BY THE COMPTROLLER GENERAL

Report To The Congress

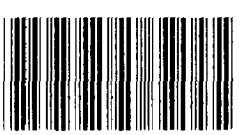
OF THE UNITED STATES

An Analytical Framework For Federal Policies And Programs Influencing Capital Formation In The United States

Capital formation is an essential part of economic growth. Job creation and productivity depend on it. The slowdown in capital formation and the capital to labor ratio in the 1970s are matters of great concern. Their long run effects extend to every American.

In this report, GAO defines elements that help analyze the effect of Federal policies, programs, and activities on the rate of capital formation in the U.S. economy. In the report, GAO provides an analytical framework for studying and evaluating the process of capital formation.

Subsequent reports will examine in detail actions the Federal government could take to promote a more rapid rate of capital formation.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report presents an overview of the process of capital formation in the United States economy. The slow rate of capital formation in the 1970's was a major contributor to the serious economic problems experienced during the past decade. This report describes how capital formation occurs, the many different aspects of the process, and why it is such an important national economic issue. It presents an analytical framework which is useful in pinpointing where problems can arise. It describes the potential effects of current Federal programs, activities, and policies on the rate of capital formation.

This report provides a springboard for further studies on the subject of possible Federal Government incentives for capital formation in this country. Subsequent reports will examine specific actions the Federal Government can take to promote a more rapid rate of capital formation.

A copy of this report is being sent to the Director, Office of Management and Budget.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

AN ANALYTICAL FRAMEWORK FOR FEDERAL POLICIES AND PROGRAMS INFLUENCING CAPITAL FORMATION IN THE UNITED STATES

D I G E S T

The rate of capital formation in the United States has slowed down. During the 1970s, the rate of increase in the net stock of fixed business capital was 25 percent lower than during the 1950s and 1960s. Because the slowdown was accompanied by a sharp acceleration in the rate of growth of the labor force, the rate of increase in the ratio of capital to labor declined even more. The ratio of capital to labor grew only 1 percent a year during the 1970s, compared with a 3 percent annual rate of increase from 1949 to 1969.

Some have argued that this slow growth indicates that the current capital stock is inadequate and that, if it does not begin to grow faster, the rates of inflation, unemployment, and productivity growth will deteriorate. The combination of these events would ultimately retard the rate of growth in the standard of living of the average American; for many, the standard of living would actually decline.

In this report, GAO describes the means by which Federal policies, programs, and activities can affect the rate of capital formation. The purpose of the report is to provide the Congress with a perspective on an economic problem of major national significance, so that it can better evaluate policies designed to stimulate more rapid capital formation.

The report draws on formal economic theory to spell out carefully what is meant by capital, investment, and saving. These concepts are then integrated in an analytical framework that is used to isolate the determinants of saving and investment. One advantage of this approach is that it reveals issues and problems sometimes overlooked in discussion of capital formation. For example, it is not always recognized that policies designed to stimulate investment demand will fail to achieve their

goal unless they simultaneously stimulate additional saving. The report explains how this can happen and why.

The economic experience of the 1970s clearly demonstrates that economic growth is not inevitable. Federal program planning should recognize that people respond to changes in the economic incentives to work, save, and invest. This report shows how individuals and business firms normally do this, and it indicates how Government activity affects capital formation by altering those incentives.

By identifying the various determinants of capital formation, the report shows that any specific Government action may affect investment and saving through several distinct channels. For example, reducing the rate of taxation on interest income may directly stimulate the flow of saving, but if it leads to a larger Federal deficit the increased flow of saving may be diverted from private capital formation.

The issues discussed can be complex. This report is only the first step toward a complete evaluation of the various Federal policies and programs affecting capital formation. Consequently, GAO will investigate these activities, their effects, and alternative approaches in future reports in more detail.

AN ANALYSIS OF THE PROCESS OF CAPITAL FORMATION

In the United States, the rate of increase in the stock of capital goods depends on a multitude of private decisions concerning investment and saving by business firms and individuals. Federal Government policies and activities condition these choices but do not dictate their outcome. Their outcome is, instead, the result of a market process that can be analyzed in the following terms:

--For new investment to occur, prospective additions to the capital stock must promise to be profitable. Reductions in the cost of capital or increases in the revenue expected from new investment will stimulate investment demand.

--The availability of resources for capital formation depends on the portion of national income saved for that purpose. Willingness to save depends on a number of economic factors, including the rate of interest paid to savers.

--Investment and saving decisions are coordinated in financial markets, where the cost of capital, the return to saving, and the actual rate of capital formation are decided.

FEDERAL GOVERNMENT ACTIVITIES THAT INFLUENCE CAPITAL FORMATION

Various programs and activities of the Federal Government influence each stage in the process of capital formation. They affect the amount of new investment private business voluntarily chooses to undertake, the willingness of individuals and business to save for the future, and the fraction of national income available to the private sector for consumption or capital formation.

Federal expenditures have some of the following effects:

--They add directly to the total stock of capital when they are invested in public capital such as roads, dams, ships, and office buildings.

--In the form of transfer payments to individuals, they substitute to some extent for private saving that would otherwise be needed to provide for the exigencies of old age, disability, or unemployment. They also alter the distribution of income in ways that reduce people's willingness to save.

--They can "crowd out" private capital formation by preempting savings that might otherwise have been used by private investors.

The most important channels through which Federal taxation affects the rate of capital formation are:

--the size of the Federal budget deficit, which influences private capital formation, since Federal borrowing competes with private borrowing in the markets for loanable funds;

--changes in the rate of taxation, which alter the return to saving and, thus, alter the attractiveness of saving;

--differential rates of taxation on alternative investment opportunities, which alter the pattern of investment and the allocation of capital.

Other Federal programs and policies also affect capital formation.

--Monetary policy is a crucial determinant of the longrun rate of inflation. Inflation, in turn, affects capital formation through its influence on market interest rates, effective rates of taxation, and the uncertainty it creates in the minds of savers and investors.

--Federal credit programs (which have expanded rapidly during the past decade) directly influence the allocation of capital.

--Regulation of prices, rates of return, and conditions of entry in various industries (such as interstate trucking) diverts capital from areas where it would be invested in the absence of regulation.

--The rapid expansion of Federal environmental and safety regulation in the 1970s has affected capital formation in several industries. This new regulation has mandated specific types of investment and has also made it temporarily more difficult for business firms to forecast the costs and benefits of investments designed to create new capacity.

--Price controls on oil and natural gas produced in the United States have retarded capital formation for energy production.

--Activity in the international marketplace has affected the way people

perceive the effects of their investment and saving and, consequently, their economic behavior.

FEDERAL ACTIONS THAT COULD PROMOTE CAPITAL FORMATION

The Federal Government influences saving and investment in numerous ways that could, in turn, promote a more rapid rate of capital formation. A list might be made of them, but further study is needed to determine their probable magnitude and cost. In the future, GAO will examine selected Federal actions that could be taken to promote increased capital formation. Some of these encompass:

--gradual reduction in the Federal budget deficit,

--changes in the tax system to correct for the distorting effect of inflation on measured corporate profits,

--reductions in the rate of taxation on the return to saving,

--elimination of the limits imposed by Federal regulation on the interest rates that can be paid on small deposits,

--stabilization of the regulatory environment,

--reconsideration of the effects of Federal credit programs on the availability and cost of funds for private investment,

--stabilization of the rate of inflation through the elimination of sharp changes and sudden reversals in monetary and fiscal policy.

An increasing awareness of the profound effect of Federal actions on the use of capital and its rate of increase is as important as any single measure designed actually to promote increases in saving and investment.

Contents

CHAPTER 1

INTRODUCTION

Capital formation is essential to economic growth. Creating jobs and improving productivity depend on it. Energy production, pollution abatement, mass transit construction, and other public policy goals require it. The longrun effects of capital formation extend to every American. A slowdown is, therefore, a matter of great concern.

Business capital grew slowly in the 1970s. From 1969 through 1978, the net stock of fixed capital in the business sector grew at an average rate of 3.1 percent a year; this rate of capital formation was 25 percent lower than that between 1949 and 1969, when it averaged more than 4 percent a year. 1/ No single measurement is definitive, but allowing for differences of opinion about the magnitude and timing of the decline, most observers agree that capital formation has slowed down.

An even more important indicator of the slowdown is the decline in the growth rate of capital available to the Nation's labor force. The availability of capital per worker has a major influence on labor productivity, the expected return or profitability of capital, and the real income and standard of living of consumers. If the slowdown in capital formation in the 1970s had been accompanied by a decline in the growth rate of the labor force, its economic effects would have been less severe, but the labor force expanded rapidly while the growth of capital stock declined. From 1949 to 1969, business employment grew at an average rate of 1.2 percent a year; after 1969, this rate nearly doubled. As children born during the 1950s entered the labor market in the 1970s, business employment rose at an average annual rate of 2.1 percent. 2/ All these figures reveal that the rate of increase in capital availability per worker declined by

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1/These growth rates were calculated from data in U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business.

2/Business employment has been calculated here by subtracting Government wage and salary workers from total civilian employment. Data are drawn from Economic Report of the President, 1979, and Council on Economic Advisers, Annual Report (Washington, D.C.: Government Printing Office, 1979).

approximately two-thirds in the 1970s. This sharp decline contributed to a sluggish rise in labor productivity and retarded the normal rise in the standard of living.

Some commentators believe that the slow rate of capital formation is also responsible for the increase in inflation, the deficit in the balance of trade, and rising unemployment. To what extent this is so is debated among economists and business analysts. They also disagree about the causes of the slowdown. It has been attributed to a wide variety of causes, prominent among which are the activities of the Federal Government, ranging from taxation and deficit financing to environmental and safety regulation.

We cannot evaluate the merits of these arguments without understanding the process of capital formation and how it is affected by actions of the Federal Government. In this report, we broadly define capital formation and the economics of saving and investment, and we set the stage for further analysis of the subject in future reports.

DOES A CAPITAL SHORTAGE EXIST?

The slowdown in capital formation came to public attention after the 1974-75 economic recession. It was widely discussed in the business press as "the capital shortage." This proved to be confusing. Attempts to measure shortage did not succeed in clarifying its dimensions or even establish its existence. A slow rate of capital formation has persisted for several years, but it is not clear that it has resulted in a shortage of capital.

The term "shortage" is well defined in economics and refers to a situation in which the demand for some commodity exceeds its supply. For capital, this could mean either a shortfall in financial markets, with the demand for loanable funds outpacing supply, or a shortage of productive capacity, preventing producers from fully meeting their customers' demands. In this latter sense, the term is unambiguous. Its signs are clear to everyone trying to buy or sell a commodity, and anyone who has ever waited in a gasoline line is familiar with them. Shortages of this type have occurred from time to time and are likely to occur again, but they are essentially temporary and disappear when markets are free to operate.

The basic economic mechanism for eliminating shortages is a rise in the price of the commodity in short supply. In financial markets, this means a rise in interest rates. When the demand for loanable funds exceeds the supply, some lenders find they can raise their rates without losing customers; some borrowers willingly pay higher rates rather than go

without credit. Other borrowers become discouraged, while additional funds are attracted by the rise in rates. Eventually--in well-organized financial markets, almost instantaneously--a new balance is struck in which all creditworthy borrowers willing to pay the higher rates obtain the funds they desire. The normal functioning of the market eliminates the shortage.

A shortage of loanable funds can persist only if interest rates are prevented from rising. In fact, Federal and State regulations place ceilings on some interest rates and, in this way, have contributed to capital shortages, most noticeably in the home mortgage market, where the regulation of rates is most extensive. The current trend is not toward further extension of this type of regulation, however, and therefore we have no reason to fear persistent shortages in financial markets.

Many of the basic materials industries experienced shortages of productive capacity or physical capital at the peak of the 1973 boom. These bottlenecks ended with the subsequent recession, however, and, by and large, have not recurred. In fact, many of these industries have been operating at considerably less than full capacity in recent years.

Shortages of this sort also respond to changes in market conditions. Goods in short supply, because of a capacity constraint, normally rise in price relative to goods that require less capital or whose production may be quickly increased without additional investment. As the relative prices change, some customers switch to the relatively cheaper goods, and the shortage eases. In 1973, wage and price controls hampered this process of normal adjustment. Over the longer run, industries affected can either add to capacity or redesign it to permit its more intensive use. As these adjustments occur, relative prices shift back again as production increases. This kind of shortage is also essentially temporary when markets are free to function.

Such bottlenecks cannot be permanently avoided simply by increasing productive capacity. Additions to capacity permit the economy to produce more goods and services. Additional production also generates additional claims on the economy's output, however. In other words, it is matched by an equivalent increase in the incomes of the people who produce the extra output. As this income is spent, demand rises to match the increase in supply.

Bottlenecks do not occur simply because what can be produced in a single industry or in the total economy is limited. These limits always exist. Bottlenecks arise when demand has

temporarily outstripped existing limits. Indeed, over the last two centuries, existing limits have usually been outstripped in some industries at the peak of every business cycle, despite the fact that capacity has grown enormously in that time. Ultimately bottlenecks can be minimized, if not avoided, by cautious demand management policies. Adding to capacity does not by itself prevent them, because it does nothing to limit demand.

The reduced rate of capital formation in the United States raises serious questions about economic policy and government activities that may have contributed to it. The slowdown has not been limited to the supply of new capital goods. A slower rate of increse in the market demand for capital also reflects it. As a result, shortage in the sense of demand exceeding supply has not accompanied the slowdown, except for temporary instances at the peak of the last business cycle in 1973. Temporary shortages, in themselves, do not appear to justify major changes in economic policy.

IS THE STOCK OF CAPITAL ADEQUATE?

Recent discussions of capital formation have used the term "capital shortage" in various ways. For some, it apparently means little more than a belief that the current stock of capital or rate of saving is less than desirable. The United States could certainly put additional capital to good use producing more goods and services, and a higher saving rate might have beneficial effects at home and abroad by demonstrating an increased willingness to sacrific current benefits for future gains. These are only opinions, however, and they are too general to help much in analyzing economic policy.

Capital is scarce, but so is any good that has economic value. Saving can yield future benefits, but it is not an absolute good always to be preferred to current consumption. If consumption is continuously deferred for the sake of additional saving, the material benefits from higher saving can never be realized. Having decided that more capital would be useful and that saving is a good thing, one is still left with the questions: How much? For what purposes? Who decides?

These questions are addressed, at least impliCitly, by analysts who have attempted to forecast capital requirements for the United States. Typically, this involves estimating the amount of capital needed to meet certain economic or social goals. This is called the "required stock of capital," and capital shortage can be defined in reference to it. If

the actual stock of capital falls short of the required stock, or, as more commonly defined, if the projected flow of saving fails to match the amount of saving needed to reach the required stock of capital forecast for some point in the future, then saving is held to be inadequate, and a capital shortage is said to exist. The usefulness of this type of analysis obviously hinges on finding sensible criteria for capital adequacy. Doing this is not as straightforward as it might seem.

One definition of required stock of capital that economists might widely accept is that it equals the total demand for capital by consumers, business firms, and public agencies. Demand here means the total quantity of capital these groups wish to hold and for which they are willing and able to pay, as can be observed in their market behavior. We can reasonably call this the required stock of capital, because it reflects the judgments of people who actually use it. They possess the most complete and accurate information about their individual requirements. Because they must pay for the capital they use and because they can expect to earn a return on it, they have the strongest incentives to gauge their demands correctly.

According to this definition, there is no reason to fear a shortage of capital. If market demand is the measure of the required stock of capital, any shortage that emerges will be like those described in the previous section. If the demand for capital exceeds the supply, market adjustments eliminate the imbalance. In the absence of comprehensive controls on interest rates or credit rationing, shortages of capital are temporary. Changes in policy will not be needed to eliminate them. Any analyst who claims otherwise must base the definition of required stock of capital on something other than the perceived needs of actual investors.

This point is sometimes obscured by the method generally used to calculate the required stock of capital, consisting of projections based on historical experience. This method quantifies the economic goals for which capital is needed by extrapolating past rates of growth in national product, real wages, or other economic variables. The amount of capital required is then obtained by multiplying these projections by the ratio that has prevailed historically between the stock of capital and the relevant economic variable. We can refine this method by disaggregating--that is, by considering the capital requirements in each industry separately--or by adjusting the required ratio of capital to reflect past trends and probable changes. We can supplement it by including the capital formation mandated by government for pollution abatement, energy conservation, and other purposes.

Similar methods are often used to forecast the future market demand for capital. In either case, the goal is to predict with as much accuracy as possible the quantity of capital that actual investors will desire to hold at some point in the future. Whether we call such an estimate the required stock of capital or the market demand for capital is only a matter of terminology.

It is also possible to project future saving. We can calculate future saving separately from the estimate of future capital requirements, but we have no guarantee that they will coincide. Most studies of capital requirements use this type of calculation. It is not surprising, therefore, that in some studies we find a gap between projected capital requirements and projected supply of new capital through saving. The gap is identified as a potential capital shortage and some have used it to recommend changes in policy that might close it. We should question this approach on several points.

In the first place, it puts an excessive burden on the forecasting ability of economists. Economic forecasts are frequently wrong, for many reasons. Economic relationships are notoriously unstable. Shortrun forecasts are often in error. Longer run forecasts are even more hazardous. Unexpected policy changes, international events, technological innovations, changes in the investment climate, all make accurate forecasting over a period as long as several years highly uncertain. A projection for capital requirements or saving can never be more than a well-informed guess, and in many cases the numbers will be wildly inaccurate.

