

THE INVESTMENT TAX CREDIT, ONCE MORE

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In the hearings on the Revenue Act of 1971,¹ Secretary Connally testified that it was necessary to subsidize capital in order to help reduce existing unemployment, improve the balance of payments, and increase capital formation in the long run.² Both the House Ways and Means Committee and the Senate Finance Committee echoed Secretary Connally's testimony, stating that the Revenue Act of 1971 had five major aims: (1) to put the lagging economy on a high growth path; (2) to increase the number of jobs and diminish high unemployment; (3) to relieve the hardship imposed by inflation; (4) to set up a rational system of tax incentives to aid in the modernization of our production facilities; and (5) to increase our exports and improve our balance of payments.³

The two major investment subsidy programs contained in the Revenue Act of 1971 are the investment tax credit, officially called the Job Development Credit, and the Asset Depreciation Range System (ADR), which accelerates depreciation deductions. Without attempting to decide whether, from a policy standpoint, the tax system is the proper mechanism to stimulate investment in capital goods, this article will examine the effectiveness of the investment tax credit in furthering the goals outlined by Secretary Connally and Congress. More specifically, the article will begin with a brief examination of the history of the investment tax credit and the provisions of the Revenue Act of 1971 pertaining to the credit. An economic analysis of the various factors influencing investment will be offered. The operation of the investment tax credit will be explained in light of these factors. Finally, the effects of the investment tax credit provisions of the Revenue Act of 1971 on stabilization, unemployment, the balance of payments and long-run capital formation will be analyzed.⁴

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¹ Act of Dec. 10, 1971, Pub. L. No. 92-178, 85 Stat. 497.

² Hearings on the Revenue Act of 1971 Before the Senate Comm. on Finance 92d Cong., 1st Sess. 6-7, 10-13 (1971). The Act itself states that its purpose is "to provide an incentive to modernization and growth of private industry." Act of Dec. 10, 1971, Pub. L. No. 92-178, 85 Stat. 497.

³ House Comm. on Ways and Means, The Revenue Act of 1971, H.R. Rep. No. 92-533, 92d Cong., 1st Sess. 1. Senate Comm. on Finance, The Revenue Act of 1971, S. Rep. No. 92-437, 92d Cong., 1st Sess. 1.

⁴ For a corresponding analysis of the Asset Depreciation Range System, see Taubman, The Case Against ADR, 27 J. of Finance 511 (1972); Comment, The Asset Depreciation Range (ADR) System: Inequity in the Revenue Act of 1971, 13 B.C. Ind. & Com. L. Rev. 870 (1972).

I. HISTORY

The investment tax credit was first suggested in late 1961⁵ for the purpose of increasing economic growth. Since then, the profile of this investment subsidy has been subject to a number of cyclical changes in policy. The credit was enacted in 1962,⁶ although it was so modified from the version proposed by the administration that its intended impact on stabilization was attenuated.⁷ It was felt that a tax subsidy would encourage domestic investment in capital goods and thereby allow American producers to compete favorably with their European counterparts who had the advantage of lower labor costs. The ultimate result would be increased capital formation and a favorable balance of payments.⁸

In 1964 the credit was significantly liberalized by the revocation of the Long Amendment.⁹ Subsequently the credit was suspended for goods ordered from October 1966 through December 1967,¹⁰ but this suspension was lifted early in 1967.¹¹ The credit was then abolished in April of 1969,¹² only to be reenacted in a more liberalized version in the Revenue Act of 1971.¹³

II. THE INVESTMENT TAX CREDIT PROVISIONS

Much of the debate concerning the propriety and utility of various accelerated depreciation schemes has been clouded by the secondary issue of whether the deferral of taxes constitutes a subsidy. However, no such confusion exists concerning the investment tax credit because it permits an immediate reduction in corporate income tax liability with no offsetting increase in future taxes. The 1971 investment tax credit permits a firm to claim, as a credit against its federal income tax liability, a fixed percentage of the cost of "qualified investment" purchased in that tax year.¹⁴ There is no increase in future taxes be-

⁵ See 1966 Economic Report of the President ch. 5.

⁶ Act of Oct. 16, 1962, Pub. L. No. 87-834, § 2, 76 Stat. 960.

⁷ Initially it was proposed that the credit apply only to qualified investment in excess of some "normal" amount. Senate Comm. on Finance, Revenue Act of 1962, S. Rep. No. 1881, 87th Cong., 2d Sess. 16-17 (1962). For discussion of the credit as enacted, see text at notes 14-27 *infra*.

⁸ *Id.* at 10.

⁹ Act of Feb. 26, 1964, Pub. L. No. 88-272, tit. II, § 203, 78 Stat. 33. See also text at note 15 *infra*.

¹⁰ Act of Nov. 8, 1966, Pub. L. No. 89-800, 80 Stat. 1514.

¹¹ Act of Dec. 27, 1967, Pub. L. No. 90-225, § 2, 81 Stat. 731.

¹² Act of Dec. 30, 1969, Pub. L. No. 91-172, tit. VII, § 703, 83 Stat. 666.

¹³ Act of Dec. 10, 1971, Pub. L. No. 92-178, tit. I, § 101, 85 Stat. 497.

