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4 Sweden

4.1 Introduction

During the postwar period, the total tax yield in Sweden increased dramatically from 25 percent of GNP in 1955 to 50 percent in 1979. As shown in table 4.1, this increase was accompanied by substantial changes in the tax structure. Social security contributions, mainly by employers, accounted for roughly half of the twenty-five percentage point increase, thereby raising employers' share of total tax receipts more than tenfold. The share of taxes on personal incomes and corporate profits, on the other hand, fell markedly.

The structural changes in the tax system, apparent from table 4.1, reflect the growth of the public sector and a marked shift in the direction of fiscal policy from the 1950s to the 1970s. The large devaluation of the Swedish crown in 1949 greatly improved the international competitiveness of Swedish industry. Through moderate wage increases the favorable relative cost position was preserved for more than a decade, making the 1950s a period of high rates of profit and steadily expanding business investment. In this situation, stabilization policy during periods of excess demand was directed mainly at containing private investment. The statutory corporate tax rate was raised, and free depreciation allowances for machinery and equipment were gradually phased out. The rules of inventory valuation were tightened, and in two instances, in 1952–53 and 1955–57, special investment taxes were introduced to reduce the rate of private capital formation.

Toward the end of the 1950s this type of fiscal policy was abandoned as economic growth became a more central economic objective. Several changes in the tax system shifted the burden of the stabilization mechanism from corporate investment to private consumption. The system of investment funds was revised and put to active use. Household taxation

Table 4.1 **Sources of Tax Revenue, Sweden, 1955–79**

Revenue Source	Share of Total Receipts (%)						Total Receipts (BSEK)[a]
	1955	1960	1965	1970	1975	1979	1979
Taxes on personal incomes (including capital gains)	53.1	52.4	48.3	49.6	46.0	42.4	97.209
Taxes on corporate incomes	13.8	8.8	6.1	4.4	4.3	3.1	7.065
Social security contributions	2.1	4.3	12.0	14.9	19.5	27.1	62.135
Employers	2.1	1.7	8.8	11.7	18.3	25.9	59.477
Employees	—	2.6	1.8	2.0	—	—	0.0
Self-employed	—	—	1.4	1.2	1.2	1.2	2.658
Payroll taxes	0.0	0.0	0.0	1.1	4.4	2.6	5.868
Property taxes	2.4	2.2	1.8	1.5	1.1	0.9	2.089
Value-added tax	—	1.9[b]	10.3[b]	10.2	11.9	13.3	30.580
Taxes on specific goods and services	26.6	28.4	19.9	16.6	11.1	9.1	20.927
Alcohol	n.a.	n.a.	5.0	4.2	3.3	2.6	5.916
Tobacco	n.a.	n.a.	2.8	2.4	1.5	1.1	2.582
Energy	n.a.	n.a.	5.3	4.2	3.2	3.3	7.578
Other	n.a.	n.a.	6.8	5.8	3.1	2.1	4.851
Miscellaneous taxes	2.0	2.0	1.6	1.7	1.7	1.5	3.357
Total receipts (%)	100.0	100.0	100.0	100.0	100.0	100.0	
Total receipts (BSEK)[a]	12.957	19.604	40.385	69.480	132.233	229.230	
Gross domestic product (BSEK)[a]	50.800	72.190	113.450	169.902	298.915	456.007	
Share of taxes in GDP (%)	25.51	27.16	35.60	40.89	44.24	50.27	

Source: Revenue Statistics of OECD Member Countries, 1965–80 (Paris, 1981).

[a]Billions of Swedish crowns.

[b]Refer to sales taxes.

was raised through a general sales tax in 1960 as well as a new payroll tax for social security. As a result, the budget surplus increased dramatically.

With the emergence of balance-of-payments deficits from the mid-1960s, expansion of industrial investment received greater emphasis in policymaking. There was a liberalization of the rules for fiscal depreciation and also a more frequent use of the special Swedish scheme of subsidizing investment—that is, the investment funds system (described in detail in section 4.2.5). In addition, the investment tax component of commodity taxation was abolished when the general sales tax was replaced by a value-added tax in 1969.

The external imbalances, which first arose in the mid-1960s, were much aggravated by the oil crises a decade later. The problem was further worsened by the rapid wage increases and the exchange rate policies of the second half of the 1970s. The long-term policy for eliminating the balance-of-payments deficit has remained one of promoting industrial growth. This has meant, for example, that firms during the second half of the 1970s and the early 1980s have been able to count on using their investment funds almost continuously for new investment. Several kinds of ad hoc measures, such as extra investment allowances, have also been used to stimulate investment. Other recent changes in the tax system include further mitigation of the double taxation of dividends and special tax concessions to household savings.

In the past twenty years there have been major changes in the redistributive role of the Swedish tax system. During the 1960s interest in economic growth gave way to concern about income distribution. The individual income tax became more progressive after the mid-1960s. A major reform of the income tax was enacted in 1971, involving, among other things, a shift from joint to individual taxation of spouses. The reform resulted in a marked increase in progressivity combined with the abolition of the deduction allowed for the local government income tax. The latter meant that an increase in local income tax no longer automatically implied a reduction of national income tax liability. As a result, effective marginal tax rates rose.

The enhanced progressivity built into the tax schedule by the reform of 1971 and the simultaneous rapid increases in local income tax rates and, in particular, of high rates of inflation caused a "marginal tax problem" for the rest of the 1970s. To secure a given increase in real after-tax earnings, it was necessary to ask for large increases in nominal pretax wages. During the early 1970s the government attempted to solve this problem by annual ad hoc adjustments to the taxation of earned income, carried out before the rounds of central collective bargaining. These adjustments, which involved reductions in income tax and increases in the payroll tax, made possible increases in real after-tax earnings at rates acceptable to the largest groups of wage earners. At the same time, the

tax adjustments were designed to achieve a further redistribution of income. (For a discussion of this period, see Normann 1978, 1981).

The policy of making annual ad hoc adjustments to the tax schedule was changed in 1979 as part of the new tax policy of the nonsocialist government that came into power in 1976. The income tax schedules were indexed to the consumer price index. In addition, some small steps were taken toward a lowering of marginal tax rates.

The beginning of the 1980s witnessed some important changes in attitudes, with a growing concern about possible detrimental effects of high marginal tax rates. More emphasis was placed on efficiency and incentives and less on the goal of an equitable distribution of income. A manifestation of this was the agreement in April 1981 between two of the three parties in the nonsocialist coalition government and the opposition Social Democratic party to a major reform of personal income taxation. The reform, enacted by Parliament in June 1982, is scheduled to be fully implemented by 1985, after a two-year phase-in period. It is designed to cut marginal income tax rates for the majority of full-time wage earners to a maximum of 50 percent, while simultaneously lowering the value of interest deductions for earners in the higher marginal rate brackets to 50 percent (see section 4.2.1 for a more detailed account of this tax reform).

4.2 The Tax System

4.2.1 The Personal Income Tax

The personal income tax in Sweden consists of two parts: a flat-rate local income tax and a progressive central government income tax. Local and national income taxes are assessed on similar bases. Before the tax reform of 1971, however, local income tax payments were deductible from the base of the national income tax.

An important feature of the reform of 1971 was the change from joint to individual taxation of spouses. Individual taxation applies to so called A-income, that is, income from wages and salaries, farms, and unincorporated businesses. Income from other sources—for example investment income, which is labeled B-income—is, however, still taxed jointly beyond a certain amount—at present 2,000 Swedish crowns (SEK).

For the calculations of taxable income, several kinds of deductions may be made. First, all individuals are entitled to a basic deduction. During the second half of the 1970s this deduction amounted to 4,500 SEK, but the rules have recently been changed. The basic deduction is now confined to local income taxation, and the amount has been raised to 6,000 SEK. Households with children are entitled to an "employment deduction," which means that the secondary worker of the family may deduct 25 percent of his or her earned income up to a maximum of 2,000 SEK.

Single persons with children are allowed the same deduction. We note, finally, a minor remnant of the old system of joint taxation of spouses. A household with only one income earner is granted a credit against the income tax liability of 1,800 SEK.

As already pointed out, investment income in Sweden is regarded as B-income and is taxed on a joint basis if over 2,000 SEK. B-income is added to the income of the primary (highest) income earner and taxed according to her or his marginal rate of income tax. (Note, however, that the first 4,500 SEK of income of each spouse is treated as A-income, regardless of source. As explained, A-income is taxed individually.)

Swedish tax laws exempt a limited amount of investment income from tax. In 1980 this tax-free amount was 1,600 SEK for a married couple and 800 SEK for a single person. Apart from this, the tax rules are symmetrical in the sense that interest payments are deductible with no upper limit. As a result of the tax reform due to be implemented by 1985, this principle of symmetry will be broken for high-income earners. Technically this will be accomplished by dividing the national income tax into two parts, the basic tax and the supplementary tax. The tax base for the basic tax will be determined according to existing rules, which include in the base net investment income and net income from homeownership (usually a negative amount after deductions for mortgage interest). The marginal tax rate rises to a maximum of 20 percent at an income of 64,000 SEK in 1981 prices. The base of the supplementary tax is defined differently in one important respect, namely that *negative* net investment income and *negative* income from homeownership may not be used as an offset against wage income. The marginal tax rates for the supplementary tax run from zero at 102,400 SEK to a maximum of 30 percent at 288,000 SEK (in 1981 prices).

During the past few years, the tax base has been further eroded by some concessions to specific forms of household savings. Savings in special bank accounts (with an annual upper limit of 4,800 SEK) and special funds for shares (with an annual maximum of 7,200 SEK) are granted a tax-free return over a five-year period. The annual savings under this scheme are further entitled to a credit against income tax liability amounting to 20 percent for bank account savings and 30 percent for savings put into the special funds for shares. Another recent change was the introduction of a temporary scheme to reduce the tax burden on dividends. Starting in 1981, and pending a possible introduction of an imputation system, shareholders are allowed a credit against their income tax liabilities of 30 percent of dividends received. This credit, however, may not exceed, 4,500 SEK for a married couple (2,250 SEK for a single person).

Capital gains are taxed in Sweden, although only upon realization. A fraction of capital gains is included in the income tax base. For long-term

gains the inclusion rate ranges from zero on personal property to 100 percent on real estate, and for financial assets, such as shares, it is 40 percent (further details may be found in section 4.2.8).

Over the past decade there has been a growing concern in Sweden about the efficiency effects of the present system of taxing capital income. There is a widespread belief that the tax system diverts savings into "unproductive" investments such as art, antiques, gold, and consumer durables at the expense of financial assets such as bank accounts and corporate securities, which are used to channel savings into business investment in fixed capital. Residential investment in owner-occupied housing and summer cottages is also favored by the tax system. Owner-occupied housing provides a noteworthy exception to the general principle of taxing only realized income. Homeownership—including summer cottages—in Sweden is taxed by imputing an income at a rate of 2 percent (with higher rates on more expensive houses) on the tax-assessed value of the house. This imputed income is included in the income tax base of the owner. The tax-assessed values are approximately 75 percent of the market values at the time they are set, and the assessments are changed at intervals of about five years. Mortgage interest is fully deductible in computing the personal income tax base. Real capital gains on housing (defined by indexing the acquisition cost) are taxed upon realization, with an inclusion rate of 100 percent. New rules enacted in 1981 imply a partial departure from the principle of taxing real capital gains by disallowing indexation of the acquisition cost for the first four years of ownership.

For more than a decade, the national income tax schedules have been changed almost annually. Since 1979 these revisions have been based on changes in the consumer price index. It would, however, be wrong to conclude that personal income taxation in Sweden is fully indexed. The basic deductions and allowances described above are all defined as fixed nominal amounts, and changes in these deductions and allowances have been implemented only ad hoc. Moreover, the taxation of capital income is unindexed, and tax is charged on nominal capital gains (except for housing) and nominal interest receipts.

The income tax schedule in Sweden is highly progressive. The degree of progressivity may be expressed in terms of the elasticity of net of tax income (the percentage change in posttax income resulting from a 1 percent change in pretax income). With a proportional tax schedule the elasticity is unity, whereas under a progressive tax system it is less than unity. During the 1950s and 1960s, the elasticity was about 0.8 for the largest groups of wage earners and varied little between different income levels. But as a result of the major tax reform of 1971, progressivity was increased, and since the beginning of the 1970s the elasticity has been about 0.6.

Figure 4.1 shows marginal and average tax rates and elasticities of

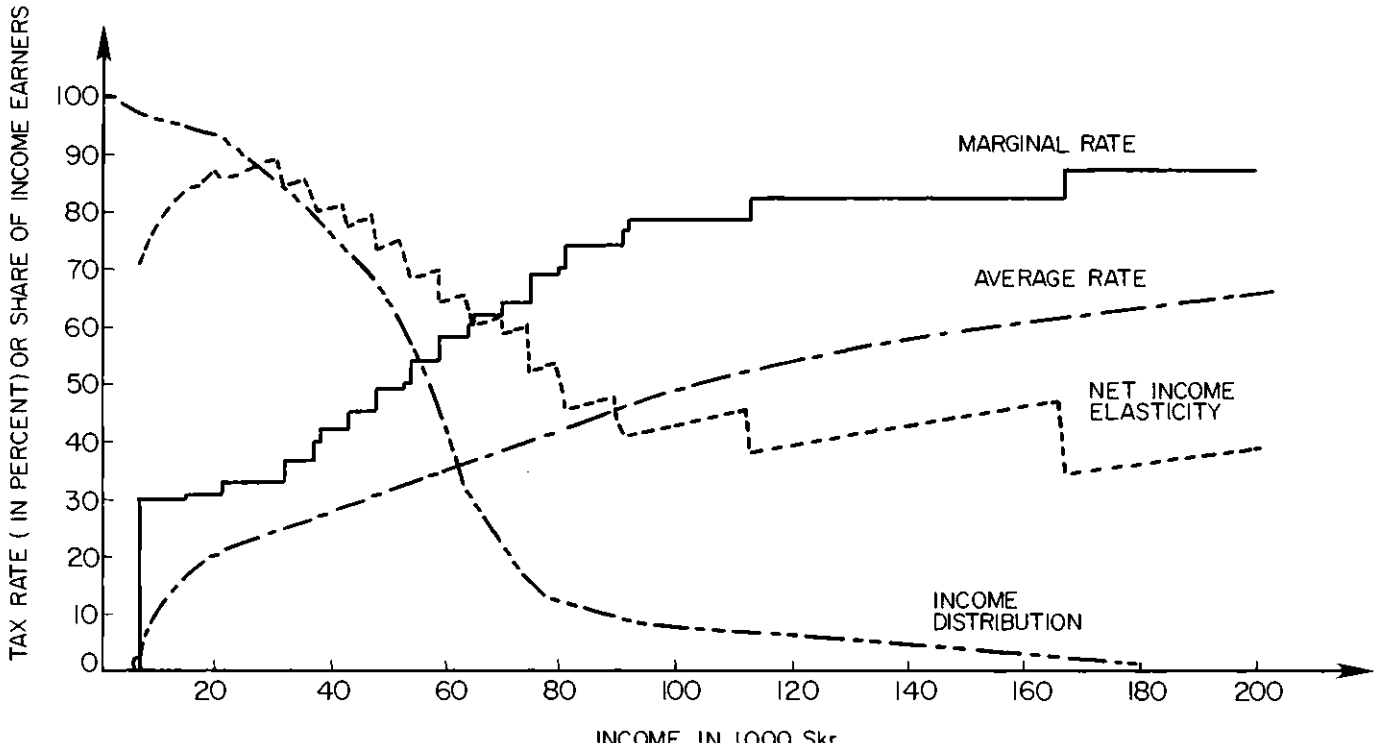

Fig. 4.1 Income tax structure in Sweden.

posttax income for different levels of pretax income in 1979. The income distribution curve shows the fraction (percentage) of the total number of income earners in income brackets with an average income of no less than the indicated amount.