Second, and more important, technology does not dictate the amount of capital we need to produce a given amount or employ a given number of workers. Even if we knew the most desirable levels of production and employment, we could not specify how much capital we would need to achieve them. The economy can operate with widely varying amounts of total capital. People in business can adapt to variations in the rate of saving. Full employment mandates no specific quantity of capital but can be achieved at different levels of capital per worker. It is noteworthy that we have seen a record increase in employment during the past 10 years while the rate of capital formation declined.

Projections that show a gap emerging between saving and the required rate of capital formation neglect the operation of market forces. Authors of such projections do not allow their "required stock of capital" to respond to changes in market conditions, but the future actual demand for capital will unquestionably respond. As a projection of future market

behavior, any study claiming to find a capital shortage has doubtful validity.

Third, and most important, projections of past trends, even if they were accurate, should not dictate future policies. Why should past economic performance bind the future? After all, past economic behavior reflects the judgments and preferences of consumers, workers, and business firms in the past. Why, then, should a projection be a more reliable indicator of the appropriate rate of capital formation for the present than the current judgments of economic agents in today's marketplace? Is a slowing down of capital formation that is caused by such judgments sufficient reason in itself to change the rate of capital formation by overriding them?

The question of how much capital formation is desirable has no simple answer, and we have no reason to believe that economic analysis and computer projections can by themselves provide one. The term "capital requirements" misleads, precisely because it suggests that a technical answer to the question is possible. Economic analysis can contribute, however, to a deeper understanding of the process of capital formation, and it can clarify the issues of Government policy regarding saving and investment.

THE SCOPE OF THE REPORT

In the U.S. economy, Federal Government actions affect capital accumulation and allocation in major but mostly indirect ways. No Federal policy mandates the rate of capital formation. It is the outcome of a complicated market process in which Government actions are only some of the influences at work among the actions of all the major economic institutions in our economy. In this report, we describe the key elements in that process. We highlight important relationships, such as the link between investment and saving, and we draw attention to the several channels through which any change in a major Federal activity, such as taxation, is likely to operate.

We base our analysis of investment and saving on standard economic theory. In chapters 2-4, we focus attention on the critical determinants of private capital formation. In the remainder of the report, we consider the actions of the Federal Government, analyzing spending, taxation, and other influences on the accumulation and allocation of capital. Specifically, in chapter 2 we discuss the demand for new capital or net investment; in chapter 3, how that capital is supplied through saving; and in chapter 4, how saving and investment are coordinated and interest rates are

determined in the marketplace. Then, in chapter 5, we look at the effects of government expenditures, in chapter 6 the effects of taxation, and in chapter 7 the effects of investment subsidies, regulation, and international policies. In chapter 8, we summarize our principal findings on the nature of domestic capital formation, having applied our understanding of capital formation in the private sector to our analysis of economic activity by the Federal Government.

The background information and perspective we provide in this report are useful in themselves, but they represent only a first step to understanding capital formation. Additional studies will fill in the outline we provide here and will link capital formation to other major national economic issues. In one such study already in progress at GAO, we will discuss the relationship of capital formation to productivity growth. Still others are planned for the near future.

CHAPTER 2

INVESTMENT: THE DEMAND FOR NEW CAPITAL

A DEFINITION OF CAPITAL AND INVESTMENT

In a general sense, capital consists of any good that is used to produce other goods or services and is itself produced. This distinguishes it from final goods, whose consumption is the ultimate purpose of economic activity, and from natural resources, which cannot be increased by human effort.

Labor is more productive when it uses capital, and this is important because our standard of living depends on our capacity to produce goods and services. Capital formation increases this capacity. In the modern economy, technical progress and capital formation are the two main ways in which productive capacity grows. Moreover, capital formation facilitates technological progress by embodying technical advances in new capital goods.

Capital formation requires net investment, defined as investment that exceeds capital replacement. It also requires a desire to invest, which can be frustrated if no resources are available. Saving releases resources for investment, and, therefore, we think of it too as a requirement for capital formation. We shall discuss the desire to invest separately from the desire to save, which is the subject of chapter 3.

THE COMPOSITION OF THE NATION'S STOCK OF CAPITAL

Business capital

The equipment and buildings owned or leased by business are clearly capital, in that they are used to produce most of the commodities the public consumes. As measured in the national income accounts, business purchases of plant and equipment are the largest component of investment, and most discussions of capital formation concentrate on them. People who argue that the rate of capital formation is too low are concerned primarily with the rate of investment in business capital, particularly in manufacturing. Table 1 shows the net stock of business capital in the entire economy and in the manufacturing sector between 1950 and 1977.

Table 1

Net Stock of Fixed Nonresidential Business Capital

	Total a/	Average annual percentage change	Manufacturing a/	Average annual percentage change
1950	$ 367.5		$102.6	
		4.2		3.5
1955	451.3		121.9	
		3.4		2.0
1960	533.0		134.7	
		3.9		1.9
1965	645.9		148.3	
		5.2		4.6
1970	833.7		186.5	
		3.3		1.6
1975	981.2		202.2	
		1.8		2.3
1976	999.0		206.8	
		2.5		2.9
1977	1,024.3		212.8	

a/Billions of 1972 dollars.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, April 1976, p. 49, and September 1978, p. 46.

We center attention on business capital in this report, but it is only one component of capital as we define it. The other components--consumer, public, and human capital--contribute to the production of goods and services as well, and they compete with business capital for a limited supply of saving. Additions to business capital entirely at the expense of other forms of capital do not contribute to total capital formation, and they make little net contribution to total production. Some of the other forms of capital may actually be more important than business capital in promoting production efficiency.

Consumer capital

Houses and apartments are capital because they supply shelter and residential services, and expenditures for new housing count as investment in the national income accounts. Housing is the largest component of consumer capital. In fact, in 1978, it accounted for approximately 30 percent of gross investment.

Most people own or rent a number of capital goods in addition to housing. A car is a capital good, for example, because it helps supply a flow of transportation services. Economists call cars "consumer durables," which may be defined as physical capital used by individuals or families. Other consumer durables are household appliances and furnishings and recreational equipment.

Although expenditures for consumer durables are an important form of investment, they generally produce an intangible service that is not exchanged, and, consequently, the return on them is hard for outside observers to measure. In fact, the national income accountants count them as personal consumption. This does not mean that if the return could be measured accurately it would be less than the return on business capital, and it does not justify a policy of investment incentives that disregards this form of capital. Ultimately, the justification for increasing capital formation must be that it increases possibilities for consumption, and this in turn normally entails some increase in the stocks of consumer durables.

Public capital

Government uses capital goods to produce public services. The national income accountants do not include Government expenditures on new capital in measured investment, but many of these goods would be counted as capital if they were privately owned. For example, hydroelectric projects, highways, and Government office buildings all provide useful services that are comparable to services produced in the private sector. Durable goods such as military equipment owned by the Government are less obviously capital, only because they provide services not readily duplicated by private business.

The return on public investment is frequently difficult to measure, because Government services are usually intangible and seldom sold. Public capital makes nonetheless both direct and indirect contributions to the economy's total production of goods and services. Public investment is also often complementary to private investment. Highways, for example,

complement privately owned cars and trucks, and investments in highway construction and repair increase the return on them.

Public investment is necessary, too, whenever private incentives do not suffice to attract capital to certain activities that are socially beneficial. This is especially true of investment in research and development, where we see a high social return in the form of new knowledge that is hard to capture in the market. Copyrights and patents help stimulate private investment, but they have their own drawbacks. Without some form of public support in these areas, the rate of investment in new knowledge is likely to be inefficiently small.

Human capital

The acquired talents and skills of people in the labor force are called human capital because they yield a return in the form of increased productivity and because acquiring them requires investment. Human capital has raised real wages and salaries instrumentally in the United States. A substantial body of evidence attributing much of the growth in American productivity to investment in human capital suggests that a program of incentives that does not extend to investment in human beings cannot be expected to improve the rate of productivity growth significantly.

THE DETERMINANTS OF BUSINESS INVESTMENT

Capital formation requires a willingess to invest in excess of depreciation. Net business investment necessarily reflects an increase in the desired stock of business capital. If the desire for stock does not increase, there is no incentive for net investment. Purchases of new capital will merely replace existing capital as it wears out. Gross investment will equal depreciation, and net investment will be zero.

Economists assume that people in business use profitability to decide how much capital to buy or lease. A desired stock of capital maximizes profit. 1/ To reach maximum

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1/Most critics of this assumption overlook the distinction between profitability as an investment criterion and profit as a goal of human behavior. Most presume that profit maximization implies a single-minded pursuit of monetary

profit, a firm must acquire additional capital whenever the revenue expected from an additional unit of capital exceeds the cost of acquiring it. The difference between expected revenue and extra cost contributes to profit, and as long as this difference is positive the firm will profit from expanding its capital. In the language of economists, the desired stock of business capital is that for which the value of its marginal product equals its marginal cost. Thus, the determinants of a desired stock of capital are the influences on its productivity and the influences on its cost.

The cost of capital

We can see the cost of capital most easily when a firm leases its capital. In the absence of taxes, cost is simply the rental price. To acquire a desired stock of capital, the firm should increase the amount it leases until the revenue produced by an additional unit equals the rent.

Rental price depends on the purchase price of the capital good and interest rates on other assets. For example, if a capital good sells for $1,000 and the rate of interest available to its owners from alternative investments is 5 percent annually, then this capital good must rent for at least $50 a year in a competitive market. Its owners must receive at least $50 a year from renting it; if they cannot, they will sell their asset and invest the money elsewhere. An increase in the price of capital or in interest rates will clearly raise the cost of capital to the firm.

The cost of capital also includes an allowance for physical depreciation. The owners of a capital good will want to be compensated for the loss if, over the course of a year, the capital good loses some fraction of its value through normal wear and tear. In our example above, if the

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gain and then argue that most people, including those in business, do not behave this way. People have other goals, they say, and most are unwilling to sacrifice leisure, peace of mind, or public respect for a few extra dollars. If profit maximization did imply this, it would surely deserve criticism, but it does not. It implies instead that firms invest whenever expected additional revenues exceed all expected additional costs. The gain must outweigh the costs or it will be avoided. But costs include the cost of forgone leisure, extra anxiety, and public disapproval, and if these are too high, profit cannot be maximized and people will not make the investment.

capital good loses 10 percent of its value in this way, then it will rent for $150. Ten percent of its $1,000 value, or $100, is added to the rent to compensate for physical depreciation.

If the market price of a capital good is changing in a way that can be anticipated when it is leased, this will also effect the rent charged for its use, in essentially the same way as physical depreciation. For example, if the market value of our capital good is falling by 3 percent a year, rent must rise by $30 per year to compensate for the decline.

If the firm buys its capital, the cost is calculated in essentially the same way, provided the capital has an active resale market. The firm is, in effect, renting capital from itself. When the firm holds capital in the desired amount, the revenue expected from an additional unit just equals the interest forgone in acquiring it plus an adjustment for any anticipated change in market value as a result of physical depreciation or changes in market conditions.

Firms frequently purchase capital goods for which there is no active resale market, however. Factory buildings and specialized equipment often have a very limited usefulness aside from the purpose for which they were designed. In deciding how much of this kind of capital to purchase, a firm must still consider the factors we have already identified. What distinguishes this decision is the length of the planning horizon. The firm will be committed to its equipment for years and its buildings for decades. The firm must know the current return on investment, and it must forecast the future return as well. Nevertheless, we see that the fundamental determinants of the cost of capital are the same.

It is helpful to consider a highly stylized example in which a firm knows with certainty the stream of revenue associated with an addition to its current stock of capital. Given the interest rate on alternative investments, we can calculate the present value of an additional unit of capital with the following formula:

$$PV = \frac{R_1}{(1 + r)} + \frac{R_2}{(1 + r)^2} + \ldots + \frac{R_T}{(1 + r)^T}$$

PV represents the present value of the extra capital, and r is the interest rate. Rl, R2, through RT represent

revenue expected from this unit of capital in subsequent years. T is the number of years the firm expects the capital to last. Annual revenue must be discounted for each year at a compound rate, to reflect the fact that it cannot be realized instantaneously. The appropriate interest rate to use in the discounting formula is the highest rate the firm could earn by lending funds to others rather than using them to add to its own stock of capital. This gives the trade-off between current and future income.

If the present value of an additional unit of capital exceeds its price, the firm should buy it. When the desired stock is attained, its present value as given by the formula just equals the cost of new capital. The cost still depends on the price of capital goods and increases when this price rises. Cost also depends on the rate of interest. When the interest increases, the present value of a marginal unit of capital declines. Using funds to increase the firm's own stock of capital will have become less attractive than lending the funds to others. Unless the revenue stream is also changing in a way that just offsets the change in the interest rate, the firm will find it necessary to modify its investment policy to restore a balance between the present value of its capital and the replacement cost.

We can modify the formula to accommodate more realistic investment opportunities. A firm uncertain about the future returns from additional capital and averse to risk may add a risk premium to the interest rate used to discount the returns. This reduces the present value of the riskier investments relative to investments whose return is similar but more certain.

As the capital wears out with use, depreciation can also be reflected in the formula. A fairly stable rate of depreciation may be added to the interest rate. This lowers the present value of less durable investments relative to investments whose return is similar but that depreciate more slowly. We can also make adjustments to the return stream, to reflect the diminishing productivity of capital as it wears out.

The effect of changes in the market value of capital goods on the cost of capital is not immediately clear in the formula. Even when the firm is unable to sell its capital except as scrap, however, it is still free to postpone buying new capital goods. When it is free to postpone, expected changes affect the timing of their purchases. Expecting an increase in price, for example, a firm may increase current investment while reducing the amount of investment

planned for the future. An expected decrease in price has the opposite effect.

When a firm postpones investment, it sacrifices the revenue that it might have earned from using new capital in production. The interest that can be earned by lending funds that would otherwise have been devoted to buying new capital offsets the revenue that is forgone. The firm also avoids the cost of depreciation. The firm will find it profitable to postpone investment, then, if the difference between the revenue forgone and the sum of interest earned plus depreciation avoided is less than the decline expected in the price of new capital.

In summary, the major determinants of the cost of capital to the investing firm are market interest rates, prices of capital goods, anticipated changes in these prices, and rates of physical depreciation. An increase in interest, in the price of capital goods, or in depreciation raises the cost of capital. A prospective capital gain lowers it, and an anticipated loss raises it. A change in the cost of capital alters the amount of capital that businesses desire to use and, consequently, affects net investment. An increase in cost generally leads to a reduction in the desired stock of business capital, while a decrease raises it. To see why this is so, we must consider the determinants of the productivity of capital.

The revenue expected from investment

Business firms wish to hold more capital when the revenue expected from investment exceeds its cost. When a firm increases its capital, it is able to produce more. The revenue expected from the investment is the additional income earned when the product is sold. The major determinants of this revenue are, therefore, the productivity of additional capital and the price at which the extra product can be sold.

The productivity of capital depends on technology, the supplies of other resources, and the stock of capital itself. It is generally true that an economy becomes more productive as its stock of capital increases, but this does not mean that each capital good becomes more productive as the number of capital goods increases. Indeed, economists believe the opposite occurs. Unless offset by improvements in technology or the increased availability of other resources, increases in the stock of capital generate smaller increases in production as the capital stock grows. The well-known law of diminishing marginal productivity implies this. Putting other

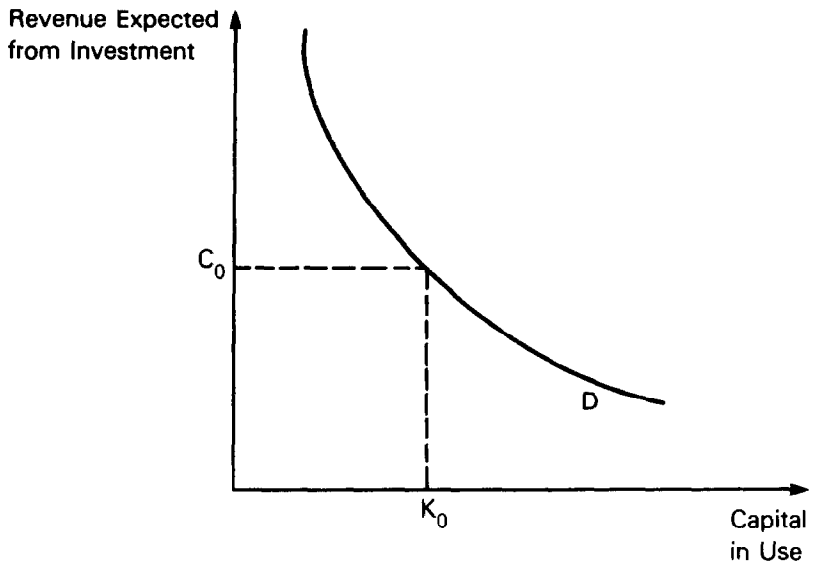
changes aside, it means that the revenue expected from investment is related inversely to the size of the capital stock. Other things being equal, more capital means smaller productivity of each capital good.

In a dynamic economy, other things do not remain equal. If they did, the United States and other developed economies could not have accumulated capital as they have. Population and technology have checked the depressing effect of accumulation on the revenue expected from investment. Population growth makes workers available to staff new equipment and factories. Competition for labor does not push wages up at the expense of income from capital, however. The rising real wages that have tended to accompany continuing capital accumulation can be explained only by the advances in technology that have continued so rapidly over the past two centuries. The invention of products and processes in agriculture, manufacturing, transportation, communication, and all other areas of economic activity has increased the productivity of all economic resources, including capital. Technological progress has continued to raise the revenue expected from investment and has offset the depressing effect of past accumulation and high real wages.

