or replace the firm's capital
stock has been made, how long will it take for the decision
to be implemented and the capital put in place and producing
goods and services? Therefore, for the interested reader,
a more detailed discussion of the four basic theories or
explanations of investment behavior follow.

Neoclassical theory of investment behavior (note a)

In the neoclassical theory of investment behavior the rental price of capital services determines the desired stock of capital. The rental price of capital or the cost of capital is given by the expression:

$$C = q(r + d) - \dot{q}$$

Where C is the rental price of capital services, r is the rate of interest or the rate of return on capital assets; d is the depreciation rate; q is the average price of capital, and $\dot{q}$ the rate of change of that price index.

This formulation allows the influence of tax incentives to be easily incorporated into the price of capital services.

$$C = q \left[r(1-u) + d \right] \left(\frac{1-k-u^z}{1-u} \right)$$

Assuming static price expectations so that $\dot{q}$ equals zero: Where u is the rate imposed on business profits by a proportional income tax, k the investment tax credit, and z the present value of the depreciation deduction.

Jorgenson uses a Cobb-Douglas production function showing that for a profit maximizing firm imbedded in a competitive industry the desired stock of capital, K*, will be related to the level of output and the price of that output relative to the rental price of capital. That is:

$$K = a\left(\frac{p}{c}\right)Q$$

Where the price of output is p, the quantity of output is Q, and the elasticity with respect to capital is a. The time between the recognition of the need for new equipment and the increased output due to that equipment is related

----

a This section of appendix II relies heavily on the discussion in George F. Break's "The Incidence and Economic Effects of Taxation," in Allen S. Blinder's, et al, "The Economics of Public Finance," Brookings Institution: Wash., D.C., 1974 pp. 205-207.

to the amount of time the firm takes to plan the investment
project, secure the necessary funds, let the contracts
and place the orders, and make the expenditures for the
desired new equipment.

Thus, new investment is taken to be a distributed lag
function of past changes in the desired stock of capital.
Replacement investment is assumed to be proportional to the
capital stock. The investment equation in the basic model
is:

$$I_t = \sum_{s=o}^{\infty} W_s \, \Delta K^*_{t-s} + dk_t$$

Where I_t is gross investment in period t; W_s is the
proportion of the change in desired capital in period
t-s that results in investment expenditures in period
t; K^*_{t-s} is the change in desired capital in period t-s;
and dk_t replacement investment in period t.

Empirical estimation of the effects on gross investment
of such tax policies, as accelerated depreciation and
investment credits, turn out to be substantial. To the
fiscal policymaker searching for effective ways of
influencing the behavior of the economy, such findings
are extremely attractive. However, the usefulness of
the neoclassical theory to determine what policy and
how much of that policy to use is subject to important
qualifications.

--Replacement investment is not analyzed in
  economic terms but is assumed to be
  proportional to the capital stock.

--Investment for expansion is dealt with in
  a partial rather than a general equilibrium
  framework.

--The cost of capital is determined by the
  net-of-the-tax rate of interest rather than the
  more desirable gross-of-tax rate. (This
  considerably restricts the applicability of the
  model.)

--The elasticity of substitution between
  labor and capital is not estimated in the
  model but is simply assumed, on the basis
  of independent studies, to be equal to

unity. (This assigns a rather high value
to the price elasticity of demand for capital.)

Output and sales theories

A second set of theories of investment behavior are
those theories that put primary emphasis on output or sales.
These theories stress in laid on demand as represented
by output or sales where the role of the rate of interest
is deemphasized. An important feature of most of these
theories is their incorporation of various expectations
theories for sales or output.

The accelerator is the oldest and simplest of these
theories whose underlying assumptions are that the desired
capital stock is a constant proportion of output:

$$K_t = VY_t$$

Where K_t is the optimal capital stock, Y_t is current output
and V is a positive constant capital to output ratio.
Thus, if output increases, capital stock will increase
in a fixed relationship. This may be extended as follows:

$$K_t^* - K_{t-1}^* = V(Y_t - Y_{t-1})$$

If we also assume that the adjustment of desired to actual
capital stock is complete each period, then

$$I_t = K_t - K_{t-1} = V(Y_t - Y_{t-1})$$

Where I is net investment.