¹⁴ Int. Rev. Code of 1954, §§ 46(a), 48(a) permit a credit equal to 7% of the taxpayer's qualified investment in depreciable property having a useful life of 3 years or more. The useful life of the property is a measure of the amount of the credit: one-third of the cost qualifies for the credit if the useful life is between 3 and 5 years; two-thirds of the

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cause, unlike a deduction for depreciation, the credit does not decrease the tax basis of the depreciable property.¹⁵ Qualified investment property includes machinery and equipment¹⁶ used predominantly in the United States¹⁷ and cattle.¹⁸ Originally the credit did not apply to most investment produced abroad and used in the United States.¹⁹ However, this "buy American" provision was of interim effect only; its demise was triggered by the 1971 Smithsonian agreement on exchange rate revaluations.²⁰

The normal credit rate is 7% for all nonregulated industries²¹ and 4% for regulated utilities;²² but a utility is precluded from claiming the credit if the ratemaking body uses the credit to lower either the cost of service to the utility or the base to which the utility's rate of return is applied.²³ The annual credit that can be claimed is limited to \$25,000 plus one-half of the business's federal tax liability in excess of \$25,000.²⁴

The credit, then, is available for certain types of investment goods and, in principle, only to firms paying income tax. However, it is possible for railroad companies and other firms that would incur no federal tax liability—due to loss carryovers, for example—to obtain the tax advantages provided by the credit by leasing equipment from other taxpayers.²⁵ The profitability of such arrangements, which have

cost qualifies for the credit if the useful life is between 5 and 7 years; and the full cost qualifies if the useful life is 7 years or more. Int. Rev. Code of 1954, § 46(c)(2). The useful life can be the one elected under the ADR provisions in the Code. Given the large increase in the credit rate at the third, fifth and seventh years, some taxpayers may actually elect longer useful lives. For a detailed explanation of the Investment Tax Credit, see 1 S. Surrey, W. Warren, P. McDaniel & H. Ault, *Federal Income Taxation* 452-56 (1972).

¹⁵ Act of Feb. 26, 1964, Pub. L. No. 88-272, § 203(a)(1), 78 Stat. 19, repealing § 48(g) of the Act of Oct. 16, 1962, Pub. L. No. 87-834, 76 Stat. 960 (commonly known as the Long Amendment), which had provided for a basis reduction equal to 7% of the qualified investment. The present investment tax credit has no provisions for the adjustment of basis, but Congress is still considering such an adjustment. Senate Comm. on Finance, *The Revenue Act of 1971*, S. Rep. No. 92-437, 92d Cong., 1st Sess. 45 (1971).

¹⁶ Int. Rev. Code of 1954, § 48(a)(1)(B).

¹⁷ Int. Rev. Code of 1954, § 48(a)(2).

¹⁸ The credit for livestock is limited to the investment in excess of amounts realized on sales during the six months preceding and following acquisition. Int. Rev. Code of 1954, § 48(a)(6).

¹⁹ Int. Rev. Code of 1954, § 48(a)(7).

²⁰ Exec. Order No. 11666, 37 Fed. Reg. 7199 (1972). Pursuant to Int. Rev. Code of 1954, § 48(a)(7)(C), if the President determines that the application of § 48(a)(7)(A) to any article or class of articles is not in the public interest he may specify that § 48(a)(7)(A) shall not apply to such property.

²¹ Int. Rev. Code of 1954, § 46(a)(1).

²² Int. Rev. Code of 1954, § 46(c)(3)(A).

²³ Int. Rev. Code of 1954, §§ 46(e)(1)(A), (B).

²⁴ Int. Rev. Code of 1954, § 46(a)(2). Any potential credit not claimed can be carried forward 7 years or carried back 3 years. Int. Rev. Code of 1954, § 46(b)(1).

²⁵ Int. Rev. Code of 1954, § 48(d)(1). For a discussion of the tax shelter aspect of

been common in the railroad and airlines industries,²⁶ may be reduced somewhat by the Revenue Act of 1971.²⁷

III. THE TAX CREDIT AND INVESTMENT

Having summarized the provisions of the tax law, let us turn to two distinct but related issues: the economic consequences of the investment tax credit and the degree to which the credit moves the economy toward the goals enunciated by Secretary Connally and Congress. The economic analysis of the credit is somewhat technical, but the results can be summarized simply. The tax credit is significant for two complementary reasons: first, the tax credit increases the after-tax earnings and the rate of return on business investment; second, the credit reduces the net price paid for qualified investment goods.

To analyze the effects of the credit, we must determine which factors influence the amount of investment a firm wishes to buy. The salient feature of a basic, though not universally accepted,²⁸ economic model of the business firm is that the firm wishes to maximize its net worth or profits, adjusted perhaps for risk premiums.²⁹ To help understand the profit maximization argument, let us construct a very simple model. Assume that there is a machine that never depreciates which can be purchased for \$1,000. Assume further that this machine can, without variation, yield \$100 a year in after-tax profits at an annual percentage rate of return, denoted " r ," equal to 10% of the purchase price.³⁰ If a business can raise financial capital at an after-

equipment leasing and the effect of the Revenue Act of 1971 on this area, see 1 S. Surrey, W. Warren, P. McDaniel & H. Ault, *Federal Income Taxation* 456-58 (1972).

When the credit was abolished in 1969, the impact on railroads was deliberately reduced by granting a special 5-year accelerated amortization privilege on newly purchased cars. Following the 1971 re-enactment of the credit, the railroads may receive the benefits of the credit or the benefits of the aforementioned privilege.

²⁶ S. Surrey, *Tax Incentives—Conceptual Criteria for Identification and Comparison with Direct Government Expenditures*, in Tax Institute of America, *Tax Incentives* (1971).

²⁷ Cf. Int. Rev. Code of 1954, § 46(d).

²⁸ For another economic model, see W. Baumol, *Economic Theory and Operations Analysis* (1965).

²⁹ This gloss on the factor of risk hardly does justice to the extensive analysis involved in decision making under uncertain conditions. See, e.g., Arrow & Lind, *Uncertainty and the Evaluation of Public Investment*, 60 *Am. Econ. Rev.* 364 (1970). However, the credit will have only a relatively minor impact on the risk associated with any investment project; therefore, risk will be ignored in the discussion that follows.