4.2.2 The Corporate Tax System

The corporation is by far the most important legal form of enterprise in Sweden. Table 4.2, which is based on a special investigation carried out for this study by the Swedish Central Bureau of Statistics (SCB), shows the share of sales originating from corporations in several industry groups. The proportion of total sales originating from corporations in 1979 is less than 90 percent only for wholesale and retail trade. This industry group also exhibits large shares of partnerships and so-called economic associations (a cooperative form of enterprise).

Corporations pay both local and national income tax. The national income tax at present amounts to 40 percent of taxable profits. The local income tax varies between different communities, averaging about 29 percent in 1980. Local income tax payments are deductible (with one year's lag) from the national tax assessment, making the total statutory tax burden on corporate net profits approximately 57 percent. This statutory tax rate is used in section 4.2.5 to compute the parameter value for τ, the tax rate on corporate profits. As will be explained, its value depends also on the rules for the investment funds system, allowing firms to deduct up to 50 percent of their profits.

The Swedish corporate income tax may be described as a classical system of company taxation. Corporations pay a flat rate of tax on all taxable profits, and the shareholders in their turn are liable to income tax on dividends. Since the early 1960s, however, some mitigation of the double taxation of dividends has been offered at the firm level through the so-called Annell legislation. According to the rules in force in 1980,

Table 4.2 **Corporate Share of Total Sales in Each Industry, 1979**
(%)

Industry	All Corporations	Privately Owned Corporations
Manufacturing	92	84
Electricity, gas, water	95	40
Building and construction	98	96
Wholesale and retail trade	77	70
Transportation	92	82
Private services[a]	91	78
Total	86	78

Source: Central Bureau of Statistics (SCB).

[a]Only part of private services are included.

firms are allowed to deduct against current profits dividends on newly issued shares for a maximum of twenty years following a new share issue. The sum of deductions taken may not exceed the amount raised by the issue, and the annual deduction is further restricted to a maximum of 10 percent of the issue. The Annell rules in force in 1970 were less generous than those applying in 1980, allowing a maximum deduction of 5 percent for ten years. No mitigation of double taxation was offered in 1960.

Formally, this can be described in the following way. Let h be the rate of Annell deduction per dollar of new issue and assume this deduction to be taken for ω years ($h\omega = 1$). Annual tax savings are τh, and the present discounted value of the tax savings will then be

$$\tau h \int_0^{\omega} e^{-\rho u} du = \frac{\tau h}{\rho}[1 - e^{-\rho\omega}], \tag{4.1}$$

where ρ is to be the firm's discount rate.

Note that this expression is the present value of tax saved per dollar of new issues. To incorporate the Annell deduction into the theoretical framework of our study, it must be transformed into an equivalent tax saving per dollar of gross investment. This necessitates a rather formal treatment, which is relegated to Appendix C. We show there that the economic effect of the Annell deduction may be modeled by adding, in the case of new share issues, an additional term to the expression for A (the present value for tax allowances) reflecting the value of the deduction. This is given in equation (C.5) of Appendix C. When the Annell deduction is incorporated in this way the value of θ ("the opportunity cost of retained earnings in terms of dividends forgone") is set equal to unity.

4.2.3 Tax Allowances for Depreciation and Inventories

The effective tax burden on corporate profits depends upon the rules governing the valuation of inventories and the depreciation allowances for fixed assets. Firms are required to value inventories at acquisition cost or market value, whichever is lower, and this means that for tax purposes profits are calculated according to the principle of "first in, first out" (FIFO). As an offset to this, a deduction is allowed up to a maximum of 60 percent of the value of net purchases of inventories. This main rule is inter alia supplemented by an additional rule ("supplementary rule I") that makes it possible for firms reducing their inventories to base inventory write-down on the average size of inventories for the past two years.

Construction firms receive a special tax treatment for that part of their inventories that consists of buildings either not yet completed or only recently completed. On assets of this kind, inventory write-down is limited to approximately 15 percent.

The Swedish rules for taxing inventories imply that $\nu = 1$ for all industry groups, and $f_2 = 0.6$ for inventories in manufacturing and commerce.

For other industry (which includes construction) the weighted average value for f_2 is 0.193.

The rules of inventory write-down described above were supplemented in 1980 by a scheme that allowed firms to defer corporate taxes by making allocations to a "profit equalization fund." The size of the fund is limited to 20 percent of the firm's total wage costs, and the amount allocated for one year is included with taxable income for the following year unless offset by a new allocation. If use is made of this scheme, regular inventory write-down is limited to 45 percent compared with the normal 60 percent.

The stated motive for the introduction of this new scheme in 1980 was to give firms with either no inventories or limited inventories an opportunity to defer corporate taxes. Judging from the empirical investigations carried out by the Government Committee on Business Taxation in the mid-1970s and by Rundfelt (1982), however, it seems clear that for the three industry groups included in this study the "representative" firm has continued to use the regular rules of inventory write-down rather than the new scheme. The rules of the "profits equalization fund" have therefore not been taken into account in our calculations.

As far as machinery and equipment are concerned, the acquisition cost may be depreciated for tax purposes at a rate of 30 percent per annum on a declining balance basis (the "30 rule"). This means that $f_2 = a = 0.3$, since the first allowances may be taken in the year of acquisition, and $f_1 = 1 - f_2 = 0.7$, in terms of the notation of chapter 2. At any time, though, firms have an option to choose instead—for the entire stock of machines—the accounting value that would result from five years' straight-line depreciation. In other words, a firm is free to write off an amount needed to bring the remaining value down to what it would have been had the firm from the outset written off 20 percent of the original amount invested. For a *single* investment it is profitable to switch to the "20 rule" after the third year. A growing firm, however, with many young vintages of capital, would always stick to the "30 rule." Our assumptions about f_2 and a for investments in machinery therefore may be thought of as applying to such a firm.

Fiscal depreciation of buildings is generally carried out on a straight-line basis. The lifetime for tax purposes varies between buildings of different types and different uses, according to special guidelines issued by the tax authorities. A comparison between these guidelines and the actual composition of investments in buildings—as reflected in the calculations of capital stocks carried out by the Central Bureau of Statistics (see section 4.2.4)—indicates that buildings within the "manufacturing industry" are typically written off using a lifetime of twenty-eight years, compared with thirty-three years for "other industry" and thirty-six years for "commerce." Buildings completed since 1970, however, are treated

more favorably. During the first five years, firms are allowed to deduct an additional 2 percent per year, which shortens the tax lifetime of the asset.

The rules of tax depreciation for buildings may be expressed in terms of the present discounted value of depreciation allowances, A_z, which is given by

$$A_z = 0.02 + \frac{1}{L} + \left(0.02 + \frac{1}{L}\right)\int_0^4 e^{-\rho u}du + \frac{1}{L}\int_4^n e^{-\rho u}du, \tag{4.2}$$

where L is the tax lifetime.

The first term of this expression reflects the fact that the first allowances may be taken in the year of acquisition. Depreciation is carried out for n years, where n is determined so as to make the sum of all allowances equal to the acquisition cost:

$$0.02 + \frac{1}{L} + 4\left(0.02 + \frac{1}{L}\right) + (n-4)\frac{1}{L} = 1. \tag{4.3}$$

This gives $n = 0.9L - 1$ for use in the calculations. Before 1970 no "primary deductions" were allowed, and the period of fiscal depreciation was therefore $n = L - 1$.

4.2.4 Estimates of Economic Depreciation

It is generally believed that the Swedish rules of fiscal depreciation are generous—at least in times of stable prices—allowing firms to defer corporate tax payments. The extent of accelerated write-off is, however, difficult to determine owing to lack of reliable studies on rates of economic depreciation.

The most ambitious attempt to calculate economic depreciation in Sweden is that of the Central Bureau of Statistics (SCB), and our assumptions about rates of economic depreciation correspond to those implicitly used by the SCB. The purpose of this section is to describe the rather complicated procedure employed by the SCB in estimating net capital stocks and economic depreciation. The implied rates of economic depreciation are shown in table 4.3.

For each specific category of asset for which capital stocks are estimated—a machine of a certain type used in a certain industry—the SCB assigns a time pattern, according to which the assets of a given cohort are retired from service, and an assumed mean value for the age at which the asset is retired. The retirement patterns have been obtained from the set of survivor curves estimated by Winfrey (1935) for the United States during the 1930s, whereas the assumptions on average retirement age are based on a number of Swedish sources. The main source for the assumptions on average retirement age is Wallander (1962).

Table 4.3 **Rates of Economic Depreciation**
(%)

	Manu-facturing	Other Industry	Commerce
Machinery[a]	7.7	19.7	18.2
Equipment	7.1	12.2[c]	11.7
Vehicles	46.7	37.0	40.3
Buildings	2.6	2.3	1.8
Total[b]	5.4	7.1	7.7

Source: Own calculations based on estimates of economic depreciation and net capital stocks of the Central Bureau of Statistics (SCB).

[a]Machinery is a weighted average of equipment and vehicles in each industry.

[b]The row for total is a weighted average of machinery and buildings in each industry.

[c]The major explanation for this rather high figure is the fast depreciation of equipment in the building and construction sector (one-third of all equipment in other industry). The average depreciation rate for this kind of asset is nearly 22 percent (drilling machines, grinding machines, cement mixers, bulldozers, and similar heavy equipment subjected to very rough usage).

The Winfrey survivor curves combined with the SCB assumptions on average retirement age form the basis for perpetual-inventory estimates of gross capital stocks. These estimates of gross capital stocks can be thought of as implying a "sudden death" assumption for each single asset, which means that an asset maintains full productive efficiency until the moment it is retired. The time of retirement varies among the different assets of a vintage, however, as reflected by the survivor curve.

The SCB also provides estimates of economic depreciation based on unpublished calculations of net capital stocks. Net capital stocks are calculated by adjusting the gross capital stocks to allow for the fact that the *value* of an asset declines as it approaches the age of retirement. The approach chosen by the SCB for this purpose can be explained in the following way. Assume that a cohort of assets of a given vintage originally consists of N machines, each of unit value. The number of machines remaining in service after u years is then $S(u)N$, where $S(u)$ represents the "normalized" survivor curve, which takes the value of unity for a new vintage. At time u, $-\dot{S}(u)N$ machines are retired from service. The average retirement age of the assets of this cohort is therefore

$$d(0) = \frac{1}{S(0)N} \int_0^{\omega} -u\, \dot{S}(u)N\, du, \tag{4.4}$$

where ω represents the maximum age of the cohorts (implying that $S(\omega) = 0$). For those assets that still remain in service after n years (at time $u = n$), the average age of retirement is

$$d(n) = \frac{1}{S(n)N} \int_{n}^{\omega} -u\dot{S}(u)N \, du. \tag{4.5}$$

The average expected remaining life of the assets surviving after n years is therefore $d(n) - n$.

Now the SCB simply assumes that an asset still in service after n years retains a fraction $f(n)$ of its original value equal to the ratio between the average expected remaining life $[d(n) - n]$ and the average total expected life $d(n)$:

$$f(n) = \frac{d(n) - n}{d(n)}. \tag{4.6}$$

The "valuation coefficient" $f(n)$ takes the value unity for a new vintage ($n = 0$) and declines to zero at the maximum age of the cohort ($n = \omega$). By multiplying $f(n)$ by the number of assets surviving, the SCB obtains a value-age profile ($n = 0, \ldots, \omega$) for a cohort of assets of a given vintage.

$$b(n) = S(n)Nf(n), \qquad n = 0, \ldots, \omega. \tag{4.7}$$

For manufacturing industry, the most frequently used survivor curve for machinery (the Winfrey S_1 curve) has an assumed average retirement age of twenty-five years. The corresponding $b(n)$ curve is then almost linear for the first one-third of the maximum life and approximately geometric for the remaining two-thirds.

This approach forms the basis for perpetual-inventory estimates of net capital stocks. Economic depreciation is then obtained as the difference between gross investment and the change in the net capital stock. To determine the actual rates of depreciation implicit in the calculations performed by the SCB, we have related economic depreciation, D, to the corresponding values of the net capital stocks, K. (Data on net capital stocks are not published by the SCB. Our calculations on rates of economic depreciation are therefore based on unpublished tables at the four-digit level, obtained directly from the SCB.) We define the rate of economic depreciation to be

$$\delta_u = \frac{D_u}{K_u}. \tag{4.8}$$

The parameter δ_u combines the effects of retirement from service (assuming no in-place loss of efficiency) and decline in value as assets approach the time of retirement. Our calculations, covering a thirty-year period ending in 1979, indicate a remarkable constancy of the implicit δ_u.

The degree of constancy is particularly striking for buildings, with practically no variation over time. As a good approximation, therefore,

the SCB estimates of economic depreciation are equivalent to estimates based on the simple case of geometric depreciation with a constant δ.

Our estimated depreciation rates are shown in table 4.3. These are an average of the implicit rates described above for the years 1970–79. The marked differences between the industry groups in the depreciation rates for machinery are largely explained by the different proportions of rapidly depreciating vehicles.

It is interesting to compare the estimates with the results of a recent survey carried out by the Industriens Utredningsinstitut (IUI) and the Federation of Swedish Industries (Wallmark 1978). According to this survey, manufacturing firms estimated the average length of life of newly installed machinery as 14.3 years and that of new buildings as 28.7 years. The exact meaning of these answers is unclear. Assuming, however, that the pattern of depreciation is geometric, which implies that the average length of life is the inverse of the rate of depreciation, these numbers may be interpreted as average rates of depreciation of 7.0 and 3.5 percent, respectively. These rates are not far from those implicit in the SCB estimates of economic depreciation for manufacturing.

4.2.5 Investment Grants and Incentives

An important feature of the Swedish corporate income tax is the investment funds system (IF). The idea behind the system is to induce firms to reserve profits during boom years to be used for investment during subsequent recessions. The IF system was introduced in 1938 but did not gain importance until 1955, when the rules were changed. In that year firms started to make tax-free allocations to investment funds, and in the 1958 recession funds were released for the first time. Since then, releases of investment funds have been more and more frequent. In particular, the efforts during the 1970s to promote industrial growth meant that firms were able to use the IF system almost continuously for new investment. Since the mid-1960s the IF system has also been used extensively for regional policy purposes.

The investment funds system works as follows. Each year a firm can deduct up to 50 percent of its tax profits by "allocating" an equivalent amount to its investment fund (appearing as an entry on the balance sheet). Since the IF allocation takes the form of a deduction against taxable profits, tax payments are reduced by an amount equal to the allocation times the (statutory) corporate tax. However, 50 percent of the allocation must be deposited interest-free at the Central Bank (the remainder may be used for any purpose). Hence, even if the funds are never used again, IF allocations provide an attractive alternative to paying profits tax: 50 percent is paid to the Central Bank rather than 57 percent to the government as profits tax.

When the investment funds are released, for example during a recession, firms are allowed to withdraw from the Central Bank deposits corresponding to 50 percent of the cost of investments considered to be financed by the IF. Depending on the rules set up for a particular release, firms are sometimes also granted an extra investment allowance in the tax assessment amounting to 10 percent of the IF used. (This refers to a so-called 9 : 1 release that was in effect at the end of the 1970s and beginning of 1980s.) Investments financed by IF, on the other hand, are considered to be fully written off for tax purposes. Firms lose, therefore, the possibility of deducting fiscal depreciation.

As pointed out, the IF system was put to extensive use during the 1970s. Available data indicate, though, that the firms in the industry groups included in our study financed less than 20 percent of their investments by investment funds. It seems reasonable to assume, therefore, that the *marginal* investment considered for this study must be written off according to the regular rules of fiscal depreciation rather than through the IF system.

This view does not imply, however, that the profitability of the marginal investment is unaffected by the IF system. As explained, Swedish corporations are allowed to reduce the income tax base by allocating up to 50 percent of taxable profits to an IF. This means that 50 percent of the profits from the marginal investment will be taxed at the statutory corporate tax rate of 57 percent, while the remaining 50 percent will be untaxed. There is, however, an implicit cost to the firm of the allocation, and this cost equals the interest forgone on the 50 percent of the allocation that must be deposited with the Central Bank plus the increased tax payments owing to the loss of regular depreciation allowances on assets financed by the IF.