The value of the extra product from additional capital depends on the demand for it. In a stagnant economy, an industry that expands its capital and production rate may face growing sales resistance and falling prices for its products. This lowers the revenue expected from investment, even with no decline in the physical productivity of capital, and it checks further expansion. However, in a growing economy, the demand for most products rises, and firms can invest without experiencing a decline in expected revenue. They do not need to reduce prices in order to encourage additional sales.

We can summarize these influences on the revenue expected from investment in a diagram that also shows the demand for capital. In figure 1, the horizontal axis measures the services of capital that a firm uses (total machine hours might be an example). The vertical axis measures the revenue expected from investment in additional capital (in dollars per unit of capital, for example). Curve D sloping downward represents the return on investment and reflects the diminishing productivity of additional units of capital as more capital is used. In this figure, we assume that only the quantity of capital varies and that other effects on revenue do not change. Diminishing marginal productivity guarantees that as K, the capital stock, rises, the revenue expected from investment in additional capital declines.

Figure 1
The Demand for Capital

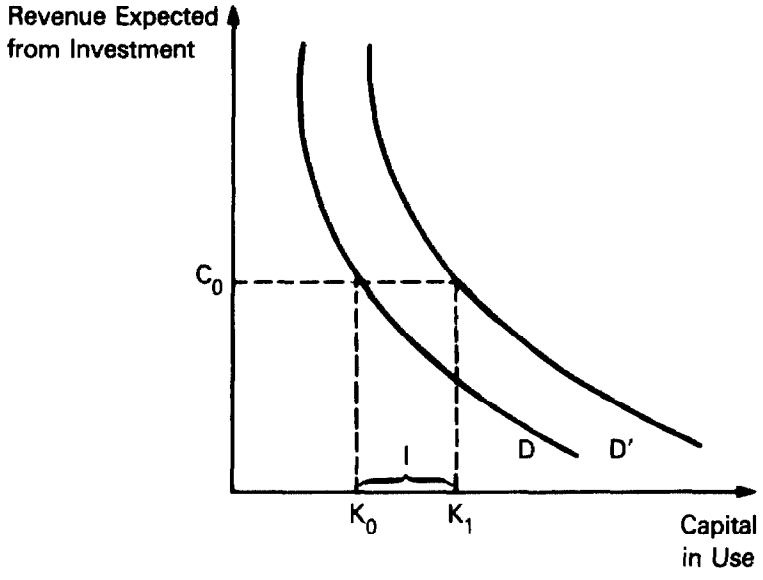


Curve D can also represent the demand for capital. If the cost of capital or rental prices is C_0, then the firm can maximize profit by using K_0 units of capital. Using less capital than K_0, a firm might expect revenue from investment to be greater than C_0, and expansion would be profitable. Using more capital than K_0, the firm would find its revenue falling below C_0; contraction would prevent loss and increase total profit. Thus, we can see how the quantity of capital that business demands varies with its cost.

We can see the other influences on the revenue expected from investment by shifting the curve, as in figure 2. If technological change or an increase in the labor force makes capital more productive, then the return on investment will increase. This will occur at any level of capital use.

The vertical displacement from D to D reflects the increased return to investment at any level of capital use. The horizontal displacement I measures the desired increase in capital following a shift to any other cost of capital. If the firm originally uses an amount of capital K_0 corresponding to a capital cost or rental price C_0, then after the technological change or labor increase it will wish to

Figure 2
Technological Progress
and the Demand for Capital



use K_1 units of new capital, unless the price changes. Figure 2 shows how a desired rate of capital formation stems from dynamic changes in the economy that increase both the revenue expected from investment and the total demand for capital.

Figure 2 shows that when the cost of capital is not falling steadily over time, positive net investment ceases unless the dynamic factors described above--population growth and technological progress--continue to shift the demand for capital outward. In the absence of such dynamic changes, a permanent reduction in the cost of capital that happens only once results in a permanent one-time increase along an unchanged demand for capital curve. Once the new higher level of capital is attained, however, there is no further stimulus to net investment, and capital formation is no higher, although the cost of capital is lower. However, replacement investment will be permanently higher as a result of the decline in the cost of capital, and, consequently, gross investment will increase. The amount of capital that business firms wish to employ increases to a point beyond which it does not move, but once a business firm has acquired additional capital, there is no further stimulus to net investment. Replacement investment will have become permanently higher

by such a change, and gross investment will therefore be permanently higher, because of a decline in the cost of capital.

In the absence of other changes, maintaining a positive rate of net investment would require a continuing decline in the cost of capital. In fact, the rate of interest after adjustment for inflation, while variable, shows no marked trend in any developed economy, and capital goods have not become significantly cheaper relative to other manufactured goods. Consequently, variations in the cost of capital have made little if any longrun contribution to business investment in the United States.

Changes in the cost of capital deserve serious attention for at least two reasons, however. The first is that changes in interest rates and capital goods prices change the stock of capital and the ratio of capital to labor. They have a permanent effect on total and per capita output, and, even though their effect on the longrun rate of growth is insignificant, their shortrun effect is not. Over several years, investment will be higher if the cost of capital declines or lower if the cost rises. These temporary effects can depress a buoyant economy or revive a sluggish one. The second reason for paying serious attention to changes in the cost of capital is that Government through its taxing, spending, and finance policies influences interest rates more than it influences the rate of technological change and population growth. The cost of capital is, therefore, the major channel of Government influence on capital formation.

The effect of inflation on business investment

Changes in prices can affect the business demand for capital and, consequently, the desired rate of investment. If the prices that firms receive for their products rise, revenue expected from investment will also rise. At the same time, if the prices of capital goods are rising, so is the cost of capital. When the return on investment and the cost of capital rise in the same proportion, the desired stock of capital does not change. Net investment is not affected by a uniform increase in prices. Inflation, defined as a substantial and sustained increase in prices, will therefore affect net investment only if it affects the revenue expected from investment and the cost of capital asymmetrically. (We will modify this conclusion when we consider taxes paid on income from capital, in chapter 6.)

Most inflation is not characterized by uniform rates of price increase, and capital goods prices certainly may

increase more or less rapidly than the prices of the goods produced with that capital during inflation. Such disproportionate changes alter the balance of cost and revenue expected, and they affect investment. No evidence shows, however, that such changes in relative prices could be avoided by better controlling the average rate of price increase. If relative price changes occur whether the average price level is rising, falling, or stable, they are unrelated to inflation. The effects of changing relative prices on investment can be important, but they are distinct from the effects of inflation. Rapid increase in the price of oil, for example, relative to the prices of other goods and services affects investment whether or not the average price level is rising or falling. This leaves us with the uniform increase in prices as the distinguishing feature of inflation, and it remains to be seen whether such an increase can alter the balance of cost and revenue expected from investment.

A uniform increase in prices has offsetting effects on the prices of capital goods and goods and services produced by capital. Since these effects are symmetrical, they do not affect investment. In addition, inflation affects anticipated capital gains and interest rates, and here a potential asymmetry emerges. Once inflation is anticipated, it increases the capital gains expected from holding capital. This lowers the rental price of capital to the user, as we discussed earlier. The owner who expects a gain can charge lower rent for an asset and obtain the same return as can the owner of an asset that does not rise in value. Through its effect on anticipated capital gains, inflation lowers the cost of capital and stimulates investment. If there were no further effects, it would contribute to capital formation, but inflation also affects interest rates.

Lenders who anticipate inflation insist on a higher rate of interest, to compensate for the reduction in the purchasing power of their wealth. If interest rates rise by the full amount of the inflation that investors expect, the increase will completely offset the reduction in the cost of capital stemming from anticipated capital gains. Therefore, the only asymmetry possible is the difference in the rates of inflation expected by investors and those from whom they borrow. Evidence suggests that interest rates have adjusted slowly to changes in inflation. Although we have seen some adjustment in recent years, in response to the acceleration of inflation to the 1960s and 1970s, interest rates have frequently failed to protect lenders fully from inflation's erosion of their wealth. However, such failure to anticipate high rates of inflation can stimulate investment only if investors are better than savers at predicting inflation. If investors are

also surprised by inflation, the mistake lenders make will not stimulate investment.

Perhaps the most serious effect of inflation is the uncertainty created by variations in the rate of inflation. Recent inflation has been rapid and volatile. Its rate has risen dramatically and then fallen sharply, only to rise again, preventing accurate calculation of the average price trend over moderate lengths of time. This has increased the risk in most forms of fixed investment. It has probably prevented investment in projects that might well have appeared profitable in a more stable economic environment. If the Federal Government does not succeed in stabilizing the rate of inflation, capital formation will be inhibited.

THE DEMAND FOR CONSUMER DURABLES

Much of the Nation's capital takes the form of durable consumer goods, including homes and their furnishings and cars. We can analyze the desired stock of consumer durables in the same way as the business demand for capital, if we modify the analysis to show that the return to consumer durables consists of a flow of services rather than a stream of revenue. When families and individuals hold the amount of consumer durables they desire, the market value of this flow of services equals the cost of the capital. As with business capital, we can expect the productivity of additional consumer capital to decline as the stock of it increases, barring changes in technology or the availability of other inputs. 1/ In addition, we can expect the indirect satisfaction of increasing the stock of consumer durables to decline relative to the direct satisfaction of buying and consuming additional final goods. For both these reasons, the return to consumer durables declines as their quantity increases, in the absence of offsetting changes.

The cost of using consumer capital depends on the prices of the goods, expected changes in prices, and interest rates. Increasing the cost leads to a reduction in the desired stock of consumer durables, whereas reducing the cost leads to an increase in the desired stock. Technological advance in the form of new goods and improvements in the quality of existing goods raises the return and the demand for this kind of

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1/ In recent years, economists have studied production within households in some detail. They consider consumer durables as resources along with the labor supplied by family members for producing a flow of services and final goods.

capital. Population growth affects the demand for these goods directly. The recent housing boom stems largely from an increase in household formation, the demographic reflection of the relatively large number of children born after the Second World War. These dynamic forces have offset the depressing effect of accumulation on the return to consumer durables and have sustained continuing investment in this form of capital.

INVESTMENT IN HUMAN CAPITAL

Wages and working conditions vary greatly in the United States labor force, because the many different jobs require different skills. Although people differ in their ability and willingness to acquire skills, some invest in the effort. Economists call acquired skills human capital, because individuals who have acquired skills supply a valuable stream of services and, thus, contribute to the economy's productive capacity. This increased productivity is reflected in workers' larger paychecks. The difference in pay between skilled and unskilled labor is a measure of the return to this form of capital.

People typically acquire human capital before entering the labor force, through education and training, but they are also often faced with the decision of whether to change their skills or levels of competence. When they decide to pursue advanced training, they are investing in human capital, having considered both the costs and the returns associated with the investment. The return can be measured by the increase in income that the training makes possible. It is analogous to the extra revenue a firm obtains when it invests in physical capital. The cost of the investment is the sum of the direct out-of-pocket expenses and any decline in current income required by the training. Thus, the cost includes direct expenses like tuition, books, and fees and also, often more importantly, the income forgone during training. Since the extra income from additional training is earned in the future while the training costs are incurred in the present, returns must be discounted before they are compared to the costs. If the discounted value of the additional income that is expected exceeds the full cost of acquiring it, a worker is likely to make the investment. If not, the worker will probably not take the training. Precise calculation is not always possible, because such decisions are influenced by people's taste for education, which is always in part a final good. It is generally true, however, that demand for training responds to changes in cost and the return expected from the training.

The formula for calculating present value can be adapted to reflect this. We need modify it only to reinterpret the return stream, R. This is the income differential associated with the extra training. When the rate of interest used in discounting the expected income stream is lower, its present value is larger. Given the cost of training, more will be demanded as the interest rate lowers.

As with other forms of capital, the return to investment in human capital declines as the stock of it grows. The depressing effect of accumulation can be partially or wholly offset by changes in technology or other aspects of labor supply, but without these changes the return declines. The income differentials between skilled and unskilled labor shrink. A college degree becomes less valuable as the number of college graduates rises. However, if technology is advancing, new specialties emerge, opportunities to gain from training in new fields arise, and new ways to make old skills useful are discovered.

CONCLUSION

Desired investment depends on the cost of capital and the revenue expected from investment. Reducing the cost of capital increases the desired stock of capital and stimulates investment; increasing the cost has the opposite effect. The cost of capital shows no marked tendency to rise or fall over the longrun, although shortrun variations commonly occur. Shortrun changes contribute to the business cycle, but sustained growth in the capital stock must be explained by dynamic changes in the economy that have raised the revenue expected from investment. Most important in maintaining net investment is technological change. It has resulted in new forms of capital, new methods of production requiring capital expenditures, and new skills and specialties requiring training and investment in human capital. It has offset the depressing effect that continuing capital accumulation would otherwise exert on the revenue expected from investment. In chapter 5, we use the concepts of business investment developed here to analyze investment in public capital.

CHAPTER 3

SAVING

Without saving, capital formation would be impossible. The capital stock can be increased only if resources are available. In an economy of private property and free exchange, producing goods and services generates claims to wages, interest, rent, and profit. Their total value equals the total value of what is produced. Some of the claims will be used to purchase final goods; only in the poorest society will all claims to goods and services be exercised in this way. We may call "saving," then, the income that remains after current consumption needs have been satisfied, regardless of what is done with it. 1/ In the absence of Government spending and foreign trade, saving releases resources to use in producing new capital goods, and producing new capital goods makes capital formation possible.

Private saving depends on the decisions of households and business firms, particularly corporations. There are two kinds of saving, personal and business, and we analyze them separately.

PERSONAL SAVING

Modern ideas about saving originate in a book by John Maynard Keynes, The General Theory of Employment, Interest, and Money. Published in 1936, it is the most influential work by an economist in this century. Keynes believed that modern economies suffer from an excessive propensity to save. He argued that while a collapse of investment demand sparked the Great Depression, the depression persisted because there was no corresponding reduction in the desire to save. A massive contraction of economic activity would have been required to reduce actual saving until it equaled desired investment.

At the center of this analysis Keynes postulated a relation between saving and national income that economists had not previously studied. Keynes claimed that, according to a fundamental psychological law, people buy more as their income rises but the increase in what they spend is not as much as the increase in their income. They do not spend all the increase in their income. Because saving is the dif-

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1/This definition of saving includes the fraction of current income claimed by Government in the form of taxes.

ference between what people earn and what people spend, this law also implies that saving increases when income increases but by less than the full amount of the change in income.

Keynes also assumed, at least as a working proposition, that the relation between current consumption, saving, and current measured income is stable--that given a $1 billion increase in national income, the increase in saving that results can be reliably predicted, given some knowledge of total income and past saving behavior. This emphasis on the close connection between current income and saving is the hallmark of the Keynesian saving function.

Since The General Theory was published, the saving function and its logical counterpart, the consumption function, have been among the most intensively studied relationships in economics. It would be an exaggeration to say that any other work has refuted Keynes, but his original hypothesis has been modified. Although they differ in some important respects, two major alternatives to Keynes' formulation of the relation between saving and income provide a better account of saving behavior. Both agree that, in explaining a household's saving decision, its conception of its expected income is more important than actual earnings. The alternative formulations are commonly known as the permanent income hypothesis and the life cycle hypothesis approach to saving.

Permanent income and saving

We may define permanent income as the income people expect to earn from all sources during some period of time, in contrast with the income they actually receive. In some cases, of course, permanent income coincides with actual earnings. Civil servants and tenured professors have more secure jobs and stable salaries than most workers. Their earnings are not likely to differ from their expected incomes. Such a difference is likely, however, for workers with less job security or whose pay depends more on unpredictable changes in economic conditions. Farm income, for example, depends on commodity prices and can fluctuate sharply from year to year. The income a farmer can normally expect to receive is likely to differ substantially from actual earnings in any given period.

The business cycle has a pervasive influence on American incomes. During a boom, many people receive more than their normal income; during a recession, many earn less. Cyclical fluctuations in measured income usually do not affect the income people can reasonably expect to receive. Thus, they do not affect permanent income.

Economist have long assumed that families and individuals will be better off stabilizing consumption than permitting it to vary with every transitory fluctuation in income. Because the pain of sharply curtailing its consumption outweighs the pleasure of an occasional splurge, we infer that a household's actual consumption will bear a closer relation to permanent income than to actual earnings as measured in surveys of consumers' expenditures.

How much of its permanent income a household plans to spend depends on several things. Age and family size are important considerations. The real rate of interest determines the rate of exchange between present and future consumption and thus influences the saving decision. The variability of actual earnings may well affect how much permanent income is saved. Because previous saving is necessary for most people who strive to stabilize their consumption while their earnings vary, they will probably save more of their permanent income when the variability of their earnings increases.

Permanent income is unobservable and can only be estimated. If households determine their permanent income by extrapolating from experience, however, the outside observer can measure this permanent income approximately, by calculating a weighted average of current and past earnings. The more weight they give to current income, the more it will influence their permanent income and their current consumption.

In the permanent income hypothesis, current saving depends on how much permanent income a person saves and on the difference between actual income and permanent income. Saving enables households to stabilize their consumption. Consequently, we can expect the ratio of actual saving to current income to fluctuate cyclically, rising during booms and falling during recessions. Over longer periods, the average saving ratio will conform to the fraction of permanent income that people wish to save. If the average age, family size, real rate of interest, and income variability are roughly constant, then the saving ratio will be constant in the long run.

The life cycle and saving

The other alternative to Keynes' saving hypothesis, called the life cycle hypothesis, assumes that current saving decisions depend on future needs and future income. Saving is primarily a means of financing consumption during retirement.