³⁰ The rate of return, r , is found by solving the following equation:

$$\text{Purchase Price of Investment} = \sum_{t=0}^{\infty} [\text{Profits}_t / (1 + r)^t];$$

where t denotes time in years. The purchase price of an investment is the dollar cost of the

tax interest cost, denoted " i ," of less than 10% of the face amount of the loan, the net worth of the business will be increased by investing in the machine. Cast in other terms, it is worthwhile for the firm to make the investment only if the *present value* of the future after-tax earnings stream, discounted by i , exceeds the purchase price of the investment; that is, if the sum over all " t " of $\$100/(1+i)^t$ exceeds \$1,000, where " t " denotes time in years. Of course, physical assets do not last forever and their earnings streams fluctuate over time. However, it is still possible to follow the same general rule, that is, to invest if the discount value of the earnings stream exceeds the purchase price of the asset. Within this framework, the investment tax credit will make increased investment profitable by lowering the effective purchase price of investment.⁸¹

Another factor that will influence the amount of investment that a firm wishes to buy is cash flow. The investment credit will increase a firm's cash flow, *i.e.*, after-tax profits plus the annual depreciation deduction. It is often argued that for several reasons cash flow is a cheaper source of financial capital than bonds or equity issues. First, investing the cash flow allows the firm to convert ordinary income into capital gains.⁸² Second, cash flow allows the firm to avoid what it may consider "too high" risk premiums imposed by the financial market. Third, the use of cash flow minimizes the possibility of loss of control. In addition, it has been argued that cash flow is a significant determinant of the point in time when the investment should be made. This timing problem is important and will be discussed below.⁸³

The cash flow concept can be worked into the profit maximizing framework. However, by focusing on the financial cost of capital, cash flow arguments obscure an extremely important issue. Specifically, by reducing the purchase price of capital, the investment tax credit reduces both the total and the marginal costs of producing any output

good (including broker's fee) plus dollar cost of installation. After-tax profits are equal to gross revenues less the sum of depreciation (zero in this case) and the cost of producing and selling the output, in dollars. The rate of return, r , is expressed in percent terms. This formula is the same as that used to determine the effective yield of a bond that pays a given annual sum and sells at a given price.

⁸¹ By permitting a credit against the taxpayer's tax liability, the investment tax credit has the indirect effect of reducing the price of the qualified machinery purchased. This enables the business to raise financial capital at a favorable tax cost. However, if the taxpayer has no taxable income the investment tax credit will not lower the effective purchase price unless he can rent the equipment from a taxpaying firm. See note 25 *supra*.

⁸² This favorable tax result is accomplished by declining to distribute the cash flow to stockholders. A distribution of the cash flow would normally be taxed as a dividend, Int. Rev. Code of 1954, § 301, at ordinary income rates to the extent of the firm's earnings and profits, Int. Rev. Code of 1954, § 316. Instead, the firm can expand or invest the retained cash, which will increase the value of the stock. This increased value will be taxed at capital gains rates when the shareholder sells his stock. Int. Rev. Code of 1954, § 1221.

⁸³ See text at notes 40-41 *infra*.

level; and the credit alters the price of qualified investment relative to the prices of the labor, goods and services used to produce any level of output. The reduction in production costs may lead firms to increase their scale of operations and, generally, to increase the quantities of each type of factor input, such as labor and raw materials, used in producing output.⁸⁴ Moreover, the alterations in relative prices induced by the investment tax credit may cause profit maximizing firms to *substitute* qualified investment for some other productive input—provided substitution is possible.⁸⁵ Thus substitutability is another factor that will influence the amount of investment a firm wishes to buy.

The substitutability of various productive inputs is, in principle, determinable from engineering and econometric studies. Since I am not aware of a comprehensive survey of engineering relationships, I will concentrate on the econometric studies. Nearly all of the econometric analyses of the impacts of the investment tax credit and other subsidies to capital have focused exclusively on the substitutability between all capital and all labor, though in a few instances capital has been divided into plant on the one hand and machinery and equipment on the other. Essentially no information is available regarding the substitutability between qualified and non-qualified investment, between various non-labor inputs and qualified investment, and between diverse types of labor and qualified investments.

Also, no study exists which directly determines the change in the profit-maximizing level of output that is due to the investment tax credit.⁸⁶ The existing studies do, however, give some rough idea of the effect of the credit.

During the last decade, economists have made numerous studies of the substitutability of capital and labor and the effects of investment subsidies on the choice between capital and labor.⁸⁷ Perhaps the safest

⁸⁴ However, if the optimum scale of operations increased greatly, it might pay to switch to a new production technique and eliminate certain types of production inputs currently used by the firm.

⁸⁵ However, some factor inputs may have to be increased, e.g., maintenance workers and electricity, as the production process becomes more investment intensive.

⁸⁶ In P. Taubman & R. Rasche, *Subsidies, Tax Law and Real Estate Investment*, in Joint Econ. Comm., 92d Cong., 2d Sess., *The Economics of Federal Subsidy Programs* (1972), the authors study such a problem with respect to the effects of accelerated depreciation for apartment and office buildings. In H. Aaron, *Federal Housing Subsidies*, in Joint Econ. Comm., 92d Cong., 2d Sess., *The Economics of Federal Subsidy Programs* 571-96 (1972), the author broadens the analysis to include other assets subject to the investment credit, but the econometric model in which he imbeds his analysis focuses on substitution rather than change in the level of output which maximizes output.

⁸⁷ Nerlove, *Recent Empirical Studies of the CES and Related Production Functions*, in *Theory and Empirical Analysis of Production* (M. Brown ed. 1967). Jorgenson, *Econometric Studies of Investment Behavior*, J. of Econ. Literature 1111 (1971), considers more recent studies. It is somewhat unfortunate that those who were primarily interested in the

generalization that can be made about these studies is that the results differ according to the industry involved.³⁸ A reasonable estimate of the average degree of substitutability or elasticity between capital and labor is about 0.6:³⁹ that is, if the ratio of the price of capital to the price of labor decreases by 10%, the ratio of capital to labor used in the production process increases by 6%. However, many studies⁴⁰ use an elasticity of 1.0, which is also reasonable, rather than the 0.6. Using the 1.0 value for elasticity, a 10% decrease in the ratio of the price of capital to the price of labor would lead to a 10% increase in the ratio of capital to labor used in production.