By this line of argument, it seems reasonable to define the *effective* corporate tax rate τ to be used for our model calculations as a weighted average of the statutory tax rate τ_s (which is 57 percent in 1980) and the implicit cost of the IF allocation. To put the expression for the effective corporate tax rate in a general form, we may introduce the following notation: let ℓ be the proportion of profits that may be allocated to the IF and b be the proportion thereof that must be deposited with the Central Bank. The IF allocation is used after n years, at which time the firm can withdraw the Central Bank deposit. The effective corporate tax rate then becomes

$$\tau = (1 - \ell)\tau_s + b\ell(1 - e^{-\rho n}) + \ell A_d\, e^{-\rho n}, \tag{4.9}$$

where τ_s is the statutory corporate tax rate and ρ the firm's after-tax rate of discount (which depends on the source of finance). The second term of the equation then represents the present value of the interest forgone on

the Central Bank deposit and the third term the present value of increased tax payments owing to forgone depreciation allowances. During the second half of the 1970s and the beginning of the 1980s, firms were allowed to use the IF system almost continuously for new investment. For 1980 it seems reasonable, therefore, to assume a zero time lag between allocation and use of the IF ($n = 0$). The cost to firms of IF allocations would then be limited to the loss of regular depreciation allowances on the acquired assets. In this case equation (4.9) simplifies to

$$\tau = (1 - \ell)\tau_s + \ell A_d. \tag{4.10}$$

Both 1960 and 1970 represent peak years of the business cycle, and, with a cycle length of four to five years, firms would expect a time lag of about two years before the IF allocations could be used. We assume, therefore, that $n = 2$ for 1960 and 1970. The details of the IF system given above imply, furthermore, that ℓ has a value of 0.5 for 1980. For 1960 and 1970 ℓ equals 0.4. In 1980, 50 percent of an IF allocation had to be deposited with the Central Bank, which means that b equals 0.5. For 1960 and 1970 b takes the value 0.46.

Considering that the present discounted value of regular depreciation allowances per unit of investment is lower for buildings than for machinery, it seems reasonable to assume that a tax-minimizing firm would use its investment funds for investments in buildings rather than machinery. This assumption will be used here, and the definition of A_d in equation (4.9) is therefore (see section 4.2.3):

$$A_d = \tau\left[0.02 + \frac{1}{L} + \left(0.02 + \frac{1}{L}\right)\int_0^4 e^{-\rho u}du + \frac{1}{L}\int_4^{0.9L-1} e^{-\rho u}du\right]. \tag{4.11}$$

The effective corporate tax rate τ, as defined by (4.9), is a function of the firm's after-tax discount rate ρ, and this means that it depends on the source of finance used in connection with future IF releases. However, to reduce the programming work involved for our numerical estimates, we use the same parameter value for τ for all sources of finance. This value is computed by using for ρ a weighted average of ρ (as obtained for the "fixed-r" case) for each source of finance. The weights correspond to the 1980 proportions of debt, new share issues, and retained earnings for the three industry groups aggregated. This procedure makes it possible, in turn, to approximate equation (4.9) by a linear function of the inflation rate (π). This means that $\tau = 0.449 - 1.06\pi$ for 1980 and $\tau = 0.410 - 0.41\pi$ and $\tau = 0.454 - 0.49\pi$ for 1960 and 1970, respectively. At 9.4 percent inflation, which is the rate of inflation actually experienced in

Sweden over 1971–80, the effective corporate tax rate τ is therefore 34.9 percent, compared with the statutory corporate tax rate (τ_s) of 57 percent. For 1960 and 1970, statutory corporate tax rates were 49 and 53 percent, and (at the same inflation rate) effective corporate tax rates were 37 and 41 percent, respectively.

On occasions there have been special and temporary improvements of depreciation rules and special tax reductions to stimulate investment. These types of stimuli appear to have been used more frequently in recent years. Thus, in 1976–78 firms were offered an extra investment allowance of 25 percent for machinery and equipment, for national income tax purposes. Regular fiscal depreciation was not affected by this extra allowance. This investment allowance was reintroduced in 1980, and the rate was then set at 20 percent for both the local and national tax assessments. A 10 percent allowance was granted for buildings. With a statutory corporate tax rate of 57 percent, these investment allowances are equivalent to investment grants of 11.4 percent for machinery and 5.7 percent for buildings. We assume, therefore, $f_3 = 1$ and $g = 0.114$ for machinery, and $f_3 = 1$ and $g = 0.057$ for buildings.

In addition to the grants and tax allowances discussed above, large subsidies were extended to manufacturing firms during the recession of the late 1970s. These were provided ad hoc, to a large extent in the form of rescue operations to maintain employment. The magnitude of payments is discussed in section 4.4.4. For this reason we have not included such subsidies in our calculations and have restricted our attention to statutory rates of allowances and grants.

The general sales tax that was in effect in Sweden between 1959 and 1969 included gross investments in its base. Tax payments were deductible against the corporation income tax base. In 1960 the general sales tax was levied at the rate of 4 percent and the corporate tax rate was 49 percent. Therefore the sales tax was equivalent to a *negative* investment grant of 2 percent ($f_3 = 1$ and $g = -0.02$ in 1960).

4.2.6 Local Taxes

The local income tax in Sweden applies not only to individuals but also to corporations. The tax on individuals was discussed in section 4.2.1. The base of the corporate tax—which is similar to that of the national corporation income tax—is defined by the central government, while the rates are determined by the local authorities. The same rate is applied to companies as to individuals. In 1980 the countrywide average was 29 percent.

A Swedish corporation is not liable for property taxes as usually defined. For local income tax purposes, however, a firm must declare an amount corresponding to 2 percent of the assessed value of its buildings and real estate. This "guarantee amount" is deductible from profits for

the local income tax assessment, but taxable income cannot fall below the guarantee amount. The effect of this is to levy a minimum tax on firms equal to the product of the tax rate and 2 percent of the value of their real estate. We have ignored this provision (which is not relevant to marginal investment in machinery and inventories) and assumed that firms investing in buildings have taxable profits above the guarantee amount.

4.2.7 Wealth Taxes

The Swedish wealth tax applies only to individuals. Capital values of insurance policies and individually acquired pension rights are excluded from the tax base. The 1980 schedule (unchanged since 1975) levied a zero tax rate on net wealth (assets less liabilities) below 200,000 SEK, a 1 percent rate on wealth between 200,000 and 275,000, 1.5 percent between 275,000 and 400,000, 2 percent between 400,000 and 1,000,000, and 2.5 percent on wealth exceeding 1,000,000 SEK.

A detailed description of the distribution of household wealth in Sweden for 1975 is presented in Spånt (1979), and this study makes it possible to estimate the marginal wealth tax rates implied by a hypothetical 1 percent increase in household wealth. Spånt shows the holdings of various assets such as real estate, bank accounts, and shares for thirteen different classes of taxable net wealth. Using this information and the marginal tax rates for each class of net wealth, as implied by the tax schedule, we have obtained separate estimates of the weighted average marginal tax rates on the holdings of equity and debt. For 1975 the marginal wealth tax rate on equity turned out to be 1.5 percent, compared with 0.4 percent on bank account holdings. Since there is almost no direct lending (through bonds, for example) from households to the business sector, the tax rate on bank account holdings has been used as our estimate of the marginal wealth tax rate on debt.

The different marginal tax rates on equity and debt obviously reflect the differences in the distribution of the holdings of shares and bank accounts among households. Wealthy households have invested a larger proportion of their net wealth in shares than have less wealthy households. An additional indication of this fact is that 35 percent of the total amount of shares owned by households are held by households paying the top marginal wealth tax rate, whereas for bank account holdings the corresponding figure is barely 4 percent. On the other hand, households with taxable net wealth below the tax-exempt limit own 10 percent of household shareholdings and 26 percent of total bank holdings.

With an average rate of inflation of nearly 10 percent since the mid-1970s, it is reasonable to expect the marginal wealth tax rates to be higher in 1980 than in 1975. Assuming the average net wealth within each wealth class to increase at the rate of inflation and the relative distributions of bank account and shareholdings to be unchanged, we have estimated that

the marginal tax rate on equity actually rose from 1.5 percent in 1975 to 1.9 percent in 1980, compared with an increase from 0.4 to 0.8 percent on debt.

The wealth tax schedule, introduced in 1975 and still in force in 1980, was changed in 1981. This revision reduced the estimated marginal tax rates to their 1975 level. Because the revision of the schedule in 1981 effectively reestablished the marginal tax rates of 1975, we have chosen as our estimates for 1980 the average of the 1975 values (which equal the 1981 values) and 1980 values. The assumed marginal wealth tax rate is therefore 1.7 percent on equity and 0.6 percent on debt.

4.2.8 Household Tax Rates

Average marginal income tax rates on investment income of households are shown in table 4.4 for the years 1960, 1970, and 1980 and for the proposals due to be implemented in full by 1985.

The figures for 1980 are based on a special investigation carried out for this study by the Central Bureau of Statistics (SCB). Since the mid-1970s the SCB has collected detailed information on household income based on a sample survey of tax returns and other sources. This data base (HINK), which consists of approximately 28,000 individuals from a population of 8.2 million, has been used to estimate the relative distributions of dividends and interest receipts over different income brackets in 1978. (The Swedish term for the income concept used is *sammanräknad nettoinkomst*.) To obtain reliable estimates, it has been necessary, furthermore, to combine the regular HINK data base with a supplementary sample of wealthy households.[1] This supplementary sample was not available for 1979 and 1980.

Since the basic data were available only for 1978, we have assumed that the "real" distributions (that is, adjusted for changes in the price level) of dividends and interest receipts were the same in 1978 and 1980. The average incomes of each of the nineteen income classes employed in 1978 were translated into corresponding nominal amounts for 1980. Marginal tax rates for the different levels of income were obtained from the IUI model of the System of Personal Income Taxation (see Jakobsson and Normann 1974). The marginal tax rates were then weighted together to obtain average marginal tax rates.

The first row of table 4.4 shows the weighted average marginal income tax rates for households that receive dividends and interest income, respectively. These numbers may, however, exaggerate the tax burden on a marginal increase of investment income, since all households are

1. The HINK data base is described in annual publications from the SCB (see Statistical Reports N1981:8.1). The procedure of using a supplementary sample of wealthy households is explained in Spånt (1979).

Table 4.4 **Average Marginal Income Tax Rates (m) and Statutory Capital Gains Tax Rates (z_s) of Household Investors**
(%)

Year	m		z_s
	Debt	Equity	
1980	52.2	65.2	26.1
1980[a]	49.9	64.0	25.8
1970	48.0	58.0	15.0
1960	34.0	45.0	0
"New rules" 1985	43.9	57.2	22.9

Source: Own calculations as described in the text.
[a]With the exemption limit for investment income taken into account.

allowed a limited amount of investment income free of tax (see section 4.2.1). We have therefore also calculated the share of dividends and interest receipts, respectively, going to households whose *net* investment income (dividends, interest receipts, etc., *less* interest costs) exceed the maximum tax-free amount. The adjusted tax rates obtained by multiplying these shares by the corresponding marginal tax rates for each income bracket then reflect the fact that some households do not pay any tax on marginal increases in investment income. As shown by the second row of the table, these calculations reduce the weighted average marginal tax rates by two and one percentage points, respectively.

For purposes of comparison, table 4.4 also includes estimates of average marginal tax rates for 1970 and 1960. The estimates are based on our own calculations using a 1966 study of the distributions of ownership of shares and bank account holdings over different income brackets (Statens Offentliga Utredningar 1969). These distributions were used, in turn, as proxies for the distributions of dividends and of interest receipts.

The calculations assume that the real distributions of dividends and interest receipts over income class were the same in 1960 and 1970 as in the year of the study, 1966. The mean incomes for the income classes employed in the 1966 study were translated into corresponding nominal amounts for 1960 and 1970, using tax assessment statistics. As for 1980, marginal tax rates were obtained from the IUI tax model.

Table 4.4 shows the statutory marginal tax rates on realized capital gains on shares. Taxation of long-term capital gains on shares was first introduced in Sweden in 1966 (see Rundfelt 1982). According to the rules in force in 1970, 10 percent of the proceeds of the *sale* of shares were included in the personal income tax base of the seller.

Assuming that investors expect capital gains to accrue at the nominal rate of 5 percent per annum (the average increase in the stock market

index at the time), and assuming a holding period of ten years, this "sales tax" is equivalent to a statutory rate of tax on realized capital gains of 15 percent. The rules were then changed in the mid-1970s to define a tax on realized nominal capital gains. The new rules require that 40 percent of realized long-term nominal gains (in excess of a tax-free amount of 3,000 SEK) be included in the taxable income of the owner. This means that, at the margin, the capital gains tax rate equals 40 percent of the income tax rate. Long-term gains are gains on assets held for more than two years. Short-term capital gains on assets held for less then two years are fully taxed as income.

Finally, the last row of table 4.4 shows marginal income tax rate for the tax reform due in 1985 but introduced into legislation in June 1982. The figures shown are the tax rates that would have applied had the reform been in full effect in 1980. The rules of the 1985 system have not been incorporated into the IUI tax model, and the numbers reported are therefore approximate. In addition, the 1985 tax system poses special problems because of the division of the national income tax into a basic tax and a supplementary tax. For the supplementary tax, *negative* income from financial investments and homeownership (*underskottsavdrag*) may not be used to offset wage income, and available information on the distribution over income class of this negative income is not fully comparable with the data used for table 4.4.

Chapter 2 of this book (as well as the country chapters for the United Kingdom and the United States) discusses in some detail the problems posed by the fact that households may hold debt instruments in a non-interest-bearing form (such as sight deposits). It is assumed that non-interest-bearing accounts yield a return in the form of bank services provided free of charge. Income from non-interest-bearing deposits is therefore deemed to be taxed at a zero rate. This implies, in turn, that the marginal tax rate on income from debt instruments must be calculated as a weighted average of the ordinary marginal tax rate (as shown in table 4.4) and the zero rate on non-interest-bearing deposits.

Household holdings of non-interest-bearing debt instruments are much less important in Sweden than in other countries. Furthermore, Swedish households do, as a rule, earn interest income on sight deposits (such as checking accounts), albeit at a lower rate than on time deposits. Income accruing to sight deposits in Sweden, therefore, will be considered to take the form of both interest income (which is taxed at ordinary tax rates) and untaxed bank services. According to our approximate calculations, the proportion of total household income on debt instruments accruing as untaxed bank services was only 1.4 percent, leaving 98.6 percent of total debt income in taxable form. The marginal tax rates of households applicable to debt finance are therefore equal to the tax rates appearing in table 4.4 times 0.986. The 1980 marginal tax rate on

interest earnings of 49.9 percent is then reduced to 49.2 percent, and the 1985 tax rate is reduced from 43.9 to 43.3 percent.

The numbers appearing in the second column of table 4.4 represent the average marginal *income* tax rates of household equity investors. As will be explained below, it is important to distinguish between changes in the tax system that affect these marginal income tax rates and changes that affect the marginal tax burden on *dividends* alone. One reason for distinguishing between the two is illustrated by the operation of the 30 percent dividend tax credit scheme introduced in 1981. The tax credit (against personal income tax and therefore relevant only to households) applies only to the first 15,000 SEK of dividend income for a married couple (the limit is 7,500 SEK for a single person). The effect on marginal tax rates for dividends has therefore been estimated in a way similar to that used when calculating the effects of exempting from tax certain amounts of investment income. We have thus determined the share of a marginal increase in dividends in each income bracket that would qualify for the credit. According to these calculations, the new dividend tax credit did reduce the 1980 average marginal tax rate on dividends by eleven percentage points, from 64.0 to 53.0 percent. Alternatively, if the 1985 tax schedule had been in effect in 1980, the dividend tax credit system would have reduced the marginal tax burden on dividends from 57.2 to 47.3 percent.

As mentioned in section 4.2.1, household taxation of investment income has also been affected by concessions to some special forms of savings—on special bank accounts and special funds for shares—introduced at the end of the 1970s. There is unfortunately no obvious way to translate the rules governing the "tax-savings" schemes into single "tax rates" comparable to the marginal tax rates on regular forms of interest receipts or dividends. The numbers reported below thus reflect several somewhat arbitrary assumptions.