When current spending exceeds current earnings, people are said to be "dissaving." It is common among retired people

who pay for some of their current consumption by spending from the savings they accumulated during their working years. It is also common among young workers and students who anticipate larger incomes in the future. Positive saving is highest among the middle-aged, for whom earnings are at their peak and retirement is approaching. Therefore, the age structure of the population determines total saving, and the saving rate will be highest when most people in society are middle-aged.

Income that is only expected is, of course, unobservable, but we can estimate it from reasonable assumptions about how expectations are formed. We can also divide income that is expected into income from human labor (wages and salaries) and income from property (interest, rent, and profit). This division distinguishes the return expected on human capital from the return expected on other forms of capital.

Total saving, in the life cycle hypothesis, varies positively with labor income, or the return on human capital. Saving increases as labor income increases. It varies negatively with the current value of household wealth in the form of physical capital and financial assets. In other words, households save in order to accumulate wealth they can draw on during retirement. An unexpected increase in wealth, perhaps from an unexpected stock market boom or a decline in the inflation rate, enables the typical family to increase its current consumption without reducing its future consumption. An unexpected increase reduces current saving.

Table 2 shows total net private saving as a fraction of net national product between 1950 and 1978. The ratio rose generally from 7.0 to 7.5 percent in the 1950s. It fell early in the 1960s but rose to over 9.0 percent in the middle of

Table 2

Total Net Private Saving
as a Percentage of Net National Product

1950-54	7.1
1955-59	7.4
1960-64	7.0
1965-69	8.3
1970-74	7.0
1975	7.2
1976	6.1
1977	5.7
1978	5.5

Source: Economic Report of the President, 1979.

the decade as income grew rapidly. Early in the 1970s, it returned to the 7.0 to 7.5 range, but then it fell again to 5.5-6.0. Thus, the ratio declined 35 percent from its level in the middle of the 1960s.

Current theorizing about aggregate saving links it positively to some measure of a person's expected income (approximated by current and lagged values of actual income) and negatively to the current value of the person's physical and financial assets. The actual production of income that is saved depends on the average age of the population, the rate of growth of the population, average family size, the variability of expected income, and, possibly, the rate of interest.

BUSINESS SAVING

In a business firm, net business saving is all income that accrues over and above the cost of production and that is not distributed to its owners. This definition does not quite coincide with business saving as measured in the national income accounts. The major difference is that measured business saving includes depreciation allowances that measure the capital used up in producing goods and services. Therefore, it is a gross and not a net measurement, since depreciation is one of the costs of production.

In proprietorships and partnerships, business income is attributed to one person or a group of people. Any undistributed profit retained in the firm is personal saving. Business saving as a separate category of saving refers only to earnings retained by corporations. Retained corporate earnings accrue to the stockholders, however, and it is certainly possible to consolidate them with the personal saving of the stockholders.

When individual stockholders treat their income in the form of retained earnings in the same way as their income from dividends and other sources, then any change in the ratio of dividends to retained earnings has no effect on total saving. Increasing retained earnings at the expense of dividends increases business saving, but personal saving declines by exactly the same amount. Stockholders react to the reduction in dividends by decreasing their personal savings dollar for dollar. They are indifferent between their personal saving and business saving by the corporations in which they own shares. Only total saving, the sum of personal and business saving, matters to the stockholders. In this case, a consolidation of business and personal saving makes sense when analyzing the economy's total amount of saving, since

when analyzing the economy's total amount of saving, since total saving will depend primarily on the determinants of personal saving discussed above.

The identification of retained earnings with other sources of income may not be this complete. For one thing, the tax system treats dividends and retained earnings differently, as we shall see in chapter 6. Moreover, the decisions of corporate management may not perfectly reflect the desires of the average stockholder. When they do not, a dollar of retained earnings is worth less than a dollar of dividends to the typical stockholder, and an increase in retained earnings brought about by a reduction in dividends will lead to an increase in total saving.

This occurs in the following way. Since shareholders regard dividends as worth more than retained earnings, the shift from dividends to retained earnings represents a reduction in total shareholder income. Such a decline in total income will lead shareholders to reduce both consumption and saving, for the reasons given in the preceding section. Therefore, personal saving will fall less in this case than if retained earnings were treated like other forms of income. Business saving will rise by the full amount of the transfer and, consequently, total saving will increase.

We may usefully distinguish business from personal saving when we do not take corporations to be perfect representatives of the interests and plans of their owners. When the difference between corporations and their owners is most pronounced, an increase in business saving brought about by fewer dividends will produce the greatest increase in total saving.

SAVING AND THE RATE OF INTEREST

The rate of interest determines how much can be spent in the future from saving taken from current income. When interest is paid on saving, a shift of $1 from current consumption to saving makes possible more than $1 worth of consumption. When the rate of interest increases, the future consumption that is made possible by current saving also increases. All this is partly modified by inflation.

The real rate of interest

Assets whose monetary value is fixed depreciate in real terms during inflation. Money itself is the classic example of such an asset, but savings accounts, certificates of deposit, credit union deposits, and Government and corporate bonds denominated in dollars share this characteristic. The

Table 3

Rate of Inflation and Nominal
and Real Rates of Interest

	Interest rate on 90-day Treasury bills	Percentage change in GNP deflator	Real interest rate on 90-day Treasury bills
1950	1.2	2.0	-0.8
1955	1.8	2.2	-0.4
1960	2.9	1.7	1.2
1965	4.0	2.2	1.8
1970	6.5	5.4	1.1
1975	5.8	9.6	-3.8
1976	5.0	5.2	-0.2
1977	5.3	5.9	-0.6
1978	7.2	7.4	-0.2

Source: Economic Report of the President, 1979.

real return from holding them includes both the interest they provide and any change in the purchasing power of the money they are worth. Inflation reduces this purchasing power and, consequently, lowers the real return when interest rates are unchanging.

To measure the real return to current saving, we must adjust the rate of interest to reflect the changing purchasing power of the assets in which saving is embodied. Economists make this adjustment by subtracting the rate of inflation that is anticipated from the rate of interest that is paid on such assets. The interest rate obtained by making this adjustment is called the "real rate of interest." For example, if a savings account pays interest at the rate of 5 percent a year but inflation is anticipated at the rate of 3 percent a year, then the real rate of interest is only 2 percent. The extra consumption made possible by adding to this saving account is only 2 percent greater than the amount that would be spent but is not in order to add to the account. The account may pay 3 percent simply to maintain a constant purchasing power. If the rate of inflation that is anticipated exceeds 5 percent, then savers can expect to spend less in the future than what they are giving up in the present.

It is the real rather than the nominal interest rate that measures the true trade-off between current and future consumption and that determines the saving decision. In

table 3, showing real interest rates on 90-day Treasury bills between 1950 and 1978, we see that short term interest rates have been negative in recent years. (Since anticipated rates of inflation are not directly observable, we must subtract the actual rate of inflation from the two nominal interest yields. Thus, the realized real rates in table 3 only approximate the real interest rates anticipated and relevant for saving and investment decisions.) However, whether a negative real rate of interest has a catastrophic effect on saving depends on the magnitude of the influence that interest rates exert on saving.

The interest elasticity of saving

The fact that the real rate of interest measures the trade-off between present and future consumption does not logically imply that changes in this rate will affect total saving. Although an increase in the real rate of interest increases the expected future consumption associated with any given level of current saving, it also implies that the same level of future consumption can be sustained with a smaller sacrifice of current consumption. For example, if the real rate of interest rises by 1 percent, savers could reduce current saving by 1 percent without affecting future consumption. The actual response of saving to changes in the real rate of interest is, for this reason, theoretically ambiguous. It can be determined only by a careful and empirical investigation of actual saving behavior.

That saving responds to changes in the real rate of interest is termed by economists the "interest elasticity of saving." In The General Theory, Keynes argued that this elasticity is negligible and that, consequently, variations in the real rate of interest are unlikely to affect desired saving significantly. Subsequent investigations of actual saving behavior appeared to support this conclusion. Changes in interest rates did not seem to have much effect on aggregate saving. Some comparatively recent studies, however, indicate a significant positive interest elasticity for saving. 1/

1/See Michael Boskin, "Taxation, Saving, and the Rate of Interest," Journal of Political Economy, vol. 86 (1978), pp. S3-S27. Boskin presents a number of estimats of this elasticity. His preferred estimate is about 0.4. If this is correct, it means that a 10 percent increase in the real rate of return on saving will generate approximately a 4 percent increase in saving. An estimate as high as this would still be rejected by most economists.

The methods and conclusions of these studies are controversial, but their implications are extremely important. An increase in the rate of capital formation requires an increase in saving. If saving, in the aggregate, does not respond to increases in the real rate of interest, then some of the most promising avenues for stimulating capital formation are closed off. In fact, most recent proposals to promote an increase in capital formation by revising the tax laws require a positive interest elasticity of saving if they are to succeed.

CONCLUSION

Putting Government spending and taxation aside, saving consists of the sum of saving by individuals and saving by corporations. Saving depends on the income that people normally expect to receive. Fluctuations in actual earnings lead to fluctuations in saving, but over time the fraction of income saved depends on underlying structural characteristics of the economy and society. Demographic characteristics such as family size, the average age of the population, and the rate of population growth affect the saving ratio. So do the frequency and severity of cyclical movements in economic activity. An uncertain business climate is likely to foster saving while discouraging investment.

The rate of interest adjusted for expected inflation is also likely to influence the volume of saving but by how much is still subject to controversy. Some recent work in economics suggests that saving responds significantly to changes in real interest rates. If this is correct, public policy must take it into account, particularly as it bears on the appropriate tax policy for property income.

CHAPTER 4

THE COORDINATION OF SAVING AND INVESTMENT

Saving and investment are not identical, yet the rate of interest influences both the desire to save and the demand for new capital. Moreover, any firm or household with access to financial markets is free either to invest more than it saves or to save more than it invests. The difference is made up by borrowing or lending. Consequently, firms and households are not compelled to coordinate their saving and investment decisions one by one.

The actual amounts of new capital that are demanded and supplied must, of course, coincide, but in a market economy they do not do so as the result of deliberate planning. Rather, saving and investment decisions are coordinated as an outcome of a market process.

THE FINANCIAL COUNTERPARTS OF SAVING AND INVESTMENT

In chapters 2 and 3, we discussed investment and saving in real terms. We defined investment as a demand for tangible commodities or, in the case of human capital, specific services. We defined saving as the release of real resources for the production of new capital goods. When investors cannot fulfill their plans by saving from their own incomes, they must obtain outside financing. Similarly, savers who are unwilling to embody their saving in specific capital goods must seek a financial repository for their saving. Thus, both investment and saving have financial counterparts. Investment normally results in some demand for loanable funds, while saving is usually accompanied by the supply of loanable funds.

The demand for loanable funds depends on market rates of interest, because demand for investment depends on the cost of capital, and this is determined in part by interest rates. The quantity of loanable funds demanded during any period of time is related inversely to the rate of interest. Declining interest rates reduce the cost of capital and stimulate investment demand, increasing the amount of borrowing that investors wish to undertake and raising the quantity of loanable funds they will demand.

The financial counterpart of saving is the supply of loanable funds. We described in chapter 3 the relationship between saving and market interest rates. An increase in interest raises the amount of future consumption made possible by current

saving. If this stimulates extra saving, there will be a positive relation between saving and interest, reflected in an increase in the quantity of loanable funds supplied when interest rises.

When the individual plans of investors and savers result in an imbalance in the market for loanable funds, interest rates adjust to eliminate the imbalance. When the demand for new capital exceeds the supply, investors are unable to obtain all the financing they seek. As they compete among themselves for the limited supply of loanable funds, interest rates rise. This increase reduces the quantity of loanable funds demanded and, possibly, increases the quantity supplied. 1/ These adjustments eliminate excess demand for credit and coordinate saving and investment decisions. An analogous adjustment occurs if the new funds supplied by savers exceed the funds demanded by investors. In this case, competition among lenders drives interest rates down and coordinates saving and investment.

These relationships can be illustrated in a diagram. Although it abstracts from the complex market setting in which borrowing and lending actually occur, it highlights the key relationships and their interactions. We would need more detail for a description of actual financial markets, but the fundamental conclusions we derive from this simplified analysis would not be altered.

In figure 3, the market rate of interest is plotted on the vertical axis and the quantity of loanable funds is plotted horizontally. Demand curve D shows the inverse relation between market interest and the demand for loanable funds. Higher rates produce lower quantity demanded. Curve S represents the supply of loanable funds. Higher interest rates produce more funds. The intersection of the two curves is the single combination of interest and loanable funds consistent with the individual plans of both savers and investors. At any other point, higher rates of interest produce an excess supply of loanable funds, and at lower rates of interest the demand for funds exceeds the supply. When interest rates are free to adjust in response to excess supply or demand, the intersection of the two curves corresponds to the actual outcome of the market process.

1/If demand responds to changes in interest rates, saving need not respond as well. As long as one side of the market adjusts when interest rates change, the process works, and the market for loanable funds coordinates saving and investment.

Figure 3
Supply and Demand for Loanable Funds

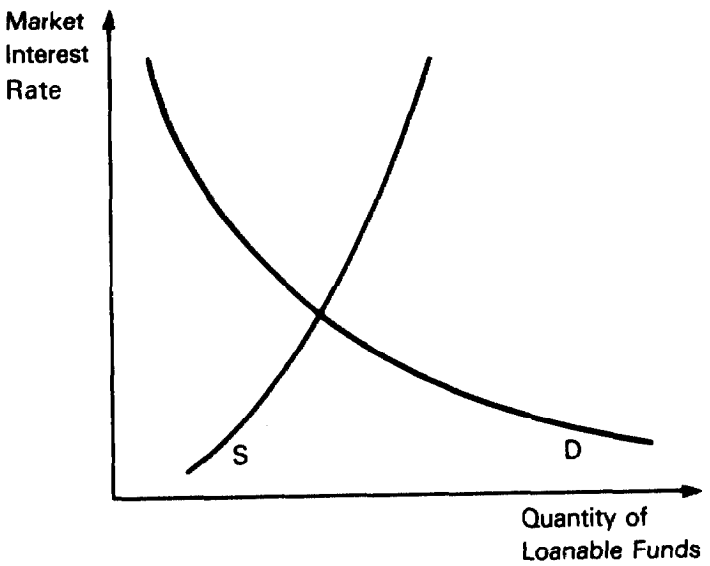
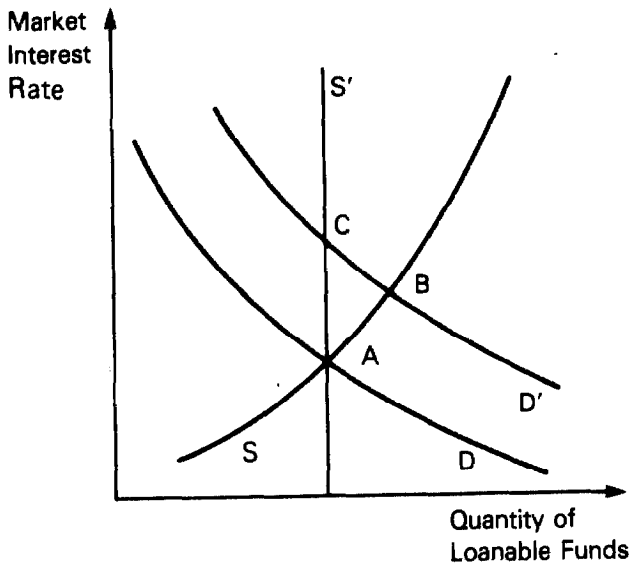


Figure 4
Interest and the Elasticity of Saving



This analysis implies that a permanent capital shortage, in the sense of a permanent excess of demand for loanable funds, is impossible. If market interest rates are free to rise, any temporary excess in demand for loanable funds is eliminated by a rise in interest rates. The increase in interest chokes off some portion of the quantity of loanable funds demanded, while possibly stimulating the quantity supplied. Higher interest rates limit the demand for new capital, but anyone willing to incur the higher cost of capital can obtain it.

An unsatisfied demand for capital can persist only if legal ceilings prevent interest rates from rising to levels that clear the market for loanable funds. General ceilings on interest rates could create a capital shortage and credit rationing, but they have never been imposed in peacetime in the United States. Selective ceilings on interest rates do exist, as we shall see in chapter 7.

Although competitive credit markets with flexible interest rates can prevent a shortage, they do not guarantee that the actual rate of investment will be as large as some people might wish. An inadequate rate of capital formation must be the result of insufficient investment or insufficient saving. It can be understood only in terms of the determinants of investment and saving we discussed in chapters 2 and 3.

Figure 3 also illustrates the importance of the responsiveness or elasticity of saving with respect to interest. If the elasticity is positive, then savers respond, in the aggregrate, to an increase in interest rates by increasing their saving. If they do not respond in this way, saving is said to be completely inelastic. These possibilities are illustrated in figure 4.

Curve S represents the supply of loanable funds when the elasticity of saving is positive. Vertical line S' shows the supply of funds when saving is completely inelastic. Curves D and D' show the demand for loanable funds before and after a change that stimulates investment demand. Savings and investment are in balance initially at point A, where the original demand curve intersects the supply curves. An increase in demand D' results in an increase in interest rates. This will be accompanied, if saving is elastic, by an increase in saving. Saving and investment will balance at B. The increase in investment demand will result in both higher interest rates and more capital formation. If saving is completely inelastic, however, the increase in demand will result only in higher interest. Saving and investment will balance at C. No additional investment will occur. The

increase in the cost of capital following the rise in interest rates will precisely offset the new stimulus to investment.