It is, of course, true that most existing capital has been molded into particular forms that require a fixed number of workers to operate. Thus the substitutability refers only to new investments. Available evidence suggests that the switch to a new production process takes longer than duplicating existing processes and that on the average the switch to the new process is half completed in about two years.⁴¹ As will be noted, the impact on unemployment and inflation occurs earlier.

Three other matters are material to the issue of effectiveness of the investment tax credit as a counter-cyclical force: time lag; the relation between aggregate demand and investment; and the timing of the investment.

IV. TIME LAG—ORDERS, PRODUCTION AND SHIPMENTS OF MACHINERY AND EQUIPMENT

In terms of both the provisions of the investment tax credit and the official accounts that measure Gross National Product (GNP), "investment" in machinery and equipment occurs when the goods are shipped or delivered to the purchaser.⁴² Thus investment is the final link in the chain of order, production and shipment. The elapsed time between an investment-influencing event, such as the investment

degree of substitution in the production function did not include information on subsidies while those who included subsidy information used only relatively unsophisticated forms of the production function.

³⁸ See note 37 *supra*.

³⁹ This estimate has been used in an analysis of the effects of the tax credit. See G. Brannon, *The Effect of Tax Incentives for Business Investment: A Survey of The Evidence*, in Joint Econ. Comm., 92d Cong., 2d Sess., *The Economics of Federal Subsidy Programs* (1972).

⁴⁰ E.g., Jorgenson, *Econometric Studies of Investment Behavior*, J. of Econ. Literature 1111 (1971).

⁴¹ Bischoff, *The Effect of Alternative Lag Distributions*, in *Tax Incentives and Capital Spending* 61-125 (G. Fromm ed. 1971).

⁴² See U.S. Off. of Bus. Economics, Dep't of Commerce, *National Income 27-60* (1954), for a discussion of the definition of GNP. For structures and a few types of equipment, investment is recognized concurrently with the progress of construction.

tax credit, and the resulting delivery of the investment can be as long as twenty-five years, although in general much less than five years is involved.

It is useful to break up the elapsed time into five stages for two reasons: the length of several stages may be quite variable; and some of the earlier phases will have a major impact on unemployment and inflationary pressures. The first three stages constitute the demand lag and the last two compose the supply or production lag.

Suppose that an investment-causing event occurs today. Before the goods are delivered, a demand lag will occur. The lag arises from several factors:

- (a) the business must recognize that the event has occurred;
- (b) it must draw up the appropriate plans and approve projects;
- (c) it must place an order with a firm.

Once the order is placed, it may be filled out of existing stocks or it may be produced anew. The production lag can be broken up into two phases:

- (d) the time spent in a backlog of prior unfilled orders;
- (e) the interval during which the ordered goods are worked upon.

The recognition lag, stage (a), can be quite long. An extreme example demonstrates that up to twenty-five years can elapse between the time the first and the last firms in an industry decide to use a major technological break-through embodied in capital.⁴³ Generally, the more obvious it is that the event has occurred, the shorter the recognition period. An investment tax credit enacted with great fanfare and press coverage should entail a relatively short recognition lag.

The length of the planning and approval lag, stage (b), depends on the complexity of the firm's organization and structure as well as the size of the project. Some of the changes in profitability bestowed by the investment tax credit may permit a manager, exercising his discretion, to buy a bigger or better version of a particular machine. However, the investment tax credit may also make a new type of production line more profitable than an existing line. Such major changes would probably have to go through several reviews and, indeed, may not be acted upon until an annual capital planning session is held. Moreover, before such changes can be planned, it is often necessary for someone to consider current "nonstandard" alternatives.

Once projects have been approved, the goods must be ordered,

⁴³ Mansfield, *Technical Change and the Rate of Imitation*, 29 *Econometrica* 741, 744 (1961).

triggering stage (c). For some items the whole ordering process can be completed in a week or two, with a firm contacting its customary supplier. On the other hand, for big, complicated and/or nonstandard items, lengthy negotiations with several firms may be in order. In addition, the ordering lag will be even longer if it is necessary to purchase a site for a new plant.

Orders for items such as office equipment, automotive products and standard types of motors may be filled readily from stock and in any case require extremely short production periods. But most items have to be produced over a time interval which may vary due to labor shortages. For example, orders for assembled machinery and equipment are normally filled and shipped in two to three months, while during the Korean police action the production lag was more like two years.⁴⁴

Capital appropriations are often made about the time the ordering process begins. Normally, the average lag in investment is twelve to fifteen months after appropriations, and the average lag from the investment-causing event, *e.g.* a tax credit, to shipment is about eighteen to twenty-one months. This suggests an average demand lag ranging from three (18 less 15) to nine (21 less 12) months; but it must be noted that the two limits are computed from different data sources and subject to different statistical problems.⁴⁵ While the average lag is long, some effects of capital subsidies on investment are often discernible within six months. However, those effects are relatively unimportant, and if investment flows do not increase by large amounts within nine to twelve months after subsidies first become available it would seem that capital subsidies are not an effective way to increase aggregate demand to counter temporary fluctuations in unemployment. Moreover, this ineffectiveness would be exacerbated by the fact that aggregate demand does not increase immediately when investment occurs.

As noted earlier,⁴⁶ increases in investment subsidies are advocated to reduce unemployment while decreases are advocated to reduce inflationary pressure. Unemployment and inflation depend on the quantity of demand that businesses perceive in the economy; but these perceptions are not related to current investment because of the condition precedent of shipment within the definition of investment.⁴⁷ Thus, a

⁴⁴ See Machinery and Allied Products Institute, *Capital Goods Review*, No. 77, March 1969.

⁴⁵ For a summary of this literature, see Jorgenson, *supra* note 40. For the appropriations results, see Almon, *The Distribution Lag Between Capital Appropriations and Expenditures*, 33 *Econometrica* 178-96 (1965).