We have noted before that investment is a dynamic
phenomenon. The assumption that investment is proportional
to the change in output requires a further assumption that
capital is optimally adjusted in each period. This means
that the supply of capital goods is perfectly elastic so
that adjustment is possible without lags. But this is too
simplistic. The more reasonable version of the accelerator
theory is the flexible accelerator.

Flexible accelerator

The flexible accelerator is based on the assumption
that there is some optimal relation between capital stock

and output, but that there are lags in the adjustment process. An increase in demand will cause the firm to first run down its stocks of inventories or increase its backlog of unfilled orders. The firm increases its output by a more intensive usage of its capital and labor. If the firm was originally producing at its lowest cost level of output, the new usage rate would imply higher (marginal) costs. The firm may wait and see whether the increase in demand is permanent before it decides to increase its capital and labor. Thus, there may be a lag in the response of the firm because of the uncertainty about how long the increase in demand will last. If the increase in demand is large, remaining at the new level for sometime, the firm would respond by increasing its demand for capital stock. Let us call this the "decisionmaking lag." Even after this there may be administrative lags in ordering the capital. There might also be lags because the firm also has to raise finance for buying the capital, assuming that there is not a perfect capital market. Finally, there would be a lag between the ordering of capital and its delivery. This delivery lag would depend on the elasticity of supply of the capital goods industry.

Decision Lag____Capital Lag____Delivery Lag____Investment

Note that there is no demand for investment. There is a demand for capital stock, but realized investment is determined by the delivery lags. If we assume that different firms have different decision and delivery lags, then, in aggregate, the effect of an increase in demand on capital stock is distributed overtime.

Profit and liquidity theories

The profits theory of investment postulates that the optimal capital stock is some function of the level of profits. Klein, for example, obtains an investment function which depends on the level of profits by assuming that entrepreneurs get satisfaction from the size of their establishment. An alternative version is that the optimal capital stock is some function of expected profits. Expected profits, in turn, are some function of actual profits in the past. Thus:

So that:

$$K = f(\Pi_{t=1})$$

Empirically, this is indistinguishable from accelerator theories since we would expect profits to be some function of the level of output or sales.

$$\Pi_t = g(Y_t)$$

So that:

$$K_t = f(g(Y_{t-1})$$

A third variant of the profits theory assumes that financial markets (i.e., the market for funds) are imperfect and, therefore, that it is cheaper to use internally generated funds than to borrow funds. When profits are higher, the cost of capital is lower and the optimal capital stock is larger. These two versions of the profit theory cannot be separated.

Fact Sheet 31

January 21, 1978

FACT SHEET

The Investment Credit

**The President's
Proposal:**

The temporary 10 percent investment credit will be made permanent.

The investment credit will be extended to new industrial buildings and to investments made to rehabilitate existing industrial buildings. Generally only manufacturing and utility buildings will be eligible for the credit. Industrial structures placed in service after December 31, 1977 will be eligible for the credit to the extent of construction costs incurred after that date. Expenditures made after December 31, 1977 to rehabilitate existing industrial structures will be eligible for the credit.

Investment credits will be allowed to offset 90 percent of tax liability in any year. They will not be permitted to offset a taxpayer's complete tax liability.

The full 10 percent investment credit will be extended to pollution control equipment that now qualifies for the special 5-year amortization.

Present Law:

The 10 percent rate of the investment credit is scheduled to revert to 7 (4 for utilities) percent on January 1, 1981.

The investment credit is available for investment in business machinery and equipment but not for investment in buildings or their structural components.

Investment credits may be used to offset all of the first $25,000 of tax liability, but no more than 50 percent of the remainder.

43

- 2 -

Certain qualified pollution control
equipment is now eligible for a maximum
investment credit of only 5 percent if
the taxpayer elects to amortize the cost
of this equipment over a 5-year period.

Reasons for the
Recommendation:

Together with the recommended 4 point
reduction in the corporate tax rate, the
proposed liberalization of the investment
credit will help stimulate increased
levels of business investment.

A particularly weak aspect of the
current economic recovery is the low
rate of business investment in long-
lived structures. The investment
stimulus provided by the credit should,
therefore, be extended to investments in
industrial structures.

Increased investment is also needed to
improve the capacity of the economy to
supply goods and services and to insure
that future growth is not aborted by
capacity shortages.

The declining rate of business invest-
ment is related to a slowdown in the
growth of productivity. Increased
capital formation can help accelerate
the growth of productivity, maintain and
improve American competitiveness in
world markets, and facilitate the
introduction of new technology.