The interest elasticity of saving thus determines how successful a policy of stimulating investment demand can be. When the supply of saving is completely inelastic, any stimulus to investment alone is totally frustrated. Its only consequence is higher interest rates. Capital formation can be increased only by altering one of the fundamental determinants of saving behavior.

FINANCIAL INTERMEDIARIES

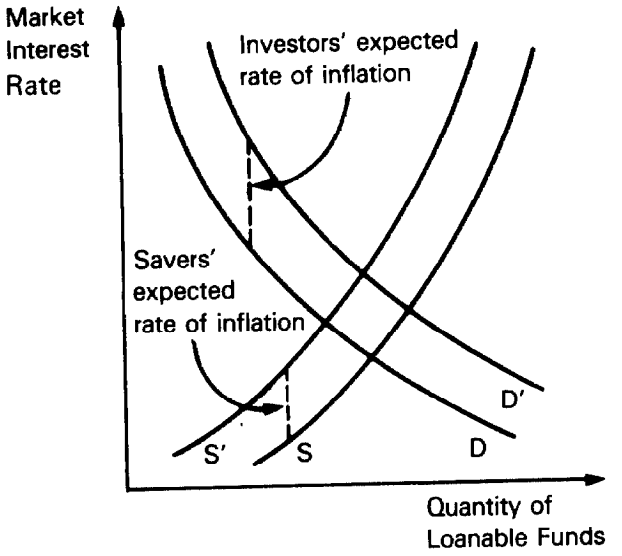
In primitive societies, lending was direct. Savers transferred their saving directly to an investor. A village money lender, for example, loaned from personal income to a borrower who invested the funds. In developed economies, direct lending is supplemented by indirect lending. In economies like the United States, most lending is indirect. Financial institutions or intermediaries--banks, saving and loan associations, credit unions, insurance companies--accept funds from savers and, in turn, pass the funds along to borrowers. The funds may pass through several hands before reaching the ultimate borrower, who invests them in capital goods.

The growth of financial intermediaries fosters capital formation by spreading the risk of nonpayment and thus reducing the uncertainty of saving. It also permits the development of specialized lending. Lending is said to be specialized when the lender finances only certain types of investment. Specialization promotes efficiency by economizing on the costs of acquiring information about potential borrowers. In the United States, for example, saving and loan associations are the major lenders in the home mortgage market, a development fostered by Government regulation. People seeking to invest in residential housing depend on flow into saving and loan associations. Corporations, which borrow externally, depend heavily on insurance companies and banks.

Government policies affect not only the total quantity of resources available for capital formation but also their allocation to different uses and sectors of the economy. Financial regulation and the financial impact of other Government policies affect not only the magnitude of net investment but whether it takes the form of residential housing, commercial structures, manufacturing equipment, or inventory accumulation.

When all prices and production costs are expected to increase at the same rate, investors can anticipate capital gains on their investments. At any given rate of interest, the cost of holding capital declines and it is profitable to increase the stock of capital. In terms of figure 4, the demand for loanable funds increases. In figure 5, the demand for loanable funds shifts from D to D' as a result of anticipated inflation. The vertical displacement between the two curves equals the expected rate of inflation. It measures the additional interest investors are willing to pay at any level of investment. This just equals the reduction in the cost of capital that results from expected inflation, and, therefore, the distance between the two curves equals the expected rate of inflation.

Figure 5
Inflation and Supply and Demand for Loanable Funds



When the interest elasticity of saving is positive, expected inflation affects saving also. As we explained in chapter 3, the real rate of interest is what is relevant for the saving decision. The nominal or market rate of interest must be adjusted when savers expect inflation. At any given level of saving, the market rate of interest must rise by exactly the rate of inflation that savers anticipate. Any smaller increase implies a reduction in the real rate of interest and this reduces voluntary saving, while a larger increase represents a rise in the real rate of interest, which stimulates saving. Thus, in figure 5, saving curve S rises by exactly the rate of inflation anticipated by savers. 1/

If savers and investors anticipate the same rate of inflation, then a change in this rate will bring the market for loanable funds into balance at the quantity of funds that obtained before the change. The vertical displacement in the two curves will coincide, and the only effect will be a change in market interest rates. Anticipated inflation will not affect saving and investment unless savers and investors disagree about the amount of inflation they expect. If they do disagree, then the actual rate of capital formation will rise or fall, depending on whether investors or savers expect a higher rate of inflation. If investors expect more inflation, the capital formation will increase. If savers have the higher expectation of inflation, capital formation will decline. 2/

1/Theoretically, inflation can change the position of the saving schedule by altering one of its determinants--the level of wealth. As inflation reduces the level of wealth, it increases the rate of saving, causing a reduction in the real rate of interest. The empirical significance of the influence of wealth on saving appears to be weak.

2/This analysis has two important qualifications. First, saving at any anticipated real interest rate may increase when the expected rate of inflation rises as wealth holders adjust their portfolios by reducing their money holdings and increasing their holdings of other assets. Second, a higher expected rate of inflation reduces the real value of money, making savers less wealthy. As we discussed, a reduction in wealth is likely to stimulate saving and reduce consumption. The implication of these qualifications is that an increase in the expected rate of inflation may lower the real rate of interest, even if investors and savers share the same inflation forecast.

Up to this point, we have concentrated on expected inflation rather than actual inflation, because investment and saving look forward. Experience influences them only to the extent that it influences expectations. In recent years, market interest rates have failed to increase sufficiently to maintain a constant real rate of return on saving. Savers appear to have underestimated the magnitude of inflation. If investors had been more successful in their predictions, this would have stimulated capital formation. In the absence of a careful empirical investigation, however, it is not possible to conclude that the actual decline in the real return to saving has contributed to increased investment. Moreover, the actual record of capital formation in the United States cannot be analyzed in abstraction from Government policies, which drive a wedge between the return that savers receive and the return that investment earns. We have reserved a more complete analysis of this topic for chapter 6.

UNEMPLOYMENT

In this chapter, we assume that the demand and the supply of loanable funds are essentially independent. A shift in demand does not automatically alter the relation between the supply of funds and market rates of interest. This is a strong assumption that many economists reject. They argue that when workers are unemployed and capacity is excessive, the total income available to society is variable. An increase in the total demand for goods and services is possible and will raise the level of total income. They argue, further, that such an increase will raise total saving. Saving does not impose a binding constraint on the rate of capital formation. In terms of figure 5, a rightward shift in the demand for loanable funds is accompanied by a rightward shift in the supply of funds. Increased investment is self-financing, in a sense, because it generates an increase in income sufficient to provide the saving that it requires.

This is essentially the view Keynes took of saving and investment in The General Theory. People who still hold this view believe that until full employment is achieved, measures to promote saving are likely to retard rather than spur capital formation. They recommend measures to stimulate total demand, such as tax reductions, expanded Government spending, and easy credit. They argue that these lower unemployment, increase production, and foster saving and capital formation from growing incomes. Measures designed specifically to increase saving, they believe, curtail consumption and thereby reduce demand and increase unemployment. This has the unintended consequence of lowering total saving and retarding

capital formation. Although this view was widespread at one time, it has received serious criticism in recent years.

People who criticize the Keynesian view of saving and investment make the following points. Since World War II, we have had no mass unemployment and not even during the worst recessions have unemployment rates reached the average levels attained during the 1930s. That this is so has reduced the scope for demand management as a policy tool for promoting capital formation. At current rates of unemployment, it can not be taken for granted that saving will automatically adjust to any desired rate of investment. Regardless of the validity of the Keynesian diagnosis of the Great Depression, it is not a reliable guide to recent problems.

One can argue, of course, that it is demand management that has made possible the improved employment performance of most developed economies. Whatever the reason for the improvement, however, it implies that saving cannot be taken for granted in constructing a capital formation policy.

CONCLUSION

Both a desire to invest and a willingness to save are required if capital formation is to occur. Increased investment demand is choked off by higher interest rates when it is not accompanied by increased saving. Any measure to stimulate investment is likely to cause some increase in interest rates, which will moderate the initial impulse to higher investment; but, the more responsive saving is to higher interest, the greater will be the success of such measures. Except in conditions of deep depression, demand stimulus alone does not suffice to raise the rate of capital formation.

CHAPTER 5

GOVERNMENT EXPENDITURES AND CAPITAL FORMATION

Having isolated the determinants of saving and investment and examined their interactions, we can analyze the effects of Government policy on capital formation. In this chapter, we discuss Government expenditures. In recent years, people have often expressed the opinion that Government spending preempts resources that would otherwise have contributed to private capital formation. They argue that Government spending "crowds out" private spending. We shall discuss this issue in this chapter, but first we shall analyze three other channels through which Government expenditures affect capital formation--public capital, income transfers, and changes in the composition of the economy's production.

PUBLIC CAPITAL FORMATION

Not all Government expenditures are for currently consumed goods and services. Most public services can be provided only if capital is available to assist in their production. National parks require forest land, for example, and the administration of justice requires courthouses and jails, while national defense requires ships, planes, missiles, and tanks. Current expenditures for these items, which are capable of providing a stream of services over several years, are properly regarded as investment. As we explained in chapter 2, they are part of the Nation's stock of capital.

Most public services are not sold. Indeed, one important reason why some services are provided by the Government is that they cannot be marketed efficiently. This does not mean that these services do not provide real benefits to the public. The consumption of public goods and services is part of society's real income and public capital is productive, but that this is so does not by itself suffice to help us determine how much public investment we should make at any given time.

Cost-benefit analysis was developed primarily to answer this question. A cost-benefit calculation consists essentially of a comparison of the net benefits that are expected with the costs of acquiring capital. The benefits should be discounted to reflect the fact that they will be achieved only in the future. Formally, therefore, the calculation is identical to the present value calculation given in the formula in chapter 2. The substantial difference is that

the stream of future benefits consists of the estimated value of a flow of public services rather than a stream of future revenue. Cost-benefit analysis is not always easy to apply. The benefits from public investment are frequently difficult to estimate, even when substantial benefits will unquestionably occur. Some people argue against the cost-benefit approach, however, because they believe it would prevent certain investments that are needed regardless of cost; they are not truly rejecting it but, rather, placing an infinite value on the expected future benefits. As with private investment, cost-benefit analysis nonetheless provides a guide for determining when and when not to undertake an investment.

In discounting future benefits, we must choose an interest rate to use. What is an appropriate social rate of discount is controversial among economists. Most market interest rates reflect not only the return expected on investment but also the risk in that return. If savers and investors do not want to take risks, they will prefer the certain promise of a low return to the uncertain expectation of a higher return. This preference will be translated into higher interest rates for investments that entail risk. Some argue, however, that the Government is in a superior position to pool the risks associated with its investments and, thus, should not use for discounting an interest rate that reflects the risk aversion of private savers. Regardless of how this issue is resolved, it is widely agreed that the appropriate interest rate is at least as great as that on private investments that have no risk.

More projects will pass the test as the interest rate becomes lower. If the rate is unrealistically low and if it is less than the market rate on investments that have no risk, then the Government will invest too much. Resources will be diverted to public investment that could have been more productively employed in private investment or in consumption. A rate that is too high has the opposite effect.

If the discount rate for public investment is inappropriate, therefore, not only will the allocation of capital between the public and private sectors be distorted, but there will be a further distortion within the private sector as well. The forms of capital that are complementary to public capital will expand or contract as public investment is large or small. If there is too much public capital, there will be too much private capital in areas that complement the public capital. If the Nation overbuilds its highway system, for example, it will also invest excessively in trucks and cars while underinvesting in competing modes of transportation. Clearly, Government expenditure invested

in public capital contributes directly to the Nation's total rate of capital formation.

INCOME TRANSFERS

In addition to the purchase of goods and services, Government expenditures include transfer payments to families and individuals. These payments do not arise from current productive activity in either the private or the public sector. Social security pensions, unemployment compensation, food stamps, and medicare compensation are all examples of such payments. They depend on the condition of families and individuals rather than the performance of a current service. Table 4 shows that the growth of Federal transfer payments has been explosive and that, since 1974, its level has actually exceeded Federal purchases of goods and services.

Table 4

Federal Purchases of Goods and Services and Transfer Payments to Families and Individuals (in Billions of Dollars)

	Purchases of goods and services	Transfer payments to families and individuals
1952	$ 52.4	$ 8.8
1957	50.0	15.7
1962	63.7	25.6
1967	90.0	40.1
1972	102.1	80.5
1973	102.2	93.2
1974	111.1	114.4
1975	123.1	146.0
1976	129.9	158.4
1977	145.1	169.5
1978	154.0	181.8

Source: Economic Report of the President, 1979.

Transfer payments are important partly because they may change the aggregate ratio of saving to national income and, thus, the total volume of saving. The aggregate ratio is a weighted average of the ratios of saving to income of all households. The weight attached to each household's ratio is that household's share of income. Transfer payments redistribute this income among households and, thus, change the weights. As a result, the saving ratios of people who receive transfer payments become more important while those of taxpayers become less so. If the ratios of recipients are lower than the ratios of taxpayers, this shift of weights lowers the aggregate ratio, with no reduction in any individual household's ratio of saving to income. While some people believe that the ratios differ in exactly this manner, there is also good reason to believe that saving ratios of broad categories of households do not differ significantly.

Transfers between generations can also affect the aggregate saving rate. We saw in chapter 4 that saving is part of a life cycle decision, a means of financing consumption during retirement. Much of capital formation is a process by which wealth can be stored for future years and capital can be sold to the next generation to provide the means for retirement living. The Government, however, can bypass wealth held in capital as the medium for this transfer, making the transfer on the basis of a promise of future benefits created by the Government. Government debt is one of these assets; social security is another. Each time Social Security is expanded, increasing its unfunded liability, the expansion substitutes for a tangible asset in the public's wealth. This creates the illusion of wealth accumulation while, in reality, the saving rate for the total economy has fallen. No real capital has been set aside to pay for future retirement of household wage earners, the problem of financing retirement has been deferred, and the responsibility for paying has been placed on a future generation. Saving now is decreased by forcing unspecified heirs to consume less.

CHANGES IN THE COMPOSITION OF THE ECONOMY'S PRODUCTION

An increase in Government expenditure, whether more purchases of goods and services or more transfer payments, alters the composition of what the economy produces, assuming reasonably full employment both before and after the increase. Government or transfer payment recipients directly demand more of some goods and less of others. As production

shifts to the industries producing the more highly demanded goods, the demand changes for the resources--labor, capital, fuel--that these industries require for operation. Ultimately, the rate of capital formation for the economy will increase if the growing industries tend to use capital more intensively in their production processes and if they do so to a greater degree than the industries that have lost business. The rate of capital formation will decrease if Government expenditure favors industries that are less capital intensive --that is, industries in which less capital is used relative to the amount of labor.

Empirically we know that Government purchases of goods and services are relatively labor intensive; when purchases increase, less new capital is demanded, and capital formation is discouraged. On the other hand, a disproportionately larger sum of transfer payments is spent on food and medical and educational services, which are higher than average in capital intensity. Thus, an expansion of transfer payments encourages capital formation. Table 4 showed us that since 1974 Government expenditures on transfer payments have exceeded expenditures on purchases of goods and services. It does not necessarily follow, however, that the growth of transfer payments has stimulated capital formation. Their stimulation of the demand for capital must be balanced against their depressing effect on saving.

CROWDING OUT

When the Government uses resources to produce public goods and services, obviously these resources are not available for other purposes, including private capital formation. Similarly, if the Government transfers income that is used, in turn, to purchase goods and services, these goods and the resources used to produce them are clearly not available for other uses. In this sense, Government expenditures always "crowd out" private expenditures, but private expenditures "crowd out" public expenditures, too. Crowding out simply expresses the fact that public expenditure reflects a choice about the allocation of resources. It says nothing about whether the choice is wise, and it provides no guidance about how much the Governmnent should spend.

The controversy among economists about crowding out centers, however, on what would have been done with resources if Government spending had not occurred. The central issue in the crowding out controversy is the responsiveness of total output to changes in total demand. When output is highly

responsive to such changes, crowding out does not occur. 1/ Before Keynes' The General Theory was published, however, most economists believed that an increase in public expenditures necessarily implied a corresponding reduction in private expenditures, although the composition of consumption and investment in this reduction might vary, depending on the nature of the increase and the method of financing it. 2/

Keynes rejected this opinion because it depends on an assumption of full employment. It is possible, however, to produce more goods and services in the public sector under conditions of unemployment, without reducing either private consumption or investment. Indeed, Keynes argued, an increase in Government expenditure has a multiplier effect, and private spending actually increases. The composition of the increase depends on the nature of the additional Government spending and the way it is financed, but, generally, public expenditure can rise without a corresponding decline in private expenditure.

Analysts who claim that Government expenditures totally crowd out private spending argue, in effect, that resources are usually fully employed. Those who maintain that Government expenditures do not crowd out private spending follow Keynes in assuming that, under normal peacetime conditions, unemployed resources of labor and capital are always available to respond to an increase in total demand.

One might think that the issue could be resolved easily by looking at the unemployment data. Since 1948, the unemployment rate has been less than 3 percent in only 1 year, and it was less than 4 percent only when the country was at war in Korea and Vietnam. In the 1970s, it averaged 6.2 percent. To many, this is conclusive evidence of considerable

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1/ If the increased Government spending is financed in a way that causes interest rates to rise, it may displace some interest-sensitive private expenditures. Thus, it is possible that private capital formation will be discouraged by an increase in Government expenditures that stimulates total private spending.