⁴⁶ See text at notes 1-3 *supra*.

⁴⁷ See text at note 42 *supra*.

firm employs people to fill an order; when the good is shipped, people are laid off. If the order is not replenished, demand will be diminished. It may be helpful for the reader to view the problem in another way: work in process inventories, which enter into computation of the GNP, are increased as the investment good is built; when the good is shipped, these inventories are reduced by the total value of the shipment. In more general terms, inflationary pressures depend on the orders backlog while employment depends on the number of machines currently being produced. The total time spent in producing and shipping goods will exceed the time lapsed before aggregate demand is influenced.

V. WHEN INVESTMENTS SHOULD BE MADE

The timing of investments is another factor which influences the counter-cyclical effectiveness of the investment tax credit. Investment is the gross addition to capital stock. Often economic analysis can be used to determine how much the capital stock will be likely to change in response to a new government policy or other events. If the analysis spans several of the aforementioned periods, there is the additional problem of ascertaining when the firm should make its investment to increase the capital stock. The current view is that business investment is depressed when the capital stock is operating well below full capacity rates, even if capacity utilization is increasing.⁴⁸ This fact raises two interrelated questions: first, whether the investment-capacity utilization behavior is consistent with the assumed profit-maximizing behavior; and second, whether excess capacity destroys the normal incentives supplied by the investment credit.⁴⁹

The basic explanation of excess capacity is that a firm will not be able to sell or immediately stop renting particular types of capital when sales or relative prices become unfavorable. Thus, even after sales partially recover, the amount of capital on hand would still exceed the amount of capital needed by the firm. Since total investments are merely reduced and not completely eliminated during recessions, the prior argument implies that, cyclically, there will be less excess capacity for some types of capital than others. In this situation, the investment tax credit could increase the cyclical disparity by making the optimum level of capital greater than the actual for items

⁴⁸ Chenery, *Overcapacity and the Acceleration Principle*, 20 *Econometrica* 1 (1952). Full capacity can be thought of as the total amount of output that the firm can produce continuously, given its capital stock. Capacity utilization is the ratio of actual capacity to full capacity. Under this definition, there is excess capacity when capacity utilization is less than 100%. (The latter figure may be modified to 95% in order to account for servicing and repairs of machines.)

⁴⁹ R. Eisner & R. Strotz, *Determinants of Business Investment*, in *Impacts of Monetary Policy* 59-337 (1963).

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that were almost in balance prior to enactment of the investment tax credit.

There is, however, one additional aspect to the problem. Suppose a firm wishes to increase its capital by one machine. Assume that the firm can buy the machine now or purchase it in a year. Such purchases (of the same machine at two different dates) involve *mutually exclusive* investments. To choose between such mutually exclusive investments, profit-maximizing behavior requires a different rule than mere comparison of the present discounted value of future returns with the net purchase price. The correct decision is to select that investment whose present value exceeds the purchase price by the largest amount.⁵⁰ If the purchase prices are expected to be the same in both

⁵⁰ The proper strategy is to buy the investment this year if:

$$\left(\frac{\text{Profits}_t}{\text{Purchase Price}_t} \right) + \left[\left(\frac{\text{Purchase Price}_{t+1}}{\text{Purchase Price}_t} \right) \left(\frac{1}{1 + \text{Cost of Financial Capital}} \right) \right] > 1$$

where it is assumed that profits beginning in years t and $t+1$ will be the same, regardless of the date when the machine is purchased. This formula is derived from that in note 30 supra. One way to express the latter formula is in terms of the discounted value of after-tax profits and the purchase price of capital. Thus, we can formulate a strategy to invest if:

$$(1) \quad 0 < \left[\text{Profits}_t + \frac{\text{Profits}_{t+1}}{(1+i)} + \frac{\text{Profits}_{t+2}}{(1+i)^2} + \dots + \frac{\text{Profits}_{t+N}}{(1+i)^N} \right] - (\text{Purchase Price}_t)$$

where the year N is so far in the future that the last term in the parentheses is close to zero. Suppose that the identical machine, purchased a year from now, will generate the same revenue from year one on as the machine purchased now. If the machine were to be purchased within a year, current profits would be zero and the equivalent form of equation (1), would be:

$$(2) \quad 0 < \left[\text{Profits}_{t+1} + \frac{\text{Profits}_{t+2}}{(1+i)} + \dots + \frac{\text{Profits}_{t+N}}{(1+i)^{t+N-1}} \right] - (\text{Purchase Price}_{t+1})$$

However, since any profits and expenditures will be made a year from now we must multiply all items by $\frac{1}{(1+i)}$. After this multiplication, we can determine whether the current or future investment is the more profitable expenditure now by comparing (adjusted) equation (2) with equation (1) and choosing the equation with the larger right hand side. Doing so, we find that equation (1), current investment, is the more profitable if:

$$(3) \quad \left[\text{Profits}_t - \text{Purchase Price}_t + \frac{\text{Purchase Price}_{t+1}}{1+i} \right] > 0$$

The formula given at the beginning of the footnote is obtained by dividing all terms in equation (3) by the Purchase Price_{*t*} and rearranging the order of terms.

periods, the machine should be purchased the next year if the first year profit rate, $\left(\frac{\text{Profits}_t}{\text{Purchase Price}_t}\right)$, is less than $1 - \left(\frac{1}{1+i}\right)$, or $\left(\frac{i}{1+i}\right)$. Effectively, this means that a firm should delay purchase of

the capital unless the profit rate in the first year exceeds the cost of financial capital that year. When there is excess capacity, the first year revenues obtained from a new machine may be close to zero, especially since currently idle yet efficient capital can be used to fill any unexpected increase in demand. But if the first year profits are zero, the necessary inequality will never obtain, given positive interest rates. In other words, if idle capital is nearly as efficient as the proposed new investments, it pays for the firm to delay building up its capital stock.