Consider an investor who puts one crown into a qualified special bank account. He immediately receives a credit against his income tax liability of twenty öre (20 percent), and no tax is charged on interest earnings provided the crown—including compound interest—is kept in the account for a full five years. After the required five years, the account turns into a regular bank account with a taxable return. We shall assume, therefore, that the investor withdraws his money (amounting to e^{i5}, including compound interest) after five years. This assumption does not limit the time horizon of the "representative" investor to five years, however. As long as the annual savings in the scheme are below the maximum sum allowed, the investment pattern described here may well be repeated any number of times. We may assume, therefore, that upon withdrawing the amount e^{i5} in year five, the investor immediately returns one crown to the special bank account and receives an additional tax

credit of twenty öre. The present value of the (negative) tax payments from repeating this procedure x times will then be

$$T = -0.2 \sum_{u=0}^{x} e^{-i(1-m)5u}, \tag{4.12}$$

where 0.2 is the tax credit per crown of qualified savings, $i(1-m)$ is the after-tax rate of discount of the "representative" investor, and u denotes time.

Now imagine an alternative hypothetical arrangement where no initial tax credit is provided, but the investor has the option of paying tax (or, rather, of receiving the subsidy involved) at the rate m^{SB} on his annual interest earnings from the special bank account. The same investment pattern in assumed, implying that the investor puts one crown into the account at time zero and then makes additional deposits between years zero and five to keep the same amount of money in the account as with the scheme described above. The investment is repeated x times, and m^{SB} is set so as to yield the same present value of tax payments (subsidies),

$$\left[\int_0^5 m^{SB} i e^{iu} \cdot e^{-i(1-m)u} du\right] \sum_{u=0}^{x} e^{-i(1-m)5u} = T, \tag{4.13}$$

where T is defined by equation (4.12) above. The expression under the integral sign of (4.13) is the present value of tax (subsidy) payments for each five-year period, discounted to the beginning of each period. It is immediately clear from (4.12) and (4.13) that the holding period of the investor (denoted by the parameter x) does not affect m^{SB}.

Given the underlying assumptions, equations (4.12) and (4.13) can be used to obtain the value of the "equivalent tax rate" m^{SB}. To an individual with a marginal tax rate (m) of 49.9 percent, the special bank savings scheme thus turns out to be equivalent to a tax of minus 3.3 percent on the annual return on the investment plan, assuming a market interest rate (i) of 15 percent. The value of 15 percent was chosen to be representative of nominal market rates at the time, although the equivalent tax rate is rather insensitive to changes in the assumed value for i.

The effects on household tax rates of the concessions to savings in the special funds for shares were estimated in a similar manner. There are at present seven funds in operation (six of which are run by banks) that acquire shares on the stock market. Savings channeled into these funds must be kept for five years, and all dividends received by the funds must be reinvested. The individual is granted a credit against his income tax liability of 30 percent of his annual savings made under the scheme, and no taxes are charged on dividends and capital gains accruing within five years.

An immediate question here is whether the 30 percent tax credit granted by the scheme should be regarded as an offset to tax payments on dividends or on capital gains. We have settled this question by considering two funds. One of the funds is assumed to specialize in shares from corporations paying all their after-tax profits as dividends. No capital gains are thus expected on the portfolio of this fund. The other fund acquires shares from corporations that retain all their profits. The return on the portfolio of this fund would then accrue only as capital gains.

On the basis of these two polar cases, the "equivalent" tax rates on dividends and capital gains can be determined. Consider the first fund specializing in shares from corporations paying all their profits as dividends. Let the dividend yield on the portfolio of this fund be μ. Since all dividends are reinvested, one crown put into the fund at time zero will earn dividends of $\mu e^{\mu u}$ at time u. The "equivalent tax rate" m^{SF} may then be derived in exactly the same way as m^{SB} above, that is, from the equation

$$\int_0^5 m^{SF}\,\mu e^{\mu u}\,e^{-i(1-m)u}\,du = -0.3, \tag{4.14}$$

where 0.3 is the tax credit per crown of savings in the special funds for shares. Assuming the pretax rate of discount and the return on the portfolio of the fund to be 15 percent ($i = 0.15$, $\mu = 0.15$), the "equivalent tax rate" m^{SF} would then be -4.7 percent for a "representative" equity investor with a marginal tax rate of 64 percent ($m = 0.64$; see table 4.4).

The second fund, by assumption, specializes in corporate shares paying no dividends. Let the rate of growth in the value of the shares of this fund be β. At the end of the tax-free five-year period, therefore, the investor withdraws an amount $e^{\beta 5}$ per crown of initial savings. The "equivalent tax rate" z_s^{SF} may then be defined as the rate of tax (subsidy) that would yield the same present value of capital gains tax payment (subsidy) if applied to the conventionally defined capital gain of $e^{\beta 5} - 1$ as the 30 percent tax credit provided by the special funds scheme:

$$z_s^{SF}(e^{\beta 5} - 1)\,e^{-i(1-m)5} = -0.3. \tag{4.15}$$

Assuming $\beta = i = 0.15$, the "equivalent tax rate" z_s^{SF} is then -35.2 percent.

The tax savings schemes discussed here have not been taken into account for the "standard case" estimates of effective tax rates for 1980 (presented in section 4.4.1). We have chosen instead to consider the tax savings schemes as part of the "new 1981 rules," which also include the dividend tax credit system described above. This requires an assumption about the weight to be attached to the tax savings schemes in estimating household tax rates.

Both types of tax savings schemes were introduced in 1978, but interest initially was largely confined to the special bank accounts. At the end of 1979, 8 percent of taxpayers participated, and, of those, only one in ten chose to put his or her savings into the special funds for shares. The average annual savings amounted to almost 70 percent of the maximum amounts allowed. During 1980 the rules of the special funds for shares were changed, increasing the initial tax credit from 20 to 30 percent and the maximum amount of qualified annual savings from 4,800 to 7,200 SEK. After these changes, savings in the special funds for shares grew rapidly. By mid-1981 the participation rate for the two schemes together had risen to 15 percent of eligible taxpayers and, of those, almost 30 percent used the special funds for shares. Average annual savings still amounted to about two-thirds of the maximum sums allowed.

It is notable that households on average have not used the "tax savings" schemes to the maximum extent. It seems reasonable, therefore, to expect that an increase of household savings, of the kind assumed when defining the "margin" in this study, would be directed both through regular channels—for example, bank accounts and the stock market—and through the "tax savings" schemes. With this view, an assumption must be made regarding the proportion of total household savings in banks that would be channeled through the special bank accounts and the proportion of household equity investments that would be put into special funds for shares.

In mid-1981 the market value of the holdings of the special funds for shares amounted to approximately 3 percent of total household shareholdings. Holdings in the special bank accounts (including compound interest) were also about 3 percent of total household bank holdings. These numbers may give an unduly conservative picture of the importance of the "tax savings" schemes, however. Considering that the schemes were introduced as late as 1978, it seems more appropriate to use flow data. For 1981 the flow of deposits into special bank accounts amounted to 10 percent of the total increase in household bank holdings. As for the special funds for shares, by mid-1981 household deposits had risen to an annual rate corresponding to 6 percent of the total amount of equity capital obtained by the nonfinancial sector by way of new issues and (gross) retained earnings. These numbers, 10 and 6 percent, respectively, have been used as weights when determining the effects of the tax savings schemes on household marginal tax rates on interest income, dividends, and capital gains.

The "tax savings" scheme is therefore assumed to reduce the marginal tax rate on interest income from 49.2 to 44.0 percent ($= 0.9 \times 0.49 + 0.1 (-0.033)$). As mentioned above, the 1981 dividend tax credit system alone effectively reduces the marginal tax rate on dividend receipts from 64.0 to 53.0 percent. Considering the special funds for shares, this marginal tax rate is further reduced to 49.5 percent ($0.94 \times 0.53 + 0.06 \times$

(-0.047)). Similarly, the capital gains tax rate is reduced from 26.1 percent to 22.4 percent ($0.94 \times 0.261 + 0.06 \times (-0.352)$).

As already pointed out, the reduction in the marginal tax rate on dividends (m_d) brought about by the dividends credit system and the "tax savings" scheme must be distinguished from a reduction in the statutory marginal income tax rate (m) of the equity investors. The expressions for the cost of capital with equity finance derived in chapter 2 of this book assume the existence of a market for alternative financial investments where the nominal rate of return is taxed as income at the marginal rate of income tax (m). This after-tax rate of return represents the rate of discount used for determining the cost of capital for equity-financed corporate investments in fixed capital. Measures that affect only the taxation of corporate dividends, such as the Swedish dividend credit system, leave unaffected the rate of discount used by equity investors.

To incorporate the difference between the tax rates m and m_d into the analytical framework set out in chapter 2, consider a marginal investment in fixed capital of unit value financed by a new share issue at the beginning of a year. To simplify notation we will abstract from inflation, initial allowances, investment grants, and so forth, and assume that the rate of fiscal depreciation equals the rate of true economic depreciation, δ. The gross return on investment is MRR, which accrues at the end of the year. The firm then immediately sells the asset and repays the money put up by the shareholders at the beginning of the year. Assuming that the firm, by selling the asset, obtains an amount equal to the replacement value, $1 - \delta$, there remains an amount

$$(\mathrm{MRR} - \delta)(1 - \tau) \tag{4.16}$$

to be distributed to the shareholders as a dividend. This dividend is taxed at the marginal tax rate m_d, and, to make it worthwhile for the shareholders to participate in the new issue, the net dividend must equal the after-tax return the shareholders could obtain on alternative financial investments:

$$(\mathrm{MRR} - \delta)(1 - \tau)(1 - m_d) = i(1 - m)\,, \tag{4.17}$$

where i is the investors' pretax opportunity cost of funds, which we take to be the market interest rate. Hence

$$\mathrm{MRR} = \frac{i(1 - m)}{(1 - \tau)(1 - m_d)} + \delta\,. \tag{4.18}$$

The corresponding expression in chapter 2 is

$$\mathrm{MRR} = \frac{\mathrm{i}}{(1 - \tau)\theta} + \delta\,, \tag{4.19}$$

which implies that

$$\theta = \frac{1 - m_d}{1 - m}. \tag{4.20}$$

Before the dividend credit system was introduced as part of the personal income tax in 1981, m_d was equal to m, and the "opportunity cost of retained earnings in terms of dividends forgone," θ, therefore took the value of unity. The "new 1981 rules," which reduced m_d from 0.640 to 0.495, then raised the value of θ to 1.403. However, since the dividend credit system as well as the tax savings scheme applies only to households, θ still takes the value of unity for the categories "tax-exempt institutions" and "insurance companies."

For the 1985 tax schedule m is reduced from 0.640 to 0.572. In combination with the 1981 dividend credit system, the marginal tax rate on dividends m_d is then 0.473, and this implies that θ for households takes the value 1.23.

4.2.9 Tax-Exempt Institutions

Tax-exempt institutions by definition pay no tax on interest receipts, dividends, or capital gains. This category of owner includes different kinds of charities, scientific and cultural foundations, and foundations for employee recreation set up by companies. It also includes the equivalent of pension funds for supplementary occupational pension schemes.

One line of business of Swedish life insurance companies is to provide individual or collective pension plans. Such pension plans belong to tax category *P* ("pension insurance"), which exempts the insurance companies from tax on the yield of policy reserves. Contributions to individual pension plans are deductible against the personal income tax base up to a limit of 10 percent of earned income.

Contributions by employers to occupational pension schemes—determined by national collective bargaining—are likewise excluded from the taxable income of employers. Pension payments received are fully taxable to individuals. Savings for pension purposes under the rules described here thus receive the equivalent of consumption tax treatment.

The occupational pension scheme for white-collar workers in the private sector (the PRI/FPG system) is rather differently organized. Under this system pension payments are handled by the participating firms themselves, and these firms are required to account for their pension obligations by entering an item called "pension debt" on their balance sheets (see table 4.19 below). The size of the pension debt of each individual firm is determined by the Pension Registration Institute (PRI) according to conventional actuarial principles.

As the size of the estimated and required pension reserve changes, the firm must make a corresponding allocation to its pension debt. This allocation—which does not affect cash flow and does not require any

earmarking of the money retained—reduces reported profits and hence the base of the corporation income tax. Pension payments are likewise deductible against taxable profits.

These special features of the PRI/FPG system obviously do not affect the size of the required pension reserve or pension payments. Had the pension plan instead been administered by a separate insurance company—as is the case for blue-collar workers—pension reserve allocations and pension payments would be covered by employer contributions and by the earnings on the pension reserve. These earnings would be tax exempt under the regulations of tax category *P*, described above. Employer contributions would also be tax deductible for the participating firms.

The PRI/FPG system, allowing firms to exclude allocations to pension debt and pension payments from their taxable income, therefore effectively accords the same tax treatment to pension savings as is accorded to the "category *P*" pension schemes described above. The PRI/FPG savings have thus been included in the category of tax-exempt institutions.

4.2.10 Insurance Companies

This category of owner includes property insurance companies, the nonpension life insurance (category *K*) business of insurance companies, and labor market organizations. We consider these in turn.

Property insurance companies—for the most part mutual companies—pay a 29 percent local tax and a 40 percent national tax on the net income of the business, including interest receipts, dividends, and capital gains. Local tax payments, however, are deductible from the national tax assessment with a one-year lag, making the total statutory tax rate approximately 57 percent.

It is important to note that the financial investments of insurance companies are treated as inventories by the tax authorities. The implication is that the accruing nominal changes in value of the investments (for example, changes in the market value of shares) constitute taxable income.

The effective tax rate on property insurance companies is, however, reduced below the statutory tax rate of 57 percent by some provisions affecting the tax base. First, companies are allowed to undervalue their financial investments for tax purposes. Shares are valued at 60 percent of their market value, and as a result taxable income is reduced by 0.4 when a company acquires a share of unit value. As the market value of the share changes, 60 percent of the accruing capital gain (or loss) is included in the tax base. Financial investments in debt instruments are valued at 90 percent of market value. Second, a return of 4 percent on the investment is effectively exempt from tax. This exemption is accomplished by allow-

ing the companies to annually allocate an amount equal to a return of 4 percent on the insurance fund to a tax-free reserve.

The effective tax rate on the capital income of insurance companies can then be determined in the following way. Let the statutory tax rate be τ_s, and assume that a company acquires a financial investment of unit value that is written down to $1 - \gamma$ for tax purposes. The net cost of investment is then $1 - \gamma\tau_s$, since the undervaluation implies a deduction against the tax base of γ. Assume, furthermore, that the market value of the investment grows at a rate β with a dividend yield of μ.[2] The taxable income on the investment at time u will then equal dividends received plus the accruing change in the tax accounting value of the investment, $(1 - \gamma)\beta e^{\beta u}$, less the tax-exempt return, $\eta e^{\beta u}$ (where in practice η equals 4 percent). The after-tax internal rate of return, j, on this investment is defined by the following equation (where the last term is the present value of after-tax proceeds from selling the investment at time ω):

$$1 - \gamma\tau_s = \int_0^{\omega} [\mu - \tau_s[\mu + (1 - \gamma)\beta - \eta)]e^{\beta u - ju}du + (1 - \gamma\tau_s)e^{\beta\omega - j\omega}. \tag{4.21}$$

This gives

$$j = (\mu + \beta)\left(\frac{1 - \tau_s}{1 - \gamma\tau_s}\right) + \frac{\tau_s\eta}{1 - \gamma\tau_s}. \tag{4.22}$$

Now the effective tax rate τ_e is defined as

$$\tau_e = \frac{(\mu + \beta) - j}{\mu + \beta}, \tag{4.23}$$

which gives

$$\tau_e = \frac{\tau_s(1 - \gamma)}{1 - \gamma\tau_s}\left[1 - \frac{\eta}{(\mu + \beta)(1 - \gamma)}\right]. \tag{4.24}$$

As explained, τ_s is 0.57, and γ equals 0.4 for shares and 0.1 for debt instruments. A return of $\eta = 0.04$ is exempt from tax. The effective tax rate depends also on the actual yields to the insurance companies. For 1980 we have assumed a nominal rate of return $(\mu + \beta)$ of 11.8 percent on investments in shares and a 9.4 percent return on debt instruments. These rates of return correspond to the average effective yield for 1971–80 on the Stockholm Stock Exchange and on long-term industrial bonds, respectively. Equation (4.24) then gives an effective tax rate on dividends

2. These parameters are defined and used similarly in section 4.2.8.

and accrued capital gains of 19 percent and an effective tax rate on interest receipts of 28 percent.