2/ All this was subject to certain qualifications. In particular it was admitted that an increase in Government expenditure could stimulate total output and employment temporarily, especially if the increase was financed by creating money. This would permit a smaller reduction in total private spending for a time, but this shortrun reaction did not contradict the general conclusion.

economic slack. If they are correct, then the total demand for goods and services has not kept pace with total supply, and measures to stimulate demand would be responsible for little, if any, crowding out.

Others do not deny that unemployment has occurred, but they do deny that it necessarily reflects a persistent deficiency in the demand for goods and services. They argue that measured unemployment is not always an accurate indication of deficient demand. They believe that some unemployment is not only inevitable but also desirable. When people are free to enter the labor force or change jobs in response to their perceptions of changing opportunities, some of them will always be between jobs. This kind of unemployment actually promotes efficiency, because it allows employers and workers to make the best possible match. In addition, unemployment compensation and various welfare programs provide an income to people who are out of work. In effect, they subsidize unemployment. Thus, by easing the financial burden of unemployment, they enable unemployed workers to wait a longer period before accepting employment. This contributes to measured unemployment.

The actual amount of unemployment that can be traced to these sources is difficult to pin down. Some economists believe that a natural or normal rate of unemployment can be attributed to them. If prices are stable, or if inflation is steady and price changes are predictable, unemployment will be near this rate. At other times it will not, as when a sudden surge in demand raises the rate of inflation unexpectedly, causing a temporary reduction in the unemployment rate. Similarly, an unexpected decline in the inflation rate can cause unemployment to rise temporarily. Once people recognize a permanent change in the rate of inflation or the average price level and react accordingly, however, unemployment tends to return to normal.

The normal rate of unemployment is not constant, even so. It varies with the composition of the labor force, and it responds to changes in Government programs that provide financial support to the unemployed. It also depends on structural changes in the economy. When different industries or regions of the country are growing at widely varying rates, the normal rate of unemployment for the economy as a whole tends to be higher. It is almost certainly higher today than it was 20 years ago. The normal rate of unemployment does not respond, however, to changes in fiscal and monetary policies, the Federal Government's tools of aggregrate demand management.

The main implication of this view of unemployment, therefore, is that demand management cannot be used to hold

unemployment permanently below its normal rate unless the Government is willing to permit a continuing and unpredictable acceleration in the rate of inflation. It is not enough to stimulate demand; the stimulus must be progressively increased. Each temporary reduction in unemployment requires a permanent increase in inflation. In the end, the policy of holding unemployment below the normal rate leads either to hyperinflation or to a situation in which unemployment is no lower while inflation is much higher than before. Clearly, this hypothesis is relevant to American experience over the last 20 years, and it is not difficult to account for the increased support it has received among economists.

Its implications for crowding out are significant. Essentially, the concept of full employment is extended to encompass a positive measured rate of unemployment. It envisions a wider range of circumstances in which Government expenditures crowd out private expenditures, which can be avoided only when slack demand is holding the economy below its normal capacity to produce goods and services. If we accept the natural rate hypothesis, such episodes occur only when unemployment is above the normal level, and they are limited to periods of economic recession and the early stages of business cycle recoveries. During periods of economic expansion, increases in Government purchases of goods and services will crowd out private spending for consumption or investment. 1/ Temporary countercyclical measures, if properly timed, do not cause crowding out initially, but if they are not abandoned when the cyclical downturn is over, they will lead to it eventually.

In short, recent work by economists casts considerable doubt on the proposition that, under normal conditions, increases in Government expenditures result in higher total output and no decline in private consumption or investment. If the natural rate of unemployment hypothesis is correct--and recent experience is consistent with it--then the opposite would be more nearly true. The occasions on which an increase in Government expenditures does not lead to crowding out are infrequent and difficult to predict.

1/Part of the crowding out may take the form of lower unemployment. In this case, some of the search activity that accompanies the normal rate of unemployment is being prevented by the increased Government expenditure. Measured output may consequently increase temporarily, as a result of the higher Government spending.

CONCLUSION

We have discussed in this chapter four channels through which Government expenditures affect capital formation. First, Government contributes directly to capital formation by spending on construction of roads, dams, parks, courthouses, office buildings, and many other capital items. Such investment may be complementary to private investment rather than a substitute for it. The end result is that the total capital stock is larger.

Second, an increasing fraction of Government expenditures has taken the form of transfer payments that redistribute income. These payments may reduce society's total saving, both because they redistribute income to people who may have a lower propensity to save and because the existence of transfer payments may reduce the propensity of many households to save. Because saving is essential for capital formation, Government transfer payments may reduce the overall rate at which capital is accumulated.

Third, Government spending on goods and services and through transfer payments changes the composition of the economy's output. Since all goods and services are not produced by the same composition of capital and labor, factors that alter the mix of output also encourage or discourage private capital formation.

Fourth, and finally, Government spending for consumption goods or for services tends to put upward pressure on real interest rates. As a consequence, such spending discourages or crowds out some private investment expenditures.

On balance, we may say that a priori it is impossible to determine the net overall effect of Government expenditures on private capital formation.

CHAPTER 6

TAXES AND CAPITAL FORMATION

Taxes affect capital formation in a variety of ways. The level of taxation determines how much expenditure must be financed by borrowing. If the income from taxes is less than what is spent, the deficit will crowd out private expenditures when employment is nearly full. If, on the other hand, the Government runs a surplus in its budget, resources are available for capital formation. 1/ Taxes also affect the return on saving. They alter the terms by which present consumption can be exchanged for future consumption. Changes in this trade-off, which may be the result of an intentional change in tax policy or unintentional inflation, have a potentially significant effect on capital formation. Moreover, taxes are not uniform on all forms of investment and, consequently, they affect the allocation of capital. In this chapter we shall analyze each of these in turn.

TAXES AND SOCIETY'S TOTAL SAVING

Saving is the portion of total income not spent on current consumption. It includes private saving by households and corporations. It also includes the total surplus of Federal, State, and local governments--that is, the amount by which tax revenues exceed current expenditures. If governments are actually incurring a deficit in the aggregrate--if total expenditures exceed total tax revenue--the surplus is negative, and it must be subtracted from private saving to obtain total saving. Defined in this way, saving represents the volume of resources available for private capital formation (leaving aside international trade and associated capital movements).

The national income accountants have essentially adopted this approach in measuring society's total saving. It has two important limitations, however. First, measured investment does not include public investment. All Government

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1/This assumes that the economy is operating at full employment. It is possible that if the Government runs a budget surplus, total income will fall to such a degree that total saving--public and private--will decline. This is merely the reverse of the crowding out argument.

expenditures are treated as if they were made for currently consumed goods and services. In fact, a substantial fraction of Government expenditures is for capital goods. These purchases should be subtracted from current expenditures in calculating the Government surplus. Second, purchases of consumer durables are counted as consumer expenditures in the national income accounts. These are properly regarded as investment expenditures and should be subtracted from current consumption in calculating private saving. Only currently consumed goods and services should be subtracted from income to obtain total saving and, if done carefully, this will include both private and public saving.

An increase in tax revenue is the most direct contribution the Federal Government can make to saving and capital formation, provided the increase is not matched or overmatched by increases in Government expenditure. A surplus in the Government's budget is offset by retirement of Government debt. Funds are transferred from the Government to bond holders. In the process, interest rates are bid down and private investment rises, assuming the change in fiscal policy does not affect the relation between interest rates and the desired quantities of new capital goods. A reduction in a deficit would have similar effects. When there is a deficit, private savers transfer funds to the Government. Reducing the deficit reduces the size of the transfer, releasing funds for private capital formation.

Two negative effects on saving partially offset the positive effects of a budget surplus on investment. First, an increase in taxes reduces disposable incomes, and this normally results in some decline in private saving. Unless savers regard an increase in Government saving as equivalent to an increase in private saving, however, they will reduce both consumption and saving as their disposable incomes fall. Therefore, private saving will decline by a smaller amount than the increase in tax revenue, and, consequently, total saving will increase. Second, the decline in interest rates may reduce the incentive to save. The total effect of an increase in the Government budget surplus, or a reduction in its deficit, is likely, therefore, to be some increase in private investment accompanied by a decline in interest rates and some reduction in private saving.

All this presumes that changes in taxes do not affect the level of total income. When resources are fully employed, this level depends on the stocks of these resources and is not affected directly by changes in taxes. But full employment is not assured, and, in the short run, changes in aggregate demand can influence the rate of resource use, and

they must be taken into account. The basic qualification is that an increase in taxes that results in a decline in consumer spending also reduces aggregate demand and total income, causing a further decline in private saving. This, in turn, may wholly offset the positive effect of the increase in the budget surplus. Attempts to promote capital formation by sudden sharp increases in taxes may be counterproductive and they will surely not yield an increase in private investment of the same magnitude as the increase in the budget surplus.

TAXES AND THE RETURN ON SAVING

The income taxes levied by Federal and State governments reduce the return on saving. They alter the trade-off between present and future consumption, and they reduce capital formation to the extent that saving responds to changes in the terms of this trade-off. When the real rate of interest (the nominal rate minus the inflation that is expected) is positive, future consumption is cheaper than current consumption; one can buy one unit more in the future by giving up the purchase of less than one unit in the present.

Many studies indicate that this responsiveness is weak or nonexistent. If it is, then the case for reform is considerably weakened. Of course, even if the response of saving to changes in interest rates is strong and positive, we cannot decide the issue on considerations of efficiency alone. The effect of such a change on the distribution of income and its fairness must also be judged.

INFLATION AND THE TAX SYSTEM

In the absence of taxes, we do not assume that inflation either stimulates or retards capital formation, provided savers and investors share a common expectation about its probable rate. With taxation, a change in the inflation rate, even if fully anticipated, has real effects on incomes and interest rates and, consequently the rate of capital formation.

Personal income tax

Federal income tax is progressive. During inflation, the money value of wages and salaries rises, and workers find themselves in higher marginal tax brackets. The real value of their taxes rises. If real incomes are growing

slowly, real income after taxes may actually decline. 1/ Inflation raises the share of total income accruing to the Government in taxes.

When the Government spends the additional tax revenue on final goods and services, either directly as purchases or indirectly as transfers, total saving as a fraction of total income declines, pushing up interest rates and reducing capital formation. When the Government uses the additional revenue to reduce the Government debt--that is, when it reduces the deficit or creates a surplus, or if it invests in public capital--then personal saving declines but total saving and capital formation increase. Therefore, the rise in taxes induced by inflation may either stimulate or retard capital formation, depending on Government expenditures. 2/

Inflation combines with the tax system to affect saving in another way. Lenders who anticipate a positive rate of inflation insist on a higher rate of interest, to compensate them for depreciation they expect in the value of their assets. This inflation premium is taxed in the same way as an increase in the real rate of interest. Therefore, if the market rate of interest rises by exactly the rate of inflation, the real rate of interest after taxes will decline. To preserve a steady real return after taxes, we would have to raise market interest rates by more than the rate of inflation. 3/

1/Consider someone whose income rises from $10,000 to $11,000 in a period when the price level is increased by 10 percent. The real income before taxes is constant. Now, suppose this person pays an income tax of 20 percent on the first $10,000 of income and 40 percent on the next $1,000. Real income after taxes is initially $8,000, and in nominal terms it rises to $8,600, but in real terms the $8,600 is worth only $7,818. This person's real income declines as a result of the tax increase caused by inflation. Deductions and exemptions expressed in nominal terms yield the same results.

2/The Congress can, of course, offset these effects by periodically adjusting the tax rates, as it did in the 1970s. As a result, the share of Federal revenue in total income has remained roughly constant.

3/The real rate of return to savers is the nominal or market rate minus inflation. If the market interest rate is 10 percent and inflation is 5 percent, the real rate is 5 per-

Capital gains tax

Inflation raises the effective rate of the capital gains tax. In an inflationary economy, a portion of every capital gain reflects a change in the price level between the time when an asset is purchased and when it is sold. For example, a share of stock purchased in 1967 and doubling in value over the succeeding 12 years would just keep pace with inflation. The 100 percent capital gain merely compensates for inflation. When this capital gain is taxed, the owner of the share suffers a real capital loss. When stock prices fail to keep pace with inflation, the capital loss is even greater. By taxing nominal capital gains, the Government in effect raises the capital gains tax rate when there is inflation.

Whether this increase affects saving and capital formation depends on whether the gains are expected. If people are motivated to save partly because they anticipate capital gains, then the interaction of inflation and the tax system will reduce this form of saving.

Corporation income tax

The effects of inflation on corporation income tax and on saving and investment are difficult to analyze because the incidence of the tax is uncertain. That is, the effects of a change in the tax depend on who pays it--corporate shareholders or the people who buy what the corporations produce.

When the burden of the tax is borne by corporate shareholders, an increase in the tax reduces the after-tax return

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cent. To calculate the real after-tax rate of return, the inflation rate must be subtracted from the after-tax nominal rate. Should the nominal and real rates both be 5 percent (no inflation) and the tax rate 50 percent, the after-tax real rate would, of course, be 2.5 percent. Suppose, now, a 5 percent rate of inflation and a 10 percent nominal interest rate (nominal rates fully adjust for inflation). With a 50 percent tax, the after-tax nominal yield declines to 5 percent which, after subtraction of the inflation rate, yields a zero real rate. Thus, a 5 percent inflation rate and a 50 percent tax rate interact to reduce the real after-tax yield from 2.5 percent to 0.

to corporations but does not affect the return to capital invested in noncorporate business. Only capital formation in the corporate sector is influenced by an increase in corporation tax. Longrun adjustments, however, can spread the effects of tax changes beyond the corporate sector.

In the long run, the after-tax returns on corporate and noncorporate investments of comparable risk tend to be equal. A discrepancy gives investors an incentive to shift from the investment paying the lower return to the one paying the higher, and this shift in the flow of investment funds tends to eliminate the discrepancy. This implies that increasing the tax rate on corporate income increases capital formation in the noncorporate sector while reducing it in the corporate sector. After the adjustment is completed, the after-tax return on all forms of capital will be lower as a result of the increased tax on corporate income. The tax is borne by all forms of private capital. Its effects on saving are comparable to the imposition of a tax on property income, and private saving is reduced to the extent that it responds to a reduction in the real return to capital.

This analysis is rejected by people who believe that the burden of paying corporation income tax is shifted forward to consumers. They say that the effect of the tax is comparable to a sales tax or to a value added tax on the output of the corporate sector. Its effect on capital formation is limited to the reduction in personal saving that results from the decline in real disposable incomes.

Empirical studies support both views. Conventional economic analysis generally supports the first view, which is challenged by the second view. Although consensus is tentative, the matter is worth pursuing, because the effects of corporation tax are potentially quite serious. Inflation distorts corporate income measurement and leads to overstatements and understatements about actual profitability. Inflation also enchances the inducements already present in the corporation income tax toward debt finance and earnings retention.

During inflation, the dollar cost of replacing capital rises along with other costs, but this increase is not reflected when historical costs are used to estimate depreciation. Measured profits are overstated because depreciation is understated when measured in terms of historical cost. Since taxes are paid on measured profits, the effective rate of corporate taxation rises. Similarly, the cost of replacing inventories rises during inflation. When the first in first out (fifo) method is used to value inventories, this cost

Table 5

Pretax Corporate Profits Before and After Adjustments for Changes in Inventory and Depreciation (in Billions of Dollars) a/

	Profits before adjustment	Inventory valuation adjustment	Capital consumption adjustment	Corporate profits after adjustment
1950	$ 42.6	$ 5.0	$ 4.0	$ 33.7
1955	48.4	1.7	2.1	44.6
1960	48.5	-0.3	2.3	46.6
1965	75.2	1.9	-3.8	77.1
1970	71.5	5.1	-1.5	67.9
1975	120.4	12.4	12.0	95.9
1978	202.4	24.3	18.1	160.0

a/Totals are not exact because of rounding.

Source: Economic Report of the President, 1979, p. 205.

increase is not reflected in measured costs. 1/ As a result, measured profit is overstated and the effective tax rate rises. The national income and product accounts in the United States include estimates of the full cost to corporations of replacing capital and inventories. For selected years since 1950, table 5 shows that adjusted corporation income has been lower because of the failure to make these corrections for inflation on corporate income statements. The discrepancy between measured income and adjusted income rose sharply in the 1970s. In 1978, the adjustments represented approximately 20 percent of measured corporate income.

Inflation distorts conventional measures of depreciation and inventory expense. It also distorts the usual measures of

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1/In a period of inflation, last in first out (lifo), an alternative method of valuing inventories, provides a more accurate measure of inventory cost. In recent years, the number of firms using it has increased. As late as 1976, however, one survey showed that 45 percent of all firms continued to use the fifo method. See George Dick and Richard Rickert, eds., Accounting Trends and Techniques (Washington, D.C.: American Institute of Certified Public Accountants, 1977).

interest expense, and the distortion may work to the advantage of corporate profitability. Most corporations are debtors, with a variety of short term and long term financial liabilities, the dollar value of which is fixed. During an era of inflation, the real burden of the debt declines.

Any unexpected increase in the rate of inflation causes an obvious transfer of wealth to corporations from their creditors. Unanticipated windfalls of this kind, however, are not likely to stimulate corporate investment or to encourage more corporate borrowing, which are necessarily based on events that are least likely to cause surprise. If anything, repeated failure to anticipate the rate of inflation correctly is likely to reduce investment. As evidence of an unstable business climate, this adds to the uncertainty that is always present in business decisions and makes firms cautious about investing.