A permanent credit is necessary to
assist businesses in making long-range
capital investment decisions and to
stimulate capital formation.

Extending the investment credit to
industrial structures will encourage
businesses to carry out more balanced
investment programs. Also, under
present law, there are many disputes now

- 3 -

caused by the need to distinguish
between equipment, for which the credit
is available, and buildings and their
structural components, for which it is
not.

New businesses and businesses facing
temporary setbacks or the need to make
major adjustments to economic changes
cannot fully use the investment credit
because of the 50 percent limit on
offseting current tax liability.

**Effect on
Taxpayers:**

The proposal will reduce the overall
tax burden on business.

Increasing the percentage of tax liability
that can be offset by investment credits
to 90 percent will aid companies with
large investment needs and relatively
low taxable incomes.

Taxpayers with tax liabilities of less
than $25,000 will no longer be able to
use investment credits to offset their
entire tax liability.

The increased investment credit for
certain pollution control equipment will
reduce the costs of compliance with
environmental standards in the case of
existing plants, many of which were
constructed when pollution control
standards were less stringent.

Effect on Revenue:

These proposals will reduce tax liabilities
approximately $2.4 billion in calendar
year 1979, the first full year of the
proposed changes.

By 1983, it is estimated that the
proposed changes will reduce tax lia-
bilities $7.2 billion, of which $4.5
billion is attributable to permanent
extension of the 10 percent credit.

o0o

BIBLIOGRAPY

Primary sources

Aaron, Henry, Frank S. Russek, Jr., and Neil M. Singer, "Tax
    Reform and the Composition of Investment," National
    Tax Journal, Vol. 25 (March 1972), pp. 1-13.

Bischoff, Charles W., "The Effect of Alternative Lag
    Distributions," in Gary Fromm (Ed.), Tax Incentives
    and Capital Spending (Wash., D.C.: 1971), pp. 61-130.

Bischoff, Charles W., "Business Investment in the 1970's: A
    Comparison of Models," Brookings Papers on Economic
    Activity (Jan. 1971), pp. 51-54.

Break, George F., "The Incidence and Economic Effects of
    Taxation," The Economics of Public Finance (Wash., D.C.:
    Brookings Institution, 1974), pp. 203-221.

Christensen, Laurib R., "Tax Policy and Investment
    Expenditures in a Model of General Equilibrium,"
    American Economic Review, Vol. 60 (May 1970),
    pp. 18-22.

Coen, Robert M., "Tax Policy and Investment Behavior:
    Comment," American Economic Review, Vol. 59 (June
    1969), pp. 370-379.

Coen, Robert M., "The Effect of Cash Flow on the Speed
    of Adjustment," in Gary Fromm (Ed.), Tax Incentives
    and Capital Spending (Wash., D.C.: 1971), pp.
    131-196.

Eckstein, Otto, "Discussion," American Economic Review,
    Vol. 52 (May 1962), pp. 351-352.

Eisner, Robert, "Tax Policy and Investment Behavior:
    Comment," American Economic Review, Vol. 59 (June
    1969), pp. 379-388.

Eisner, Robert, "Components of Capital Expenditures:
    Replacement and Modernization versus Expansion,"
    Review of Economics and Statistics, Vol. 54 (Aug. 1972),
    pp. 297-305.

Feldstein, Martin S., and David K. Foot, "The Other Half of Gross Investment: Replacement and Modernization Expenditures," Review of Economics and Statistics, Vol. 53 (Feb. 1971), pp. 49-58.

Fisher, Franklin M., "Discussion" in Gary Fromm (Ed.) Tax Incentives and Capital Spending (Wash., D.C.: 1971), pp. 243-255.

Gordon, Roger and Dale W. Jorgenson, "Investment Incentives in the 1971 Tax Bill," Business Economics, Vol. 7 (May 1972), pp. 7-13.

Hall, Robert E., and Dale W. Jorgenson, "Tax Policy and Investment Behavior," American Economic Review, Vol. 57 (June 1967) pp. 391-414.

Hall, Robert E., and Dale W. Jorgenson, "Tax Policy and Investment Behavior: Reply and Further Results," American Economic Review, Vol. 59 (June 1969), pp. 388-401.

Hall, Robert E., and Dale W. Jorgenson, "Application of the Theory of Optimal Capital Accumulation," in Gary Fromm (Ed.) Tax Incentives and Capital Spending (Wash., D.C.: The Brookings Insitution, 1971) pp. 9-60.