It should be noted that the tax-exempt yield η is fixed in nominal terms, and therefore the effective tax rate will depend on the inflation rate. The 1980 effective tax rates of 0.19 and 0.28 thus reflect the actual rate of inflation used in our calculations for 1980, which is 9.4 percent. It is obviously difficult to know what rates of return insurance companies would have earned on their investments in 1980 in a hypothetical situation with no inflation. Equation (4.24) indicates that the effective tax rate would be zero if the returns on equity and debt instruments did not exceed 6.7 and 4.4 percent, respectively. It seems reasonable to assume that the rates of return with zero inflation would be below these critical values. We have assumed, therefore, an effective tax rate of zero in the case of no inflation.

The second type of tax treatment of insurance companies relates to nonpension life insurance business. Investment in this kind of policy belongs to the K category (*Kapital-insurance*) for tax purposes. Premiums are paid out of after-tax income, and the proceeds of such policies are not taxable. The insurance companies are liable for a 29 percent local tax and a 10 percent national tax on their net business income, including interest receipts, dividends, and capital gains. Because local tax payments are deductible against the base of the national tax, the combined result is a statutory tax rate of approximately 36 percent. This tax rate is then effectively reduced by some special provisions affecting the tax base. First, 5 percent of net capital income is exempt from taxation, and, second, companies are allowed to reduce their tax base by a factor of 0.003 times a "base" amount (*basbelopp*) for each policy. This amount was 16,000 SEK at the end of 1980. This last provision, however, is not taken into account here because its effects are assumed to be intramarginal. The total statutory tax rate on the return on insurance policies of category K is therefore 34 percent (0.95×0.36).

As is the case for property insurance companies, the financial investments of the life insurance companies are treated as inventory holdings, and the same rates of undervaluation for tax purposes apply. The provision that exempts from tax a 4 percent return on the insurance fund, however, is not extended to life insurance companies. The effective tax rate on capital income is therefore

$$\tau_e = \frac{\tau_s(1-\gamma)}{1-\gamma\tau_s}. \tag{4.25}$$

With $\tau_s = 0.34$, the effective tax rate is 24 percent on dividends and accrued capital gains and 32 percent on interest receipts.

Finally, our category "insurance companies" includes labor market organizations. These pay a 29 percent local tax and a 15 percent national

tax on dividends and interest receipts, making a total tax rate of 40 percent (allowing for the deductibility of local tax payments). Capital gains are taxable according to the same schedule as for individuals (see section 4.2.8). For 1980, therefore, the tax rate on realized capital gains equals 40 percent of the marginal income tax rate—that is, 16 percent.

The marginal tax rates on insurance companies are summarized in table 4.5. The rates for the three groups—property insurance, nonpension life business, and labor market organizations—were weighted together using 1980 ownership proportions. These were 0.67, 0.17, and 0.16, respectively, for equity, and 0.68, 0.22, and 0.10 for debt.

The effective tax rates of table 4.5 reflect the assumption that property insurance companies earn a nominal rate of return of 11.8 percent on their equity investments and 9.4 percent on debt instruments. The same yield assumptions are used for 1960 and 1970 in order to focus interest on the changes in tax legislation rather than on the combined effect over time of changes in tax legislation and actual market yields. The rules of undervaluation (expressed in the parameter γ) have applied since 1960, and the increases in the marginal effective tax rates from 1960 through 1980 are explained by the increases in the statutory tax rates caused by the gradual increases over time in local income tax rates.

The (weighted average) effective marginal tax rates of insurance companies depend on the rate of inflation, to the extent that nominal yields to property insurance companies are affected by inflation. The numbers appearing in table 4.5 reflect the "actual rate of inflation" of 9.4 percent, experienced over 1971–80. As explained above, it seems reasonable to assume that the market yields to property insurance companies at zero inflation would be sufficiently low to imply a zero marginal tax rate on investment income. Our estimates of the effective (weighted average) marginal tax rates of insurance companies at zero inflation, shown in table 4.6, have been obtained using this assumption. The effective tax rates for 10 percent inflation have been estimated by simply extrapolating

Table 4.5 **Average Marginal Income Tax Rates (m) and Statutory Capital Gains Tax Rates (z_s) of Insurance Companies at 9.4 Percent Inflation**
(%)

	m		
Year	Debt	Equity	z_s
1960	23.8	17.4	12.9
1970	26.8	20.2	15.4
1980	31.0	24.4	19.1

Source: Own calculations as described in the text.

Table 4.6 **Average Marginal Income Tax Rates (m) and Statutory Capital Gains Tax Rates (z_s) of Insurance Companies at Zero Inflation**
(%)

Year	m		z_s
	Debt	Equity	
1960	6.8	7.1	2.3
1970	8.5	8.8	3.7
1980	11.0	10.6	5.0

Source: Own calculations as described in the text.

the rate of change in the effective tax rates between zero and 9.4 percent inflation.

Swedish insurance companies (as well as households and tax-exempt institutions) hold debt instruments in both interest-bearing and non-interest-bearing forms. According to our estimates, non-interest-bearing debt accounted for 4.7 percent of the total debt holdings of insurance companies in 1980, and, as explained in section 4.2.8, we assume that income from non-interest-bearing debt (accruing as bank services) is taxed at a zero rate. The marginal tax rate of insurance companies applicable to debt finance (to be used for the calculations presented in section 4.4 below) is therefore obtained by multiplying the marginal tax rate derived in this section, and shown in tables 4.5 and 4.6, by $(1 - 0.047)$.

4.3 The Structure of the Capital Stock and Its Ownership

In section 4.2 we presented the parameters needed to estimate the wedge between the pretax rate of return on a marginal investment project and the posttax return on the savings made to finance the investment. We analyze this tax wedge for three kinds of real assets, three industry groups, three sources of finance, and three categories of owners, implying eighty-one possible combinations of a hypothetical marginal investment. The purpose of this section is to describe the construction of the weights for these eighty-one combinations. These weights, in turn, are used for the estimates of the weighted average marginal tax rates presented in section 4.4.

4.3.1 Data Limitations

Data limitations prevented us from computing separate numbers for more than thirty out of the eighty-one possible combinations. One obvious reason for the seemingly modest achievement is the difficulty in linking the real and financial activities of firms. We were forced to assume

that, within an industry, investment in the three types of assets was financed by debt, new share issues, and retained earnings in the same proportions.

Another difficulty was to identify the beneficial owners of financial securities in the different industries. We managed to produce rough estimates of the shares of financial liabilities in the respective industries held by each of the ownership groups, but we did not succeed in finding industry-specific equity ownership data.

We distinguish between three industry groups: manufacturing, other industry, and commerce. Restricting the analysis to these three industrial sectors implies a restricted coverage of overall activity in the economy. The three groups accounted for about 56 percent of total GDP in 1980, as seen in row 4 of table 4.7. The table shows also the importance of the public sector in Sweden. The "cost of production" in civil service departments, public authorities, and so on (government services, line 8) and the

Table 4.7 Distribution of Value Added in Sweden, 1980

Sector	Billions of Swedish Crowns		%	
1. Manufacturing		113.3		24.1
2. Other industry		72.5		15.4
a. Electricity, gas, water	14.3		3.1	
b. Building and construction	35.0		7.4	
c. Transport and storage	23.2		4.9	
3. Commerce		75.5		16.0
a. Wholesale and retail trade	52.6		11.2	
b. Other services	22.9		4.8	
4. Total included industries		261.3		55.5
5. Excluded business sectors		92.4		19.6
a. Agriculture, forestry, fishing	16.0		3.4	
b. Mining and quarrying	2.4		0.5	
c. Restaurants and hotels	4.0		0.8	
d. Communication (public)	8.4		1.8	
e. Finance, insurance, real estate	61.6		13.1	
6. Other domestic services, discrepancies		5.0		1.1
7. Total industry		358.7		76.2
a. Public enterprises	22.6		4.8	
b. State business agencies	22.3		4.7	
8. Government services		112.1		23.8
9. Gross domestic product		470.8		100.0

Source: National accounts of the Central Bureau of Statistics (SCB). Factor values exclude indirect taxes but include subsidies, in current prices. Lines 7a and 7b are estimates from annual reports of the included enterprises.

value added in publicly owned industry (lines 7a and 7b) together account for approximately one-third of total value added.

We have also excluded from our study nationalized industries, enterprises where the public interest is predominant, and unincorporated businesses. The implications of considering only the corporate sector are illustrated in table 4.8 for the year 1979. From column 1 of this table, state business agencies were excluded to obtain column 2. This adjustment affects other industry particularly, because of the state-owned electricity company (Vattenfall) and the railroad company (Statens Järnvägar). Second, legal forms of organization other than corporations were excluded to obtain column 3. These units—for example, family businesses in the form of partnerships—are, as one could expect, most common in wholesale and retail trade. Finally, we excluded state and local government corporations—for example, the large holding company Statsföretag. Summarizing the table, we see that the three industry groups defined in our study account for no more than 38 percent of GDP (column 4, row 10). This limited coverage must be borne in mind when evaluating the results presented in section 4.4.

The importance of confining the analysis to private corporations is further demonstrated in table 4.9, which shows various characteristics of the total business sector divided according to legal form of organization. The table reveals the existence of substantial differences among the types of organization. For example, public corporations invested three times more than private corporations, as seen in the fifth row, but these investments were internally financed to a much lesser extent than in private industry (row 4). Nevertheless, the experience of private corporations (in column 3) was very similar to that for "all firms" (in column 1). The corporate form has, in fact, strengthened its dominant position during the past fifty years, as seen from table 4.10. The table reveals, furthermore, a rather dramatic decrease in "individuals" (mainly single proprietorships), from almost one-third of total operating income at the beginning of the 1930s to about 10 percent in 1979.

Suitable data on capital stocks, sources of financial capital, and ownership of debt and equity for our three industry groups are not readily available from official statistics. The numbers presented below are based on information from a number of sources, of which the most important was the annual publication *Enterprises, Financial Accounts of the Central Bureau of Statistics* (SCB). Unfortunately, information of acceptable quality on real capital stocks is not available from this source, and for this reason we have used an additional classification scheme based on the national accounts. Thus we have had to interface two partly separate industrial classifications. Yet a third system of classifying business activity is used in Financial Statistics of the SCB, an important source for tracing

Table 4.8 **Value Added by Industries, 1979**

Industry	National Accounts Total		Financial Accounts Total		Financial Accounts, Nonfinancial Corporations		Financial Accounts, Private Nonfinancial Corporations	
	BSEK	%	BSEK	%	BSEK	%	BSEK	%
1. Manufacturing	102.9	100	100.8	98	97.3	95	89.7	87
2. Electricity, gas, water	11.8		3.8		3.7		1.7	
3. Building and construction	31.8		19.0		18.5		18.1	
4. Transport and storage	21.0		14.0		12.9		9.9	
5. Other industry (2 + 3 + 4)	64.6	100	36.8	57	35.1	54	29.7	46
6. Wholesale and retail trade	47.5		43.8		35.2		32.8	
7. Other services	20.7		9.3		8.5		7.2	
8. Commerce (6 + 7)	68.2	100	53.1	78	43.7	64	40.0	59
9. Total included (1 + 5 + 8)	235.7	100	190.7	81	176.1	75	159.4	68
10. In % of GDP (416.0 BSEK)		56.7		45.8		42.3		38.3

Source: Enterprises, Financial Accounts, 1979 of the Central Bureau of Statistics (SCB), and unpublished data.
Note: BSEK = billions of Swedish crowns.

Table 4.9 **Economic Characteristics of Different Parts of Industry, All Industrial Sectors, 1979**

	All Firms	Corporations				Partner-ships	Associa-tions	Other Legal Forms
		All	Private	State	Local Government			
1. Value added (BSEK)[a]	207.5	190.3	171.3	14.7	4.3	4.9	11.8	0.6
2. Gross operating profit/ Value added	21.5	21.0	21.5	10.3	38.2	39.4	22.8	12.6
3. Retained earnings/ gross operating income	4.2	4.3	4.3	3.2	11.0	8.9	2.1	5.3
4. Retained earnings/ gross investment	117.7	113.8	134.6	36.9	80.4	266.4	121.7	112.5
5. Gross investment/ value added	13.4	13.4	11.3	31.5	34.5	12.8	13.8	11.8
6. Value added/fixed assets	155.7	154.8	183.9	65.1	59.5	252.3	150.5	90.9
7. Machinery/net capital stock	23.7	24.1	23.9	20.6	46.1	32.8	15.6	10.1
8. Buildings/net capital stock	25.2	24.7	21.5	38.4	39.8	13.9	32.9	80.2

Source: Enterprises, Financial Accounts, 1979, and special computations from SCB. Note that the capital stocks are measured at book value, not replacement cost.

[a]Value added is in billions of Swedish crowns. All other figures are percentages.

Table 4.10 **Distribution of Gross Operating Income by Legal Form of Organization, All Industrial Sectors**
(%)

Form of Organization	1930	1950	1972	1979
Corporations	53.1	60.7	74.1	75.3
Partnerships	5.1	2:6	2.0	2.1
Economic associations	6.4	11.3	11.7	10.4
Individuals	30.1	19.9	6.3	12.2[a]
State business and other legal forms	5.3	5.5	5.9	
Total	100.0	100.0	100.0	100.0

Source: The 1931, 1951, and 1972 Census of Enterprises and Enterprises, Financial Accounts, 1979. The 1979 figures are not fully comparable with those for earlier years.

[a]No data are available for individuals and state business agencies in 1979, so we use the same share of gross operating income as for 1972.

the ownership of securities. Finally, we note that in some instances the latest year for which data were available was 1979.

4.3.2 Capital Stock Weights

Net capital stocks are estimated for two reasons. First, with values for real capital, financial assets, and debt we are able to determine debt/equity ratios from the stock side, treating equity capital as a residual. These ratios are then used in constructing weights for the different sources of finance (section 4.3.3). Second, real capital stock figures are required in order to estimate the distribution of assets among the three industry groups. Our estimates of the proportions for machinery and buildings are based on unpublished tables of net capital stocks from the Central Bureau of Statistics (SCB). As described in section 4.2.4, the SCB calculates these stocks using the perpetual-inventory method (see also Cederblad 1971). The SCB estimates refer to activity as a whole and are scaled down to the corporate sector using data on value added for national accounts enterprises, on the one hand, and for private corporations on the other. Inventory values for nonfinancial private corporations are obtained from Enterprises, Financial Accounts. These inventories are valued according to certain legal rules and are normally not very different from replacement cost values. The written-down book values (for tax purposes) are, of course, much lower, as seen in section 4.2.3.

Table 4.11 shows the distribution of the corporate capital stock among assets and industries in 1980. The corresponding matrix of the nine asset-by-industry capital stocks and proportions is shown in table 4.12. Two remarks should be made in connection with table 4.12. The first has to do with the concept of inventories in the "building and construction" part of other industry. As can be seen from the table, inventories constitute a remarkably high share, more than 50 percent, of the capital

Table 4.11 **Proportions of Nonfinancial Capital Stock by Asset and Industry, 1980: Private Corporations Only**

Asset	Industry		
	Manufacturing	Other Industry	Commerce
Machinery	.2635	.0253	.0345
Buildings	.2127	.0662	.0620
Inventories	.1496	.0957	.0905

Source: National accounts and Enterprises, Financial Accounts, and own calculations.

in that particular sector. This is, however, merely a reflection of the fact that inventories include buildings either under construction or recently completed but not yet sold.