Interest rates rise when lenders and borrowers expect a positive rate of inflation. Lenders know that they need a higher rate of interest to compensate for the decline they expected in the real value of their loans, and borrowers are willing to pay a higher rate because they confidently expect the real burden of their obligations to decline. Much of the drift upward in interest rates over the past 15 years can be explained this way.

The tax system in the United States does not distinguish between increases in interest rates that serve merely to offset the effects of inflation and increases that represent a rise in real interest expense. As a result, interest rates must rise by more than the increase anticipated in the inflation rate in order to maintain a stable real rate of interest. For example, if inflation is expected to rise by 5 percentage points, corporations can increase the dollar value of their debts by 5 percent without increasing their real debt burden, since the real debt burden declines at the rate of inflation. This additional borrowing would be just enough to finance an increase of 5 percentage points in interest rates. When interest payments are tax deductible, the after-tax cost of capital rises by less than 5 percentage points in nominal terms and it declines in real terms. Corporations gain from increases in expected inflation unless interest rates rise by a proportion larger than the increase in the anticipated inflation rate.

When increases in anticipated inflation are not exceeded by increases in interest rates, the tax system provides corporations with an incentive to increase their borrowing. Any advantage corporations gain in this fashion is precisely off-

set, however, by the loss to their creditors. The total return on all capital invested in the corporate sector, including the investments of bond holders and share holders, is not affected by this transfer. Consequently, when attention focuses on this aggregrate measure of corporate profitability, the main effect of inflation on corporation income is limited to the understatement of depreciation and inventory expense. This effect, as we indicated in table 5, substantially reduced the return on corporate capital during the 1970s.

TAXATION AND THE ALLOCATION OF CAPITAL

Federal tax legislation provides a number of incentives for reallocating capital among projects, industries, and foreign and domestic locations. As a result, the tax system influences not only the total quantity of capital but also the place where capital is used. Capital allocation has not received the same attention that the total rate of capital formation has, but it is important.

The arguments for a Federal boost to the rates of saving and investment hinge on the presumption that additional capital will be used productively. Increasing the rate of capital formation contributes to more rapid economic growth and improvements in the productive efficiency of other resources, but the size of the contribution depends on where the additional capital is invested. Under the current tax systems, not all uses of capital are equally productive.

In the absence of taxes, all investments of comparable risk tend to earn a similar return. When taxes are paid on income from capital, this tendency is still present, but it operates only on the after-tax return. This, after all, is the return the private investor actually receives, and it is the investor's decision to shift from one form of investment to another that establishes the tendency toward equal rates of return. Unless there is a uniform rate of taxation on all types of investment, there is no tendency toward equality among the before-tax returns. In fact, when tax rates differ, the equality of after-tax return implies disparities in before-tax returns.

The current system taxes different forms of property income at widely differing rates. As a result, the before-tax returns on alternative investment opportunities vary widely. This means that the marginal contribution of additional capital to the production of goods and services varies as the taxes it must pay vary. If the capital is invested where the before-tax return is high, the additional product will

be more valuable, measured at market prices, than the additional product attainable from an investment for which the before-tax return is low. Consequently, the size of the contribution to economic growth and productivity from a given increase in the rate of capital formation will be high or low as the extra capital earns a high or low return before taxes. How additional investment is allocated is as crucial as the size of the increase in determining the gains from a more rapid rate of capital formation.

A further consequence of the differing tax rates paid on alternative investments is that capital reallocation can be used to achieve what would otherwise require an increase in the aggregrate rate of capital formation. Measures that equalize the before-tax returns on competing investment opportunities divert the flow of new investment into areas in which its marginal contribution to growth and productivity is higher. This does not require any increase in the aggregrate rate of saving or in the total quantity of taxes collected. The more efficient allocation of capital is vital if increased capital formation is to contribute to faster growth and increased productivity. It is also an alternative means of achieving these goals.

The host of differences in the taxes paid on alternative investments in the United States arose over a long period and for a variety of reasons. Eliminating them completely is impractical and probably undesirable, but reducing some of the existing disparities would be a step toward a more efficient and productive economy.

One prominent source of disparity is the corporation income tax. Capital invested in the corporate sector is, in a sense, taxed twice. Corporate share holders pay personal income taxes on their dividends, as do other investors who pay taxes on the property income they receive. In addition, the corporation income tax is paid on the return to corporate capital before dividends are distributed. This double taxation justifies the statement that corporate dividends are taxed twice.

The main effect of the corporation income tax is not to lower the after-tax return on corporate capital below that on other forms of business capital but, instead, to raise the before-tax return. The consequences are a reduction in the total quantity of capital invested in corporations and a significant disparity between the before-tax return on corporate and on noncorporate capital. The national output is lower because the Nation's stock of capital is allocated inefficiently. The size of the reduction is questionable,

but it was estimated at $4 billion to $6 billion in 1976. 1/ This calculation set aside effects the tax may have had on the overall return to capital and, consequently, on the long-run rate of capital formation.

Provisions in the tax code specifically designed to spur capital formation by reducing the tax burden on capital income partially offset these effects of the corporation income tax. Most prominent are the accelerated depreciation allowance and the investment tax credit. These measures were designed to reduce the cost of capital to the investing firm. Accelerated depreciation does so by permitting firms to reduce taxable income by a larger fraction of their capital costs in the early years of an investment's life than would be possible if straight line depreciation were used. The investment tax credit currently permits firms to deduct 10 percent of their expenditures for qualified investments from their taxes. Together, these provisions reduce the average effective rate of the corporation income tax from an estimated 48 to 38 percent for large corporations.

Although these measures have reduced the effective rate of taxation on corporation income, they have not eliminated the differential tax treatment resulting from the corporation income tax. Moreover, they have introduced some additional differentials into the tax system. For example, the investment tax credit does not apply to buildings. It favors investment in equipment. As a result, corporations have an incentive to invest more in equipment than in structures. Also, the incentive to increase investment provided by accelerated depreciation has been eroded by the high inflation rates of recent years.

CONCLUSION

We have discussed three channels through which taxes affect capital formation. First, the level of tax revenues, together with the level of Government expenditure, determines the size of the Government's budget deficit or surplus.

1/Martin Feldstein and Daniel Frisch, "Corporate Tax Integration: The Estimated Effects on Capital Accumulation and Tax Distribution of Two Integration Proposals," cited in George Break, "Corporate Tax Integration," Federal Tax Reform, ed. by Michael Boskin (San Francisco: Institute for Contemporary Studies, 1978), pp. 60-61.

Changes in this size exert shortrun and longrun effects on the level of saving and investment. The shortrun effects result from changes in the current level of aggregrate demand. The long-run effects result from changes in the stocks of money or Government bonds, with consequent portfolio effects on interest rates. Second, changes in effective tax rates alter the rate of return on saving and, hence, the incentive to save. These changes can occur either as the result of deliberate policy actions or as the unintended consequence of inflation. Third, the allocation of capital across industries is affected by tax policy, since certain forms of investment are singled out for favorable tax treatment.

CHAPTER 7

OTHER GOVERNMENT POLICY AND PRACTICES AND CAPITAL FORMATION

All levels of government engage in a great variety of activities in addition to spending and taxing that affect the overall volume and allocation of saving and investment. These include (1) programs and policies that influence the rate of inflation, most notably the monetary policy of the Federal Reserve System; (2) regulatory activity that includes regulation of prices, rates of return, and conditions of entry into various industries as well as, during the 1970s, a vast increase in health, safety, and environmental regulation; (3) intergovernmental grants and loans; (4) Federal credit programs that shift resources to the housing industry and other favored sectors; and (5) financial flows into international areas. We will discuss these only very briefly here but at greater length in subsequent reports.

MONETARY POLICY AND OTHER GOVERNMENT INFLUENCES ON THE RATE OF INFLATION

In previous chapters, we have shown how inflation affects the volume of saving and investment. Some argue that inflation is caused by greedy unions or greedy corporations or both, but others are coming increasingly to believe that a steady and continuing rise in prices can be caused only by growth rates of the money supply that exceed the growth rate of production. In the 1970s, the Federal Reserve System's Federal Open Market Committee recognized explicitly, for the first time, the importance of controlling the monetary growth rate and began setting a range of target values for it. Nevertheless, in extended periods the actual monetary growth rate has far exceeded the Federal Reserve System's target range, because the Federal Reserve was attempting to keep the level of interest rates within a cerain target range at the same time. The money growth target and the interest rate target were inconsistent.

The 1970s also witnessed increased regulation of health, safety, energy, and the environment. Once regulatory programs are in place, they can only cause prices to be higher than they would be without the programs. They cannot cause continuously rising prices, but if getting the programs into place is marked by a long transition process of costly rules changes, the programs can cause prices to rise until the transition period ends. Similarly, unchanging levels of minimum wages or agricultural price supports or other subsidies or taxes

can account for higher prices but not the continually rising prices that characterize the process of inflation. If subsidy or tax rates are raised frequently, however, the result can be continuously rising prices. The Board of Governors of the Federal Reserve System could, in principle, reduce the growth rate of the money supply sufficiently to offset these effects. But restrictive monetary policy reduces the rate of inflation only after it slows down real economic activity. Therefore, the Federal Reserve is under intense political pressure not to take such action.

REGULATION

Prices, rates of return and conditions of entry

The Federal Government regulates rates charged and paid to customers--such as interstate transporation rates and interest rates paid by insured financial institutions--and the conditions of entry into various markets. Allocation of private capital in all industries relative to each other might be such that aggregrate output could not be increased by shifting capital from one industry to another. But regulating prices and conditions of entry could lead to a misallocation of private capital. For example, regulation might cause an excessive amount of capital in truck transporation relative to capital in rails or vice versa.

Regulating the interest paid by federally insured financial institutions tends to misallocate funds, too, when market interest rates exceed the federally set ceilings. When they do, savers generally redirect their savings into other assets. Sectors of the economy, especially housing, that depend on financial institutions for their loanable funds find themselves unable to borrow and, hence, unable to obtain the financial means to maintain investment levels. At the same time, other sectors find it easier to obtain funds. As a result, the allocation of investment is affected. Similarly, rate-of-return regulations common to many public utilities may lead to a distortion in the prices of factor inputs (the well-known Averch-Johnson effect), and so they may encourage excessive investments in certain industries. Regulation, therefore, can affect the level of capital investment as well as its allocation among projects and its allocation between industries.

Health, safety, and environment

In the 1970s, new standards for clean air and water and safe work environments required firms to make substantial

changes in their production techniques. Pollution has real costs to health, safety, and life. By preventing business firms from using the environment as if it were a free resource, Government regulation has improved society's health and welfare, but it also forced firms to consider effects of their production activities that they might otherwise have neglected.

By raising the private costs of doing business, the new environmental and safety regulations lower the return to capital and discourage capital formation. Making it more expensive for firms to use the environment reduces the output from other resouces. Where regulations actually require additional equipment, if firms are to continue producing, this effect is obvious. The new equipment does not contribute to marketed output, and its costs must be covered by production from labor and equipment, which does. This lowers the return payable to these other resources.

The methods used to administer regulatory laws also reduce capital formation. Using fixed standards for pollutants rather than levying pollution fees or taxes tends to limit the ways in which business can attempt to meet the required level of environmental quality. This further lowers the return to capital. In addition, frequent changes in regulation and a rising burden of litigation stemming from them have made investment planning temporarily more difficult. Firms are reluctant to commit massive sums to capital projects that may fail to meet new standards or new interpretations of existing standards. As more experience is gained with the new regulations, these uncertainties tend to disappear, but in the meantime capital formation is discouraged.

Finally, price controls on domestically produced crude and refined oil and natural gas discourage capital formation by reducing the rate of return on investments in them. On the other hand, if energy use and capital complement each other in the production process, subsidizing energy cost through price controls increases the demand for capital in the economy at large and in industries and sectors that use energy heavily. If domestic gas and oil prices rise to OPEC price levels, the domestic demand for capital will decrease. This could reduce longrun productivity growth in the United States.

This argument loses much of its force, in the finding that capital and energy are complements in the short run but substitutes in the long run. This is not surprising, given that, for existing capital equipment, the energy required per hour of capital service is likely to be roughly constant. Thus, higher energy prices induce increases in labor and

material and reductions in the use of capital in the short run. In the long run, however, one might expect capital and, energy to be substitutes, since new equipment can be designed to achieve higher thermal efficiencies but at greater capital costs.

INTERGOVERNMENTAL GRANTS

The Federal Government maintains many grant-in-aid programs for State and local governments. From a social point of view, the resources made available by these grants are obviously not without cost, although the recipient governments may regard them as costing nothing. If they are so regarded, the anticipated cost of any project in which the grants will be used decreases relative to the benefits anticipated. If Federal grants could be used for any project a recipient government might wish to undertake, the cost-benefit ratios of all projects would improve. An inappropriately large amount of public capital formation might occur. Grants-in-aid are not available for all purposes, however.

When resources that are made available by Federal grants are viewed as costless, the cost-benefit ratios of projects for which they could be used will seem to improve relative to those of other projects. But because the resources are not in fact costless, this seeming improvement will be spurious. Thus, Federal grants may inappropriately affect the relative rankings of projects being considered by recipient governments as well as the cutoff point.

FEDERAL CREDIT PROGRAMS

The Federal Government redirects the flow of private credit in many ways. Political decisions grant credit to certain industries, enterprises, and individuals on terms more favorable than are available in private capital markets. Thus, an element of subsidy exists in any Federal credit program. The subsidy is explicit in the case of direct loans from the Government and from privately owned, Government-sponsored enterprises at below-market interest rates or with longer maturities, higher loan-to-value ratios, and greater liquidity than are available in private markets. The interest subsidy is implicit in loans extended by private lenders but guaranteed against default by the Government. Another form of implicit subsidy is the granting of tax exemption to interest income from State and local government securities.

Table 6

Funds Advanced by U.S. Government and Federally Sponsored Agencies (in Billions of Dollars)

	Total	U.S. Government	Federally sponsored agencies
1950	$ 1.2	$ 0.7	$ 0.5
1955	2.0	0.7	1.3
1960	2.2	1.0	1.2
1965	5.4	2.9	2.5
1970	13.2	2.8	10.4
1971	8.7	2.8	5.9
1972	10.6	1.8	8.8
1973	21.9	2.8	19.1
1974	36.3	9.8	26.5
1975	29.9	15.1	14.8
1976	29.2	8.9	20.3
1977	38.6	11.8	26.8
1978	65.0	20.4	44.6

Source: Federal Reserve System, Board of Governors, Flow of Funds Accounts 1946-75, Annual Total Flows and Year-End Assets and Liabilities, December 1976, pp. 7-8, and Flow of Funds Accounts, 2nd Quarter 1979, August 1979, pp. 4-5.

Table 6 shows annual data on the Federal Government's direct lending activity, breaking down the total of funds advanced in credit markets by the Federal Government and by Federally sponsored agencies, such as the Federal Home Loan Bank Board. The massive increase in direct loan activity in the 1970s is very clear. Table 6 does not show loans by private lenders with Federal Government guarantees. In 1969, $7.8 billion of such loans was extended. In the 1970s, this kind of activity increased, so that, by 1977, $14.1 billion of such loans was extended. The total of such loans outstanding at the end of 1977 was $18.4 billion.

Except for tax exemption of the interest from State and local securities, these programs were at one time directed almost exclusively at helping the housing industry, but this is no longer true. Loans to farmers, college students, New York City, Amtrak, and the Washington, D.C., subway system are among the vast numbers that have been guaranteed by the

Federal Government. It may well be that these recipients could not have been granted the loans without Government guarantees, but we must remember that the loans they received would have gone to other demanders of credit had the guarantees not existed. The guarantees and the direct loans do nothing to increase the volume of saving. This means that Federal credit programs are not costless. Their cost is the net difference between the return on the investments they subsidize and the return on the investments they prevent.

GOVERNMENT RESTRICTIONS ON INTERNATIONAL FINANCIAL FLOWS

Economists define a "closed" economy as one that has no contact with foreign economies. It neither exports nor imports, and its borders are closed to external movements of labor and capital. An "open" economy engages in a full range of economic transactions with other countries. In the preceding chapters, we have analyzed capital formation in the United States as it would occur in a closed economy. It is clear, however, that we must examine this assumption in the light of international development.

Although the closed economy assumption is clearly unrealistic and would certainly be inappropriate in many applications, it is not necessarily a misleading approximation for all purposes. The feature of a truly open economy that might cause us to modify the analysis of capital formation presented earlier for a closed economy is that capital is free to move across international borders in response to international differences in rates of return. But if Government policies and restrictions seriously hinder this movement, then, for purposes of anlyzing the process of capital formation, the assumption of a closed economy may be more appropriate than that of an open one. A closed economy would, in turn, be an important effect of these programs and restrictions. In this section, we first explain how the process of capital formation is altered when capital is free to respond to international differences in rates of return. We then examine whether such freedom actually exists or whether, on the other hand, Government restrictions on such responses make the closed economy model a better tool for analyzing capital formation.

Considering the United States as an open economy, our conclusions in this report about saving do not necessarily hold true. In a closed economy at full employment, an increase in the rate of capital formation requires a reduction in the current consumption of goods and services, as we have seen. Similarly, an increase in saving necessarily leads to

additional capital formation, provided recession is avoided. A country with an open economy, however, can obtain resources for additional capital formation by borrowing from abroad. Moreover, an increase in saving in such a country may not result in more domestic investment. It may flow overseas, instead, to finance investment or consumption there. International capital movements thus break the tight link between domestic saving and investment that we have emphasized previously. For a set of countries with open economies that constitute a single international trade and investment unit, the equality between saving and investment holds for that unit as a whole. Any component country may save more or less than it invests, financing the difference by lending or borrowing from abroad.