Harberger, Arnold C., "Discussion: in Gary Fromm (Ed.) Tax Incentives and Capital Spending (Wash., D.C.: 1971) pp. 256-269.

Jorgenson, Dale W., Jerald Hunter and M. Ishaq Nadiri, "A Comparison of Alternative Econometric Models of Quarterly Investment Behavior," Econometricia, Vol. 28 (Mar. 1970), pp. 189-212.

Jorgenson, Dale W., "Economic Impact of Investment Incentives," in Long-Term Implications of Current Tax and Spending Proposals, Joint Economic Committee, 92d Cong., 1st Sess. (1971), pp. 176-92.

Klein, Lawrence R., and Paul Taubman, "Estimating Effects Within A Complete Econometric Model," in Gary Fromm (Ed.), Tax Incentives and Capital Spending (Wash., D.C.: 1971), pp. 197-242.

Tauhman, Paul, and Terence J. Wales, "Impact of Investment
    Subsidies in a Neoclassical Growth Model," Review
    of Economics and Statistics, Vol. 51 (Aug. 1969),
    pp. 287-297.

Background

Branson, William H., "Macroeconomic Theory and Policy"
    (New York: Harper and Row, 1972), chapter II,
    pp. 198-226.

Due, John F., and Ann F. Friedlaender, "Government Finance"
    (6th Ed.) (Homewood, Ill.: Richard D. Irwin, 1977),

Jorgenson, Dale W., "Econometric Studies of Investment
    Behavior: A Survey," Journal of Economic Literature,
    Vol. 9 (Dec. 1971), pp. 1111-1147.

Junankar, P.N., "Investment: Theories and Evidence" (London,
    U.K.: MacMillan, 1972).

Musgrave, Richard A., and Peggy B. Plusgrave, "Public
    Finance in Theory," Public Finance in Theory and Practice,
    2nd Ed. (New York, N.Y.; McGraw-Hill, 1976).

Pechman, Joseph A., Federal Tax Policy, (3rd Ed.) (Wash.,
    D.C.: Brookings Institution, 1977), pp. 136-162.

The Argument is Joined

Bischoff, Charles W., "Hypothesis Testing and the Demand
    for Capital Goods," Vol. 51 (Aug. 1969), pp. 354-368.

Coen, Robert M., "The Effects of Tax Policy on Investment
    in Manufacturing," American Economic Review, Vol. 58
    (May 1968) pp. 200-211.

Eisner, Robert, and Nidiri M. Ishaqu, "Investment Behavior
    and Neoclassical Theory," Review of Economics and
    Statistics, Vol. 50 (Aug. 1968), pp. 369-82.

Jorgenson, Dale W., "Anticipations and Investment Behavior,"
    in James S. Duesenberry and others (Eds.), The
    Brookings Quarterly Economic Model of the United States
    (Chicago, Ill.: Rand-McNally, 1965), pp. 35-92.

Jorgenson, Dale W., "The Theory of Investment Behavior,"
    in Robert Ferver (Ed.), Determinants of Investment
    Behavior, A Conference of the Universities-National
    Bureau Committee for Economic Research (New York,
    N.Y.: Columbia University Press, 1967), pp. 129-155.

Jorgenson, Dale W., and James A. Stephenson, "The Time
    Structure of Investment Behavior in U.S. Manufac-
    turing, 1947-1960, Review of Economics and Statistics,
    Vol. 49 (Feb. 1967), pp. 16-27.

Jorgenson, Dale W. and James A. Stephenson, "Issues in the
    Development of the Neoclassical Theory of Investment
    Behavior," Review of Economics and Statistics, Vol. 51
    (Aug. 1969), pp. 346-353.

Of Historical Interest

Anderson, W.H. Locke, "Corporate Finance and Fixed
    Investment: An Econometric Study" (Cambridge, Mass:
    Harvard University: Graduate School of Business
    Administration, Division of Research, 1964).

Meyer, John R., and Edwin Kuh, The Investment Decision
    (Cambridge, Mass.: Harvard University Press, 1957).

Meyer, John R., and Robert R. Glauber, "Investment
    Decisions, Economic Forecasting, and Public Policy"
    (Cambridge, Mass.: Harvard University Graduate School
    of Business, Division of Research, 1964).