The second remark concerns the rapidly growing use of *leasing* as a way of expanding capacity. The SCB assigns such investments to the sector of ownership (mainly financial companies). It should be noted, however, that assets acquired by leasing in Sweden, in contrast to many other countries (e.g., the United Kingdom), still seem to account for an insignificant part of the total capital stock—less than 1 percent. There may, however, be some potentially important tax advantages to leasing. For example, a firm with positive taxable profits could purchase assets and claim the 20 percent investment allowance (see section 4.2.5), then lease the assets to firms with zero taxable profits. This could enable firms with zero taxable profits to take advantage of the investment allowance. Since 1982 this particular arrangement can no longer be used. According to the new rules, the investment allowance can be claimed only by the "final users" of assets.

The alternative approach to measuring capital stock weights would be to compute proportions using data on investment flows. To demonstrate the differences between the stock and flow methods, we have put together, in table 4.13, the resulting asset proportions for manufacturing, had they instead been based on gross investments. As can be seen, the pattern is much changed, with machinery receiving a larger weight. In a steady-state situation with no net investment, we would expect this outcome, since machines in general depreciate faster than buildings and therefore have to be replaced sooner. The reader is referred to the discussion of this point in chapter 2.

4.3.3 Sources of Financial Capital

To estimate market value debt/equity ratios, the following approach was used. The first stage was to estimate the replacement cost value attributable to equity. Using the net capital stock calculations—at current

Table 4.12 **Private Corporate Capital Stock, 1980**

	Manufacturing		Other Industry		Commerce		Total	
	BSEK[a]	%	BSEK	%	BSEK	%	BSEK	%
Machinery	121.168	42.1	11.628	13.5	15.891	18.5	148.687	32.3
%	81.5		7.8		10.7		100.0	
Buildings	97.807	34.0	30.422	35.4	28.495	33.1	156.724	34.1
%	62.4		19.4		18.2		100.0	
Inventories	68.772	23.9	44.018	51.1	41.618	48.4	154.408	33.6
%	44.5		28.5		27.0		100.0	
Total	287.747	100.0	86.068	100.0	86.004	100.0	459.819	
%	62.6		18.7		18.7			100.0

Source: National accounts and Enterprises, Financial Accounts, and own calculations.
[a]Billions of Swedish crowns.

Table 4.13 **Proportions of Capital and of Gross Investment in Manufacturing** (%)

	Net Capital Stock 1980	Investments 1970–80	Investments 1980
Machinery	42.1	65.5	62.8
Buildings	34.0	23.7	19.7
Inventories	23.9	10.8[a]	17.5[a]
Total	100.0	100.0	100.0

Source: National accounts and Enterprises, Financial Accounts, and own calculations.
[a]Changes in stocks of inventories.

replacement cost—and balance sheet data on financial assets and liabilities together with our own calculations of the contingent tax liability resulting from accelerated depreciation and inventory write-down, the replacement cost value of equity was determined as a residual. Net trade credit was excluded. In the second stage we estimated the market value of equity using a sample of thirteen major engineering corporations (or conglomerates), accounting for 40 percent of sales in manufacturing and 25 percent of the market value of the Stockholm Stock Exchange in 1980. The ratio of market value to replacement cost (the "q ratio") for the thirteen large corporations is shown in table 4.14. Our calculations indicate that equity in 1960 had a market value very close to its estimated replacement value. The "q ratio" fell to 0.6 in 1970 and further to 0.3 in 1980, reflecting the poor performance of the Swedish stock market. These q ratios were assumed to be representative of the three industry groups. The market values of equity were then computed as q times the estimates of the replacement cost value of equity, using the 1970–80 average value of q equal to 0.51.

In judging this method for calculating the market value of equity, it should be noted that, in view of the preferential tax treatment of capital gains, it may be quite rational for a firm to undertake investments that produce less than a dollar's worth of capital gains for the marginal dollar of retention, leading to a value for q of less than unity (Bergström and Södersten 1976). In equilibrium, shareholders would be indifferent between a dollar of dividends and $(1 - m)/(1 - z)$ dollars worth of capital gains, if dividends were taxed at the rate m and (accrued) capital gains at the rate z. For $m = 0.409$ and $z = 0.096$, representing weighted average marginal tax rates for equity investors in 1980, this "marginal rate of substitution of dividends for capital gains" takes the value of 0.65. This analytically derived value for "marginal q" is well in line with the q ratios appearing in table 4.14 for the first half of the 1970s.

The debt/equity ratio was estimated as the ratio of the market value of debt to the market value of equity. For the former we used data on the

Table 4.14 **"q Ratios" for Thirteen Major Engineering Corporations**
(%)

Year	q	Year	q
1970	59.3	1976	48.0
1971	73.6	1977	37.3
1972	74.3	1978	34.3
1973	62.8	1979	29.4
1974	50.8	1980	31.3
1975	57.2		

Source: Own calculations. The underlying capital stocks were constructed assuming a geometric rate of depreciation of 5.4 percent, corresponding to the average rate for machinery and buildings in manufacturing. See section 4.2.4. The last three years are measured directly, and the preceding years are estimates. The corporations are: Alfa Laval, ASEA, Atlas Copco, Bahco, Bulten-Kanthal, Electrolux, ESAB, Flaktfabriken, Ericsson (LME), PLM, Saab-Scania, SKF, and Volvo.

Note: The q ratio is the ratio of market value to net worth.

book value of debt because very little debt is marketable. The market for corporate bonds is rather thin in Sweden, and the share of bonds in total net debt held by beneficial owners is less than 5 percent.

The division of equity finance between retained earnings and new share issues was estimated from sources of funds data, and we used a three-year average (1978–80). Since new share issues to acquire an existing company (*apportemission*) do not constitute a source of net new finance, such issues were excluded from our calculations. The three-year average was necessary to prevent cyclical fluctuations in both retained earnings and new issue activity from biasing the results. Table 4.15 summarizes the result of this exercise. We were able to separate manufacturing in this table but not able to distinguish commerce from other industry. Making use of the data on identical enterprises with more than fifty employees in 1979 and 1980, we managed to extrapolate the 1979 data for private corporations to 1980.

Finally, the shares of different sources of corporate finance were obtained by adjusting both debt and equity for intermediate ownership. The adjustment coefficients are given in sections 4.3.4 and 4.3.5, and the final weights for the different sources of finance appear in table 4.16. The first thing to notice from the table is that the proportion of total finance from new share issues is, as in other countries, very small. Another striking feature is the high degree of indebtedness in other industry and commerce. The higher debt ratio in the former industry is explained by the fact that buildings in progress, which are included in inventories in table 4.12, are typically financed by short-term debt, and that inventories make up a particularly large share of the net capital stock. This is illustrated by the approximate figures on the maturity structure of debt

Table 4.15 **Equity Finance, 1971–80**

Year	Manufacturing			Other Industry/Commerce		
	New Issues[a]	Retained Earnings[a]	New Issues as % of Equity Finance[b]	New Issues[a]	Retained Earnings[a]	New Issues as % of Equity Finance[b]
1980	1.362	17.478	7.23	1.539	18.790	7.57
1979	1.252	15.654	7.41	1.077	16.719	6.05
1978	0.313	11.057	2.75	1.054	11.360	8.49
1977	0.344	5.437	5.95	1.291	10.587	10.87
1976	1.060	11.950	8.15	2.766	11.435	19.48
1975	1.214	13.447	8.28	1.034	9.997	9.37
1974	0.949	17.099	5.26	0.549	10.521	4.96
1973	0.268	11.541	2.27	0.345	8.067	4.10
1972	0.488	7.098	6.43	0.371	6.220	5.63
1971	0.329	6.146	5.08	0.361	5.292	6.39
1971/80	7.579	116.907	6.09	10.387	108.988	8.70
1978/80	2.927	44.189	6.21	3.670	46.869	7.26
1978/80 adjusted	1.850	44.189	4.02	2.319	46.869	4.71

Source: New issues (cash payments) are from the Central Bank and the Registration Office for Enterprises (PRV). Retained earnings are from Enterprises, Financial Accounts. Manufacturing also includes mining. Other industry/commerce is "other companies" (excluding bank and credit institutions, manufacturing, mining, agriculture and forestry). In the row "1978/80 adjusted," new issues have been corrected for intermediate purchases (see table 4.18).

[a]In billions of Swedish crowns.

[b]100 × (new issues)/(new issues + retained earnings).

Table 4.16 **Sources of Finance in Each Industry, 1980**
(%)

Source of Finance	Industry		
	Manufacturing	Other Industry	Commerce
Debt	40.5	81.2	62.5
New share issues	2.4	0.9	1.8
Retained earnings	57.1	17.9	35.7
Total	100.0	100.0	100.0

Source: Own calculations as described in the text.

given in table 4.17. Long-term debt accounted for 66.8 percent of total borrowing in manufacturing, but only 51.6 percent in commerce and 33.4 percent in other industry.

4.3.4 The Ownership of Equity

We would like to obtain ownership weights for equity that reflect beneficial ownership—that is, intermediate holdings should be excluded. There is unfortunately no information readily available about such indirect or *nominee* ownership. In table 4.18 the numbers showing the distribution of owners in 1979/80 have therefore been obtained from many different sources; the main source was a report to the Commission on Wage-Earners Funds (Boman 1982), but substantial complementary calculations of our own were necessary.

The major drawback of these ownership distributions is that they refer only to shares quoted on the Stockholm Stock Exchange. Unquoted

Table 4.17 **Maturity Structure of Private Corporate Debt in Each Industry, 1980**

Industry	Long-Term Debt as % of Net Financial Debt
1. Manufacturing	66.8
2. Other industry	33.4
Electricity, gas, water	96.5
Building, construction	13.3
Transportation	72.9
3. Commerce	51.6
Wholesale, retail trade	50.9
Private services	57.8

Source: Own calculations based on unpublished data from the national accounts and Enterprises, Financial Accounts.

Table 4.18 **Shareownership in Sweden 1979/80 and 1975/76 in Billions of Current Swedish Crowns**
(proportions in parentheses)

Category of Owner	1979/80	1975/76
1. Households	23.2	22.0
	(0.604)	(0.724)
Direct ownership	21.9	21.5
In share funds	1.0	0.5
In tax-sheltered funds	0.3	—
2. Tax-exempt institutions	11.6	6.0
	(0.302)	(0.197)
Life insurance (type P)	4.3	2.2
Charities and foundations	7.3	3.8
3. Insurance companies	3.6	2.4
	(0.094)	(0.079)
Property insurance	2.4	2.0
Life insurance (type K)	0.6	0.3
Labor market and other taxable organizations	0.6	0.1
Total	38.4	30.4
	(1.000)	(1.000)
4. Other ultimate owners		
Government	2.3	0.4
Other organizations	0.5	0.2
Foreign owners	3.0	2.0
Total ultimate owners (1 + 2 + 3 + 4)	44.2	33.0
5. Intermediate owners	16.6	12.0
Investment companies	8.5	7.0
Other companies	8.1	5.0
6. Total stock of shares	60.8	45.0

Source: Boman (1982), Carlsson (1976), Spånt (1979), Aktiv Placering, and own calculations.

shares are not included, since there are few data with which to determine their ownership, and valuation is difficult in the absence of an active market. If we assume that the relation between book and market values for unquoted companies was the same as for quoted companies, then these unlisted corporations would, as a group, have a market value exceeding the value of all listed corporations by approximately 50 percent. We also know that intermediate ownership is much larger for unlisted companies. Roughly half the shares in these companies are owned by other firms, and between 15 and 20 percent belong to the public sector, leaving one-third to direct beneficial owners (compared with two-thirds of the quoted shares, table 4.18). The lion's share of these holdings is held by households, nonprofit bodies, and the like, rather than by pension funds and insurance companies.

If the ownership of these unquoted shares were included in our study, it is quite plausible that the share of households would be larger than the 60 percent figure in table 4.18. Our calculations, however, are solely based on the ownership of shares listed on the Stockholm Stock Exchange, the only stock market in Sweden. Considering the relative smallness of this market, we have not attempted to construct industry-specific ownership proportions. Although the quoted sector accounts for roughly 40 percent of all private corporate sales and an even larger share of gross profits, it is heavily dominated by manufacturing, with few firms from industries such as construction, transportation, and commerce.

In table 4.18 we see that the principal owner of equity is the household sector, accounting for 60 percent of total beneficial ownership. There has, however, been a significant downward trend in the fraction of equity owned by households.

The decreasing household ownership has, of course, a counterpart in the growing importance of institutions as shareholders. Classifying all but households as institutions, we notice a ten percentage point increase during the latter half of the 1970s for this group. The growth is especially marked for government institutions (e.g., the AP fund explained below), insurance companies, and tax-exempt institutions. Foreign ownership has, on the other hand, stayed rather constant during the period. In 1981, however, there was a marked increase in foreign investors' interest in the Swedish stock market. This interest was partly due to the abolition in 1979 of some formal obstacles to "export" of Swedish shares, and for the first time a surplus was registered for this type of portfolio investment in the capital account.

Foreign ownership of Swedish industry is more important than indicated by the stock-market figures of table 4.18, however. The reason for this is that the greater part of foreign ownership is accounted for by direct investment rather than by portfolio investment. Foreign investors' total share of (beneficial) equity ownership in Sweden amounts to nearly 10 percent.

Investment companies, shown in the table as intermediate owners, have held a fairly constant share of the ownership of listed corporations. These Swedish investment trusts are of the "closed end" type—that is, the share capital is not freely variable. A major feature of the investment trusts from a tax point of view is that dividends are exempt from tax provided at least 80 percent of the receipts are redistributed.

Table 4.18 shows that the beneficial owners included in our study account for 63.2 percent of the total value of the Swedish stock market (38.4 out of 60.8 BSEK). This share is the adjustment coefficient referred to in section 4.3.3. It is used to adjust available data on new share issues and retained earnings before estimating the shares of different sources of corporate finance.

4.3.5 The Ownership of Debt

Table 4.19 shows the ownership of financial debt in our three sectors. The estimates are based mainly on unpublished primary tables from Enterprises, Financial Accounts (covering *all* enterprises with more than fifty employees, industry by industry). The industry-specific parameters for beneficial ownership of corporate debt are shown in the top half of the table. Beneficial ownership accounts for 28, 29, and 40 percent of total debt in manufacturing, other industry, and commerce, respectively. These proportions are the adjustment coefficients for debt used in section 4.3.3 to estimate the shares of different sources of finance.

In keeping with our general approach we exclude public ownership, and hence the ownership weights calculated from the table exclude direct government lending and "special government lending." "Special lending" denotes the lending activities carried out by a number of finan-

Table 4.19 **Liabilities of Swedish Enterprises, 1980, in Billions of Current Swedish Crowns**
(proportions in parentheses)

Category of Owner	Manufacturing	Other Industry	Commerce
1. Households	7.9	18.1	9.2
	(0.252)	(0.750)	(0.482)
Through banks	7.0	17.3	5.8
Direct lending	0.9	0.8	3.4
2. Tax-exempt institutions	21.1	4.8	9.1
	(0.672)	(0.199)	(0.476)
Pension debt (PRI)	16.1	2.1	4.5
Life insurance (type P)	3.9	1.9	1.0
Charities and foundations	1.1	0.8	3.6
3. Insurance companies	2.4	1.2	0.8
	(0.076)	(0.051)	(0.042)
Property insurance	1.8	0.9	0.4
Life insurance (type K)	0.5	0.2	0.1
Labor market organizations	0.1	0.1	0.3
Total beneficial owners	31.4	24.1	19.1
	(1.000)	(1.000)	(1.000)
4. Other domestic	57.7	52.0	26.0
"Special" lending	5.5	2.0	2.2
ATP	12.2	4.0	1.7
Government	5.8	25.0	1.9
Short-term financial debt	34.2	21.0	20.2
5. Foreign owners	22.8	7.5	2.8
Loans	16.1	6.8	2.8
Bonds	6.7	0.7	—
6. Total financial debt	111.9	83.6	47.9

Source: Enterprises, Financial Accounts, and own calculations.

cial institutions funded via the state budget. These institutions provide debt finance on terms that often are more favorable than those prevailing in the regular capital market.