The above economic analysis is admittedly complicated; it has been included to aid in understanding the difference between permanent and temporary subsidies. Suppose that a credit is to be given only for investments shipped within a year from now. Then the net purchase price of the mutually exclusive investments will be more expensive a year from now and the necessary inequality⁵¹ is more likely to obtain. Indeed, it is always possible to induce a firm to buy now rather than later by making the temporary credit sufficiently large. That is, the net purchase price in the first year can be reduced by a sufficiently large tax credit so that $\left(\frac{\text{Purchase Price}_{t+1}}{\text{Purchase Price}_t}\right) \left(\frac{1}{1+i}\right) > 1$. Moreover, a temporary investment credit will always have as great an impact on current investment as a permanent credit of the same amount if the goods can be ordered and shipped within a year.

VI. THE STABILIZING EFFECTS OF THE REVENUE ACT OF 1971

The newly enacted investment tax credit will increase business demand for machinery and equipment. However, its usefulness as an instrument for stabilization depends on how much additional investment and other aggregate demand it induces in the near future. According to the formula used by the Treasury Department, the 7% credit would reduce the net price of *qualified* capital by 10%.⁵² This

⁵¹ See the inequality set out in note 50 *supra*.

⁵² The Treasury figures are taken from Secretary Connally's statement before the Senate Finance Committee, Hearings on the Revenue Act of 1971 Before the Senate Comm. on Finance, 92d Cong., 1st Sess. 5 (1971) [hereinafter cited as 1971 Senate Hearings]. As I explain below, the formula is incorrect but the 10% change due to the credit is probably not too sensitive to alterations in the formula.

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particular figure, however, overstates the effect of the tax law for total business investment because of the annual limitations on amount claimed,⁵³ because of the lower rates provided utilities and shorter-lived assets,⁵⁴ and because structures, inventories, and other investments are not "qualified."⁵⁵ Assuming that other factors remain constant, a 10% reduction in the price of qualified capital would lead to an approximate increase of from 6% to 10% in the desired stock of capital—perhaps \$5 billion in added investment over a period of several years.⁵⁶ All other things, however, will not be constant. As currently unemployed workers are hired, output and disposable income will increase. The increase in output will lead to further investment demand and the increase in disposable income will augment the demand for consumption goods. Of course, these new demands will lead to another increase in employment and output. This so-called "multiplier-accelerator" process implies that, over a given period, each initial dollar increase in investment will induce an increase in GNP or aggregate demand of more than one dollar.⁵⁷

There is as yet no general consensus regarding either the size of the "multipliers" to be applied to the investment increase (initially due to the tax credit) or the timing in the increase in investment demand. The Wharton Economic Forecasting Model (Wharton Model) presents estimates of the effect of the tax credit on investment, unemployment, and consumer prices from two widely known and used models.⁵⁸ This model indicates the impact of the tax credit in each of the first eight quarters and an average impact for the first and second years. According to the Wharton Model, investment will be unchanged in the quarter that the credit is granted, investment will increase by \$0.1 billion in the next quarter, and investment will rise gradually to \$1.0 billion after eight quarters. The average increase is \$0.2 billion and \$0.7 billion for the first and second years respectively. Because of the multiplier effects, real GNP rises about twice as much as investment, \$0.4 billion and \$1.3 billion in the first and second years, but inflation and unemployment are barely changed.

⁵³ Int. Rev. Code of 1954, § 46(a)(2).

⁵⁴ Ind. Rev. Code of 1954, § 46(c)(3) (utilities), § 46(c)(2) (shorter-lived assets).

⁵⁵ Int. Rev. Code of 1954, § 48.

⁵⁶ This figure may overstate the amount of *investment* that will have to be undertaken over the next several years because of the existence of excess capacity.

⁵⁷ The change in GNP divided by the change in investment is called the "multiplier." An increase in aggregate demand will be subject to the multiplier process, though there may be different multipliers for different tax and subsidy changes. Note that the multiplier can incorporate the increase in (work in process) inventories prior to the shipment of the machinery and thus allow for the additional impacts of the increased after-tax profits on dividends (and consumption) and business demand for loans.

⁵⁸ The Wharton Model is presented in the following table:

For example, the .07% decrease in unemployment rate represents a change from 5.17% to 5.1%.

A different model, the Data Resources Model,⁵⁹ indicates practically no effect on investment in the first year, but after five quarters investment spurts and winds up \$2.9 billion higher for the second year. Because of the pattern of investment, real GNP and the other variables are virtually unchanged in the first year. Since the multiplier for the

TABLE 1: EFFECT OF INVESTMENT TAX CREDIT ON VARIOUS MAGNITUDES
Wharton Economic Forecasting Model^a

Quarter after Tax Credit imposed	Real GNP Bill \$	Real Non- Residential Fixed Investment Bill \$	Consumer Price Index Points	Unemploy- ment Rate %
0	0	0	0	0
1	.2	.1	.1	-.01
2	.6	.3	0	-.02
3	.9	.4	.1	-.04
4	1.2	.5	0	-.05
5	1.3	.7	.1	-.06
6	1.4	.7	.1	-.07
7	1.4	1.0	0	-.08
First year	.4	.2	.05	-.02
Second year	1.3	.7	.05	-.07

^a Based on calculations supplied by WEFA.

⁵⁹ The Data Resources Model is presented in the following table:

TABLE 2: EFFECT OF INVESTMENT TAX CREDIT ON VARIOUS MAGNITUDES
Data Resources Model^a

Quarter after Tax Credit Imposed	Real GNP Bill \$	Real Non Residential Fixed Investment Bill \$	Consumer Price Index Points	Unemploy- ment Rate %
0	0	0	0	0
1	0	0	0	0
2	0.1	0	0	0
3	0.2	.1	0	0
4	0.8	.7	0	0
5	2.0	1.8	0	0
6	3.8	3.5	0	-.1
7	6.2	5.7	0	-.2
First year	.1	0	0	0
Second year	3.2	2.9	0	-.1

^a R. Gordon and D. Jorgenson, "Investment Incentives in the 1971 Tax Bill," dated Dec. 1971.