The allocation of capital among countries linked by such transactions depends on adjustments in interest rates. Other things being equal, an interest rate higher than the average rate of all the countries in the unit attracts funds from abroad. This inflow of capital eventually drives down the interest rate while raising it in the countries that provide the funds. Investment and saving are equal worldwide while investment resources are allocated in accordance with their earning potential.

An increased willingness to save in a single country with an open economy initially places downward pressure on its domestic interest rates. This, in turn, prompts an outflow of capital until interest rates fall sufficiently in the other countries of the trade and investment unit. As a result, part of the increase in saving in the first country is distributed across all these other countries. Only the fraction of the increase that remained at home is available for domestic capital formation. This fraction is determined by the country's share of the unit's potential investment projects.

We see clearly that the degree to which our earlier conclusions must be modified depends on the freedom and extent of international capital movements. When the free flow of capital is hampered, interest rate differentials persist and domestic investment depends more on the magnitude of domestic saving. The assumption that capital is relatively immobile between countries can be justified only if enough barriers exist between them.

Several kinds of barriers are possible, but for purposes of this discussion we limit attention to barriers that result from Government programs and restrictions. Political uncertainties raise the risks of foreign investment in a way that frequently offsets the appeal of high returns. Governments can impede the free flow of capital in many deliberate

ways. Foreign exchange controls prevent funds from moving abroad. It may be that no funds will enter a country if there is little prospect of withdrawing them or the profits they earn. Even the threat of exchange controls may affect foreign savers significantly. Other regulations and institutional practices can inhibit foreign investments indirectly, such as limitations on investment by thrift institutions and the operation of the prudent-man rule on pension fund management. A balance-of-trade deficit is the necessary counterpart of foreign borrowing. Consequently, conventional trade barriers like tariffs and quotas can also restrict capital mobility. Measures designed to protect domestic industry can prevent both capital and consumer goods from entering a country.

Considered as a group, these governmental barriers to international capital mobility suggest that analyses based on a closed economy assumption may be as realistic as those based on that of an open economy. Indeed, the conclusion of one empirical study is that the closed economy assumption validly approximates actual experience. 1/ The analysts discovered a high correlation of levels of domestic saving and investment among the countries they studied and they claim that had these countries had economies genuinely open to the free capital movement, the high correlation could have resulted only from remarkable coincidence. They believe the correlation is more plausibly accounted for by assuming that barriers to capital mobility effectively closed these economies.

The issue is still moot. Since the economic conditions that favor high investment also favor high saving, for example, we could expect some correlation between domestic saving and investment even in an open economy. Moreover, in the period of the study, there was little year-to-year change in either saving or investment rates, and there was thus no opportunity to examine whether the effects of a sharp increase in one of the two rates might have been confined within national boundaries or spread around the world.

Countries with open economies have tools for promoting capital formation that are not available to countries with closed economies. One such tool is a lowering of trade barriers and other restrictions on capital mobility to reduce investment risks that foreign lenders have to consider. This enables domestic borrowers to attract capital frm abroad more easily and contributes, thus, to domestic capital formation.

1/Martin Feldstein and Charles Horioka, "Domestic Saving and International Capital Flows," Discussion Paper 700, Harvard Institute of Economic Research, April 1979.

When foreign sources of saving are available, a policy of investment promotion is not so tightly constrained by the need to stimulate domestic saving. On the other hand, promoting domestic saving does not automatically guarantee an increase in capital formation when saving is free to flow abroad. We can infer, therefore, that as the economy of the United States becomes more nearly open, measures designed to raise the after-tax return on investment will be more effective while measures that concentrate on domestic saving will be less effective.

CONCLUSION

Several Government activities other than taxing and spending affect saving and investment. Among them, monetary policy determines the rate of inflation, which, as we have seen, affects saving and investment. Government regulation of prices, rates of return, and conditions of entry in various industries also undoubtedly affect the volume of capital formation in those industries. The increase in Federal regulatory activity has made it much more difficult for people in business to assess proposed capital projects, while energy price controls actually discourage capital formation. Intergovernmental grants provide incentives for particular capital use. Operation of Federal credit programs affects the overall allocation of capital. Finally, Government restrictions on the free international flow of capital make it more difficult to attract capital from abroad but also reduce the possibility that any increase in saving will contribute to capital formation abroad rather than in the United States.

CHAPTER 8

CONCLUSION

The extremely complicated process of capital formation involves all the major economic institutions in the country, including the Federal Government, although the effects of Federal activities are largely indirect. In studying them, it is useful to isolate the fundamental determinants of capital formation before analyzing the ways in which the Federal Government affects the determinants of capital formation. Here we have defined the determinants and described the channels through which Federal actions affect them. In this chapter, we first summarize all this and then list possible alternatives to current Federal practices. In future reports, we will study these alternatives in more detail.

THE DETERMINANTS OF CAPITAL FORMATION

Capital formation requires net investment--that is, investment in excess of replacement. Private capital formation occurs only when individuals and business firms desire to add to their stocks of capital. Even a strong desire to invest, however, will be frustrated unless resources are released. Resources are made available through saving, and, therefore, saving is also needed for capital formation. Although the actual amount of investment in any period must equal the actual amount of saving, the decisions of savers and investors are not necessarily consistent with one another and must be reconciled in the financial markets. In the process, real rates of interest on various outlets for saving are determined.

In chapters 2, 3, and 4 we analyzed planned investment and desired saving and their coordination in the financial markets. We set activities of the Federal Government aside, in order to isolate the major determinants of investment, saving, and interest rates. Once these were clarified, it was possible to analyze spending, taxing, borrowing, and regulating activities in terms of their effects on these determinants.

THE DETERMINANTS OF PLANNED INVESTMENT

The amount of investment firms or individuals plan depends on the amount of capital they desire to hold or use. Unless desired stocks of capital are increasing, no additions to productive capacity will be planned. No net investment will be planned. Therefore, investment rate depends, basically, on the rate of change in desired stocks of capital.

In chapter 2, we showed that an individual or a business firm will desire to hold the amount of capital for which the revenue expected from an incremental increase just equals the cost of acquiring that increment. The determinants of the desired stock of capital can be classified in two groups, depending on whether they affect the revenue expected from additional capital or the cost of the additional capital.

Interest rates, prices of new capital goods, rates of physical depreciation, and changes expected in market conditions for capital goods are the major components of the cost of capital. An increase in interest rates or the current prices of new capital goods raises the cost of capital and reduces the amount of capital demanded. A reduction in interest rates or the prices of new capital goods has the opposite effect. A change in the expected future price of capital changes the current cost of capital. An increase that is expected makes it more profitable to hold capital, thus lowering the current cost, while a decline that is expected reduces the profitability of holding capital, thus raising the current cost. Other things being equal, an increase in the durability of capital lowers its cost, while a reduction in durability raises it.

A reduction in the cost of capital for any of the reasons given above generally increases the quantity of capital demanded. This, in turn, stimulates net investment in the short run; in the long run, a one-time change in the cost of capital does not stimulate net investment. To provide a continuing stimulus to net investment, it would be necessary to cause the cost of capital to decline continuously. 1/ This has not occurred in the United States, and, therefore, we must turn to the other group of determinants of the desired stock of capital to explain the Nation's long historical record of positive net investment.

The level of technology, the availability and prices of other resources, the prices of what is produced, and risk all affect the revenue expected from additional investment and, thus, influence the desired stock of capital. A technological improvement, an increase in the supply of other resources that cooperate with capital in production, or an increase in the prices of products using relatively capital intensive techniques all increase the revenue expected from additional

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1/A reduction in the cost of capital provides a continuing stimulus to gross investment, since a permanent increase in the stock of capital results in a permanent increase in replacement investment.

investment and increase the demand for capital. An increase in risk normally requires some increase in expected revenue. When the risk associated with the revenue expected from current investment increases, investors tend to reduce investment until the revenue expected from it rises to compensate them for the greater uncertainty.

Over the long run, technological progress has been most important in maintaining positive net investment. The development of new forms of capital, new methods of production requiring capital expenditures, and new skills and specialties requiring investment in human capital and the invention of new products creating new markets have all served to maintain revenue expected from additional investment. These continuing dynamic changes have offset the depressing effect that continued capital accumulation tends to exert on revenue expected from investment.

THE DETERMINANTS OF DESIRED SAVING

Saving consists fundamentally of the portion of current income that is not spent on current consumption. In the absence of Government spending and taxes, the resources released by private household and corporation saving would all be available for private capital formation.

The volume of desired saving depends on the income people normally expect to receive. Over time, the fraction of income saved depends on underlying structural characteristics of the economy and society. Family size, the average age of the population, and the rate of population growth affect the saving ratio. The frequency and severity of cyclical fluctuations in earnings and employment also affect it. An unstable economic environment is likely to increase voluntary saving while at the same time reducing the desire to invest.

The real rate of interest is defined as the rate of interest that savers expect to receive after adjustment for inflation. For example, when a 7 percent rate of inflation is expected and the rate of interest on Treasury bills is 10 percent, the real rate of interest on these bills is only 3 percent. If a saver's wealth is held in the form of Treasury bills, 70 percent of the interest payment simply compensates for the expected erosion in the real value of that wealth.

The real rate of interest reflects the trade-off between present and future consumption. A change in the real rate of interest affects the allocation of consumption potentially over the consumer's lifetime, and therefore it affects saving. Some recent empirical studies suggest that increases in the real rate of interest have a positive effect on saving.

Earlier work generally showed that, in the aggregrate, this effect is weak or nonexistent. The responsiveness of saving to changes in interest rates is of crucial significance for policy. If saving is responsive, then tax changes that raise the after-tax return on saving can be expected to promote capital formation. If it is not, not only tax changes but also investment subsidies and many other widely suggested policy changes will prove ineffective in promoting capital formation.

THE COORDINATION OF SAVING AND INVESTMENT AND THE DETERMINATION OF INTEREST RATES

The existence of financial markets means that firms and households are not compelled to coordinate their saving and investment decisions one by one. In a market economy, coordination is the result of a market process rather than deliberate planning.

The supply of loanable funds is the difference between the amount savers wish to save and the amount they are willing to invest in physical or human capital. The demand for loanable funds is the difference between the amount investors wish to invest in new capital and the amount they can finance from their own saving. Desired saving is equal to planned investment when the supply and the demand for loanable funds are balanced.

An imbalance between supply and the demand for loanable funds is eliminated by changes in interest rates. A permanent capital shortage, in the sense of a permanent excess in the demand for loanable funds relative to their supply, is impossible if interest rates are free to rise. Such an increase would reduce the amount of planned investment, while possibly increasing the supply of saving. Similarly, an excess supply of saving is eliminated by reducing interest rates, which possibly stimulates investment and reduces saving.

The investment tax credit, accelerated depreciation, and other measures that increase the desire to invest are likely to cause some increase in interest rates, which will moderate the initial impulse toward greater investment. When saving does not respond to higher interest rates, the main effect of such measures is rising interest rates with no effect on capital formation. When saving does respond to higher rates of interest, however, interest rates increase some and so does capital formation.

These conclusions must be qualified when capacity is excessive and unemployment is widespread. Under these conditions, increased investment can be financed by saving out of

the higher incomes that such investment generates. When the economy is operating at nearly full capacity, however, real incomes cannot be increased simply be stimulating demand; under these circumstances, investment stimulus alone does not suffice to raise the rate of capital formation. Without effective incentives or other action to promote saving, the attempt to stimulate investment will be frustrated.

GOVERNMENT ACTIVITIES AND CAPITAL FORMATION

Expenditures

Government expenditures affect capital formation through four main channels.

First, Government is directly responsible for public capital formation. When the Government spends to construct roads, dams, ships, office buildings, and other durable goods, it is contributing directly to capital formation.

Second, Government transfer payments may affect the voluntary saving of families and individuals. Most important are programs, such as Social Security, that provide benefits that might otherwise have been provided by private saving. The magnitude of this effect is debated among economists, however.

Third, Government purchases of goods and services affect the composition of final demand directly, and Government transfer payments affect it indirectly. Changes in the composition of final demand may raise or lower the demand for capital by reallocating output among sectors of the economy with different capital intensities. This, in turn, encourages or discourages private capital formation, depending on whether Government spending favors capital intensive goods and services.

Fourth, Government spending may "crowd out" some private investment. Whether this affects total capital formation depends on the extent of public capital formation in Government expenditure. How much is crowded out depends on how close the economy is to full employment. When there is mass unemployment and vastly excessive capacity, additional Government expenditures may stimulate private capital formation. Only as the economy approaches full employment does crowding out threaten capital formation.

Taxation

Taxes affect capital formation in three main ways. The first of these is that the difference between taxes and Government expenditures determines the magnitude of the Govern-

ment's budget surplus or deficit. A surplus channels funds into financial markets, reducing the cost of capital. A deficit must be financed by borrowing, which competes with private borrowing and raises the cost of capital. In a fully employed economy in which saving is only slightly responsive to changes in interest rates, an increase in the budget surplus or a reduction in the deficit is the most direct and effective way for the Government to promote private capital formation.

Second, changes in effective tax rates alter the return on saving. Changes may result from deliberate changes in policy or the unintended consequence of inflation. If saving responds to changes in its return, then taxes on the return have a significant effect on capital formation.

Third, taxes affect the allocation of capital. Certain forms of investment receive favorable tax treatment relative to other investments. These differences affect the amount of capital that is used in different sectors of the economy.

Other Government activities

Monetary policy affects the rate of inflation, which in turn influences market interest rates and, in the presence of taxes, the real return to saving and investment.

Government regulation of prices, rates of return, and conditions of entry in various industries divert capital out of some areas into others where it would not be found in the absence of this regulation. Moreover, the rapid expansion of Federal environmental and safety regulation in the 1970s affected capital formation in several industries. New regulation not only mandated specific types of investment but also made it temporarily more difficult for business firms to determine in advance the likely costs and benefits of investments to create new capacity.

Price controls on various forms of energy produced in the United States have discouraged capital formation in energy production.

Intergovernmental grants create incentives that would not otherwise exist for the use of capital by State and local governments.

Government also influences the allocation of capital directly, through increasingly large and growing Federal credit programs.

Finally, financial transactions between the United States and open or partially open economies outside the United States

may affect domestic saving and investment and, therefore, capital formation.

POSSIBLE POLICY CHANGES TO STIMULATE CAPITAL FORMATION

The Government might undertake a number of measures to increase the rate of private capital formation in the United States economy. The following list is only partial, but it identifies some measures likely to promote additional saving and investment.

A reduction in the Federal budget deficit would release funds for private capital formation. This is probably the most direct and effective means available for the Federal Government to increase total saving and capital formation. Suddenly eliminating the current Federal deficit would have certain risks, however. An attempt to balance the budget or generate a surplus quickly could cause aggregate demand to contract and thus provoke a recession. A recession would not only make reducing the budget deficit more difficult but would also discourage investment demand and, thus, defeat the purpose of the policy change. A gradual return to a fiscal policy in which Federal tax revenues equal or exceed Federal expenditures when labor is nearly fully employed is more likely to foster increased saving and investment. 1/

Stable fiscal and monetary policies would reduce the uncertainty of business investment. They would lower risk premiums, which appear to have risen in the 1970s, and permit an increase in the rate of capital formation without requiring any substantial increase in the current return expected from additional investment.

It is possible to envision a more stable economic environment in which a positive but more predictable rate of inflation persists. Under such conditions, a partial indexing of the tax system to correct for the distorting effects of inflation on measured corporate profits would contribute to increased capital formation. Alternatively, increases in depreciation allowances or in the investment tax credit or reductions in the corporation income tax would, to some

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1/Given the current labor force and existing Government programs to support unemployed workers, a measured rate of unemployment of between 5 and 6 percent probably corresponds today to the 4 percent rate that indicated full employment in the 1950s and 1960s.

extent, correct for the effect of inflation on corporate profitability and investment.

The income tax drives a wedge between the return that savers actually receive on their saving and the return their savings can earn when invested in capital. If saving responds to an increase in the real rate of return, then measures to relieve the tax burden on saving will promote capital formation. Various alternatives exist. For example, if saving were made tax deductible, the tax advantage of current consumption would be eliminated, and people would have a further incentive to postpone consumption and increase saving.

Financial regulation currently limits the interest that can be paid to savers with samll deposits. Eliminating or modifying this regulation would raise the return on saving for these savers, and this in turn could stimulate additional saving and, therefore, capital formation.

Federal safety, health, and environmental regulation has lowered the private return on capital and created uncertainty. Frequent changes in regulation contribute to the uncertainty of business investment, and this has raised risk premiums and disrupted investment planning unnecessarily.

Aside from borrowing to finance its own deficit, the Federal Government in recent years has aided the public in some types of borrowing. Borrowing by Government-sponsored enterprises and Government-guaranteed borrowing increased rapidly in the 1970s. To the extent that this has financed investment in human or physical capital, the net effect of federally assisted borrowing on total capital formation may be small, but when the funds generated in this fashion finance current consumption rather than investment, total capital formation is reduced. Although analysts have studied the effect of this borrowing on the rate of investment, its effects on allocation have not been examined carefully. More attention should be paid to the borrowers and potential borrowers who have been displaced by federally sponsored debtors.

The investment tax credit and other Federal subsidies for investment promote total capital formation only when they result in an increase in total saving. Otherwise, they simply displace other investments. If saving responds to increases in interest rates, further Government action to promote saving will not be necessary; if it does not, the Government must link its investment subsidies to measures that promote saving, including the creation of budget surpluses, if it wishes to increase total capital formation through investment subsidies.

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