The National Supplementary Pension Plan (ATP) is by far the most important scheme of occupational pensions in Sweden. The ATP plan, enacted in 1960 and financed by employers' contributions, is basically a "pay as you go" system where total contributions each year are supposed to cover that year's pension payments. However, during the introductory years of the system the rates of employer contributions were set by Parliament at such a high level that a fund of considerable size was created. There is no connection in the ATP plan between the size of this fund (or its earnings) and the pension benefits. The idea behind creating a fund during the period of introduction was rather "(i) to make possible a gradual introduction of the plan without creating inequity between different age groups, (ii) to compensate for an expected decline in private insurance savings, (iii) to make possible a general increase in capital formation without raising taxes and (iv) to enhance the ability of the economy to fulfill pension commitments in a future with a greater number of retired persons to be supported by the plan" (Bentzel and Berg 1983, p. 169). Thus, the ATP plan may be schematically described as a "pay as you go" system combined with a payroll tax that earmarks part of the revenue for financial investment. These characteristics motivate the exclusion of the ATP fund investments from our ownership weights.

Furthermore, we exclude "short-term financial debt" and foreign owners from our ownership weights. Under the heading "short-term financial debt" we include interfirm debt and value-added tax liabilities and income taxes deducted at source but not yet paid to the government. Finally, bank holdings of corporate debt—advances and bonds—have been imputed to households, insurance companies, and other owners according to the respective ownership categories' shares of total bank deposits, regarding banks or financial intermediaries.

4.4 Estimates of Effective Marginal Tax Rates

This section presents the effective marginal tax rates on capital income in the corporate sector in Sweden. It is organized in the following way. Section 4.4.1 summarizes the results of the "base case," which represents our best estimates of the parameter values for the tax system and for the capital stock weights in 1980. As explained in earlier sections of this chapter, however, some important changes in tax legislation, including a new dividend tax credit system and a reduction in personal income tax rates, have been made in recent years. In section 4.4.2 the effects of these changes are analyzed. For comparison, calculations of effective tax rates are presented also for 1960 and 1970 in section 4.4.3. Finally, in section 4.4.4 we present a comparison between calculations of effective marginal

tax rates and average tax rates on the return to capital invested in the nonfinancial sector.

4.4.1 Principal Results

Table 4.20 shows the marginal effective tax rates on private nonfinancial corporate investment in Sweden in 1980 for the fixed-*p* case in which all assets earn a pretax real annual rate of return of 10 percent. Each column of the table corresponds to a specific assumption about the inflation rate. Three assumptions are explored—a zero rate of inflation, the actual average rate of inflation of 9.4 percent experienced in 1971–80, and a 10 percent rate of inflation.

The first three rows of the table show the marginal tax rates for machinery, buildings, and inventories. These are average marginal tax rates where the average has been taken over all industry groups, sources of finance, and categories of owner.

The variation in effective tax rate by asset is striking. As far as investment in machinery is concerned, the present tax system approximates an expenditure tax (equivalent to a zero tax rate on capital income). It is, in fact, more favorable than an expenditure tax at a zero inflation rate, providing a net subsidy to investment in machinery. For other assets the tax rate is higher. With a fully indexed comprehensive income tax, the

Table 4.20 **Effective Marginal Tax Rates, Sweden, 1980, Fixed-*p* Case**
(%)

	Inflation Rate		
	Zero	10%	Actual (9.4%)
Asset			
Machinery	−18.1	1.5	0.2
Buildings	28.9	37.3	36.6
Inventories	26.5	71.0	68.8
Industry			
Manufacturing	8.1	28.3	27.1
Other industry	29.6	62.6	60.5
Commerce	12.1	40.7	39.2
Source of finance			
Debt	−12.9	6.4	5.0
New share issues	44.2	93.2	90.4
Retained earnings	40.9	69.5	68.2
Owner			
Households	57.1	108.0	105.1
Tax-exempt institutions	−39.2	−52.8	−51.8
Insurance companies	−16.0	22.0	18.9
Overall	12.9	37.0	35.6

marginal tax rates corresponding to table 4.20 would equal an average of marginal income tax rates. In 1980 the average marginal income tax rate of households (taken over debt and equity) was 57.3 percent, and apart from investment in inventories when inflation is high, the present tax system is more favorable than an income tax.

The differences in effective tax rates among the industry groups are explained mainly by differences in the composition of their capital stock. Inventories constitute twice as large a share of the total net capital stock in other industry and commerce as in manufacturing, and inventory investment is the most heavily taxed type of real investment. The average allowed rate of inventory write-down is only 19.3 percent for other industry compared with 60 percent for manufacturing and commerce, as seen in section 4.2.3, and this contributes to the dispersion of tax rates.

The effective marginal tax rate differs markedly among the different sources of finance. The relatively lower tax rates on debt finance are explained by the combined effect of allowing companies to deduct the nominal cost of debt and the fact that the average marginal income tax rate on interest income is lower than that on dividends and capital gains. New share issues constitute the most heavily taxed form of equity finance, despite the special scheme to mitigate the "double taxation" of dividends (see section 4.2.2).

There are dramatic differences in effective tax rates among the three categories of owners. Investment financed by savings channeled through tax-exempt institutions receives a substantial subsidy. The effective tax rate of minus 51.8 percent means that for a 10 percent rate of return on real investments undertaken by corporations, tax-exempt institutions earn a posttax real rate of return of 15.2 percent on their savings. This seemingly paradoxical result is explained by the interaction between personal and corporate taxation and the fact that the corporate tax system provides a subsidy to real investment.

The taxation of the return to savings channeled directly to companies by households represents the case opposite to that of tax-exempt institutions. At the inflation rate actually experienced in 1971–80, the wedge between the pretax and posttax rates of return corresponds to more than 100 percent of the pretax rate of return.

The last row of table 4.20 shows the overall average marginal tax rates, where the average is taken over source of finance, category of owner, industry, and type of asset. At the actual rate of inflation in 1971–80, this overall tax rate of 35.6 percent is considerably below the average marginal income tax rate of households of 57.3 percent.

On *average*, therefore, the present tax system is more favorable than a comprehensive income tax, and at low rates of inflation it is closer to an expenditure tax than to an income tax. An important difference between the present system and either an expenditure tax or a comprehensive

income tax is, of course, the wide dispersion of effective tax rates around the mean and their sensitivity to inflation. Both of these issues are investigated further in chapter 7.

A comparison of the different columns of table 4.20 reveals the effects of inflation on effective tax rates. The Swedish tax system is not indexed, and it is often assumed that this causes the effective tax burden to rise as the rate of inflation increases. This belief is, for Sweden, confirmed by our study. An increase in the inflation rate from zero to 10 percent almost triples the overall effective tax rate. Several factors combine to explain this remarkable result. The real value of historical cost depreciation is undermined by inflation, and FIFO accounting rules make corporations pay tax on purely nominal capital gains on inventory holdings. Inflation reduces also the real value of the special Swedish scheme to mitigate the "double taxation" of dividends (the Annell deduction). Inflation increases the nominal market interest rate, and the resulting increase in nominal interest receipts is included with the income tax base of households and insurance companies. Insurance companies are further affected by inflation because inflation reduces the real value of nominally fixed deductions for reserves (see section 4.2.10). These tax-increasing effects of inflation are partly offset by the fact that nominal interest costs are fully deductible against the taxable income of corporations. This last provision actually outweighs the taxation of nominal interest receipts to investors, since the (effective) corporate tax rate, τ, exceeds the personal rate, m, averaged over investors. The difference between the two rates is reduced by inflation, however, and the reason for this is that the effective corporate tax rate is reduced by inflation (see section 4.2.5).

Tax-exempt institutions provide a striking exception to the rule that inflation raises tax rates. In the "fixed-p" case, we calculate the maximum nominal rate of return the company can afford to pay on the financial claims of investors. Under the Swedish corporate tax system, a ceteris paribus increase in inflation leads to an increase in the real market yield that can be paid to investors. For tax-exempt institutions this raises the real rate of return on savings. For households and insurance companies, however, the increase in real market yields is not enough to compensate for the income taxation of the nominal returns to debt and equity.

It is interesting that inflation increases the dispersion of effective tax rates dramatically. The tax differential between machinery and inventories increases from 45 percentage points at zero inflation to 70 percentage points at 10 percent inflation. Similarly, the tax differential between households and tax-exempt institutions increases from 96 percentage points at zero inflation to 161 percentage points at a 10 percent rate of inflation.

The results for the "fixed-r" case are shown in table 4.21. By assuming that the yield to investors before personal tax is the same for all invest-

Table 4.21 **Effective Marginal Tax Rates, Sweden, 1980, Fixed-*r* Case**
(%)

	Inflation Rate		
	Zero	10%	Actual (9.4%)
Asset			
Machinery	−113.9	2.8	−0.7
Buildings	33.6	49.2	48.5
Inventories	37.8	73.4	72.5
Industry			
Manufacturing	12.5	46.2	45.1
Other industry	32.6	78.7	77.0
Commerce	12.7	54.9	53.7
Source of finance			
Debt	−25.5	13.4	11.5
New share issues	40.8	94.1	92.9
Retained earnings	50.3	91.2	89.6
Owner			
Households	74.0	143.6	141.0
Tax-exempt institutions	−58.2	−69.6	−68.8
Insurance companies	−28.5	30.9	26.9
Overall	16.7	54.9	53.6

ment projects, the tax rates obtained are in general higher than those in the "fixed-*p*" case. The reasons for this difference were explained in chapter 2. Note, however, that the variation in effective tax rates according to asset, industry, source of finance, and category of owner is just as true for the "fixed-*r*" case as for the "fixed-*p*" case.

4.4.2 Recent Changes in Tax Legislation

Several changes in the taxation of investment income have been introduced or proposed during the last few years. These include the so-called tax savings scheme, the dividend tax credit introduced in 1981, and the proposed "1985 system" of personal income taxation. The details of these changes were presented in sections 4.2.1 and 4.2.8 above.

We consider first the "new rules of 1981," defined to include the tax savings scheme and the dividend tax credit. They imply that (*a*) the average marginal tax rate on the interest income of households is reduced from 49.2 to 44.0 percent; (*b*) θ, the opportunity cost of retained earnings in terms of dividends forgone, for households is raised from unity to 1.403 but remains at unity for institutional investors; (*c*) there is a minor reduction in the statutory capital gains tax on households from 26 to 22 percent (arising from the tax savings scheme). Table 4.22 shows the

effects of these new rules for the "fixed-p" case. Their main effect is to bring about a considerable reduction in the marginal effective tax rate on savings channeled through new share issues. Depending on the rate of inflation, the effective tax rate on new share issues is reduced by between 10 and 17 percentage points, making new share issues less heavily taxed than retained earnings at zero inflation. New issues remain, however, the most heavily taxed source of equity capital at higher rates of inflation because the effect of the scheme to mitigate the double taxation of dividends, the Annell deduction, is undermined by inflation (see section 4.2.2).

The 1981 "new rules" apply only to households, but the reduction in the average effective marginal tax rate on households is small. Depending on the rate of inflation, the reduction ranges from 3.5 to 6 percentage points. The explanation for this limited effect on household taxation is, of course, the relative unimportance of new share issues as a means of channeling household savings into real investment.

A major reform of personal income taxation was decided upon by the Swedish Parliament in June 1982 and is due to come into full effect in 1985. It implies a reduction in the average marginal income tax rate of household equity investors from 64.0 percent in 1980 to 57.2 percent. The statutory marginal tax rate on capital gains, which equals 40 percent of

Table 4.22 **Effective Marginal Tax Rates, Sweden, 1981 Rules, Fixed-p Case**
(%)

	Inflation Rate		
	Zero	10%	Actual (9.4%)
Asset			
Machinery	−19.9	−1.1	−2.3
Buildings	27.3	34.1	33.5
Inventories	24.5	67.8	65.7
Industry			
Manufacturing	7.1	26.9	25.7
Other industry	25.7	55.2	53.4
Commerce	9.8	36.9	35.4
Source of finance			
Debt	−16.7	0.8	−0.5
New share issues	34.6	75.8	73.5
Retained earnings	41.0	70.2	68.8
Owner			
Households	53.6	102.0	99.2
Tax-exempt institutions	−39.2	−52.8	−51.8
Insurance companies	−16.0	22.0	18.9
Overall	11.1	34.1	34.7

the marginal income tax rate, is therefore reduced from 26 to 23 percent. The average marginal income tax rate of household investors' debt is cut from 49.2 percent in 1980 to 43.3 percent, taking into account that 98.6 percent (see section 4.2.8) of household income on debt instruments is in taxable form. The combination of the cut in the marginal income tax rate of equity investors and the dividend tax credit system implies that the tax discrimination variable θ takes the value of 1.23 for household investors. (The tax savings scheme is not considered part of the "1985 system.")

As shown in table 4.23, the 1985 rules reduce the overall average effective tax rate at 10 percent inflation by no more than three percentage points compared with the 1981 rules. Only household investors are affected, however. Depending on the rate of inflation, their tax reduction ranges from four to eight percentage points.

The third and final alternative considered in this section represents a change in tax legislation of a different kind. We shall examine the effects of abolishing the corporation income tax (and associated grants and allowances). This represents an interesting case not only because the abolition of the separate tax on corporate profits has been suggested in Sweden as an alternative to tax reform, but also because it brings out clearly the importance of the corporation tax for the results presented above. Furthermore, in practice many Swedish corporations do not pay

Table 4.23 **Effective Marginal Tax Rates, Sweden, 1985 Rules, Fixed-*p* Case**
(%)

	Inflation Rate		
	Zero	10%	Actual (9.4%)
Asset			
Machinery	−21.7	−4.4	−5.6
Buildings	26.2	31.5	30.9
Inventories	23.4	65.7	63.7
Industry			
Manufacturing	5.7	23.9	22.9
Other industry	24.6	53.1	51.3
Commerce	8.7	34.6	33.2
Source of finance			
Debt	−16.7	−0.3	−1.5
New share issues	33.0	73.0	70.7
Retained earnings	39.1	65.7	64.5
Owner			
Households	49.6	93.9	91.4
Tax-exempt institutions	−39.2	−52.8	−51.8
Insurance companies	−16.0	22.0	18.9
Overall	9.8	31.4	30.1

any corporation income tax as a result of the combination of low pretax earnings and the existing extensive possibilities to reduce taxable profits. Another important group of companies with low pretax earnings pay corporation tax just sufficient to meet the requirement in Swedish law that dividends be paid out of current or accumulated book profits (which in turn are approximately equal to tax-accounting profits). For these companies, an additional investment project may not affect total tax payments, provided tax allowances on existing assets have not been fully used. (For further discussion of this point, see section 4.4.4.) The effective marginal tax rates in the fixed-p case for $\tau = 0$ and $g = 0$ appear in table 4.24.

Comparing tables 4.24 and 4.20 makes it clear that eliminating the corporate income tax would bring about a considerable increase in the overall effective tax rate. The explanation for this increase is that the range of tax concessions to investment is sufficiently great that taken together they more than offset the effects of the tax. The required rate of return on a project is a decreasing function of the corporate tax rate. Readers looking for a full discussion of this point are referred to the second part of Appendix C. In the case of debt finance, the effective tax rate falls as the corporate tax rate rises if the tax allows full interest deductibility and depreciation allowances beyond the value of true eco-

Table 4.24 **Effective Marginal Tax Rates, Sweden, with the Corporation Tax Abolished, Fixed-p Case**
(%)

	Inflation Rate		
	Zero	10%	Actual (9.4%)
Asset			
Machinery	25.4	45.7	44.0
Buildings	27.6	50.3	48.8
Inventories	29.4	54.1	52.6
Industry			
Manufacturing	23.7	42.1	40.9
Other industry	39.6	75.3	73.1
Commerce	28.1	51.7	50.2
Source of finance			
Debt	25.3	50.4	48.8
New share issues	49.9	92.3	89.7
Retained earnings	29.1	47.9	46.7
Owner			
Households	62.8	112.3	109.3
Tax-exempt institutions	−11.9	−26.0	−25.2
Insurance companies	−7.0	23.6	20.7
Overall	27.5	50.1	48.7

nomic depreciation. When interest payments are not deductible, the tax rate falls only when allowances and grants for investment are worth more than 100 percent first-year allowances (immediate expensing). The same argument applies to equity finance, with the condition about deductibility of interest payments replaced by a condition about the deductibility of dividends (imputation credit). With immediate expensing and no imputation credit for dividends, the corporate tax reduces the net cost of investment by the same proportion as it reduces the present value of the earnings from the investment. Hence, when the tax system allows deductions that have a value greater than that implied by immediate expensing, companies pay a negative tax on equity-financed marginal investments.