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first few periods is smaller in this model, the increase in real GNP in the second year is only slightly greater than the gain in investment. Prices remain unchanged, while the unemployment rate declines by .1% in the second year.

Readers may find these differences in the results projected by the two models, especially those of the second year, disturbing. Economists are also disturbed, but at this writing even the few available unbiased economists cannot say which is the better analysis. Despite the differences, the results from each model suggest that the permanent investment tax credit would have very little stabilizing value during its first year and only a small impact on unemployment and inflation in the second year. Other policies, such as a temporary tax credit or an increase in government expenditures, portend more immediate impact. However, a temporary tax credit was rejected by Congress,⁶⁰ and government expenditures were reduced to help balance the revenue lost by the investment tax credit. Thus I conclude that, in the short run, employment was not increased and in fact may have been reduced by the combined package, assuming government expenditures were reduced. The tax credit was thus a failure as a stabilizer in the 1971-72 period.

Events since the enactment of the Revenue Act of 1971 support this conclusion. Orders for machine tools did not begin to rise strongly until March 1972, and investment in machinery and equipment rose only by 8% in real terms between August 1971 and August 1972.⁶¹ This growth rate in investment falls far short of the 12% in the boom period of 1955 or 1966. Yet investment should have benefited from the asset depreciation range system, from a more rapid rate of growth in the economy, and from a devaluation of the dollar as well as from the investment tax credit.⁶²

VII. BALANCE OF PAYMENTS EFFECTS

The provisions for investment tax credit, as originally conceived in the Revenue Act of 1971, could have directly affected the balance of payments situation in three ways. First, the provisions could have encouraged the purchase of domestically produced investment goods, since they restricted the credit to goods for which more than 50% in basis was attributable to value added in the United States. However, this "buy American" provision was dropped late in 1971.⁶³ Second,

⁶⁰ A temporary credit was advanced in the Administration's original proposal and was advocated by Secretary Connally. See 1971 Senate Hearings, *supra* note 52, at 5.

⁶¹ See the statistical appendix to 1973 Economic Report of the President.

⁶² See generally Brannon, *supra* note 39.

⁶³ See note 20 *supra*.

the investment subsidy lowers production costs and accordingly could allow American firms to lower prices of goods that compete with foreign-made goods. Third, the investment subsidy could increase the rate of return on direct domestic investment as compared with its foreign counterpart. In principle, each of these effects *should* occur, but of course the important question is how strong each effect will be.

Since the "buy American" provision has been eliminated, it cannot affect the balance of payments situation now, although it could have had an impact through the first quarter of 1972. But it is of interest to ascertain with its impact would have been, had it remained in effect. The United States exports \$9 billion of non-automotive machinery and equipment, while the corresponding imports are \$3 billion to \$4 billion. The tax credit would have encouraged the substitution of domestically produced equipment for close substitutes produced abroad. While economists have tried to estimate import demand functions for machinery and equipment, the attempts have not been very successful.⁶⁴

There are, however, good reasons for suspecting that the impact of the credit on substitution of domestic-produced for foreign-produced investments would have been more modest than anticipated. First, foreign-produced goods, rather than having been priced at cost, may have been priced in the United States just low enough to divert American business.⁶⁵ Accordingly foreign producers may be able to lower their prices further to offset the investment tax credit and still make a profit. While such price reductions would help our balance of payments, the quantitative effect would be much smaller than transferring the whole purchase price to an American producer. Moreover, the substitution argument assumes that "all else" is constant, which might not be the case. If the policy were successful, foreign machinery makers might complain that a discriminatory practice of the United States had harmed them; a request for retaliatory action under the General Agreement on Tariffs and Trade might be expected.⁶⁶ Since the United States exports more machinery than it imports, the net effect of a countervailing tax credit by foreign countries would probably impair still further

⁶⁴ E. Spittler, *The 1961 Revaluations and Exports of Manufacturers*, Int'l Monetary Fund Staff Papers 110-26, March 1970.

⁶⁵ This could not be the case in the perfectly competitive world, but the foreign machinery industry is not a perfectly competitive world.

⁶⁶ 61 Stat. A5 (1947), T.I.A.S. No. 1700, 55-61 U.N.T.S. (effective Jan. 1, 1948), arts. XXIII and XXVIII permit a Contracting Party to retaliate against another Contracting Party when a tariff benefit is being nullified or impaired. In addition, Article VI, § 3 allows a Contracting Party to levy a countervailing duty "for the purpose of offsetting any bounty or subsidy bestowed, directly or indirectly, upon the manufacture, production or export of any merchandise." It seems that the investment tax credit runs the danger of both methods of retaliation.

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the United States' balance of payments. While the investment tax credit can aid the balance of payments by lowering the price of an input factor, thereby lowering the cost of production, the lower input prices apply only to new investments that will be acquired over a period of several years. It is doubtful, then, that the credit can be a particularly powerful stimulus to the balance of payments in the short run.

Firms decide to build or buy plants in the United States or abroad partly on the basis of the comparative after-tax rate of return on investments. Once again, a fairly long decision lag should be expected on major expenditures plans. Evidence suggests that a 10% increase in the rate of return would reduce American investments abroad by 15%.⁶⁷ This estimate seems too large because the 10% applies only to qualified investment.⁶⁸ The Treasury has argued that foreign countries give greater subsidies to capital than does the United States. For reasons that I shall explain below, I doubt that this argument is correct, but I admit that if it is true, the credit might be advocated as necessary to offset foreign inducements to direct investment.

The discussion in this section indicates that the short-run effects of the credit on the balance of payments will probably be minimal, especially in comparison with the effects of the Domestic International Sales Corporation provisions in the Revenue Act of 1971⁶⁹ and the devaluation of the dollar. With such weak effects it is difficult to defend, on balance of payments grounds, a policy which gives subsidies to firms whether they export or not.

VIII. ECONOMIC GROWTH

The investment tax credit can increase output and consumption by creating a demand for currently unemployed resources. In the long run, however, resources tend to be used either fully or at a fixed rate, and accordingly this demand appears to be of minimal importance. Even with full employment, consumption per person—the economic definition of growth—can be accelerated if physical investments are accumulated more rapidly.⁷⁰ As already explained, the investment

⁶⁷ S. Kwak, *A Model of Direct U.S. Foreign Investments*, 1969 (Brookings Institution mimeograph); J. Popkin, *Interfirm Differences in Direct Investment Behavior of U.S. Manufacturers*, 1955 (unpublished doctoral thesis, University of Pennsylvania).

⁶⁸ Int. Rev. Code of 1954, § 46(a).

⁶⁹ Act of Dec. 10, 1971, Pub. L. No. 92-178, §§ 501-03, 85 Stat. 497, amending Int. Rev. Code of 1954, §§ 992-93.

⁷⁰ I assume a definition of consumption which includes the value of the quality of life and which does not count costs arising from pollution as consumption. This definition does not correspond to the GNP accounts on which the empirical estimates are based.

credit would increase business's desired amount of capital, assuming all else remains the same, by lowering the price of capital. This logic has led commentators and the Treasury Department to conclude that the investment credit would increase growth at full employment.⁷¹

Indeed, Secretary Connally's testimony before the Senate Finance Committee relied heavily on the following type of reasoning. Foreign countries give greater subsidies to capital than does the United States.⁷² Foreign countries, therefore, will accumulate more capital and will have an advantage in international trade. Thus the United States should increase its subsidies to capital.

There are, however, at least three flaws in this reasoning. First, the formula used by Secretary Connally in arriving at his conclusion that foreign governments give greater subsidies is incomplete and almost surely overstates the extent of foreign subsidies to capital.⁷³ Second, according to the balance of payments argument, if other countries give subsidies and distort relative prices in their economy, the proper response of the United States is to distort its economy. Conversations with specialists in international trade have indicated that this particular problem has not been studied, but that they doubt—as do I—that this conclusion is correct. The third flaw in the argument is that it is not necessarily true that subsidies that lower the price of capital will lead to more capital being accumulated.⁷⁴ The earlier arguments regarding such effects as short-run stabilization all assumed that there were unemployed resources that could be used and that all market prices remained fixed after the subsidy was granted. However, in a fully employed economy the extra investments can only be obtained by reducing or bidding away resources devoted to other areas.

The following is a useful way to picture the long-run adjustment process to the granting of the investment tax credit. Assume that the government does not reduce its expenditures but raises income taxes. The investment tax credit increases the demand for qualified investment at given prices, including interest rates. The increased orders for investment goods and financial capital lead to higher interest rates and prices for investment goods. The higher prices in turn cause cur-

⁷¹ See 1971 Senate Hearings, *supra* note 52, at 6-7.

⁷² *Id.* at 8.

⁷³ For example, the Treasury did not include various taxes on net worth, especially those levied by the non-central government, which are substantial in Germany and elsewhere. For other problems see my testimony before the Senate Finance Committee. *Id.* at 743. Conversations since then have indicated that the situation is more complex than indicated in my testimony and, in particular, that some points I raised there may be incorrect.

⁷⁴ The following argument ignores the possibility that the subsidy will divert the direct investment abroad back to the United States.

rent producers of consumer goods and nonqualified goods, such as housing, to switch into the production of qualified investment. Thus, if there is no increase in saving and in the aggregate amount of investment, the tax credit would cause only a readjustment of prices and interest rates to reallocate given savings. Of course, saving may be stimulated by the increase in the interest rate but the (admittedly weak) evidence that is available would suggest that interest rates have only a small effect on saving. Also, the investment tax credit, combined with a proportional increase in the personal income tax schedule, will cause the share of after-tax earnings that go to the wealthy and to the owners of businesses to increase. This redistribution probably will increase savings.

The effects of a 10% investment tax credit have been estimated⁷⁶ using a growth model assuming either that each 10% increase in the interest rate raised saving by 1%, or that the wealthy save ten times more of their income at the margin than do the poor.⁷⁶ In the first instance, per capita consumption rose 0.3% and the interest rate 11.4% in response to the credit.⁷⁷ In the second—assuming that capitalists save at the margin ten times as much as do wage earners—the 10% tax credit would raise per capita consumption 1% and the interest rate 8½%. Both of these examples indicate that the credit can modestly increase investment and consumption in the long run; and a usual justification for the tax credit is that the tax benefit granted to the rich will trickle down to everyone in the society. Yet it would appear that in the long run the consumption of workers would decline by 0.5% in the first instance and increase by 0.25% in the second case.⁷⁸ In other words, the trickle would be small or non-existent.

SUMMARY

This article began by enumerating the goals that the investment tax credit was supposed to fulfill. The analysis in the article indicates that a permanent credit will not be very effective for short-run stabilization or for improvements in the balance of payments. In fact, in 1971 the credit may have had perverse stabilization impact because of the associated decrease in government expenditures. The investment tax

⁷⁶ Taubman & Wales, *The Impact of Investment Subsidies in a Neoclassical Growth Model*, 51 *Rev. of Econ. & Statistics* 287 (1969).

⁷⁶ Thus a 7% credit would have about 70% effectiveness.

⁷⁷ If saving is twice as responsive to interest rate changes, per capita consumption would rise 6%.

⁷⁸ Taubman & Wales, *supra* note 75, at 291, 295.

credit will influence long-run growth, but only modestly and with little or none of the benefits trickling down to the poor. Thus, in a broad sense, on grounds of economic efficiency the policy must be judged a failure. Of course, economic policy can also be used to correct or change income distribution. Thus the ultimate defense of the investment tax credit must rest on the proposition that businesses and their owners are taxed too heavily as compared to wage earners and the poor.