As shown in tables 4.24 and 4.20, abolishing the corporation tax would result in a sharp rise in the effective tax rate on debt-financed investments. With the exception of the rate on new issue finance at zero inflation, abolishing the corporate income tax would reduce the effective tax rate on the return to equity-financed investment. This indicates that the combined effect of the available deductions and grants on average is less favorable than free depreciation. Inspection of the results for the eighty-one individual combinations in Appendix B makes it clear, however, that the depreciation allowances for machinery in combination with the 11.4 percent investment grant are more favorable to firms than free depreciation. The corporation tax therefore provides a subsidy to marginal investments in machinery irrespective of the source of finance, although it is a positive tax as far as other assets are concerned.

4.4.3 Comparison with 1960 and 1970

Promotion of industrial growth by means of generous investment incentives at the corporate level has been a paramount policy objective of Swedish governments for more than two decades. During this period there has been a rapid growth of total taxes, from 27 percent of GDP in 1960 to 41 percent in 1970, and to 50 percent in 1979 (see table 4.1 above). It is particularly interesting to examine the changes over time in the incentives to save and invest, as measured by the effective marginal tax rates on capital income, in the light of this growing tax burden.

Brief accounts of the derivation of the parameter values for 1960 and 1970 were given in section 4.2. In 1960 Sweden had a classical system of corporate taxation, whereas in 1970 some mitigation of double taxation had been introduced through the Annell legislation. By 1980 the Annell deduction had increased further. The rules of inventory valuation and of fiscal depreciation of machinery have not been changed since the mid-1950s, whereas for buildings an extra 2 percent allowance was introduced in 1970. In 1960 investment in machines and buildings was taxed under the sales tax at a rate equivalent to an investment grant of *minus* 2 percent. No investment grants were available in 1970, whereas in 1980

investment in machinery and buildings qualified for allowances equivalent to investment grants of 11.4 percent and 5.7 percent, respectively. The rules of the investment funds system (IF) were altered during the late 1970s, and the system was also put to more active use. At the margin, as explained in section 4.2.5, the IF system effectively reduces the corporate tax rate below the statutory tax rate. As a result, the effective corporate tax rate (as defined in section 4.2.5 and assuming a 9.4 percent inflation rate) was 37 percent in 1960, 41 percent in 1970, and 35 percent in 1980, compared with the statutory corporate tax rates for the three years of 49, 53, and 57 percent. The statutory corporate tax rate increased over time as a result of gradual increases in local income tax rates.

The 1960s and 1970s brought considerable increases in household tax rates. The average marginal tax rates on household investors in debt and equity rose from 34 and 45 percent in 1960, respectively, to 48 and 58 percent in 1970, and to 50 and 64 percent in 1980. Taxation of capital gains on household shareholdings was introduced in the mid-1960s, and by 1970 and 1980 the average marginal statutory tax rates had risen to 15 and 26 percent, respectively.

As a result of increases in local income tax rates, the marginal tax rate on insurance companies (estimated at a 9.4 percent inflation rate) rose from 24 percent in 1960 to 27 percent in 1970 and to 31 percent in 1980 for investment in debt, whereas the marginal tax rate on dividends increased from 17 percent in 1960 to 20 percent in 1970 and 24 percent in 1980. Capital gains taxes were increased from 13 percent in 1960 to 15 percent in 1970 and 19 percent in 1980.

The results of our calculations of effective marginal tax rates on capital income in 1960 and 1970 are shown in tables 4.25 and 4.26. The combined effect of the rising marginal tax rates on investors and of the more generous investment incentives has been to leave the overall effective marginal tax rate, at a 9.4 percent inflation rate, practically the same in 1980 as in 1960. The zero inflation effective tax rate was almost halved between 1960 and 1980. A comparison between tables 4.25, 4.26, and 4.20 reveals, furthermore, that the effective tax rates rose between 1960 and 1970 and fell again between 1970 and 1980. This development is explained by the fact that most of the increases of personal taxes occurred between 1960 and 1970, whereas the reduction in corporation tax was concentrated in the period 1970–80.

There are some noteworthy differences in the changes in effective tax rates over time between the three categories of owners. For tax-exempt institutions, the effective cuts in the corporation tax have brought about a considerable reduction in the effective tax rate over time, whereas for households the greater investment incentives have been insufficient to counteract rising marginal tax rates. We note also that the tax discrimina-

Table 4.25 **Effective Marginal Tax Rates, Sweden, 1960, Fixed-*p* Case**
(%)

	Inflation Rate		
	Zero	10%	Actual (9.4%)
Asset			
Machinery	16.2	16.8	16.7
Buildings	31.3	28.1	28.3
Inventories	19.9	58.2	56.1
Industry			
Manufacturing	21.5	30.8	30.3
Other industry	29.5	45.8	44.9
Commerce	19.1	35.9	35.0
Source of finance			
Debt	2.1	1.3	1.3
New share issues	58.4	99.9	97.6
Retained earnings	44.4	69.6	68.3
Owner			
Households	50.2	82.3	80.4
Tax-exempt institutions	−10.0	−26.7	−25.6
Insurance companies	4.6	29.5	27.3
Overall	22.6	34.6	33.9

tion against new share issues was more pronounced in 1960 than in 1980, and the explanation for this is that in 1960 there was no mitigation of double taxation. The variation in effective tax rate by asset was less striking in 1960 and 1970 than in 1980. The main reason for this difference is that the investment grants available in 1980, but not available in 1960 and 1970, favored investment in machinery over investment in buildings.

A final observation concerns the sensitivity to inflation of the effective tax rates. Inflation causes the overall effective tax rate to rise for both 1960 and 1970, but the tax-increasing effects of inflation are less dramatic than in 1980. While historical cost depreciation and FIFO accounting rules provide explanations common to all three years for the increase in effective tax rates with inflation, the differences in the sensitivity to inflation are mainly explained by the fact that the purely nominal increases in market yields to investors were taxed at lower rates in 1960 and 1970 than in 1980. It should be noted, finally, that for 1960 the effective tax rate on the return to debt-financed investment falls as the rate of inflation increases, whereas the opposite is true for both 1970 and 1980. In 1960 the tax-reducing effect of deducting interest costs at the (effective) corporate tax rate of 37 percent outweighs the tax-increasing effect of taxing nominal interest receipts to all three categories of owners.

Table 4.26 Effective Marginal Tax Rates, Sweden, 1970, Fixed-*p* Case (%)

	Inflation Rate		
	Zero	10%	Actual (9.4%)
Asset			
Machinery	15.2	20.3	19.9
Buildings	33.1	34.5	34.4
Inventories	24.1	72.5	69.9
Industry			
Manufacturing	21.7	35.6	34.8
Other industry	36.1	63.2	61.6
Commerce	21.2	45.9	44.5
Source of finance			
Debt	2.0	8.4	7.9
New share issues	55.6	103.7	100.9
Retained earnings	48.4	79.1	77.5
Owner			
Households	60.6	106.4	103.7
Tax-exempt institutions	−18.3	−37.6	−36.3
Insurance companies	−0.3	27.6	25.1
Overall	24.3	42.7	41.6

4.4.4 Comparison with Average Tax Rates

It is of interest to compare the calculations of marginal effective tax rates presented above with estimates of the average tax rates implied by actual tax payments. The calculations presented in this section all refer to the national accounts sector of nonfinancial enterprises. In addition to our three industry groups (manufacturing, other industry, and commerce) the national accounts data also cover mining and quarrying, agriculture, forestry and fishing, real estate, and business services. Public business agencies (for example, the State Railway Company) as well as other nonprivate and unincorporated enterprises are included. The choice of the nonfinancial enterprises sector for our calculations has been dictated by the lack of suitable alternative data.

The 1970s represented a period of dramatic change for the Swedish economy. After the 1971–72 recession and the oil crisis of 1973, Swedish firms—in particular manufacturing firms—experienced a boom in profits of an intensity not witnessed since the Korean War. The subsequent downturn, beginning in 1976, was equally dramatic, with the severest profits crisis for manufacturing industry since the 1930s. Business conditions improved again in 1979 and 1980, though profits remained low compared with their previous long-term average. This is clearly reflected

in table 4.27, which shows corporate profits and their appropriation among corporate taxes, interest payments, dividend payments, and retained earnings. As a result of low profits, retained earnings net of economic depreciation were negative in 1978–80. A significant feature of the government's response to the difficulties facing business was large subsidies to industry (Carlsson, Bergholm, and Lindberg 1981). This policy, which included both rescue operations on a massive scale and ad hoc investment subsidies, is reflected in the second row of table 4.27. Corporate taxes of minus 2,078 million SEK are here defined as the sum of corporate tax payments of 4,170 million and ad hoc subsidies of no less than 6,248 million SEK. It should also be noted that, despite the downturn in profits, payments of corporation tax and payments of dividends from the nonfinancial sector continued to increase in 1978–80 compared with earlier years.

The average effective tax rate for the nonfinancial sector is defined here as the ratio of total taxes on capital income originating in the sector to real operating profits (net of economic depreciation). Its calculation is summarized in table 4.28. Data on actual tax payments are available only for the corporation tax. The actual amounts of income tax paid by the owners of debt and equity on interest receipts and dividends cannot be observed. Investment income is included with earned income for assessment of tax, and it is not possible to determine whether investment income comes "first" or "last." We have estimated tax payments on interest receipts and dividends by simply multiplying the interest and dividend payments of the sector by the weighted average marginal tax rates on interest income and dividends, respectively, using the ownership proportions presented in sections 4.3.4 and 4.3.5 as weights. The 1980 average marginal tax rates were 25.3 percent on interest income and 40.9 percent on dividend income.

Table 4.27 **Corporate Profits and Their Appropriation, Sweden 1978–80**
(billions of current Swedish crowns)

	1978–80 Average
Real operating profits	14.224
Corporate taxes (including subsidies)	−2.078
Interest payments[a]	19.932
Dividend payments	3.833
Real retained earnings	−7.463

Source: Own calculations based on National Accounts, 1980.

[a]Nonfinancial firms pay dividends and interest on debt both to other firms within the same sector and to recipients outside the sector. Firms likewise receive dividends and interest earnings from both within and outside the sector. By interest payments we mean the sum of all interest costs less the sum of all interest receipts. Dividend payments are defined analogously.

Table 4.28 **Average Tax Rate on Real Corporate Profits**
(billions of current Swedish crowns)

	1978–80 Average	Percentage of Profits
Total taxes		
Including subsidies	4.184	29.42
Excluding subsidies	10.432	73.34
Corporate taxes	−2.078	−14.61
Corporate tax payments	4.170	29.32
Ad hoc subsidies	−6.248	−43.93
Taxes on		
Interest payments	5.043	35.45
Dividend payments	1.568	11.02
Real retained earnings	−0.719	−5.05
Personal wealth	0.370	2.60
Real operating profits	14.224	
Average tax rate (%)		
Including subsidies	29.4	
Excluding subsidies	73.3	
Average profit rate (%)		
Gross of tax	2.0	

Source: Own calculations as described in the text.

Retained earnings are taxed as capital gains to the extent that profit retention causes the market value of equity to rise. We assume here that the tax rate on retained earnings can be approximated by the effective rate of tax paid by the owners of equity on accrued capital gains.

As explained in section 4.2, the effective capital gains tax rate of insurance companies is 19 percent, and for simplicity we have taken the effective accruals tax (EAT) rate of households to be one-half the statutory tax rate of 26 percent. This gives a weighted average tax rate on the retained earnings of the nonfinancial sector of 9.6 percent.

The Swedish wealth tax is assessed on the net wealth (assets less liabilities) of households, and there is no obvious way to allocate wealth tax payments among various assets. It is possible, however, to obtain rough estimates of the amounts of wealth taxes paid on account of the holdings of equity and debt of nonfinancial enterprises. In his recent study of household wealth, Spånt (1979) gives a detailed account of the distributions of financial and real assets of various kinds, as well as household debt, over different size classes of net (taxable) wealth. This information makes it possible to estimate the wealth tax payments of each class, using the tax schedule presented in section 4.2.7. We then simply assume that the wealth tax payments can be allocated proportionately

among the various assets of each class. If, for example, shares make up 30 percent of total assets of a specific class of net wealth, 30 percent of the wealth tax payments of this class are allocated to the shares. This approach is obviously equivalent to assuming that within a specific class of net wealth assets of all kinds are financed by debt in the same proportion.

Using this approach, we estimate that approximately 25 percent of total wealth tax payments may be attributed to equity holdings and 13 percent to the ownership of bank deposits. Since only some 35 percent of bank lending goes to the nonfinancial sector, we attribute only 5 percent of total wealth tax payments to household ownership of debt. Hence, in total, 30 percent of wealth tax payments are attributed to the nonfinancial corporate sector, and the resulting 370 million SEK figure is shown in table 4.28.

Our estimates of the average effective tax burden on capital income from the nonfinancial sector appear in table 4.28. When the ad hoc subsidies extended to the business sector during the crisis are treated as negative taxes, the average tax rate turns out to be 29.4 percent. This is six percentage points lower than the overall average marginal tax rate for 1980, at the actual average rate of inflation. If, on the other hand, the 6.2 billion SEK of subsidies are excluded, the average tax rate rises to 73.3 percent. Considering the very low level of business profits in 1978–80, it is of interest to compare these numbers with corresponding figures for earlier years. For 1973—the year preceding the profits boom of 1974–75—we estimate the average effective tax rate to be 35.4 percent including subsidies and 42.2 percent when ad hoc subsidies are excluded.

For the comparison with the results of section 4.4.1, however, there are several observations to be made. As already pointed out, the tax rate in table 4.28 reflects actual tax payments and profits associated with both old and new assets held by firms, whereas the effective tax rates of section 4.4.1 refer to a set of hypothetical "marginal" investments. With a corporate tax system that allows firms extensive possibilities to defer tax payments through various schemes of accelerated depreciation, actual tax payments and the share of profits paid as corporate income tax become endogenous. They depend on the rate of growth of real investment and on the firms' (average) rate of return (see Södersten 1975, 1978).

The theoretical calculations of effective tax rates in this study are all based on the crucial assumption that corporations take full advantage of depreciation allowances and rules of inventory undervaluation. This implies either that the "representative" firm has sufficiently large profits, or that the tax laws provide for full loss offset on "tax accounting" losses. Empirical studies on a large number of Swedish firms indicate, however, that most firms have not been able to fully use the existing extensive

possibilities to reduce or defer corporate tax payments. There is, in fact, a strong correlation between the use of accelerated depreciation, and so forth, and the (before-tax) rate of return of individual firms. As a result, high-profit firms have a lower effective annual tax burden than low-profit firms.

A possible explanation for this result is the combined effect of the requirement of Swedish law that dividends be paid out of current or accumulated book profits and of the close connection between book and tax accounting profits. Within the limits set by tax legislation, Swedish firms may themselves decide the size of the profits reported on the books, through a more or less intensive use of accelerated depreciation, variations in the valuation of inventories, and allocations to investment funds. If a policy of stable dividends is to be maintained, a firm with low profitability may not be able to make full use of these possibilities of tax deferral. This means the effective (annual) tax burden will be high in comparison with a more profitable firm that is able to use all its tax allowances.